



Hydrology & Hydraulics:

Opportunities for Communities to Reduce Flood Risks

Alan Johnson, PE



FEMA

April 4, 2019

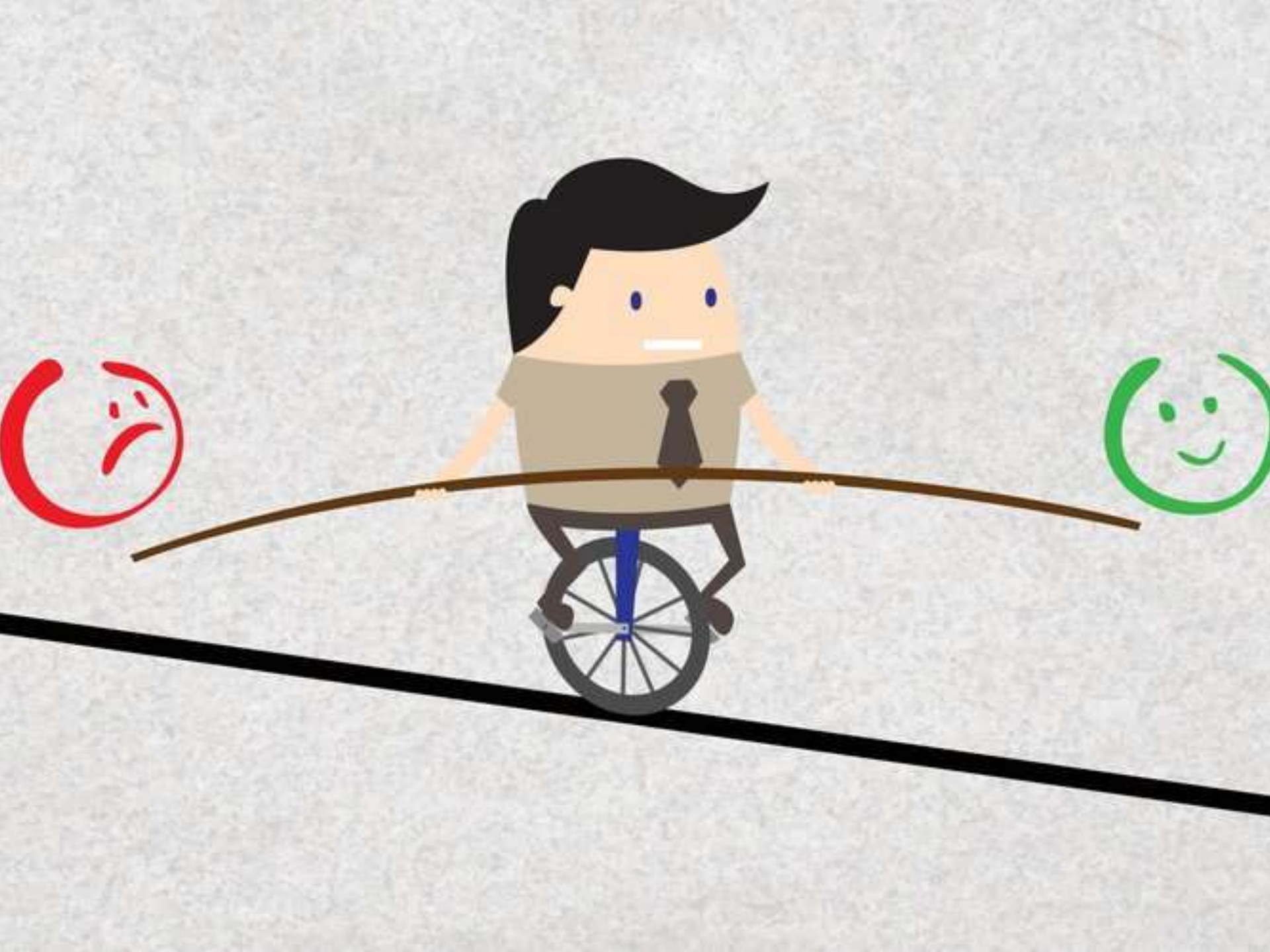












Flood Resistant Design & Construction

ASCE 24

In the Spring of 2014, FEMA adopted Policy-203-074-1, [Minimum Design Standard for HMA Projects in Flood Hazard Areas](#), requiring the use of engineering design standards detailed in ASCE 24 Flood Resistant Design and Construction for mitigation reconstruction, structure elevation, and dry flood proofing projects funded by Hazard Mitigation Assistance (HMA) grant programs.



<https://www.fema.gov/media-library/assets/documents/93727>

ASCE 24 & the NFIP

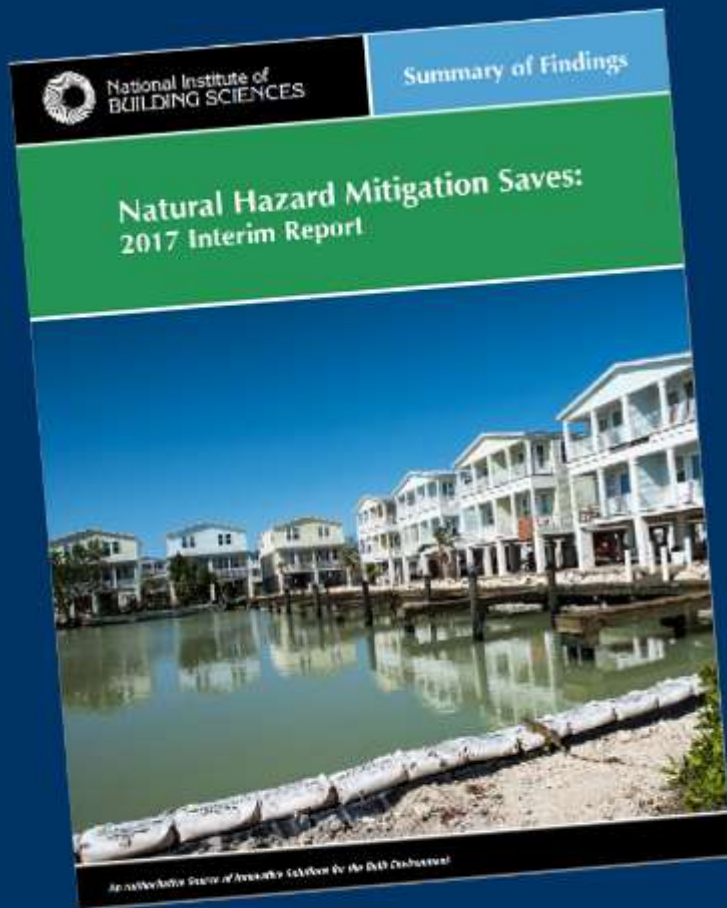
- The provisions of ASCE 24 are consistent with NFIP performance requirements.
- ASCE 24 provisions meet or exceed NFIP regulations.
- Establishes new minimum requirements (*ASCE 24 is now the standard of practice*)
- In comparison with NFIP requirements, ASCE 24:
 1. Provides more specific requirements
 2. Incorporates the Coastal A Zone with foundation requirements
 3. Requires new construction and Substantial Improvement/Damage construction to incorporate freeboard
 4. Requires to dry floodproofing to consider human intervention requirements



FEMA

National Mitigation Investment Strategy

Principals



1. Catalyze private and non-profit sector mitigation investments and innovation
2. Improve collaboration between the federal government and State, Local, Tribal and Territorial governments, respecting local expertise in mitigation investing
3. Make data- and risk-informed decisions that include lifetime costs and risks.

Mitigation Saves

2017 Interim Report

National Institute for Building Science (NIBS)

National Benefit-Cost Ratio Per Peril

**BCR numbers in this study have been rounded*

Overall Hazard Benefit-Cost Ratio

**Federally
Funded**

6:1

**Beyond Code
Requirements**

4:1



Riverine Flood

7:1

5:1



Hurricane Surge

Too few
grants

7:1



Wind

5:1

5:1



Earthquake

3:1

4:1

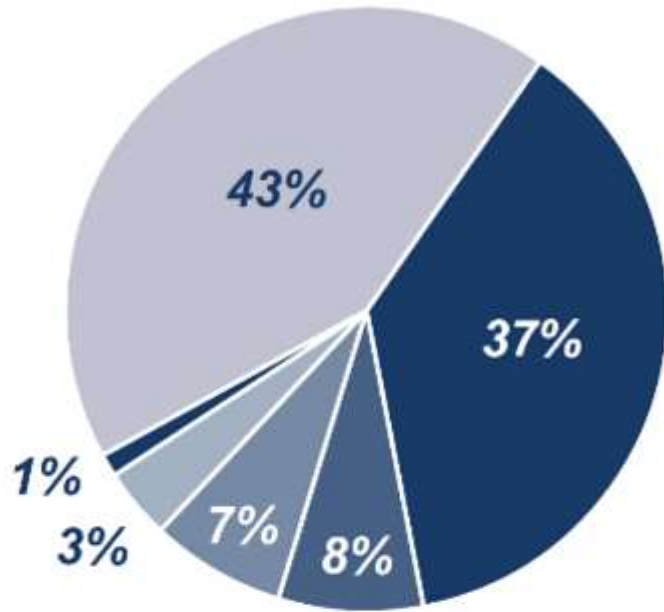


Wildland-Urban Interface Fire

3:1

4:1

Figure 1: Total costs and benefits of 23 years of federal mitigation grants.



