Floodplain Management 101: UNIT II
Maps & Flood Insurance Studies
Who is ASFPM?

ASFPM stands for the Association of State Floodplain Managers

- A national organization of floodplain management professionals
- A national certifying agency; home of the Certified Floodplain Manager® (CFM®) Program.
ASFPM Mission

To promote education, policies, and activities that mitigate current and future losses, costs, and human suffering caused by flooding, and to protect the natural and beneficial functions of floodplains – all without causing adverse impacts.

www.floods.org
Phone: 608-274-0123
Fax: 608-274-0696
14,000 members

27 Chapters

State Assoc. & Pending Chapters
# Course Topics

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<td>UNIT VI</td>
<td>Flood Insurance</td>
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UNIT II
Maps & Flood Insurance Studies (FIS)
UNIT II - Topics

- Basic Abbreviations & Terms
- Types of Maps
- Flood Insurance Studies (FIS)
- Using the Map
- Approximate A Zones
- Updating Maps
## Common Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BFE</td>
<td>Base Flood Elevation</td>
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<tr>
<td>FHBM</td>
<td>Flood Hazard Boundary Map</td>
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<tr>
<td>FIRM</td>
<td>Flood Insurance Rate Map</td>
</tr>
<tr>
<td>FIS</td>
<td>Flood Insurance Study</td>
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<td>Floodplain Administrator</td>
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<td>LOMC</td>
<td>Letters of Map Change</td>
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<tr>
<td>NFIP</td>
<td>National Flood Insurance Program</td>
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<tr>
<td>SFHA</td>
<td>Special Flood Hazard Area</td>
</tr>
<tr>
<td>WSEL</td>
<td>Water Surface Elevation</td>
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</table>
Base Flood

**Base Flood** = NFIP flood of regulation for floodplain management. Flood that has a 1% chance of being equaled or exceeded in a given year.

The **Base Flood** is often referred to as the “100 year” flood or a “100 year” event. This is a misnomer since it doesn’t occur only once in 100 years.
Special Flood Hazard Area (SFHA)

- Area subject to the Base Flood (1% chance) or greater, annual chance of flooding in any given year.
- The SFHA includes A and V zones on floodplain maps.
- AKA the 1% Floodplain or “100 year” Floodplain.
Types of Maps

- Flood Hazard Boundary Map (FHBM)
- Flood Insurance Rate Map (FIRM)
- Flood Boundary & Floodway Map (FBFM)
- Digital Flood Insurance Rate Map (DFIRM)
Most maps include...

- North arrow
- Scale
- Identification of flood zones
- Location information as a base
  - Some or All streets
  - STR (Section, township, range) survey*

* More common West of the Mississippi
Flood Hazard Boundary Map

- Is abbreviated FHBM
- Shows no BFEs, no elevations
- Uses approximate methods to locate flood zone boundaries
- Is earliest form of NFIP flood map
Flood Insurance Rate Map

- Is abbreviated FIRM
- Shows BFEs
- Uses engineering studies as basis for elevations (FIS)
- Used for insurance rating and floodplain management
Flood Boundary & Floodway Map

- Abbreviated FBFM
- Shows boundary of floodway
- Issued with FIS
- Used in conjunction with FIRM for BFEs
- Only used for regulatory purposes
Digital Flood Insurance Rate Map

- Abbreviated DFIRM
- Makes flood data available in paper and electronic format
- Data can be used in Geographic Information Systems (GIS)
- Newest form of flood map
Example: Travis Co., TX
Travis County, No Aarial Photo
FIRMettes

- FIRMette’s are an Official copy of a portion of the FIRM panel and is considered to be a legal document for NFIP purposes.
- This is not true for copies of the FIRM that are reproduced using an office copier.
- FIRMette’s are created online using FEMA’s Map Service Center (MSC)
FEMA’s Map Service Center

