Elevation Certificates

Event: 2020 ISPLS Annual Conference
Date: February 26, 2020
Location: Nampa Idaho

Presenter: Scott Van Hoff
Agency: FEMA
Contact info: scott.vanhoff@fema.dhs.gov
Workshop Agenda

- Overview:
- National Flood Insurance Program
- Elevation Certificates
- Questions
National Flood Insurance Program Overview

- **DEFINITIONS:**
  - **NFIP** – National Flood Insurance Program
  - **SFHA** – Special Flood Hazard Area
  - **BFE** – Base Flood Elevation
  - **LAG** – Lowest Adjacent Grade: the elevation of the lowest finished grade touching the structure’s foundation. For A and AO zones use natural grade
  - **HAG** – Highest Adjacent Grade – the elevation of the highest natural ground touching the structure’s foundation
Definitions (Continued)

- **Bottom Floor** – the lowest floor of lowest enclosed area (including basement and crawl space)

- **Basement** – Any area of a building having its floor subgrade (below ground level) on all sides

- **Crawlspace** – A structure with a crawlspace must comply with Technical Bulletin 11-01 to be compliant
Definitions (Continued)

- **Fill**: Defined as material from any source placed to raise the ground to or above the BFE
  - Fill that is placed before the date of the first NFIP map showing the area in a SFHA is considered natural grade.
  - Check with the Community Status Book to determine when the community entered the NFIP.
Zone Designations

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Areas of 1% annual chance flood determined by approximate methods; base flood elevations not determined</td>
</tr>
<tr>
<td>AO</td>
<td>Areas of 1% annual chance shallow flooding where average depths are between 1 and 3 feet (usually sheet flow on sloping terrain); average whole-foot depths are shown</td>
</tr>
<tr>
<td>AH</td>
<td>Areas of 1% annual chance shallow flooding (usually ponding) where average depths are between 1 and 3 feet; whole-foot base flood elevations are shown</td>
</tr>
<tr>
<td>AE and A1-30</td>
<td>SFHAs inundated by 1% annual chance flood; base flood elevations are shown</td>
</tr>
</tbody>
</table>
## Zone Designations

<table>
<thead>
<tr>
<th>Zone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE and V1-30</td>
<td>SFHAs inundated by 1% annual chance flood; coastal floods with velocity hazards (wave action); base flood elevations are shown</td>
</tr>
<tr>
<td>V</td>
<td>SFHAs inundated by 1% annual chance flood; coastal floods with velocity hazards (wave action); no base flood elevations are determined</td>
</tr>
<tr>
<td>Shaded X and B</td>
<td>Areas of 0.2% annual chance flood; areas subject to 1% annual chance flood with average depths less than 1 foot or with contributing drainage area less than 1 square mile; and areas protected by accredited levees from base flood</td>
</tr>
</tbody>
</table>
## Zone Designations

<table>
<thead>
<tr>
<th>Zone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unshaded X and C</td>
<td>Areas determined to be outside the 0.2% annual chance floodplain</td>
</tr>
<tr>
<td>A99</td>
<td>SFHAs inundated by 1% annual chance flood to be protected from 1% annual chance flood by a Federal flood protection system under construction; no base flood elevations are determined. <strong>(These zones are currently found only in CA)</strong></td>
</tr>
<tr>
<td>D</td>
<td>Areas in which flood hazards are undetermined</td>
</tr>
</tbody>
</table>
Old paper Map  

New Digital map
FLOOD INSURANCE RATE MAP (FIRM)

Approximate BFE

Zone boundary

Cross sections

City of Bellingham 530199

Panel Contains:

<table>
<thead>
<tr>
<th>COMMUNITY</th>
<th>NUMBER</th>
<th>PANEL</th>
<th>SUFFIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>BELLINGHAM, CITY OF</td>
<td>530199</td>
<td>1214</td>
<td>E</td>
</tr>
</tbody>
</table>

VERSION NUMBER
2.3.2.1

MAP NUMBER
53073C1214E

MAP REVISED
JANUARY 18, 2019
Flood Insurance Study: FIS

- Developed in conjunction with the FIRM and FHBM
- Flood profiles
- Floodway data tables
- Summaries of elevations
- Narrative of the flood history
- Discusses the engineering methods used to develop the FIRMS
### Floodway Data Table