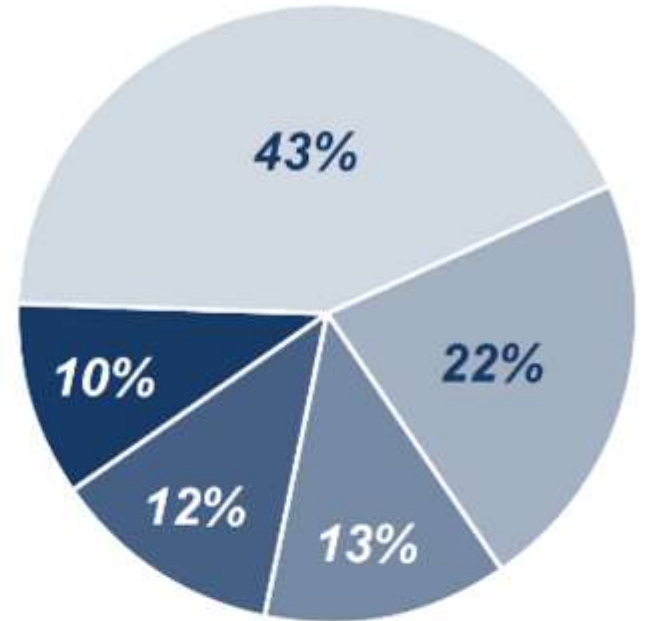
Benefit: \$157.9 billion

- 43% – Casualties & PTSD: \$68.1
- 37% – Property: \$58.1
- 8% – Additional living expenses & direct business interruption: \$12.9
- 7% – Insurance: \$10.5
- 4% – Indirect business interruption: \$6.3
- 1% – Loss of service: \$2.0

billions 2016 USD

Cost: \$27.4 billion

Figure 2: Costs & benefits of new design to exceed 2015 I-Code requirements.



Benefit: \$15.5 billion

- 43% – Property: \$6.7
- 22% – Additional living expenses & direct business interruption: \$3.5
- 13% – Casualties & PTSD: \$2.0
- 12% – Indirect business interruption: \$1.8
- 10% – Insurance: \$1.5

billions 2016 USD

Cost: \$3.6 billion

Hazard Mitigation Assistance Program

HMA Program provides assistance for mitigation activities that reduce damage and protect life and property from future damages.

HMA Addendum (dated 2/27/2015) states: *“FEMA will use ASCE 24-14, or latest edition, or its equivalent as the minimum design criteria for all HMA-funded structure elevation, dry flood proofing, and mitigation reconstruction projects in flood hazard areas.”*



Detailed information on FEMA HMA Programs:
<https://www.fema.gov/hazard-mitigation-assistance>

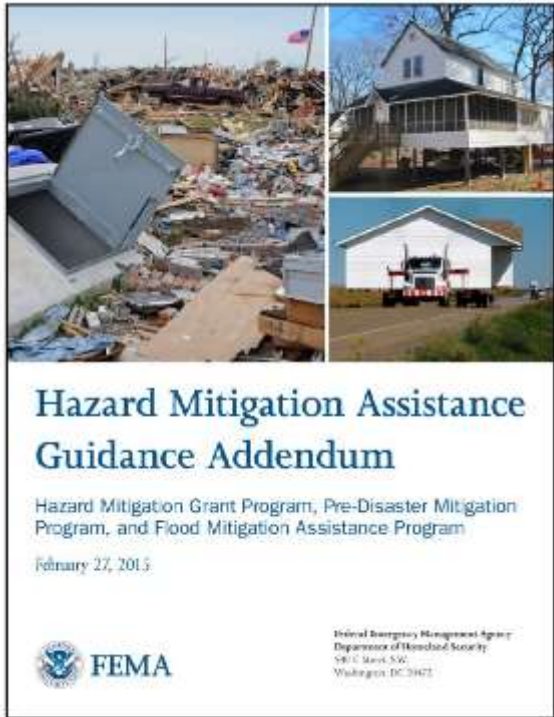


FEMA

HMA Grant Programs

- **Hazard Mitigation Grant Program (HMGP):** Provides grants to implement long-term hazard mitigation measures after a major disaster declaration in a given State.
- **Pre-Disaster Mitigation (PDM) Program:** Provides nationally competitive grants for hazard mitigation planning and implementing mitigation projects before a disaster event.
- **Flood Mitigation Assistance (FMA) Program:** Provides grants on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP).

Building Codes and Standards Directive



- As of September 6, 2016 - “FEMA will encourage and, to the extent permitted by law, require the integration and use of nationally recognized voluntary consensus-based building codes and standard consistently across FEMA programs.”
- Policy applies to all FEMA offices and programs
 - Includes Public Assistance
- FEMA programs will adopt as appropriate regulations, policies, grant conditions, or other appropriate instruments, where legally permitted...

Guidance for Application of ASCE 24

- Different from the actual ASCE 24 Standard (You will need both for project oversight)
- Ensures that each project meets FEMA's HMA requirements which includes adhering to project-related design standards
- Supports integration of ASCE 24 as the minimum standard for flood-related HMA projects



Applying Codes, Standards & Ordinances

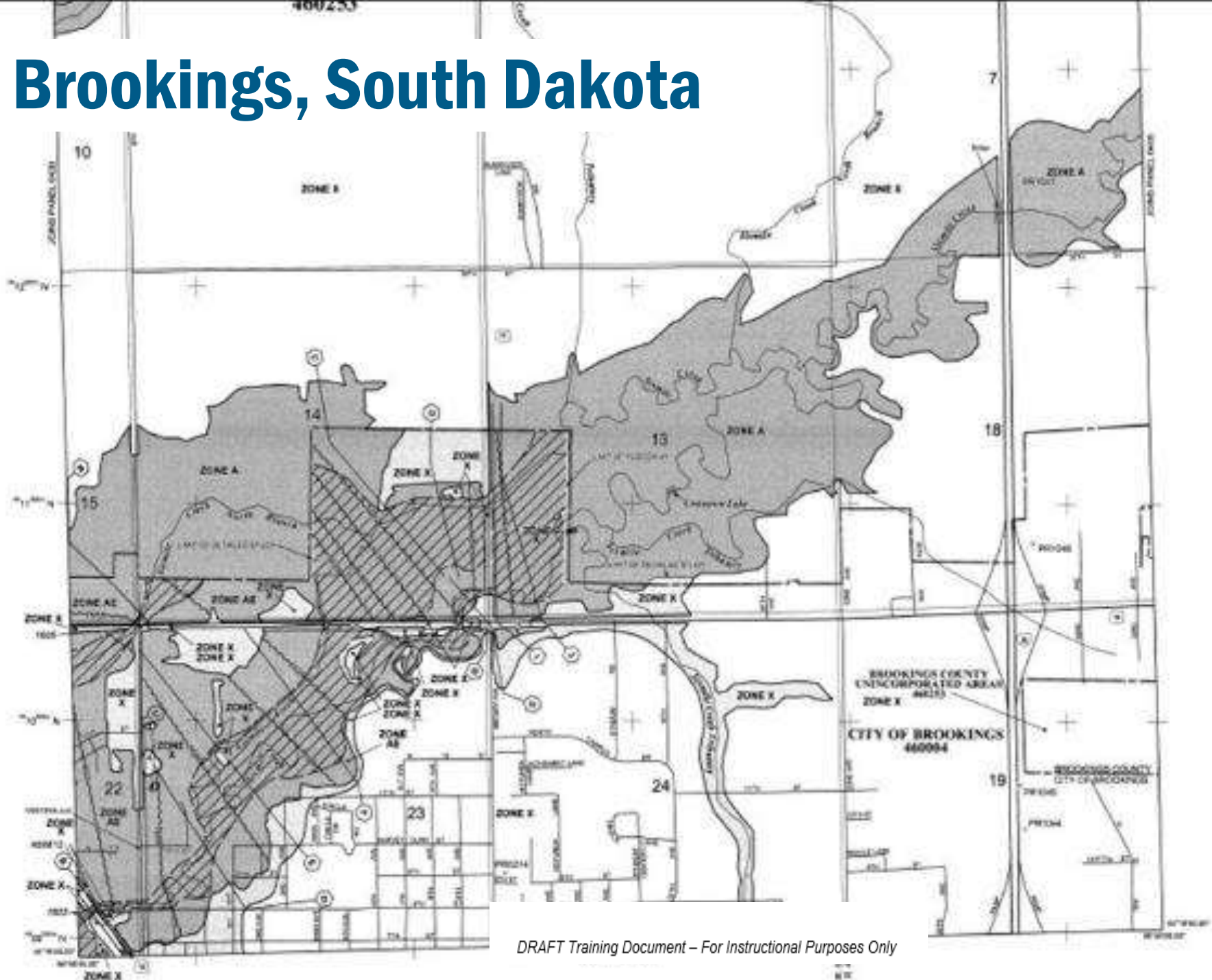
HMA projects must comply with:

- State and local laws/ordinances
- Consensus standards referenced in the codes
- Federal laws, regulations, and statutes, and requirements within NFIP

Even if a project is technically feasible and cost effective, if implementing the project violates a Federal, State, or local ordinance, code, or requirement, the project will be ineligible for Federal assistance.