- Online Digital Maps
  - Scanned images of older maps
  - DFIRMS of newer maps
  - Option to create FIRMette
- Ordering for flood insurance studies
- Records of letters of map change
- Create FIRMettes, FIRMette Tutorial

http://www.msc.fema.gov
Flood Insurance Studies (FIS)

- Detailed engineering study
- Of certain watercourses, or parts of watercourses, in community
- Data in both text and tables
- Basis of insurance ratings for community
FIS Results

- Determines community flood risks
- Estimates flood flow frequencies
- Establishes flood elevations & BFEs
- Establishes flood profiles
- Calculates floodway, if available
- Designates flood risk zones
Using the Map

1. Identify SFHA (A and V zones)
2. Identify location of specific property
3. Estimate BFE at the property
4. Use estimate to guide regulatory decisions
Mapping Example

FEMA’s Flood County, USA FIRMette
## Mapping Example

### New Residential Development

<table>
<thead>
<tr>
<th>Site Description</th>
<th>Circle Answer</th>
</tr>
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<tbody>
<tr>
<td>A 150’ X 150’ corner lot on the North Side of Butler Drive and on the West side of Heyden Drive</td>
<td></td>
</tr>
<tr>
<td>What Risk Zone is this Site Located In?</td>
<td>A  B  A3</td>
</tr>
<tr>
<td>Is this Site in the 1% Floodplain?</td>
<td>Yes</td>
</tr>
<tr>
<td>What is the 1% Flood Elevation at this Site? (Use FIRM)</td>
<td>455’ 455.5’ 456’</td>
</tr>
<tr>
<td>What is the 1% Flood Elevation at this Site? (Use FIS)</td>
<td>454.6’ 455’ 455.5’</td>
</tr>
<tr>
<td>If Flood County, USA Floodplain Ordinance has the 1-foot Freeboard Requirement, at what Elevation can the lowest floor be built at?</td>
<td>455.6’ 456.5’ 456’</td>
</tr>
</tbody>
</table>
Mapping Example

➤ Select Correct FIRM Panel
A 150 ft by 150 ft corner lot on the North side of Butler Dr. and on the West side of Heyden Dr.
Mapping Example

- Identify Specific Location

A 150 ft by 150 ft corner lot on the North side of Butler Dr. and on the West side of Heyden Dr.
Mapping Example

Identify Specific Lot

A 150 ft by 150 ft corner lot on the North side of Butler Dr. and on the West side of Heyden Dr.
What risk zone is this site located in?

Zone A3

Is this site in the 1% floodplain?

YES – Any risk zone beginning with the letter “A” is the 1% floodplain.
Mapping Example

Is the Site in the Regulatory Floodway?

NO – If there was a regulatory floodway on Flat Creek it would have been represented by the “hatched” area.

Map type is the new FIRM (no separate floodway map).
Mapping Example

- Determine BFE Using FIRM

1. Determine flow direction.

2. Draw upstream BFE line for site.

BFE = 455.5 ft (by FIRM).
Mapping Example

Determine BFE Using FIS Flood Profile

1. Still need to determine flow direction and draw BFE line.

Now determine nearest landmark to site

A. Road crossings
B. Cross Sections

What is the nearest landmark?

Cross Section “D”
Mapping Example

➤ Determine Distance to closest Landmark

Measure the distance to the nearest landmark along the centerline of the stream.

Distance between Cross Section “D” and site = 5 X 125 ft + 100 ft = 725 ft +/-
Mapping Example

Determine Flood Profile Datum

1. Determine the profiles “square” measurement.

Therefore, the Minor Grid Line or “square” measurement = 125 feet per “square” or “box”.

For this example, to measure 725 feet on this Profile, we would count 5.8 “boxes” (725 ft / 125 ft = 5.8 squares).