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FLOODWAY</th>
<th>1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>REGULATORY</td>
</tr>
<tr>
<td>CROSS SECTION</td>
<td>DISTANCE (FEET)</td>
<td>WIDTH (FEET)</td>
</tr>
<tr>
<td>A</td>
<td>190</td>
<td>226</td>
</tr>
<tr>
<td>B</td>
<td>490</td>
<td>47</td>
</tr>
<tr>
<td>C</td>
<td>1,140</td>
<td>47</td>
</tr>
<tr>
<td>D</td>
<td>1,550</td>
<td>73</td>
</tr>
<tr>
<td>E</td>
<td>1,790</td>
<td>49</td>
</tr>
<tr>
<td>F</td>
<td>1,820</td>
<td>24</td>
</tr>
<tr>
<td>G</td>
<td>2,140</td>
<td>58</td>
</tr>
<tr>
<td>H</td>
<td>3,255</td>
<td>86</td>
</tr>
<tr>
<td>I</td>
<td>4,060</td>
<td>46</td>
</tr>
<tr>
<td>J</td>
<td>4,575</td>
<td>44</td>
</tr>
<tr>
<td>K</td>
<td>4,618</td>
<td>41</td>
</tr>
<tr>
<td>L</td>
<td>4,959</td>
<td>83</td>
</tr>
<tr>
<td>M</td>
<td>6,210</td>
<td>46</td>
</tr>
<tr>
<td>N</td>
<td>6,500</td>
<td>75</td>
</tr>
<tr>
<td>O</td>
<td>7,209</td>
<td>59</td>
</tr>
<tr>
<td>P</td>
<td>7,523</td>
<td>66</td>
</tr>
<tr>
<td>Q</td>
<td>7,965</td>
<td>62</td>
</tr>
<tr>
<td>R</td>
<td>8,185</td>
<td>49</td>
</tr>
<tr>
<td>S</td>
<td>8,635</td>
<td>109</td>
</tr>
<tr>
<td>T</td>
<td>8,986</td>
<td>67</td>
</tr>
</tbody>
</table>

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[www.msc.fema.gov](http://www.msc.fema.gov)
Flood Profile

- Sutter Blvd Bridge
- Monterey Ave Bridge

Elevation (feet NGVD)

Stream distance in feet above confluence with Lake Hightower

10-Year Flood
50-Year Flood
100-Year Flood
500-Year Flood

Points:
A, B, C, D, E - stream bed locations
Finding a Base Flood Elevation

- From the upstream side of the building, Draw a line perpendicular to direction of flow.
- Measure along the centerline of the stream to cross section or road crossing.

823 ft
From c/s AA
BFE: 471.9

Cross section AA

823 ft

1.93 ft

528.
Finding BFE (example 2) - find building location

- From upstream side of building, draw a line perpendicular to the direction of flow

- Measure along stream channel to reference point identifiable on FIS profile chart (road crossing, cross section, etc.)
Finding BFE (example 2) - locate site on profile chart
Finding BFE (example 2) - determine BFE

- Locate your reference landmark on the profile and plot your field measured distance to building location.

- From the point of the building location, draw a line vertically to the 1% chance flood line.

- From that point draw a line to the left margin of the profile to read the Base Flood Elevation BFE.

- In this example, BFE = 58.1 ft.
Why not just interpolate between cross sections?

Interpolation assumes uniform grade (slope). Interpolation will not work here.
Still Water Elevation

Often associated with lakes and backwater areas

The elevation number on the FIRM is rounded off. To find the regulatory BFE, look at the summary of elevations table in the Flood insurance study (FIS)
• Summary of Still Water Elevations can be found within the FIS