Brookings, South Dakota



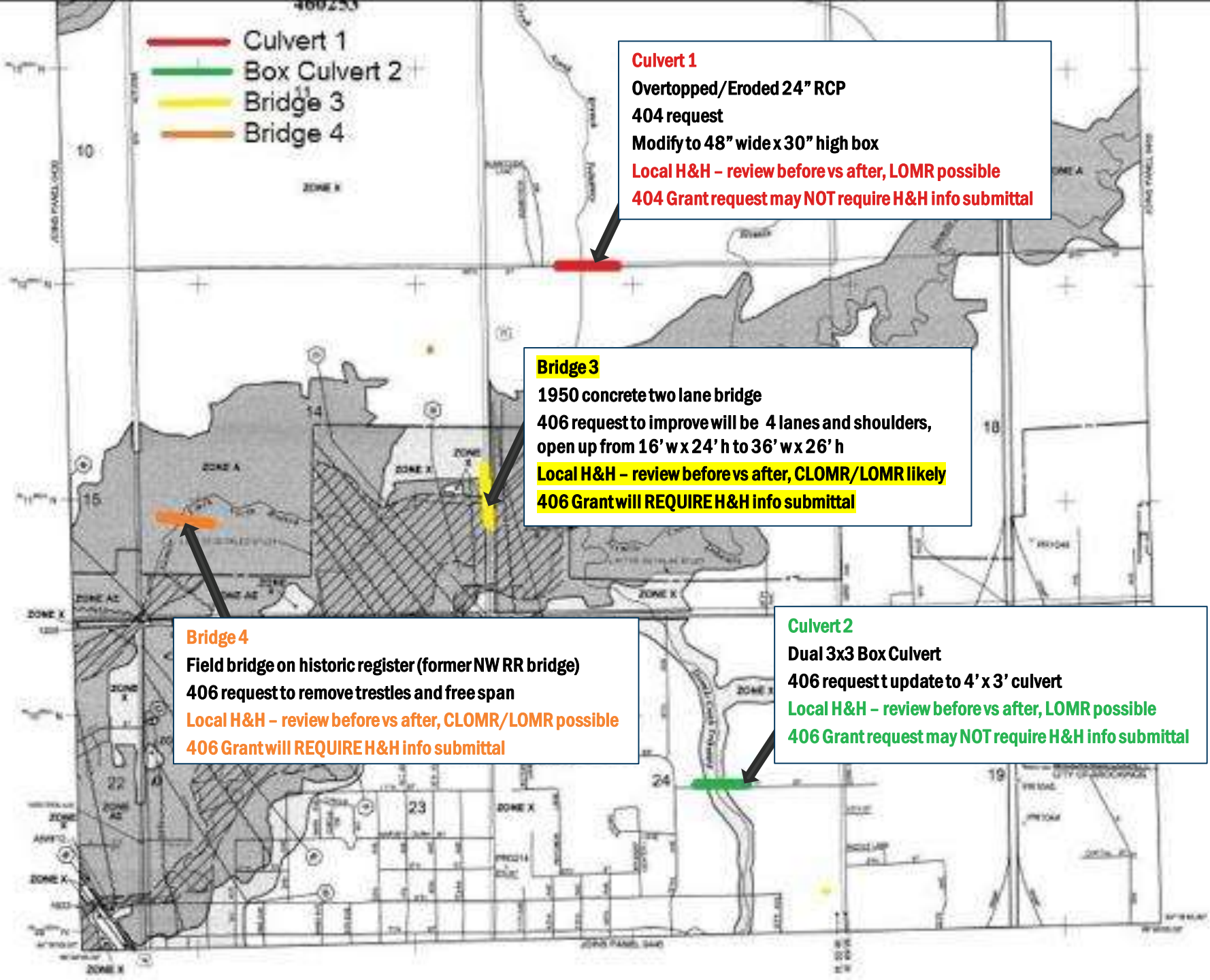
- Culvert 1
- Box Culvert 2
- Bridge 3
- Bridge 4

Culvert 1
 Overtopped/Eroded 24" RCP
 404 request
 Modify to 48" wide x 30" high box
 Local H&H – review before vs after, LOMR possible
 404 Grant request may NOT require H&H info submittal

Bridge 3
 1950 concrete two lane bridge
 406 request to improve will be 4 lanes and shoulders,
 open up from 16' w x 24' h to 36' w x 26' h
 Local H&H – review before vs after, CLOMR/LOMR likely
 406 Grant will REQUIRE H&H info submittal

Bridge 4
 Field bridge on historic register (former NW RR bridge)
 406 request to remove trestles and free span
 Local H&H – review before vs after, CLOMR/LOMR possible
 406 Grant will REQUIRE H&H info submittal

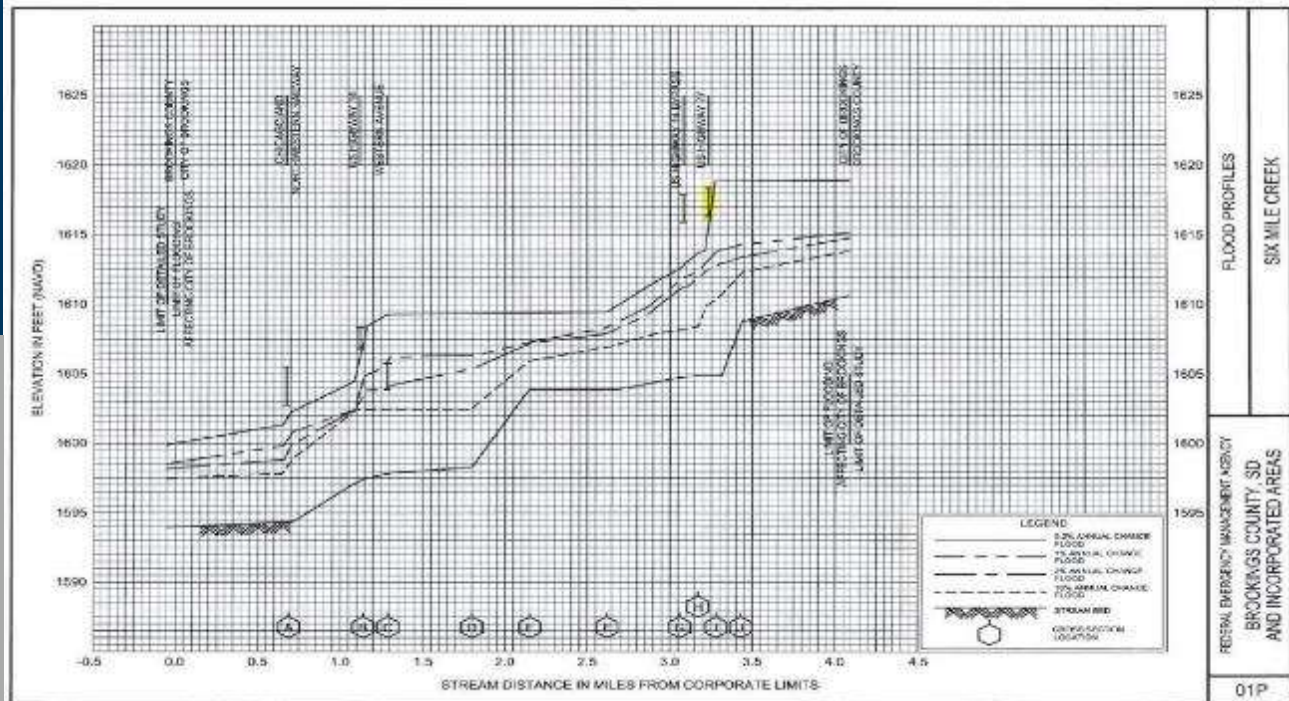
Culvert 2
 Dual 3x3 Box Culvert
 406 request to update to 4' x 3' culvert
 Local H&H – review before vs after, LOMR possible
 406 Grant request may NOT require H&H info submittal