Distance to site from X-Sec “D” = 725 ft downstream

4250 ft – 3000 ft = 1250 ft (Between Major Grid Lines).
Mapping Example

Determine BFE

1. Measure downstream from X-Section “D” 725 ft or 5.8 “squares” or “boxes”.

2. Extend measurement line up to the 1% water profile.

3. Measure horizontally over from the intersection of 1% profile to determine BFE.

BFE = 454.6 ft (Nearly a foot lower than FIRM!).
Mapping Example

Additional Freeboard Requirements

This Flood County, USA’s floodplain ordinance requires all development to be one-foot above the determined BFE, at what elevation could the lowest floor be at this site?

Lowest Floor Elevation = 455.6 feet (By FIS)

Or LFE = 456 feet (If rounding up)

A 150 ft by 150 ft corner lot on the North side of Butler Dr. and on the West side of Heyden Dr.
Mapping Exercises

How are Your Roads Shown?

Previous Example

DFIRM Example
Mapping Exercises

Example One - FIRMette
Example One – Residential Development

A 150 ft by 200 ft lot on the West side of Plaza Drive 125 ft North of the intersection with Glebe Way

Is this site...
Located in a floodplain?
Located in the regulatory floodway?

What might you tell the developer?
What will the borrower be told?
Mapping Exercises

- Locate Property on FIRM

A 150 ft by 200 ft lot on the West side of Plaza Drive 125 ft North of the intersection with Glebe Way.
Mapping Exercises

- Locate Property on FIRM

A 150 ft by 200 ft lot on the West side of Plaza Drive 125 ft North of the intersection with Glebe Way.
Mapping Exercises

- Determine Permit Requirements

- Is this site located in a floodplain? Yes
- Regulatory floodway? No

What might you tell the developer?
- Any work in Zone AE needs a permit
- Stay out of the 1% floodplain
- Need contour information
- Provide a detailed site plan

What might the lender say?
- Structures in Zone AE to be elevated
- Need flood insurance!

Is this site located in a floodplain? Yes
Regulatory floodway? No
What might you tell the developer?
Any work in Zone AE needs a permit
Stay out of the 1% floodplain
Need contour information
Provide a detailed site plan
What might the lender say?
Structures in Zone AE to be elevated
Need flood insurance!
Mapping Exercises

- Determine BFE using the Flood Profile

BFE = 10.5 ft
Mapping Exercises

- Determine BFE using Floodway Data Table

![Floodway Data Table]

<table>
<thead>
<tr>
<th>CROSS SECTION</th>
<th>DISTANCE (FEET)</th>
<th>WIDTH (FEET)</th>
<th>SECTION AREA (SQUARE FEET)</th>
<th>MEAN VELOCITY (FEET PER SECOND)</th>
<th>REGULATORY</th>
<th>WITHOUT FLOODWAY</th>
<th>WITH FLOODWAY</th>
<th>INCREASE</th>
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</table>

Regulatory (BFE) Elevation = 10.4 ft

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1 Feet above county boundary

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FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD COUNTY, USA
AND INCORPORATED AREAS

FLOODWAY DATA
ROCKY RIVER
Mapping Exercises

- Example Two - FIRMette
Example Two – Community Development

Community development dept. wants to replace the existing footbridge over Cobb Brook

Is a permit required for this project?

Is an Elevation Certificate required?

Should any documentation be submitted prior to issuing the permit?

Can the top of the new footbridge be built below the regulatory 1% flood elevation?
Mapping Exercises

- Locate Property on FIRM

Community development dept. wants to replace the existing footbridge over Cobb Brook.
Mapping Exercises

Determine Permit Requirements

- Is a permit required? Yes!
- Is an Elev. Cert. required? No
- Should any documentation be submitted prior to issuing the permit? Yes – For development in detailed study areas, without a regulatory floodway, proof should be submitted showing the proposed development will not increase existing flood heights by more than one foot (44CFR 60.3(C)(10)).
Mapping Exercises

Determine Permit Requirements (cont.)

Can the top of the new footbridge be built below the regulatory 1% flood elevation?

Yes – IF they can meet the requirements of Section 60.3(c)(10) of the local floodplain ordinance. This proof must be obtained prior to issuing the permit.