<table>
<thead>
<tr>
<th>Flooding Source and Location</th>
<th>10 Percent Annual Chance</th>
<th>2 Percent Annual Chance</th>
<th>1 Percent Annual Chance</th>
<th>0.2 Percent Annual Chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newman Lake</td>
<td>2,129.9</td>
<td>--¹</td>
<td>2,130.9</td>
<td>--¹</td>
</tr>
<tr>
<td>Saltese Flats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Dike</td>
<td>2,082.3</td>
<td>2,047.5</td>
<td>2,048.9</td>
<td>2,052.2</td>
</tr>
<tr>
<td>Below Dike</td>
<td>2,040.3</td>
<td>2,041.6</td>
<td>2,042.0</td>
<td>2,042.6</td>
</tr>
<tr>
<td>Stormwater Runoff</td>
<td>--¹</td>
<td>--¹</td>
<td>2,005.0</td>
<td>--¹</td>
</tr>
</tbody>
</table>

¹ Data Not Available
Finding BFE in a Coastal VE or AE Zone

VE zones and coastal AE zones

regulatory BFE is printed on the map in whole numbers
Flood Zones Based on Wave Height

- **V** (Wave height ≥ 3 feet)
- **COASTAL A (MoWA)** (Wave height 3.0–1.5 feet)
- **A (MiWA)** (Wave height < 1.5 feet)
- **x** (Limit of base flooding and waves)

Key:
- BFE: Flood level including wave effects
- 100-year stillwater elevation
- Sea level
- Shoreline
Flood Zones Based on Wave Run-Up

- **Wave runup depth ≥ 3 feet**
  - 100-year stillwater elevation
  - 100-year wave runup elevation = BFE

- **Wave runup depth < 3 feet**
  - Inland extent of wave runup
  - 100-year wave crest elevation

Datum (e.g., NGVD, NAVD)
Elevation Certificates
FEMA Form 81-31
Current Elevation Certificate (EC)

- The current EC was released January 6, 2016
  - Expiration date of 11/30/2018
  - Replacement expected soon
  - Can be found at:
    - https://www.fema.gov/media-library/assets/documents/160
Purpose of the EC

- Required to rate insurance for Post-FIRM (and some Pre-FIRM) buildings
  - Can be developed for a Pre-FIRM
- Used to determine compliance with building codes/local ordinance
- Supports LOMA/LOMR-F
- Prerequisite for CRS program
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).
The EC does not 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!
### Section A – Property Information

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

<table>
<thead>
<tr>
<th>A1. Building Owner's Name</th>
<th>FOR INSURANCE COMPANY USE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Policy Number:</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>ZIP Code</th>
</tr>
</thead>
</table>

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

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

<table>
<thead>
<tr>
<th>A5. Latitude/Longitude:</th>
<th>Horizontal Datum:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lat.</td>
<td>Long.</td>
</tr>
</tbody>
</table>

| 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) Number 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) Number 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 A – Property Information

- Can be completed by the community or homeowner
- Verify property description/use and building diagram
- Review number of flood openings for compliance with local ordinance and TB-1
### Section A – Property Information

- **A4** – Is it residential, non-residential? Is it a detached garage?
- **A5** – Provide latitude and longitude coordinates for the center of the front of the building. Provide Coordinates to at least 5 decimal places or better
- **A6** – Attach at least 2 photographs of the building to be insured
### 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**
Diagram numbers

Diagram 1A
All slab-on-grade single- and multiple floor buildings (other than split-level) and high-rise buildings, either detached or row type (e.g., townhouses); with or without attached garage.

Distinguishing Feature – The bottom floor is at or above ground level (grade) on at least 1 side.*

Diagram 1B
All raised slab-on-grade or slab-on-cem wall with fill single- and multiple-floor buildings (other than split-level), either detached or row type (e.g., townhouses); with or without attached garage.

Distinguishing Feature – The bottom floor is at or above ground level (grade) on at least 1 side.*

Diagram 2A
All split-level buildings that are slab-on-grade, either detached or row type (e.g., townhouses); with or without attached garage.

Distinguishing Feature – The bottom floor (excluding garage) is at or above ground level (grade) on at least 1 side.*

Diagram 2B
All split-level buildings (other than slab-on-grade), either detached or row type (e.g., townhouses); with or without attached garage.

Distinguishing Feature – The bottom floor (basement or underground garage) is below ground level (grade) on all sides.*

Diagram 3A
All single- and multiple-floor buildings with basement (other than split-level) and high-rise buildings with basement, either detached or row type (e.g., townhouses); with or without attached garage.