Materials for Reference/Use

Make decision from

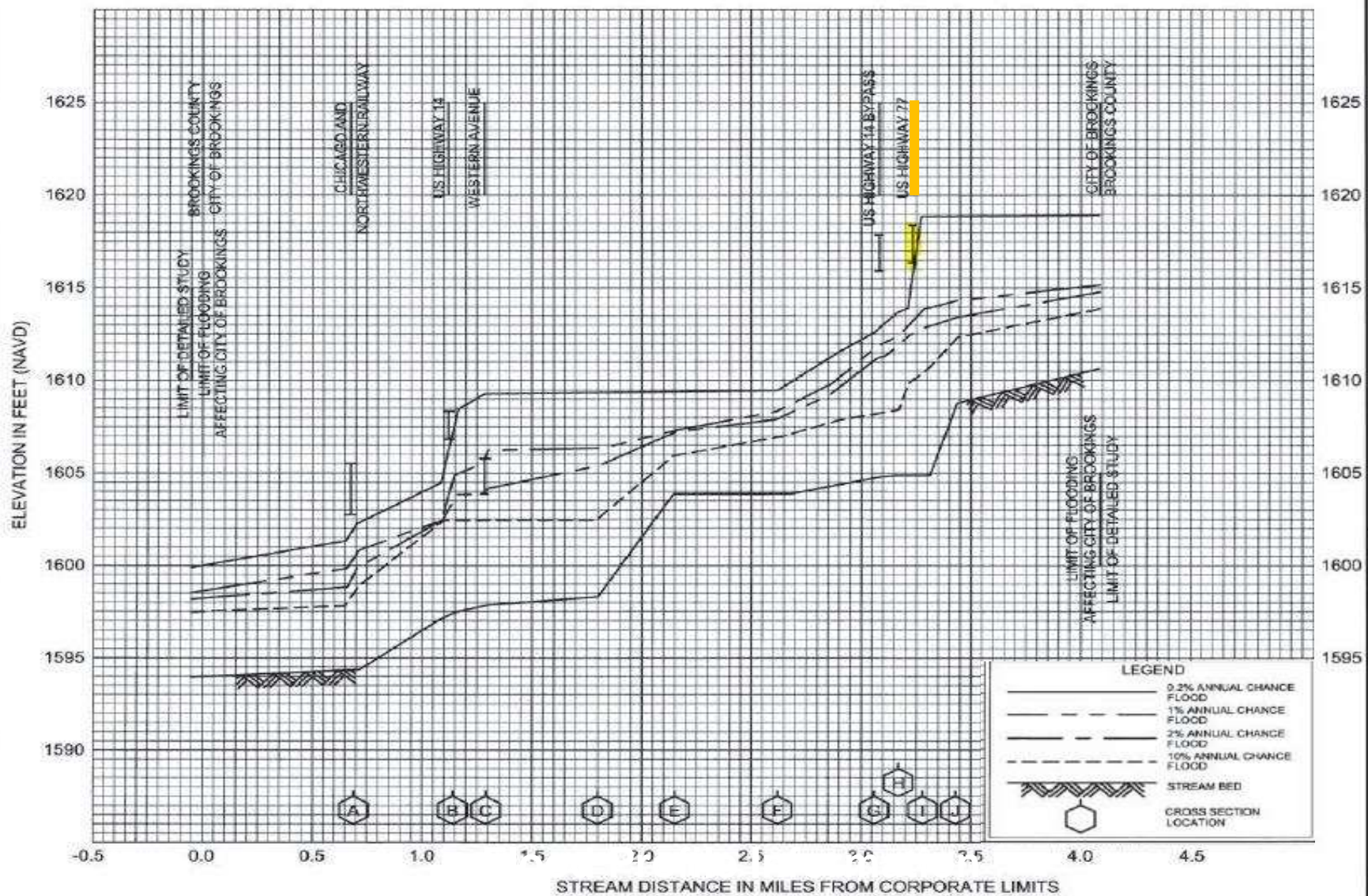
- Flood Insurance Rate Map (FIRM)
- Flood Insurance Study (FIS) Text
 - Flood Profile
 - Floodway Data Table
 - Summary of Discharges



FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SIX MILE CREEK								
A	0.88	135	4,541	0.88	1,600.8	1,600.8	1,600.8	0.0
B	1.14	100	1,120	3.53	1,604.7	1,604.7	1,605.4	0.7
C	1.29	140	1,190	3.30	1,605.9	1,605.9	1,605.9	0.0
D	1.80	215	852	4.64	1,608.4	1,608.4	1,608.4	0.0
E	2.15	726	1,834	2.15	1,607.3	1,607.3	1,608.2	0.9
F	2.62	1270	3,420	1.15	1,608.3	1,608.3	1,608.9	0.6
G	3.06	1000	4,180	0.78	1,611.9	1,611.9	1,612.3	0.4
H	3.17	200	836	3.89	1,612.5	1,612.5	1,612.9	0.4
I	3.28	1800	6,824	1.09	1,613.8	1,613.8	1,613.8	0.0
J	3.43	1885	3,298	2.25	1,614.2	1,614.2	1,614.2	0.0

TABLE 2 - SUMMARY OF DISCHARGES

Flooding Source / Location	Drainage (Square Miles)	Peak Discharges (Cubic Feet per Second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
SIX MILE CREEK (including SIX MILE CREEK NORTH BRANCH)					
Chicago and Northwestern Railroad	76	1,430	4,650	7,660	18,500



FLOOD PROFILES
SIX MILE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
BROOKINGS COUNTY, SD
AND INCORPORATED AREAS

01P

Questions

- Does this structure/crossing result a change/reduction in the Base Flood Elevation?
- What is the location (Cross-Section) of the structure in question?
- Why do I want to ask these questions?

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SIX MILE CREEK								
A	0.69	135	4,541	0.88	1,600.8	1,600.8	1,600.8	0.0
B	1.14	100	1,120	3.53	1,604.7	1,604.7	1,605.4	0.7
C	1.29	140	1,190	3.30	1,605.9	1,605.9	1,605.9	0.0
D	1.80	215	852	4.64	1,606.4	1,606.4	1,606.4	0.0
E	2.15	726	1,834	2.15	1,607.3	1,607.3	1,608.2	0.9
F	2.62	1270	3,420	1.15	1,608.3	1,608.3	1,608.9	0.6
G	3.06	1000	4,180	0.78	1,611.9	1,611.9	1,612.3	0.4
H	3.17	200	836	3.89	1,612.5	1,612.5	1,612.9	0.4
I	3.28	1600	6,824	1.09	1,613.8	1,613.8	1,613.8	0.0
J	3.43	1885	3,298	2.25	1,614.2	1,614.2	1,614.2	0.0

Bridge 3 is located between cross-sections H and I

- What is the current cross-sectional area (1%) of the floodway near the bridge?
- What is the current recorded velocity (1%) of the floodway near the bridge?
- Is flow constrained by the current crossing/structure?
- Why do I want to ask these questions?

Questions

TABLE 2 – SUMMARY OF DISCHARGES

<u>Flooding Source / Location</u>	<u>Drainage (Square Miles)</u>	<u>Peak Discharges (Cubic Feet per Second)</u>			
		<u>10% Annual Chance</u>	<u>2% Annual Chance</u>	<u>1% Annual Chance</u>	<u>0.2% Annual Chance</u>
SIX MILE CREEK (including SIX MILE CREEK NORTH BRANCH)					
Chicago and Northwestern Railroad	76	1,430	4,650	7,660	18,500

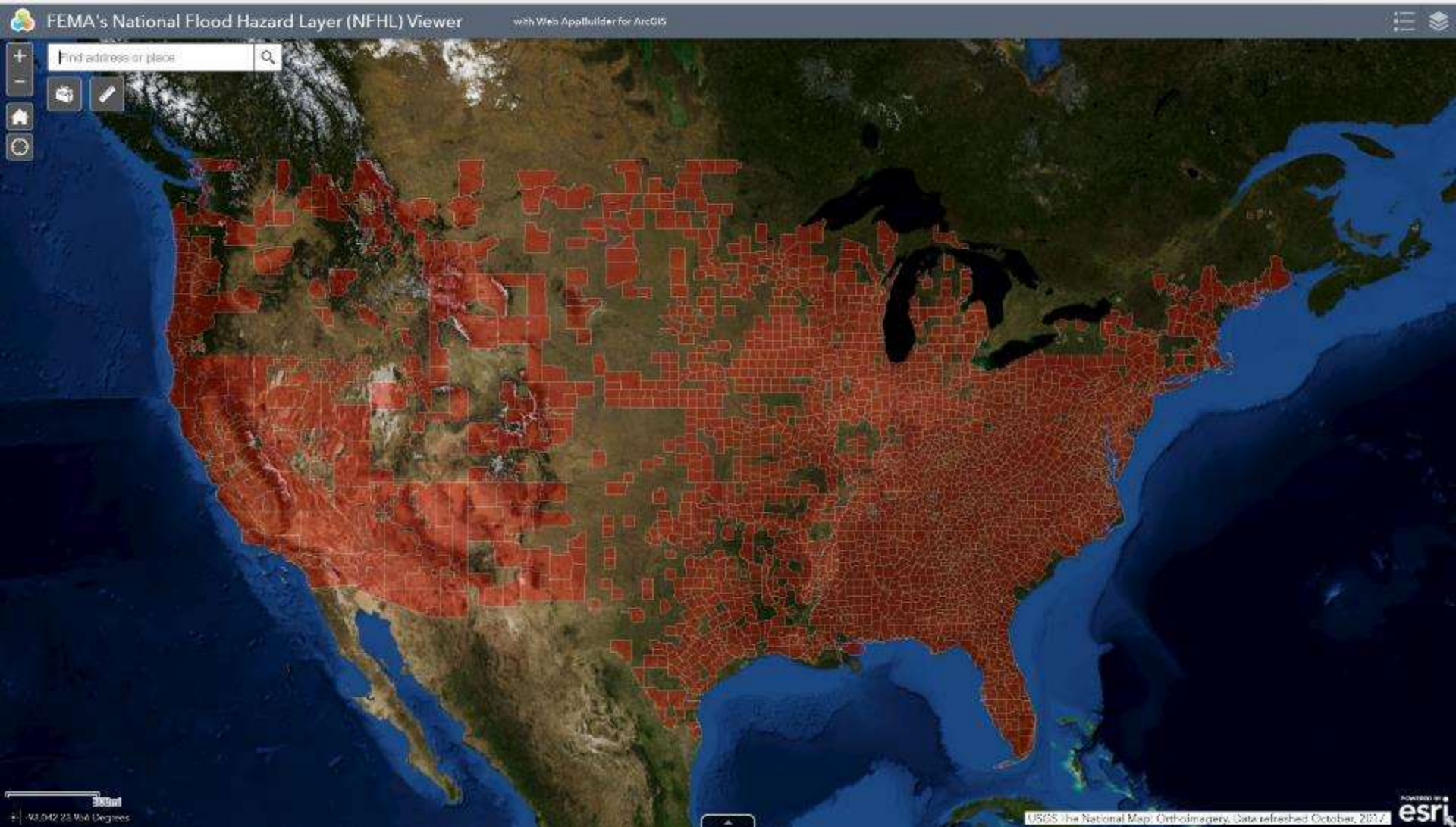
Questions

Bridge 3 is located at US 77 (Medary Avenue) ?