Existing footbridge is above the 1% and 0.2% events.
Mapping Exercises

Example Three - FIRMette
A 100 ft by 100 ft residential lot on the South side of Wesley Street with the front corners being located 650 ft & 750 ft East of the centerline of Rock Hill Road.

Is the site located in the 1% floodplain?

Is the site located in the regulatory floodway?

Is an Elevation Certificate required for this type of development?

Will a “No-Rise” Certificate be required?

What is the BFE for this site?
Mapping Exercises

- Locate Property on DFIRM

A 100 ft by 100 ft residential lot on the South side of Wesley Street with the front corners being located 650 ft & 750 ft East of the centerline of Rock Hill Road.
Mapping Exercises

➢ Determine Permit Requirements

Is this site located in the 1% floodplain? Yes

Regulatory floodway? No – Not located in “hatched” area.

Is an Elevation Certificate required for this type of development? Yes

Will a “No-Rise” Certificate be required? No – “No-Rise” Certificates are only required when the development falls within a regulatory floodway.
Mapping Exercises

➢ Determine BFE using the Flood Profile

[Diagram showing flood profiles and backwater effects from the Big River]
Determine BFE using the Floodway Data Table

<table>
<thead>
<tr>
<th>CROSS SECTION</th>
<th>DISTANCE</th>
<th>WIDTH (FEET)</th>
<th>SECTION AREA (SQUARE FEET)</th>
<th>MEAN VELOCITY (FEET PER SECOND)</th>
<th>REGULATORY (FEET NAVD)</th>
<th>WITHOUT FLOODWAY (FEET NAVD)</th>
<th>WITH FLOODWAY (FEET NAVD)</th>
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</tr>
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</table>

What is the BFE for this site?

Regulatory (BFE) elevation = 561.6 ft
Mapping Exercises

- Elevation Certificate

If to be used for compliance purposes the finished construction box must be checked and the document must be properly certified.
Mapping Exercises

➤ Permit vs. Elevation Certificate

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.


Benchmark Utilized: 301012 Vertical Datum: NAVD 1988
Conversion/Comments: -NA-

Check the measurement used.

a) Top of bottom floor (including basement, crawl space, or enclosure floor): _______ 563.1 ft feet meters (Puerto Rico only)

b) Top of the next higher floor: _______ 972.4 ft feet meters (Puerto Rico only)

c) Bottom of the lowest horizontal structural member (V Zones only): _______ -NA- ft feet meters (Puerto Rico only)

d) Attached garage (top of sill): _______ 563.1 ft feet meters (Puerto Rico only)

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number
Jefferson City, CID No. 290106

B2. County Name
Cole

B3. State
Missouri

B4. Map/Panel Number
29051C0126

B5. Suffix
D

B6. FIRM Index Date
12/02/05

B7. FIRM Panel Effective/Revised Date
12/02/05

B8. Flood Zone(s)
AE

B9. Base Flood Elevation(s) (Zone AO, use base flood depth)
561.6 ft

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

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

Compliant: Lowest Floor is 563.1 > 562.6 the community elevation requirement
Mapping Exercises

Example Four - FIRMette
Mapping Exercises

Example Four – Floodway Development

A two acre residential lot at the end of Eagle Drive as shown on the FIRMette below.

Can this lot even be developed under current NFIP regulations?

Developer could not provide a “No-Rise” for the original location of the house, moved structure out of the floodway, is a “No-Rise” Certificate still required?

Can a permit be issued prior to receiving the “No-Rise” Certificate?
Mapping Exercises

Determine Permit Requirements

- Can this lot even be developed under current NFIP regulations? Yes

The structure is no longer in the regulatory floodway but there is still going to be some utility work & grading activities occurring, is a “No-Rise” Certificate still needed? Yes

Can the permit be issued prior to receiving the “No-Rise” Certificate? No
Mapping Exercises

“No-Rise” Certificate Example

This certificate is all that is provided to show “No-Rise”; is this acceptable?