Distinguishing Feature – The bottom floor (basement or underground garage) is below ground level (grade) on at least 1 side.*

Diagram 3B
All single- and multiple-floor buildings with basement (other than split-level) and high-rise buildings with basement, either detached or row type (e.g., townhouses); with or without attached garage.

Distinguishing Feature – The bottom floor (basement or underground garage) is below ground level (grade) on at least 1 side.*

Diagram 4A
All buildings elevated on piers, posts, piles, columns, or parallel shear walls. No obstructions below the elevated floor.

Distinguishing Feature – For all zones, the area below the elevated floor is open, with no obstruction to free of foot traffic (open to the air and not fenced in). Permeability test (to determine the pattern interaction) should be performed before and after construction.

Diagram 4B
All buildings elevated on piers, posts, piles, columns, or parallel shear walls with full or partial enclosure below the elevated floor.

Distinguishing Feature – For all zones, the area below the elevated floor is enclosed, either partially or fully. In Zones A, the partially or fully enclosed area below the elevated floor is either without coverings or covered with a 1.2m (4-ft) minimum of low-enclosure material. Make sure to maintain a 1.2m (4-ft) minimum of low-enclosure material.
Select the diagram that best describes the building you are working on.
Enclosures and flood vents

A8. For a building with a crawlspace or enclosure(s):
    a) Square footage of crawlspace or enclosure(s) ______________ sq ft
    b) Number 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) Number 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
Two types of flood Vents

Prescriptive (non-engineered): 1 square inch of net open area for each square foot of enclosed area (large openings must be below the BFE). A variety of options and devices can serve as non-engineered openings).

Engineered: specifically designed and certified by a registered design professional as meeting the required performance and design requirements outlined in TB 1. Designed to provide greater capacity that prescriptive vents. MUST HAVE CERTIFICATION DOCUMENTATION.
Flood Vent Requirements (Tech. Bul. 1)

• Each enclosed area must have a minimum of two openings

• The bottom of each opening must be no more than 1 foot above the higher of the interior or exterior grade immediately under the opening.

• Any screens, grates, grilles, fixed louvers, or other covers or devices must not block or impede the automatic flow of floodwaters into and out of the enclosed area.

• Only the Portion of the openings that are below BFE can be counted toward the required net open area.
44CFR 60.3(c)(5)

minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.”
Are These flood vents?
Are these flood vents?

NO!
Flood Vents?

Yes!
Are these flood vents?

YES!
Only those portions of openings that are below the BFE can be counted towards the required net open area.
Line A8(c) and A9 (c)

Estimate the total net area of all such permanent flood openings in square inches, excluding any bars, louvers, or other covers of the permanent flood openings.

A8. For a building with a crawlspace or enclosure(s):
   a) Square footage of crawlspace or enclosure(s) __________________________ sq ft
   b) Number 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) Number 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 – 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

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP INDEX
WHATCOM COUNTY, WASHINGTON AND INCORPORATED AREAS

PANELS PRINTED:
0065, 0070, 0120, 0215, 0218, 0219, 0240, 0245, 0580, 0585, 0630, 0633, 0634, 0635, 0636, 0641, 0642, 0643, 0644, 0655, 0660, 0661, 0675, 0690, 0695, 0700, 0703, 0704, 0708, 0710, 0715, 0720, 0729, 0730, 0731, 0732, 0733, 0734, 0736, 0737, 0738, 0739, 0741, 0743, 0745, 0755, 0760, 0770, 0780, 0790, 0795, 0825, 1135, 1155, 1160, 1165, 1170, 1180, 1185, 1190, 1193, 1194, 1205, 1211, 1212, 1213, 1214, 1216, 1217, 1218, 1219, 1230, 1235, 1240, 1255, 1260, 1261, 1262, 1263, 1264, 1268, 1270, 1300, 1605, 1610, 1625, 1630, 1632, 1634, 1640, 1645, 1651, 1653, 1675, 1700, 1702, 1704, 1705, 1706, 1708, 1710, 1715, 1716, 1717, 1720, 1750