- What is the current range of discharges at the location of Bridge 3?
- Why do I want to ask these questions?

National Flood Hazard Layer – Portal

<https://msc.fema.gov/nfhl>





Questions

Does this flood area look familiar? (Hint: We were just looking at this)

- Can you locate Bridge 3 on this image?
- Why does this floodplain look strange?

Obtaining Flood Data & Modeling

To request technical (H&H models) from FEMA/NFIP:

[FEMA FIS Technical Data Request](#)

<http://www.fema.gov/how-order-technical-administrative-support-data>

MT-2 Forms also available online

CLOMRs and LOMRs submittal formatted data:

[MT-2 Forms and Instructions](#)

<http://www.fema.gov/media-library/assets/documents/1343?id=1493>

Note:

- ▶ Communities may request their own data at NO COST
- ▶ In some instances, those who can DEMONSTRATE that they will be performing a FEMA-funded project may also receive MSC data at no cost.
- ▶ **Otherwise, there are fees for review of technical data for proposed projects.**

<https://hazards.fema.gov>

► **Online search portal** providing public access to data created to support FEMA flood risk map projects and FIRM updates, at **NO COST** to the user.

► **Step by Step directions** available in the [FRiSEL User Guide](#)

https://hazards.fema.gov/femaportal/wps/PA_MIPSearchEngine/help/Flood%20Risk%20Study%20Engineering%20Library%20User%20Guide.pdf



This will take you to the FRiSEL search portal. Depending on what web browser you are using, you may need to enable Compatibility Mode or otherwise adjust your browser settings in order to make all components of the application display correctly.

Constructing a Search

Flood Risk Study Engineering Library

Keyword(s) Search

Advanced Search

State	<input type="text" value="-- select --"/>	FEMA Case Number	<input type="text"/>
County	<input type="text" value="-- select --"/>	Effective Date From	<input type="text" value="e.g., mm/dd/yyyy"/>
Community Name	<input type="text" value="-- select --"/>	Effective Date To	<input type="text" value="e.g., mm/dd/yyyy"/>
Type of Data Product	<input type="text" value="-- select --"/>	Projection	<input type="text" value="-- select --"/>
Project ID/Name	<input type="text"/>	Grid Coordinate System	<input type="text" value="-- select --"/>
Originator	<input type="text"/>	Entity Type	<input type="text"/>
Contact Name	<input type="text"/>	Fiscal Year	<input type="text" value="-- select --"/>
Abstract	<input type="text"/>	Date Uploaded From	<input type="text" value="e.g., mm/dd/yyyy"/>
Flooding Source	<input type="text"/>	Date Uploaded To	<input type="text" value="e.g., mm/dd/yyyy"/>
Community ID	<input type="text"/>		

Culvert Design Resources

▶ [TDOT ROADWAY DRAINAGE MANUAL](#)

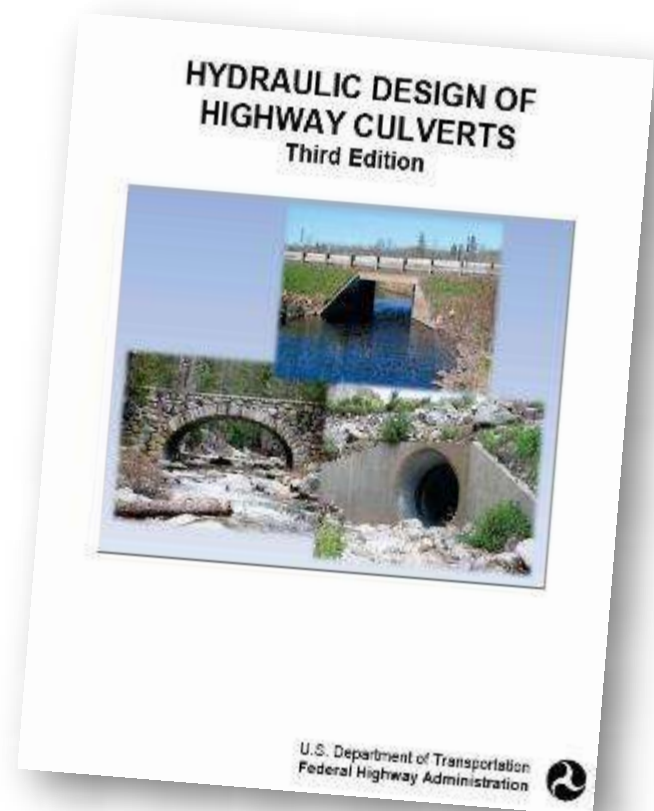
▶ [FHWA DESIGN OF CULVERTS](#)

The screenshot shows the Oklahoma Department of Transportation (ODOT) website. At the top, there is a search bar and navigation links for Traffic and Travel, What's New, Doing Business, Progress and Performance, Programs and Projects, and About ODOT. Below this, the "Roadway Drainage Design Manual" is listed with a table of contents. Each item in the table of contents is preceded by a small circular icon containing a red and white traffic sign. The items are: Preface & Table of Contents (Edition 1.0, November, 2014), Chapter 1: ODOT Administration, Chapter 2: Legal Aspects, Chapter 3: Policy, Chapter 4: Planning and Location, Chapter 5: Data Collection, Chapter 6: Documentation, Chapter 7: Hydrology, Chapter 8: Reach Site Channel, Chapter 9: Culverts, Chapter 10: Stormwater Drainage, Chapter 11: Linear Drainages, Chapter 12: Storage Facilities, Chapter 13: Erosion and Sediment Control, Chapter 14: Bank Protection, Chapter 15: Permits, and Chapter 16: Hydraulic Software. At the bottom, there is a link for "Email: Questions, Comments, or Concerns".

Roadway Drainage Design Manual

- [Preface & Table of Contents](#) Edition 1.0, November, 2014
- [Chapter 1: ODOT Administration](#)
- [Chapter 2: Legal Aspects](#)
- [Chapter 3: Policy](#)
- [Chapter 4: Planning and Location](#)
- [Chapter 5: Data Collection](#)
- [Chapter 6: Documentation](#)
- [Chapter 7: Hydrology](#)
- [Chapter 8: Reach Site Channel](#)
- [Chapter 9: Culverts](#)
- [Chapter 10: Stormwater Drainage](#)
- [Chapter 11: Linear Drainages](#)
- [Chapter 12: Storage Facilities](#)
- [Chapter 13: Erosion and Sediment Control](#)
- [Chapter 14: Bank Protection](#)
- [Chapter 15: Permits](#)
- [Chapter 16: Hydraulic Software](#)

Email: [Questions, Comments, or Concerns](#)

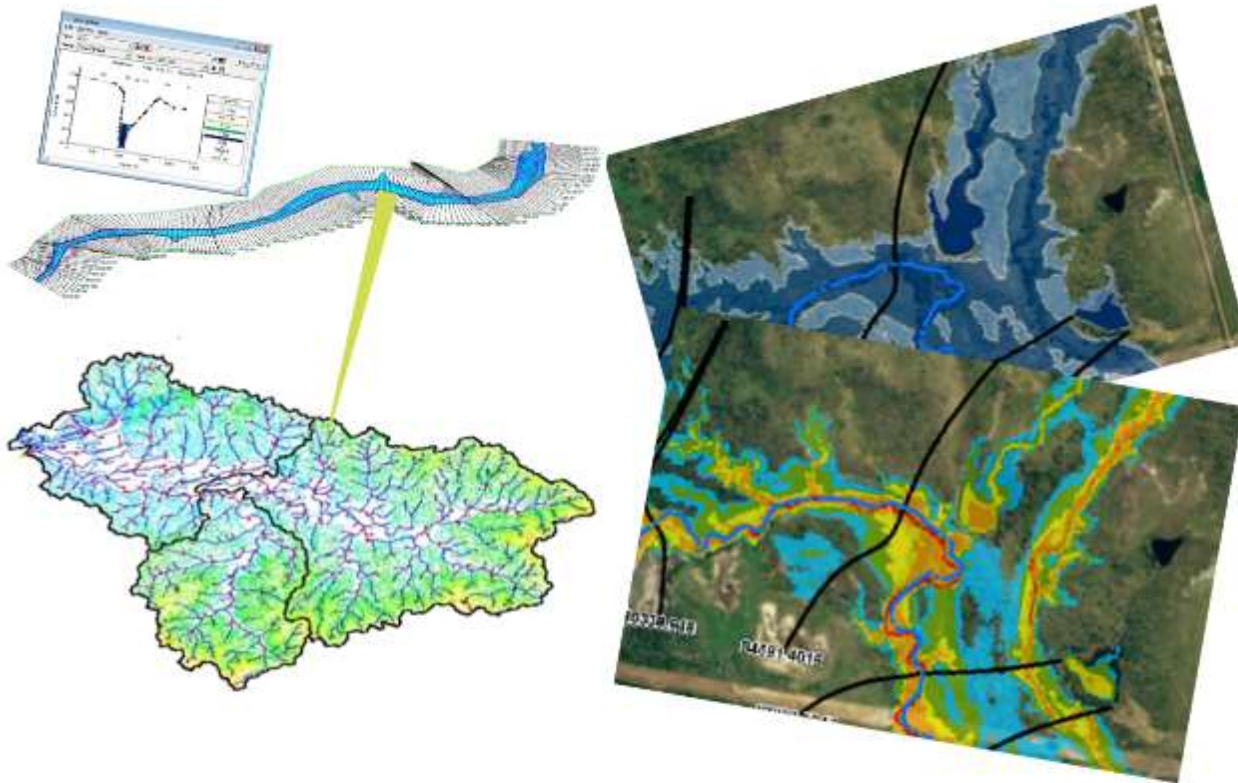




Questions

- **Various culverts within the Zone A floodplain. Most Zone A models don't always include structure information**
- **Do these damaged culverts require an H&H analysis?**
 - For Local review/submittal?
 - For post-disaster grant request?

