Elevation Certificates
NORFMA Floodplain Conference
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Agenda
- Introductions & Housekeeping
- Overview
- Basics of FEMA Form 81-31
- Building Diagrams
- Exercise
- Common Errors
- Using ECs in Floodplain Development Review
- Questions
- Test

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The Current Form
- The current EC became effective in 2012
- “Phase in” period ended in July 2013
- On the web: http://www.fema.gov/library/viewRecord.do?id=1383

Adobe Fillable Form

Elevation Certificates
FEMA Form 81-31
Purpose of the Elevation Certificate

- Required to rate insurance for Post-FIRM (and some Pre-FIRM) buildings
- Determines compliance with building codes/local ordinance
- Supports LOMA/LOMR-F
- Prerequisite for CRS

Who uses the EC?

- LOMA/LOMR
- Building Department
- Planning Department
- Elevation Certificate
- FEMA/State CAV
- Developer/Builder
- Insurance Agent

Does the community have to require an Elevation Certificate?

- The primary purpose of the EC is to rate a flood insurance policy.
- CRS communities must collect and retain ECs for all Post-FIRM structures inside the SFHA.
- Building/Planning officials are required to obtain certified elevations of certain floodplain development in 44 CFR 60.3 (b) (5) (i)—the EC is the logical method (check your local ordinance).

Does the EC certify a building as “compliant”?

The Elevation Certificate is a report of existing conditions. The surveyor/engineer’s stamp does not certify that the structure complies with federal, state, or local regulations. It only certifies the elevations in Section C.

THE COMMUNITY must review the certificate for completeness and accuracy, and determine if the structure is compliant!

Completing the EC

Key Terms

- FIRM = Flood Insurance Rate Map
- FIS = Flood Insurance Study
- BFE = Base Flood Elevation
- SFHA = Special Flood Hazard Area (1% ACF)
- LAG = Lowest adjacent grade
- HAG = Highest adjacent grade
- Lowest Floor
- Bottom Floor
Section A – Property Information

- Property description
- Latitude/Longitude
- Horizontal datum (NAD)
- Building diagram number
- Photographs, two required for flood insurance rating
- Measurements of crawl spaces, enclosures, attached garages, and flood openings

Can be completed by the community or homeowner
Verify property description/use and building diagram
Review number of flood openings for compliance

A7 – Building Diagram

- Proper building diagram selection is essential for determining the elevations that must be measured to properly complete the EC
- Take photographs that capture the characteristics that support the building diagram

Flood Openings

- A flood opening is a permanent opening that allows for the free passage of water automatically in both directions without human intervention.
- Under the NFIP, a minimum of two openings are required for every enclosed area or crawlspace.
- The openings shall provide a total net area of not less than one square inch for every square foot area enclosed, excluding any bars, louvers, or other covers of the opening.

Engineered Flood Openings

- Individual Engineered Flood Openings Certification or an Evaluation Report issued by the International Code Council Evaluation Service (ICC ES) must be submitted to document that the design of the openings will allow for automatic equalization of hydrostatic flood forces on exterior walls.
More About Flood Openings

- A window, a door, or a garage door is not considered an opening; but openings may be installed in doors.
- Subtract area of grates, louvers, or grills.

More About Flood Openings

- The bottom of the openings must be no higher than one foot above the higher of the exterior or interior grade or floor immediately below the opening.
- For more guidance on openings, see NFIP Technical Bulletin 1 – ‘Openings in Foundation Walls and Walls of Enclosures.’

Attached Garages

- Common wall
- Single structure
- One insurance policy
- Separate foundations
- Can be considered a separate structure
- Can be insured separately
- Covered breezeway connects the garage to the house
- Could also have a separate EC

Section B – FIRM Information

- Can be completed by the community or homeowner
- Verify ALL FIELDS, especially Community Number, Map/Panel numbers/dates and BFE
- Check elevation datum used (NGVD29/NAVD88)
Section B – FIRM Information

- Base Flood Elevation (BFE) to the tenth (0.1) of a foot.
  - Zone AE or A1-99—Use Flood Insurance Study
  - Zone AO—Use depth number on the FIRM/FIS
  - Zone A—if no BFE available, enter “N/A” and complete Section E, unless applying for a LOMA or LOMR-F
  - Zone VE—Use the FIRM and FIS

Common Errors in Section B

- Wrong Community Number
- Very common after new maps or annexations
- Wrong Index date
- Wrong Panel date
- Item B-10: Where did the BFE come from, especially in unnumbered “A” zones
- Estimating BFE’s between the wavy lines on the FIRM