MAP NUMBER
53073CD00C

MAP REVISED
JANUARY 18, 2019

B1
B2 & B3
B4 & B5
B6
B7
### Section B – FIRM Information

<table>
<thead>
<tr>
<th>B1. NFIP Community Name &amp; Community Number</th>
<th>B2. County Name</th>
<th>B3. State</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4. Map/Panel Number</td>
<td>B5. Suffix</td>
<td>B6. FIRM Index Date</td>
</tr>
<tr>
<td>B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ FIS Profile</td>
<td>☐ FIRM</td>
<td>☐ Community Determined</td>
</tr>
<tr>
<td>B11. Indicate elevation datum used for BFE in Item B9:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ NGVD 1929</td>
<td>☐ NAVD 1988</td>
<td>☐ Other/Source:</td>
</tr>
</tbody>
</table>

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

**B9 – 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

**B10 – If select other, must have community letter**
### Section B – FIRM Information

<table>
<thead>
<tr>
<th>B1. NFIP Community Name &amp; Community Number</th>
<th>B2. County Name</th>
<th>B3. State</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4. Map/Panel Number</td>
<td>B5. Suffix</td>
<td>B6. FIRM Index Date</td>
</tr>
<tr>
<td>B7. FIRM Panel Effective/Revised Date</td>
<td>B8. Flood Zone(s)</td>
<td>B9. Base Flood Elevation(s) (Zone AO, use base flood depth)</td>
</tr>
</tbody>
</table>

**B11** – Datum used must be recorded

**B12** – N/A at this time in Pacific Northwest
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 (interpolating) BFE’s between the wavy lines on the FIRM**
Section C – Building Elevations

- MUST be completed by a surveyor
  - Some states also allow an engineer or architect
- NO Blanks – use “N/A” if there is nothing to measure

Official survey required
**Section C**

**C.1/Building elevation information**

**SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)**

<table>
<thead>
<tr>
<th>C1. Building elevations are based on:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Construction Drawings*</td>
</tr>
<tr>
<td>☐ Building Under Construction*</td>
</tr>
<tr>
<td>☐ Finished Construction</td>
</tr>
</tbody>
</table>

*A new Elevation Certificate will be required when construction of the building is complete.*


- **Benchmark Utilized:**
- **Vertical Datum:**

Indicate elevation datum used for the elevations in items a) through h) below:
- ☐ NGVD 1929
- ☐ NAVD 1988
- ☐ Other/Source:

Datum used for building elevations must be the same as that used for the BFE.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Measurement Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Top of bottom floor (including basement, crawlspace, or enclosure floor)</td>
<td>Feet</td>
</tr>
<tr>
<td>b)</td>
<td>Top of the next higher floor</td>
<td>Feet</td>
</tr>
<tr>
<td>c)</td>
<td>Bottom of the lowest horizontal structural member (V Zones only)</td>
<td>Feet</td>
</tr>
<tr>
<td>d)</td>
<td>Attached garage (top of slab)</td>
<td>Feet</td>
</tr>
<tr>
<td>e)</td>
<td>Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)</td>
<td>Feet</td>
</tr>
<tr>
<td>f)</td>
<td>Lowest adjacent (finished) grade next to building (LAG)</td>
<td>Feet</td>
</tr>
<tr>
<td>g)</td>
<td>Highest adjacent (finished) grade next to building (HAG)</td>
<td>Feet</td>
</tr>
<tr>
<td>h)</td>
<td>Lowest adjacent grade at lowest elevation of deck or stairs, including structural support</td>
<td>Feet</td>
</tr>
</tbody>
</table>

- “Finished construction” means all machinery and equipment are installed and final grading is completed
Section C C.1/Building elevation information
### Section C

#### 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.


Datum used for building elevations must be the same as that used for the BFE.