Base Level Engineering



Credible and expandable engineering analysis and modeling for FEMA, State, communities and developers.

Data assisting the estimation of flood extents, water surface elevations and flood depths



May be adopted as Best Available Information (BAI) by communities & inform development decisions.

Welcome to the

Base Level Engineering assessments are produced using high resolution ground data to create technically credible flood hazard information that may be used to expand and modernize FEMA's current flood hazard inventory.

I Want to



Explore

View Base Level Engineering Data

Access all available Base Level Engineering data without GIS software.

- Click the **DATA LAYERS** button to add or remove map layers.
- Click the **LEGEND** tab to view an explanation of all data shown.
- Click the **MAP VIEW** button to open or close a second viewing window for side-by-side comparisons.

Estimated Base Flood Elevation Viewer

I Want to



Download

Download Datasets & Models

Download the Base Level Engineering data presented in the viewer.

- Click the **DATA LAYERS** button and add the **DOWNLOADABLE DATA** layer.
- Click shaded areas in the map to open a dialog for choosing datasets to download.

What Is My



Flood Risk?

Property Look Up

Where data is available, produce a property-specific report with estimated base flood information.

- Click the **REPORT** tab to create a flood risk report for a specific location.

Click a topic to get started!

www.infrm.us/estBFE

Estimated Base Flood Elevation (estBFE) Viewer



Create a Flood Risk Report

Search for a place

Enter an address or place of interest in the above search box. A popup will appear at the chosen location and you can create a report if BFE data are available there.

Go

My Location

Click this button to zoom the map to your actual location. A popup will appear and you can create a report if BFE data are available there.

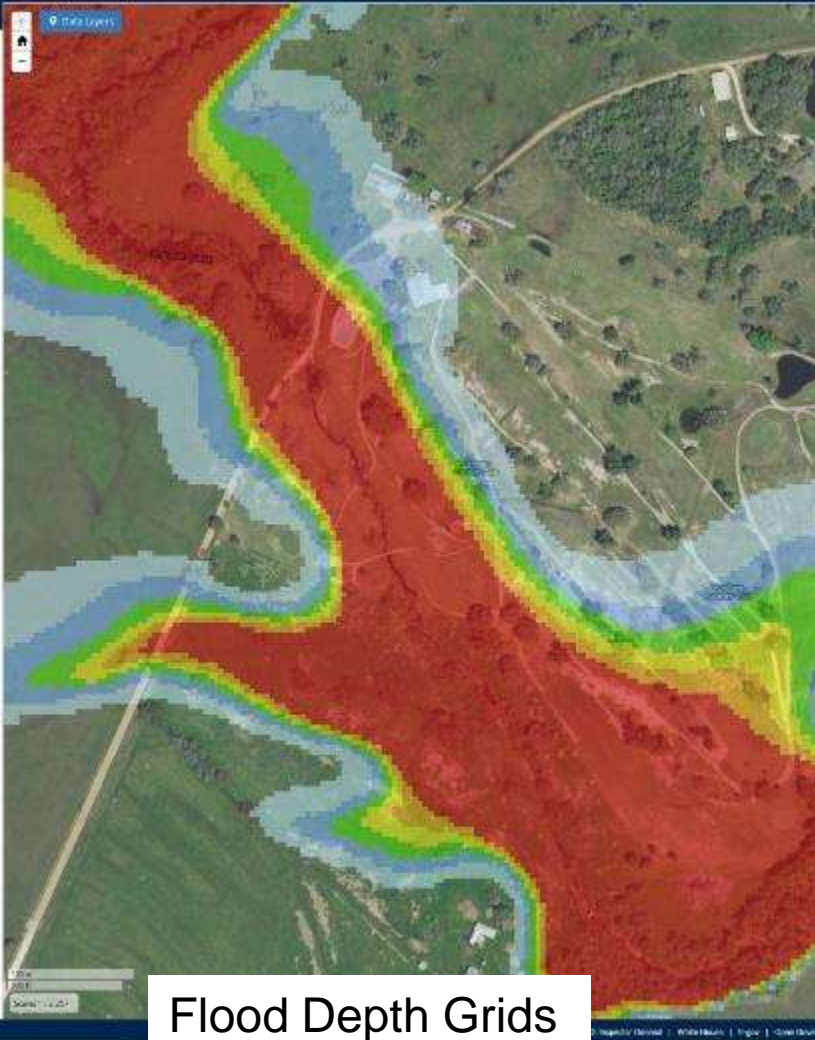
Tip: Your web browser must support and have JavaScript enabled.

Go

Map Data

Down the scale and/or zoom. Click this button and save the map. A popup will appear and you can create a report if BFE data are available there.

Tip: Click on the center of the road if you're here on the most accurate part of your address.



Flood Depth Grids



Estimated Flood Extent
– 10%, 1% and 0.2%

www.infrm.us/estBFE

https://webapps.egs.gov/infrm/estBFE/



Estimated Base Flood Elevation (estBFE) Viewer



Report

Legend



Data Layers

Map View

Base Map

Create a Flood Risk Report

More Info >

Search for a place

Enter an address or place of interest in the above search box. A popup will appear at the chosen location and you can create a report if BFE data are available there.

OR

My Location

Click this button to zoom the map to your actual location. A popup will appear and you can create a report if BFE data are available there.

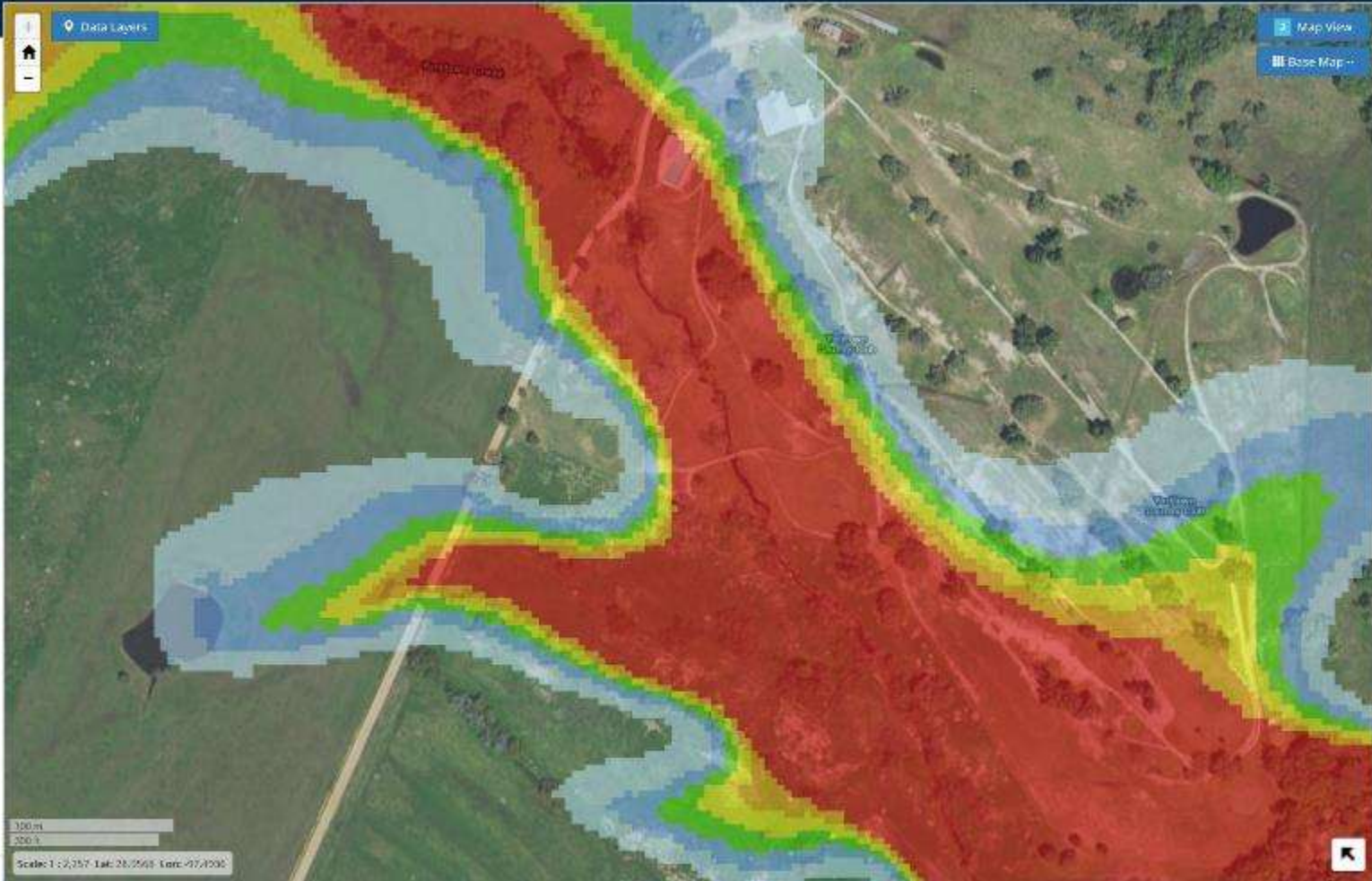
Tip: Your web browser must support and have geolocation enabled.