Section C – Building Elevations

- MUST be completed by a surveyor or engineer
- “Finished construction” means all machinery and equipment are installed and final grading is completed
- NO Blanks – use “N/A” if there is nothing to measure

Section C – Benchmarks

- Each benchmark in a network has a unique identifier
- The National Geodetic Survey uses the Permanent Identifier (PID) to uniquely identify each benchmark.
- Most other networks will assign a similar identifier
Section C - Building Elevation Data

- It may be necessary to enter the building to ensure that all required elevations are obtained
- Use the same datum as was used in B9

C2 a – Top of Bottom Floor

- "Top of bottom floor" elevation depends on construction and diagram number indicated in Section A.
  - Slab foundation
  - Basement floor
  - Elevated floor
  - Enclosure floor
  - Crawlspace floor

Top of Bottom Floor

Bottom Floor vs. Lowest Floor

Bottom Floor
- Objective
- Measured by the surveyor
- The floor with the lowest elevation
- Assumed to be level
- If sloped, use lowest point of the floor
- C2.a on the EC

Lowest Floor
- Interpreted by the community floodplain administrator
- Based on multiple factors
- Used for rating insurance
- Determines whether structure is compliant with local floodplain ordinance

C2 d – Attached Garage

- An attached garage means the garage is beside the building, not underneath or separate
- Record the elevation for attached garages only, otherwise enter "N/A"
Attached Garages

- Common wall
- Single structure
- One insurance policy

Separate foundations
Can be considered a separate structure
Can be insured separately

Could also have a separate EC

C2 e – Machinery and Equipment

- Machinery and equipment servicing the building includes those located in an attached garage, enclosure, or on an open utility platform.

Machinery & Equipment

- Yes, ductwork counts.

Machinery & Equipment

C2f & C2g – Lowest & Highest Adjacent Grade

- Measure the grade immediately adjacent to the building.
C2h – Lowest Grade Elevation at Deck Support or Stairs

- Enter value only if stairs or deck are attached to the structure; if freestanding or it doesn’t exist, enter “N/A”
- C2h required (if applicable) if EC will support a LOMA or LOMR-F

Common Errors in Section C

- Surveying for Finished Construction too early
- Information certified in C2(a-g) does not support Building Diagram used
- Datum not converted to that of B9 (BFE)
- No entry for C2e (machinery and equipment)
- Leaving field blank or entering “0” instead of using “N/A” when there is nothing to measure

Section D - Surveyor Certification

The certification box must include the certifier’s seal if Section C was completed by a surveyor or engineer

Who can certify elevations?

- Surveyor ✓ OK in all states
- Engineer - Check with your State NFIP Coordinator
- Architect - Not allowed in many states

Section D - Comments

- Location of mechanical
- Engineered flood openings
- Benchmarks
- Building characteristics
- Anything that needs explanation

Section E - Survey not required

- Used in AO Zones and Approximate A Zones where there is no established BFE
- Certified by homeowner or community official
- Elevations should be relative to highest or lowest NATURAL GRADE whenever available; indicate that elevations E1 – E4 are based on natural grade in “Comments” area of Section F
Notes on Section E

- In Zones without a BFE, Section E is all that is required to obtain flood insurance
- Section E may be completed by a property owner or owner’s representative
- May also be completed by a surveyor or community floodplain manager
- To support a LOMA or LOMR-F
  - Section C must also be completed and elevations certified by a licensed surveyor, architect, or engineer

More Notes on Section E

- For Floodplain Management compliance:
  - To determine compliance in Zone AO or A without BFE, elevations E1 – E4 must be based on NATURAL GRADE
  - If filling or grading will occur, stake levels of highest and lowest natural grade prior to construction
  - Then measure NATURAL GRADE from staked locations after final construction, during final survey

Building elevations must be based on final construction to document compliance

Section F

Property Owner Certification

- Certifies measurements in Section E taken by a property owner (or owner’s representative)
- The address entered in this section must be the mailing address of the property owner or property owner’s representative who provided the information on the certificate

Section G - Community Information

- The community official who completes Section C or E must complete this section
  - Must attach certified documentation with EC

Suggestions for Surveyors

- The EC is used to communicate important information to many different audiences for many different reasons; accuracy is key
- Read the Instructions, they are detailed and helpful
- Refer to FEMA 467-1, Floodplain Management Bulletin Elevation Certificate, May 2004 for further instruction
- Selecting the correct Building Diagram is very important
Suggestions for Surveyors

- The community floodplain administrator can help you determine the correct flood zone or use FEMA’s Map Service Center.
- When determining BFEs in AE zones, use the flood profiles in the FIS, not the FIRM panel alone.
- The floodplain administrator may call you to clarify information on the EC or to ask you to correct it if necessary.