<table>
<thead>
<tr>
<th>Benchmark Utilized:</th>
<th>Vertical Datum:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate elevation datum used for the elevations in Items a) through h) below.</td>
<td></td>
</tr>
<tr>
<td>[ ] NAVD 1988</td>
<td>[ ] Other/Source</td>
</tr>
<tr>
<td>[ ] NAVD 1929</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Measurement Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Top of bottom floor (including basement, crawlspace, or enclosure floor)</td>
<td>feet, meters</td>
</tr>
<tr>
<td>b)</td>
<td>Top of the next higher floor</td>
<td>feet, meters</td>
</tr>
<tr>
<td>c)</td>
<td>Bottom of the lowest horizontal structural member (V Zones only)</td>
<td>feet, meters</td>
</tr>
<tr>
<td>d)</td>
<td>Attached garage (top of slab)</td>
<td>feet, meters</td>
</tr>
<tr>
<td>e)</td>
<td>Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)</td>
<td>feet, meters</td>
</tr>
<tr>
<td>f)</td>
<td>Lowest adjacent (finished) grade next to building (LAG)</td>
<td>feet, meters</td>
</tr>
<tr>
<td>g)</td>
<td>Highest adjacent (finished) grade next to building (HAG)</td>
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</tr>
<tr>
<td>h)</td>
<td>Lowest adjacent grade at lowest elevation of deck or stairs, including structural support</td>
<td>feet, meters</td>
</tr>
</tbody>
</table>

**Check the measurement used:**

- [ ] feet
- [ ] meters

- [ ] feet
- [ ] meters
- [ ] feet
- [ ] meters
- [ ] feet
- [ ] meters
- [ ] feet
- [ ] meters

---

- Provide National Geodetic Survey Permanent Identifier (PID) or other unique identifier for the **Benchmark Utilized** field
- [https://www.ngs.noaa.gov/datasheets/](https://www.ngs.noaa.gov/datasheets/) or a copy of your OPUS report

---
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

https://www.ngs.noaa.gov/datasheets/
Section C - GPS survey

Indicate the benchmark used for the base stations used. Also attach the OPUS report.
Section C – Building Elevations

- **Enter measurements to nearest tenth of a foot**
- This section is required for Zones A1-30, AE, AH or A (with BFE) and for VE zones
- This section is not required for Zones AO or A (without BFE), except to support an application for LOMA or LOMR-F
Section C – Building Elevations

- 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
C2a & C2c – 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 – crawlspace example
Top of bottom floor

Not all crawlspace floors are flat or level.

It may be necessary to enter the crawlspace of a completed structure to find the lowest point.
Top of bottom floor

C2.a

C2.b

C2.a
Top of bottom floor
Top of Bottom Floor – is this a basement?

- Top of bottom floor
- Next highest floor
Top of Bottom Floor – in this example, top of slab
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”
Garages: attached or detached? A difficult question

- **Attached ??**
  - Common wall
  - Common foundation
  - Single structure
  - One insurance policy

- **Detached ?**
  - Separate foundations
  - Can be considered a separate structure
  - Can be insured separately
  - Could also have a separate EC
Garages: the insurance perspective

Examples of additions and extensions and the five means of connection

If the house and garage are connected by any of these means, it is one structure covered under one policy.

- Roof
- Elevated walkways
- Exterior rigid walls
- Load-bearing (solid) interior walls
- Stairs
Machinery and equipment servicing the building includes those located in an attached garage, enclosure, or on an open utility platform.
Yes, ductwork counts.

Line C2e

Flexible ducts should be lifted and attached to bottom of floor and not laying on the ground.
Machinery & Equipment

Line C2e
Look for the lowest equipment servicing the building. Don’t forget to look in the crawlspace.
C2f & C2g – Lowest & Highest Adjacent Grade

- f) Lowest adjacent (finished) grade next to building (LAG)
- g) Highest adjacent (finished) grade next to building (HAG)
- h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support

- Measure the grade immediately adjacent to the building
### C2 h – Lowest Grade Elevation at Deck Support or Stairs

Datum used for building elevations must be the same as that used for the BFE.

- **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**

<table>
<thead>
<tr>
<th>Item</th>
<th>Measurement Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Top of bottom floor (including basement, crawlspace, or enclosure floor)</td>
<td></td>
</tr>
<tr>
<td>b) Top of the next higher floor</td>
<td></td>
</tr>
<tr>
<td>c) Bottom of the lowest horizontal structural member (V Zones only)</td>
<td></td>
</tr>
<tr>
<td>d) Attached garage (top of slab)</td>
<td></td>
</tr>
<tr>
<td>e) Lowest elevation of machinery or equipment servicing the building</td>
<td></td>
</tr>
<tr>
<td>(Describe type of equipment and location in Comments)</td>
<td></td>
</tr>
<tr>
<td>f) Lowest adjacent (finished) grade next to building (LAG)</td>
<td></td>
</tr>
<tr>
<td>g) Highest adjacent (finished) grade next to building (HAG)</td>
<td></td>
</tr>
<tr>
<td>h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support</td>
<td></td>
</tr>
</tbody>
</table>
Line C2h - lowest elevation of deck or stairs
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**
  - Not in Washington

