The BFEs Are(n’t) All Right
An Assessment of Elevation Certificates and Implications to the National Flood Insurance Program

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Background

Base Flood Elevation

Lowest Adjacent Grade
The expected elevation of the base flood at the most upstream point of a structure/property, to the nearest tenth of a foot.
Background

Base Flood Elevation

Lowest Adjacent Grade

The lowest ground touching a structure, including window wells, stairs, porches, etc. Also to the nearest tenth.
Approved/Removed from SFHA

Base Flood Elevation

Lowest Adjacent Grade
Approved/Removed from SFHA

Base Flood Elevation

Lowest Adjacent Grade
Denied/Maintains SFHA status

Base Flood Elevation

Lowest Adjacent Grade
Common Sources of BFEs and LAGs

- Elevation Certificates
- Elevation Information Forms
- MT-1 Forms
- MT-EZ Forms
- Certified Letters
- Paper Napkins
Lessons I Learned being a LOMA Analyst

You can trust the property elevations on incoming certified documents
But the BFE is almost never correct
We (analysts) always did our own BFEs for every case
This has bothered me ever since…
Many, Many Years Later…

Opportunity to conduct an assessment

Pulled 790 scanned Letter of Map Change case files from 12 states* and 9 FEMA Regions to determine level of accuracy of incoming BFEs

346 cases were dropped from our assessment because they:

› Were Zone A (no official BFE) or AO (depth instead of BFE)
› Because a property-specific BFE was not determined for the case (generally dropped, OAS, and newer cases)
› Were E-LOMAs (BFE audited until correct)
› 444 cases were able to be assessed

*NY, MD, FL, KY, IL, IN, AR, OK, KS, CO, CA, and WA
Assessment Details (444 cases)

1. Reviewed scanned case files
   › All incoming materials
   › Notes/forms filled out by analyst
   › Final LOMA/LOMR-F

2. Documented
   › Case outcome (approved/denied)
   › The analyst-determined BFE
   › The incoming, certified BFE
   › Form of incoming BFE
Results

We found BFE errors between -4 feet and +5.6 feet* on over 80% of the incoming, certified supporting documentation

› 156 were too high
› 85 were correct
› 201 were too low
› 2 were non-sensical (“<1 foot, 1-3 feet” and “1331/12.74”)

* Does not include one outlier that listed a BFE on an EC that was 1,206.1 feet higher than actual BFE. Even with an assumed decimal error, the BFE would still have been still -13.3 feet in error.
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Tell us how high to build lowest floors!

Used to rate flood insurance policies!

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Used to rate flood insurance policies!
Common Sources of BFEs and LAGs

- **Elevation Certificates**: Tells us how high to build lowest floors!
- **Elevation Information Forms**: Used to rate flood insurance policies!
- **MT-EZ Forms**: Helps me maintain compliance with 60.3!
- **MT-1 Forms**: Is a minimum standard for CRS participation!
- **Certified Letters**: Paper Napkins

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*Member of the SNC-Lavalin Group*
Common Sources of BFEs and LAGs

- Paper Napkins
- Certified Letters
- Elevation Information Forms
- MT-EZ Forms
- MT-1 Forms
- Elevation Certificates

Over 77% error rate
Extent of BFE Errors on Certified Documents

Percent of erroneous assessment vs. Amount of error (in feet)

- 0.1: 18%
- 0.2: 17%
- 0.3: 22%
- 0.4: 12%
- 0.5: 5%
- 0.6: 4%
- 0.7: 3%
- 0.8: 5%
- 0.9: 3%
- 1.0: 2%
- 1.1: 1%
- 1.2: 2%
- 1.4: 1%
- 1.6-5.6: 5%
Almost 70% of the errors were within 4 tenths of the actual BFE.
## Does a Tenth of a Foot Even Matter?

<table>
<thead>
<tr>
<th>BFE Error on EC</th>
<th>Example 1</th>
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<th>Example 2</th>
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<td>LF</td>
<td>BFE</td>
<td>LF-BFE</td>
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<td>BFE</td>
<td>LF-BFE</td>
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# Does a Tenth of a Foot Even Matter?