Suggestions for Community Officials

- Do not cross out or make corrections on the EC!
- Use Section G – It’s there for a reason.
- Call the surveyor for clarification or corrections.
- Require a Finished Construction EC before issuing the Certificate of Occupancy.
- Require photographs of all sides of the building to document compliance and conditions at the time of approval (especially the vents and machinery).

Building Photographs

- Photographs are optional unless the Elevation Certificate is being used to obtain flood insurance.
- The certifier must provide at least two photographs showing the front and rear of the building taken within 90 days from the date of certification.
- Date must be included on photo.
- Photographs should capture key elements, such as flood openings, mechanical and building diagram.

Diagram 1A (Slab on grade)

Not allowed in any flood zone as new construction or substantial improvement because it is insufficiently elevated.

If $C2.a = C2.g$ and $C2.h$ or $E1.a$ and $E1.b = 0$ above LAG/HAG
You have a Diagram 1A building.

Diagram 1A (Without Garage)

C2.a – Top of bottom floor
C2.f – Lowest adjacent (finished) grade next to building (LAG)
C2.g – Highest adjacent (finished) grade next to building (HAG)

C2.a = lowest floor when a BFE is available; E1.a is lowest floor if no BFE
### Diagram 1A
Slab-on-grade, multiple-floors

- C2.a – Top of bottom floor
- C2.b – Top of next higher floor
- C2.f – Lowest adjacent (finished) grade next to building (LAG)
- C2.g – Highest adjacent (finished) grade next to building (HAG)

### Diagram 1A
Is this allowed in the SFHA?

NO

### Diagram 1B (Raised slab)

Distinguishing Feature – the bottom floor is at or above ground level (grade) on at least one side.*

- C2.a = lowest floor when a BFE is available; E1.a is lowest floor if no BFE

### Diagram 1B

- Thick slab or inside of foundation is filled
- C2.a = lowest floor when a BFE is available; E1.a is lowest floor if no BFE

### Diagram 2 - Basement

Is this allowed in the SFHA?

NO

Not allowed in any flood zone as new construction or substantial improvement

C2.a = lowest floor when a BFE is available; E1.a is lowest floor if no BFE

### Basement

Any area of the building having its floor below ground level on all sides.
Diagram 3 – Split level

All split level buildings that are detached, either attached or unattached (e.g., condominiums), with or without attached garage.

Diagram 3 (no flood openings)

• Not allowed in any SFHA unless bottom floor has sufficient flood vents (next slide)
• C2.a = lowest floor when a BFE is available; E1.a is lowest floor if no BFE

Diagram 3 – with flood openings

• Bottom floor may only be used for parking and storage
• C2.b = lowest floor when a BFE is available; E2 is lowest floor if no BFE

Diagram 4 (Split level, basement)

Is this allowed in the SFHA?

• Not allowed in any flood zone as new construction or substantial improvement

If C2.a is less than C2.f or C2.g or E1.a and E1.b is below HAG/LAG you have a basement.

C2.a = lowest floor when a BFE is available; E1.a is lowest floor if no BFE

Diagram 5 – Posts & Piers

All buildings elevated on piles, posts, piers, columns, or piles and columns, with or without attached garage.

Diagram 5

• In A Zones, C2.a is the lowest floor when a BFE is available; E1.a is lowest floor if no BFE
• In V Zones, C2.c is the lowest floor
Diagram 5 - Manufactured Dwellings

- Manufactured dwellings installed on piers would be considered Diagram 5
- Skirting, non-structural screening, or lattice can be ignored.
- C2.a = lowest floor when a BFE is available; E1.a is lowest floor if no BFE

Diagram 5 – Manufactured w/breakaway skirting

Not allowed in any flood zone as new construction or substantial improvement unless enclosure has sufficient flood openings.
**Diagram 6**

- Enclosure may only be used for parking and storage
- In SFHA, flood openings necessary in lower enclosure
- Lowest floor is the first floor without flood openings (C2.a or C2.b)

**Diagram 7 (Full-story foundation)**

- Walk-out enclosure may only be used for parking and storage
- C2.b = lowest floor when a BFE is available

**Diagram 7**

**Diagram 8 (Crawlspace)**

- Crawlspace height must not exceed 4 feet
- Attached garage must be used only for parking and storage
- C2.b = lowest floor

**Diagram 8**

**Diagram 9 (Below-grade crawlspace)**

- Is this an 8 or a 9?
Diagram 9

- Crawspace height must not exceed 4 feet high, 2 feet deep
- Attached garage must be used only for parking and storage
- C2b = lowest floor

More on Diagram 9

- Look carefully at building plans
- C2a must be no more than 2 feet below LAG on all sides
- C2b minus C2a must not exceed 5 feet
- If these conditions are not met, you have a Diagram 2 (basement)

Check the Diagram number!