OR

Map Click

Zoom into your area of interest. Click this button and then the map. A popup will appear and you can create a report if BFE data are available there.

Tip: Click on the center of the roof of your home or the most upstream point of your structure.



Quick Start | Glossary | About

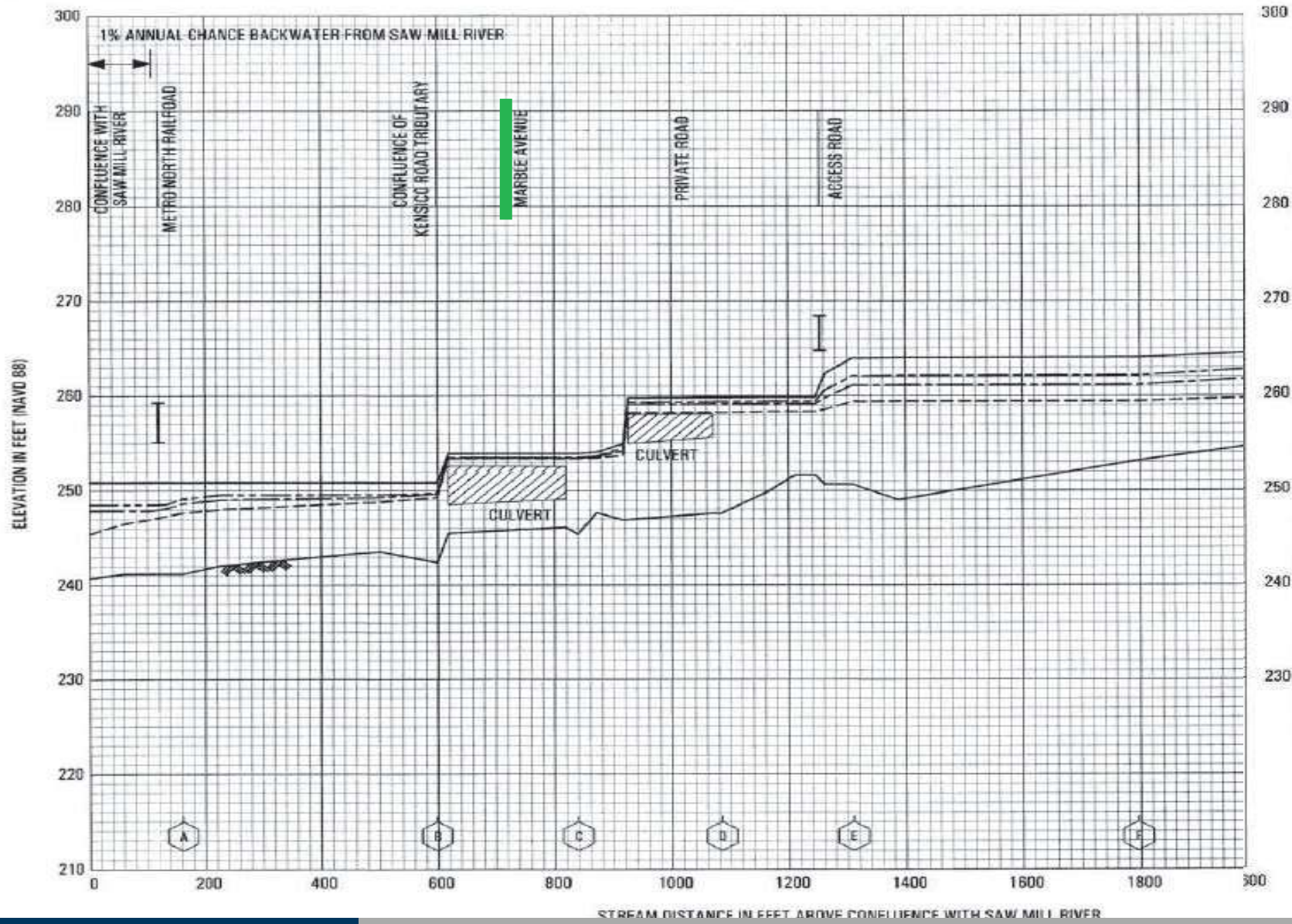
Town of Mount Pleasant, New York





Questions

- Applicant wants to increase this 42" CMP culvert to a 72" concrete box culvert using HMGP.
- Does increasing the culvert size provide a flood benefit?
- Can the applicant be funded under HMGP?
- Is an H & H study needed to justify BCA?
- Any other concerns?



FLOOD PROFILES

NANNY HAGEN BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WESTCHESTER COUNTY, NY

(ALL JURISDICTIONS)

1000

Floodway exists in the proposed project area.

- Culvert appears overtopped during all flood profiles depicted (10% thru 0.2%)
- Larger culvert will pass more water, will this cause problems downstream?

Questions



 Navigation

 Search

 Languages

Welcome to Flood Hazard Mapping Annex

The following sites are accessible to Federal Emergency Management Agency (FEMA) staff, and FEMA contractors, mapping partners, mapping program stakeholders, and National Flood Insurance Program (NFIP) map users, as well as Risk MAP staff and state, tribal, and local mitigation planners, through this page without a FEMA-provided password.

> [Expand All Sections](#)

> [Risk MAP/Floodmaps File eXchange \(FFX\) Site](#)

> [Flood Hazard Mapping Bulletin Archive](#)

> [Coastal Hazards Mapping Bulletins](#)

> [cHECK-RAS Bulletins](#)

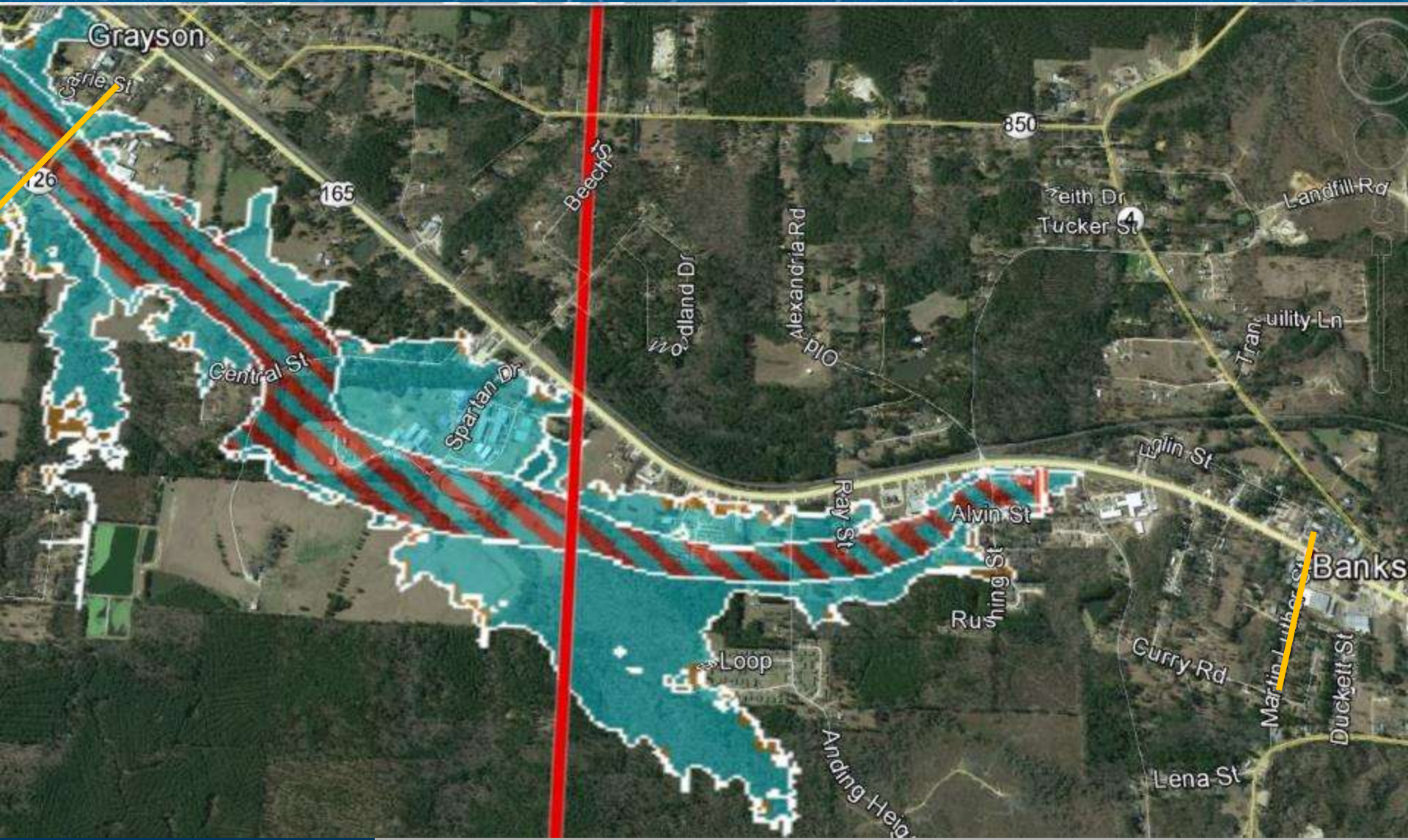
> [Quick-2 Bulletins](#)

> [National Flood Frequency Bulletins](#)

The following additional sites also are accessible to designated FEMA staff and agency representatives through this page; however, a FEMA-provided password is necessary.