| BFE Error on EC | Example 1 | | | Example 2 | | |
|-----------------|-----------|-------------------|-------------------|--------------------|-------------------|
|                 | LF | BFE | LF-BFE | Rounded Elevation Difference | LF | BFE | LF-BFE | Rounded Elevation Difference |
| -1              | 10.2 | 8.7 | 1.5 |  | 9.5 | 0.5 | +1 |  |
| -0.9            | 10.2 | 8.8 | 1.4 |  | 9.6 | 0.4 | 0 |  |
| -0.8            | 10.2 | 8.9 | 1.3 |  | 9.7 | 0.3 | 0 |  |
| -0.7            | 10.2 | 9 | 1.2 |  | 9.8 | 0.2 | 0 |  |
| -0.6            | 10.2 | 9.1 | 1.1 |  | 9.9 | 0.1 | 0 |  |
| -0.5            | 10.2 | 9.2 | 1 |  | 10 | 0 | 0 |  |
| -0.4            | 10.2 | 9.3 | 0.9 |  | 0.1 | -1 | 0 |  |
| -0.3            | 10.2 | 9.4 | 0.8 |  | 0.2 | -2 | 0 |  |
| -0.2            | 10.2 | 9.5 | 0.7 |  | 0.3 | -3 | 0 |  |
| -0.1            | 10.2 | 9.6 | 0.6 |  | 0.4 | -4 | 0 |  |
| Actual BFE      | 10.2 | 9.7 | 0.5 |  | 9.5 | -0.5 | -1 |  |
| +0.1            | 10.2 | 9.8 | 0.4 |  | 0.6 | -0.6 | -1 |  |
| +0.2            | 10.2 | 9.9 | 0.3 |  | 0.7 | -0.7 | -1 |  |
| +0.3            | 10.2 | 10 | 0.2 |  | 0.8 | -0.8 | -1 |  |
| +0.4            | 10.2 | 10.1 | 0.1 |  | 0.9 | -0.9 | -1 |  |
| +0.5            | 10.2 | 10.2 | 0 |  | 1 | -1 | -1 |  |
| +0.6            | 10.2 | 10.3 | -0.1 |  | 1.1 | -1.1 | -1 |  |
| +0.7            | 10.2 | 10.4 | -0.2 |  | 1.2 | -1.2 | -1 |  |
| +0.8            | 10.2 | 10.5 | -0.3 |  | 1.3 | -1.3 | -1 |  |
| +0.9            | 10.2 | 10.6 | -0.4 |  | 1.4 | -1.4 | -1 |  |
| +1              | 10.2 | 10.7 | -0.5 |  | 11.5 | -1.5 | -2 |  |

Yes.
Yes it does.
Trust me on this.
Other Implications

Floodplain Management issues communities may not be aware of – program implementation and unknown violations

Losses avoided-type studies that assume post FIRM homes are built to the correct BFE

Assumptions used in risk assessments could be incorrect

BW-12/HFIAA implications on rating

Other implications – grants? Post-disaster?
What's the problem? What's the Solution?

80% of certification professionals are doing it wrong?
What's the problem?

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What's the Solution?

More training is needed on how to get a BFE the right way?
What's the problem?
The materials from which BFEs are derived are not user-friendly?

What's the Solution?
What's the problem? What's the Solution?

The materials from which BFEs are derived are not user-friendly?
What's the problem? The materials from which BFIs are derived are not user-friendly?

What's the Solution? Are different products the answer?
VI. Pamphlets

In addition to the full scale quadrangle maps, attractive information pamphlets that describe the program and the maps will be prepared for selected cities and towns that have significant present or potential flood problems. The pamphlets will be printed, in color, in large quantities (1,000) for general distribution to the public. It is proposed to place them in public buildings such as post offices, banks, and libraries. The folders will cost more to print than the larger maps, and available funds are not adequate to permit a pamphlet for each large map. Pamphlets are prepared only for quadrangles where flood prone area maps have been completed.
Can Digital Data Help?

Water surface elevation grids are part of FEMA's Flood Risk Products
Allow for point and click BFE options
Can be used with local data for better accuracy and precision
Available on FEMA's Map Service Center in some areas
Other Ideas

- Digital Flood Insurance Study (FIS) option
- Downloading of model data
- Point and click for elevation data
What Do you Think?

If you had access to the models, would that be helpful?
Would you need tools to help you interpret the data?
Is there something in-between paper FIRMs/FIS materials and access to downloadable models, can be made available everywhere, and doesn’t require you to be an engineer or a GIS specialist?
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Are these the right questions?
What Do you Think?

Is a tenth of a foot taking it too far?
Are our maps even appropriate for that level of detail?
Does Risk Rating 2.0 make this all moot anyway?
Does it provide an opportunity to redesign the tools the program provides (FIRMs and FISs) to better suit the needs of the FPM community since the insurance community will no longer be needing it?
Wrap Up

Questions? Comments? Further Discussion?
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