Notes for the Surveyor

- You may need to enter the structure and/or look into the crawlspace to select the correct building diagram and take all required measurements
- The use of the building's bottom floor enclosure can change the Building Diagram
- Measure bottom of flood openings relative to interior or exterior grade, whichever is higher; explain in comments
- Remember, you are just there to report what you see.

Notes for the Community Official

- Ensure that the EC makes sense
- Verify that the correct building diagram has been selected
- Verify that all necessary data has been collected to determine building compliance
- Only use an EC based on finished construction to determine building compliance

Find the error...
Find the error...

...verify the Community and Map Information

Counting blocked flood openings

Counting flood openings that are too high

Missed Machinery—Go Inside!

Common Surveyor Errors

- Assuming that a structure built on fill or natural ground above BFE is “above the floodplain” and therefore in Zone X
- Using the wrong datum, not converting to the one used on FIRM
- Leaving fields blank
- NO COMMENTS!
Top Community Errors
- Not requiring a “Finished Construction” EC for final review
- Crossing out entries to make corrections
- Not using Section G to make comments, modifications (e.g. added flood vents), or to enter permit information
- Accepting Elevation Certificates without reviewing for accuracy or for compliance with local regulations.

Helpful Hints for Reviewers
- Make a “complete and correct” finished construction EC a condition for Certificate of Occupancy
- Never assume the EC was filled out correctly because it has the “professional's” seal on it
- Establish a review process that determines if the EC is complete and correct
- Fill out as much of the EC as you can at the time of permit application (Section A and B)

Using Elevation Certificates in the Development Review Process

8 Steps to Plan Review
- 1) Is it “Development”?
- 2) Is it in the Special Flood Hazard Area?
- 3) Permits
- 4) Substantial Improvement
- 5) Base Flood Elevation
  - Require an Elevation Certificate
- 6) Lowest Floor Elevation
- 7) Inspections
- 8) Record Keeping

Step 3: Permits
- Floodplain Development Permit (FDP) application
  - Fees as required by your ordinance
  - A location or plat map
  - Plans showing existing and proposed conditions
  - Pre-construction Elevation Certificate
- Additional state or federal permits
  - Wetlands, below ordinary high water line, in a scenic corridor, or adjacent to a fish-bearing stream, etc.

Step 5: BFE – Require EC
- Inform the applicant of the need for an Elevation Certificate and the need to hire a surveyor.
- Surveyor should include at least three visits:
  - Pre-construction
  - Mid-construction
  - Finished construction (As-Built)
Step 6: Lowest Floor Elevation

Lowest floor of the building must be built to, or above BFE

- Check your local ordinance for additional freeboard requirements

Flood protection methods:
- Elevate on piers, posts, columns or walls
- Elevate on fill
- Floodproofing (non-residential buildings only)

Verify the Building Diagram on the Elevation Certificate

Permit Approval/Denial

- If the development complies with floodplain regulations and is reasonably safe from flooding, approve it and issue the permit
  - Conditional approval
  - Flag for inspection as floodplain development
  - Enter the permit into a log of floodplain development permits and in Section G4 of the Elevation Certificate

- If the proposed development does not comply, deny the permit application with a written explanation of the denial

Step 7: Inspections

Site inspections ensure that the project is built according to the plans

- After the foundation is staked out, but before construction begins
- When the foundation is complete
  - (Under Construction EC Required)
  - After ALL mechanical and building utilities installed
    - After final grading completed
    - Verify flood-resistant materials below BFE
    - Count flood vents in lower enclosures
    - Verify completed Finished Construction Elevation Certificate

Issue the Certificate of Occupancy only after full compliance is demonstrated and the final Elevation Certificate is submitted.

Step 8: Record Keeping

Keep all pertinent records, for completed projects and denied permits, forever:

- Permit application/review checklist
- Engineering data (plans, specifications, hydraulic and hydrologic analyses, No-Rise Analyses)
- Correspondence relating to the project
- Variance or appeals proceedings
- Inspection documentation
- BFE data for subdivisions of at least 5 acres or 50 lots
- Finished Construction Elevation Certificates
- Certificate of occupancy
- Floodproofing Certificate (non-residential structures)

Ask the Help Desk

- The Region X Help Desk is available for all your questions about Elevation Certificates.

RegionXHelpDesk@starr-team.com

Contact Information

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