 Share This Page.

[Home](#) [Download Plugins](#) [About Us](#) [Privacy Policy](#) [No Fear Act Data](#) [Freedom of Information Act](#) [Office of the Inspector General](#) [Strategic Plan](#) [Whitehouse.gov](#) [DHS.gov](#) [USA.gov](#)



Project suggests channelization from US Hwy 126 (DS) to MLK St (US)

- Potential Issues?
- Original Hydraulic Model from 1976. How can community match this modeling?

Questions

FEMA Hydraulic Modeling Considerations

Duplicate Effective

- Models may be requested from the Map Service Center
- Also check with local floodplain administrator to locate modeling
- Submittal requires duplication of the current effective modeling

Corrected Effective

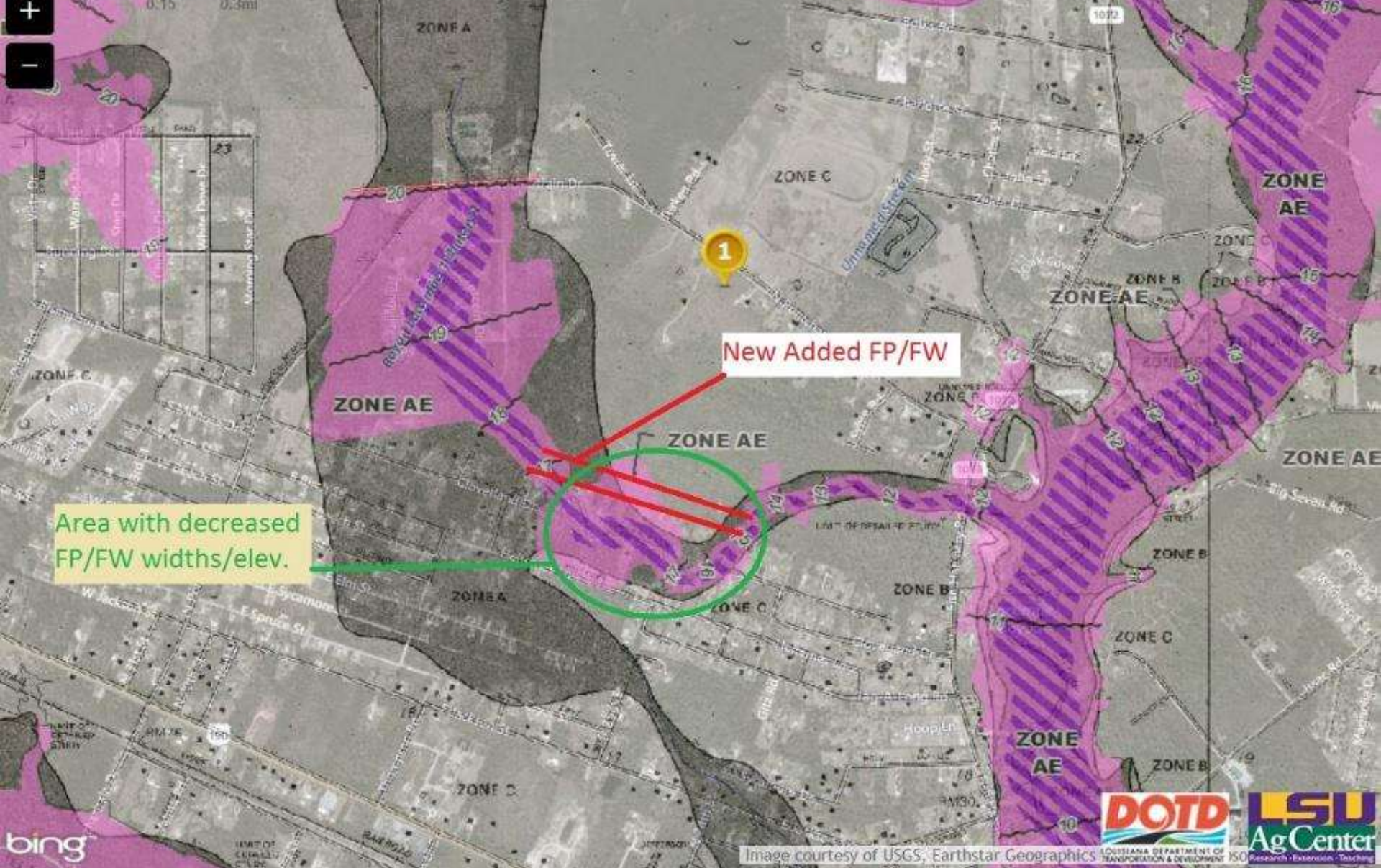
- Requestors may alter/modify and make corrections to the duplicate effective.
- Changes may include: n-values altered, stream length updates
- Suggested that one model for each set of changes is made
- Physical changes (cross-section updates and or bridge/culvert additions should NOT be included

Existing Conditions

- AKA pre-project conditions model
- Add new cross-sections (for fill placement, suggest minimum include one at start, one at end and one intermediate)
- Add structures that currently exist
- Update hydrology, if necessary
- For quicker review – it is suggested that one model for each set of changes is made

Proposed Conditions

- Add proposed project conditions
- Alter cross-sections to mimic proposed earthwork/channelization
- Alter structure geometry in modeling to show proposed bridge/culvert
- Review effects of project **Pre-Project versus Proposed Project** and determine effect of project on BFEs (is CLOMR needed?)
- Zone A or AE, no floodway → increases greater than 1.0 should require CLOMR
- Any (0.00ft) change in Zone AE with floodway requires CLOMR
- **All projects require LOMRs**



Questions

- Mitigation project proposed would create secondary channel and divert flood flow
- Review of submitted modeling indicates project would cause an increase in BFEs
 - What other options are available, if any?

Pre-Adopt Increased Risk

▶ **44CFR65.12**

- Allows community via CLOMR, then LOMR process to pre-adopt risk.
- No Insurable structures can be added.
- All adversely impacted owners notified, and approved of change.
- .

- ▶ **Once CLOMR approved, community provides FEMA copy of FP ordinance adopting increased risk.**
- ▶ **Ready to construct as proposed.**



Additional Resources

- ▶ **Guidance for Applying ASCE 24 Engineering Standards to HMA Flood Retrofitting and Reconstruction Projects (2013)**
- ▶ **Highlights of ASCE 24-14 Flood Resistant Design and Construction (2015)**
- ▶ **Highlights of ASCE 24-05 Flood Resistant Design and Construction (2010)**
- ▶ **FEMA P-312 – Homeowner’s Guide to Retrofitting (2014)**
- ▶ **FEMA P-259, Engineering Principles and Practices of Retrofitting Floodprone Residential Structures, 3rd Edition (2012)**
- ▶ **FEMA P-936 – Floodproofing Non-Residential Buildings (2013)**
- ▶ **FEMA NFIP Technical Bulletins**

Additional Resources



Mitigation Planning and the Community Rating System Key Topics Bulletin

October 2018



Table 2. FEMA Planning		
	Local Mitigation Planning	CRS Floodplain Management Planning
Objective	Identify local policies and actions that can be implemented to reduce long-term risks and future losses from natural hazards	Produce an overall strategy of programs, projects, and measures that will reduce the adverse impact of the hazard on the community and help meet other community needs
Authority	The Robert T. Stafford Disaster Relief and Emergency Assistance Act , as amended by the Disaster Mitigation Act of 2000	National Flood Insurance Reform Act of 1994, Section 541
Requirements	44 CFR §201.6. Local Mitigation Plans	<i>CRS Coordinator's Manual</i> , Activity 510 (Floodplain Management Planning)
Reference	Local Mitigation Plan Review Guide Local Mitigation Planning Handbook (2013)	<i>CRS Coordinator's Manual</i> , Activity 510 (Floodplain Management Planning)
Hazards Addressed	All natural hazards that can affect the community	Flooding and flood-related hazards, e.g., dam failure, coastal erosion, etc.
Incentive	Reduce the threat to people and losses to property caused by natural hazards	Reduce the threat to people and losses to property caused by floods
Extra Incentive	Prerequisite for FEMA mitigation grants	Reduction in flood insurance premiums
Approval	Review by the State Hazard Mitigation Officer or the state mitigation planning office with final approval by the FEMA Regional office	Approval by the Insurance Services Office, FEMA's contractor for the CRS
Updates	Required every 5 years	Required every 5 years
Requirements Checklist	Plan Review Tool in Local Mitigation Plan Review Guide	<i>510 Floodplain Management Planning Checklist</i> (Appendix 2)
Funding Support	FEMA Hazard Mitigation Assistance (HMA) grants, such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) Program, and Flood Mitigation Assistance (FMA)	Same as for mitigation planning, provided the resulting plan meets the FEMA mitigation planning requirements
Website	https://www.fema.gov/hazard-mitigation-planning	https://crsresources.org/500-2/



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Questions?



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