YES!

COMMENTS: The proposed conditions were analyzed using the original HEC-RAS model used by FEMA during the Initial Identification of the existing Floodplain & Floodway Conditions. The model was calibrated and matched the effective published BFE’s. The proposed construction activities, grading, filling, & utility installation, was then incorporated into this model and did not cause an increase in the effective published base flood elevations.
Mapping Exercises

Is the permit acceptable?  

YES

6. Property Located in a Designated Floodway?  Yes  X  No  

IF ANSWERED YES, CERTIFICATION MUST BE PROVIDED PRIOR TO THE ISSUANCE OF A PERMIT TO DEVELOP, THAT THE PROPOSED DEVELOPMENT WILL RESULT IN NO INCREASE IN THE BASE (100-YEAR) FLOOD ELEVATIONS.

7. Property Located in a Designated Floodplain Fringe?  Yes  X  No  

8. Elevation of the 100-Year Flood (ID source)  605.0 ft (Community's Own FEMA Issued FIS Stream Profile)  

9. Elevation of the Proposed Development Site  605.0 ft  

10. Local Ordinance Elevation/Floodproofing Requirement  

CONDITIIONAL PERMIT APPROVAL/DENIAL

THE CONDITION OF THIS PERMIT IS THAT NO PERMANENT STRUCTURES WILL BE PLACED IN THE FLOODWAY.

Plans and Specifications Approved/Denied this  Approval Date  Day of  Approval Month, 20  Approval Year  

Signature of Developer/Owner

William T. Rose, Owner, Custom Homes of Mid MO

Authorizing Official

Susie Q. Snack, Floodplain Administrator

Print Name and Title

WILL BE ELEVATED OR FLOODPROOFED SO AS NOT TO SUBMERGE THE BASE FLOOD ELEVATION.

This Permit is used with the condition that the developer/owner will provide certification to a registered engineer, architect, or land surveyor of the "subcritical" lowest floor (including basement) elevation of any new or substantially improved building covered by this permit.

William T. Rose, Owner, Custom Homes of Mid MO
Mapping Exercises

Elevation Certificate

Is the Elev. Cert. acceptable for proof of compliance?

- Verify street address
- Verify BFE information
- Verify “Finished Construction” is checked
- Verify elevation datum
- Verify the “Top of Bottom Floor” is above the elevation requirement
- Verify document is certified by a Registered Professional

8. Elevation of the 100-Year Flood (ID source) 603.0 ft

10. Local Ordinance Elevation/Floodproofing Requirement 604.0 ft
Mapping Exercises

Elevation Certificate Page Two

- Verify comment section is filled out for elevation listed in C2e.
- Verify 2nd page is also certified by a Registered Professional.
- Recommend completing Section G for record keeping purposes only.

Finished construction not checked and missing 2nd certification signature on page 2.
Updating Maps

Physical map revision process, such as MapMod **Result:** New map

Letters of Map Change processes

- Amendment (LOMA) – *natural* change
- Revision (LOMR) – *manmade* change

**Result:** Part of map changed
Letters of Map Amendment

LOMA – for “inadvertent inclusions”
  • MT-EZ Form: single residential lot or structure
  • E-LOMA online application – engineers, surveyors
  • MT-1 Form: multiple residential lots or structures

CLOMA – based on proposed situation
Letters of Map Revision

- LOMR-F – for structures on fill
  - MT-1 Form

- LOMR
  - MT-2 Form

- CLOMR-F and CLOMR – based on proposed situation
LOMC Process

- FEMA reviews and issues letter
- FEMA fees to review applications vary
- Can be up to $6,000 for LOMRs

Online FEMA tutorials:

www.fema.gov/plan/prevent/fhm/ot_lmreq.shtm
UNIT II Summary Review

Where did we confuse you in covering:

- Types of flood maps
- Flood insurance studies (FIS)
- Using maps
- Working with Approximate A zones
- Letters of Map Change (LOMC)?