- **Architect**
  - Not in Region X (Alaska, Idaho, Oregon, and Washington)
### Section D - Comments

<table>
<thead>
<tr>
<th>Comments (including type of equipment and location, per C2(e), if applicable)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

- **Location of mechanical**
- **Engineered flood openings**
- **Attachments**
- **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
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
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**

<table>
<thead>
<tr>
<th>Property Owner or Owner's Authorized Representative's Name:</th>
</tr>
</thead>
</table>

- Certifies measurements 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
Building photographs

- Two to four color photographs
- Digital is acceptable
- Show the lowest level of the building that is above grade
- Show the front and rear of the building
- Be sure to include the date of the photograph.
- Photographs should capture key elements, such as flood openings
Building photographs

Right side view of the building to be insured

Date the photograph was taken

Left side view of the building to be insured

Date the photograph was taken

Building Photographs

See Instructions for Item A6.

If using the Evaluation Certificate to obtain NFIP flood insurance, attach 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.
The community official who completes Section A, B or E must complete this section

Must attach certified documentation with EC
Section G - Community Information

- Use Section G to document corrections or changes
- Enter permit information
- Community determined BFE
- Community identified Design Elevation
- Identify attachments
- Comments, or anything that requires explanation
If C2.a = C2.g and C2.h or E1.a and E1.b = 0 above LAG/HAG
You have a diagram 1A building
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 1B (Raised slab)

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

Distinguishing Feature – the bottom floor is at or above ground level (grade) on at least one side.*
Diagram 1B – raised slab on filled stem wall

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.e machinery
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.
Diagram 2b – Walkout Basement

- C2.g HAG
- C2.a bottom floor
- C2.f LAG
Diagram 3 – Split level

DIAGRAM 3
All split-level buildings that are slab-on-grade, either detached or townhouse; with or without attached garage.

Distinguishing Feature – The bottom floor (excluding garage) is at or above ground level (grade) on at least one side.

C2a

C2b

C2f–h

(determined by existing grade)
Diagram 4 (Split level, basement)

All split-level buildings (other than slab-on-grade), either detached or row type (e.g., townhouses), with or without attached garage.

Distinguishing Feature – The bottom floor (basement or underground garage) is below ground level (grade) on all sides.

Diagram:

- C2.a: Higher Floors
- C2.b: Bottom Floor (Basement)
- C2.f-h: (determined by existing grade)
Diagram 5 – Posts & Piers

• In V Zones, C2.c is the lowest floor

• In A Zones, C2.a is the lowest floor when a BFE is available; E1.a is lowest floor if no BFE
C2.a – Top of bottom floor

C2.h – Lowest adjacent grade at lowest elevation of deck or stairs, including structural support
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

C2.a

C2.h

C2.e
Diagram 6

All buildings elevated on piers, posts, piles, columns, or parallel shear walls with full or partial enclosure below the elevated floor.

Distinguishing Feature – For all zones, the area below the elevated floor is enclosed, either partially or fully. In A Zones, the partially or fully enclosed area below the elevated floor is with or without openings present in the walls of the enclosure. Indicate information about enclosure size and openings in Section A – Property Information.

C2.a

C2.b

A8.a-c

C2.c

(For V zones only)

C2.f-h

ELEVATED FLOOR

NEXT HIGHER FLOOR

GRADE

ENCLOSURE

Detected by existing grade

Detected by enclosure size & openings, if any.

(V Zones only)
Diagram 6

**DIAGRAM 6**

All buildings elevated on piers, posts, piles, columns, or parallel shear walls with full or partial enclosure below the elevated floor.

**Distinguishing Feature** – For all zones, the area below the elevated floor is enclosed, either partially or fully. In A Zones, the partially or fully enclosed area below the elevated floor is with or without openings present in the walls of the enclosure. Indicate information about enclosure size and openings in Section A – Property Information.

**Diagram Description**

- **C2.a**: ELEVATED FLOOR
- **C2.b**: NEXT HIGHER FLOOR
- **C2.c**: ENCLOSURE
- **C2.d**: GRADE
- **C2.e**: Determined by existing grade
- **C2.f**: For V zones only

**Enclosure Requirements**

Enclosure must have sufficient flood openings (V zone requires breakaway walls).
- Enclosure may only be used for storage, parking, and access (SPA)
- In SFHA, flood openings necessary in lower enclosure
Walk-out enclosure may only be used for storage, parking, and access.

C2.b = lowest floor when a BFE is available.
Diagram 7

All buildings elevated on full-story foundation walls with a partially or fully enclosed area below the elevated floor. This includes walkout levels, where at least one side is at or above grade. The principal use of this building is located in the elevated floors of the building.

Distinguishing Feature – For all zones, the area below the elevated floor is enclosed, either partially or fully. In A Zones, the partially or fully enclosed area below the elevated floor is with or without openings present in the walls of the enclosure. Indicate information about enclosure size and openings in Section A – Property Information.
Diagram 8 (Crawlspace)

All buildings elevated on a crawlspace with the floor of the crawlspace at or above grade on at least one side, with or without an attached garage.

Distinguishing Feature – For all zones, the area below the first floor is enclosed by solid or partial perimeter walls. In all A zones, the crawlspace is with or without openings* present in the walls of the crawlspace, indicate information about crawlspace size and openings in Section A – Property Information.
Diagram 9 (Below-grade crawlspace)

C2.b = lowest floor
- Flood openings required, otherwise it’s Diagram 2
More on Diagram 9

- Look carefully at building
- C2.a must be no more than 2 feet below LAG if area inside foundation walls is below grade on all sides
- C2.b minus C2.a must be 5 feet or less
- If these conditions are not met, you have a diagram 2 (basement)

Diagram 9 only allowed if local ordinance allows below grade crawlspaces; otherwise a below grade crawlspace is Diagram 2.
When is a crawlspace actually a basement?

**DIAGRAM 9**

All buildings (other than split-level) elevated on a sub-grade crawlspace, with or without attached garage.

**Distinguishing Feature** – The bottom (crawlspace) floor is below ground level (grade) on all sides.* (If the distance from the crawlspace floor to the top of the next higher floor is more than 5 feet, or the crawlspace floor is more than 2 feet below the grade [LAG] on all sides, use Diagram 2A or 2B.)
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.
You may need to enter the structure and/or look into the crawlspace to select the correct building diagram and take all required measurements.

A foundation without flood openings that you can count (because they are too high or blocked) can change the Building Diagram from a 9 to a 2!

Measure bottom of openings relative to interior or exterior grade, whichever is higher; explain in comments.

Remember, you are just there to report what you see AND verify.
Which Building Diagram?
Elevation Certificates – Local administrator considerations
Elevation Certificate Uses

- **Community Compliance**
  - Used to provide elevation information necessary to ensure compliance with community floodplain management ordinances and the NFIP regulations

- **If a community utilizes the Elevation Certificate**
  - The local official who is authorized by law or ordinance to administer the community’s floodplain management ordinance will need to determine the lowest floor based on the information provided on the form and final field inspections
• Insurance

- The Elevation Certificate is used, along with the insurance manual, to determine the proper rating for flood insurance premiums.
Elevation Certificate Uses, cont’d

- **SUPPORT** map changes
  - **Letter of Map Amendment (LOMA):**
    - Pre-FIRM conditions identified in SFHA by providing additional data
  - **Letter of Map Revision based on fill (LOMR-F):**
    - Post-FIRM conditions resulted from changes to SFHAs by permitted alterations (fill) to sites

Does not replace the MT-EZ, MT-1 or MT-2 forms which must be filled out
• Community Rating System (CRS)

  ▪ Communities that participate in the Community Rating System (CRS) **must** use the FEMA Elevation Certificate as a condition of participation
The elevation certificates need to be filed so they can be retrieved, copied, and provided to requestors. This can be either in a separate elevation certificate file or in files kept for each property or each permit. What counts is that they are easily retrievable by address.
Questions?