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# National Flood Insurance Program MT-2 Presentation

**DNRC Floodplain Engineering 101 Course - July 2010**

Joe Kuechenmeister, PE, CFM – Michael Baker Jr., Inc.

# MT-2 Presentation Overview

MT-2 WORKSHOP

- Definitions
- Brief overview of the National Flood Insurance Program (NFIP)
- Letters of Map Change (LOMC)
- Revisions – MT-2 Process
- LOMR and CLOMR Examples
- Common Errors in MT-2 Submittals
- Questions



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- Base Flood – 1% Annual chance flood (100-year)
- BFE – Base Flood Elevation
- SFHA – Special Flood Hazard Area
- FIS – Flood Insurance Study
- FIRM – Flood Insurance Rate Map
- LOMR – Letter of Map Revision
- CLOMR – Conditional Letter of Map Revision
- PMR – Physical Map Revision



- **Mapping**
  - Communities, states and Federal agencies use them as the basis for the regulating new flood-prone construction
  - Insurance agents use them when rating flood insurance policies
  - Accuracy of the maps is of the utmost importance
- **Insurance**
  - Available to all buildings in participating communities – not just ones in floodplain
  - Premiums for post – FIRM buildings are based on the degree of flood protection provided
  - Premiums for pre – FIRM buildings are subsidized by the NFIP



- Regulation
  - Community must adopt and enforce floodplain management regulations
  - Can be a politically sensitive issue
  - Communities failing to enforce regulations can be suspended from NFIP



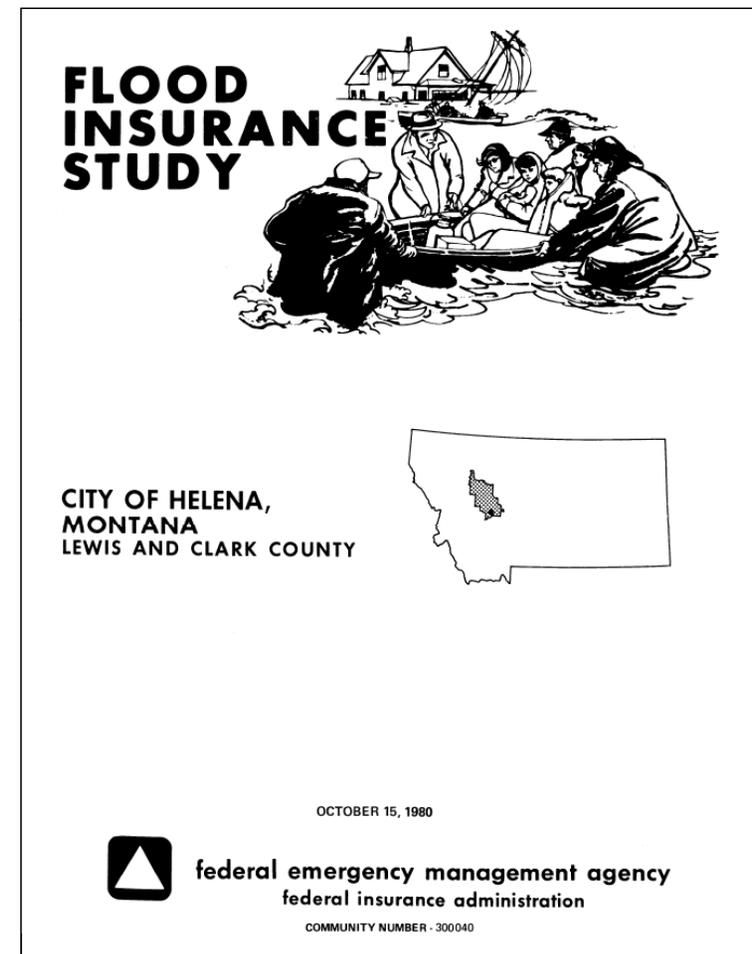
- Components of a Flood Insurance Study
  - The Report
    - FIS - Flood Insurance Study Report
  - The Maps
    - FIRM - Flood Insurance Rate Map
    - FBFM - Flood Boundary and Floodway Map (studies before 1986 two maps one showing flood boundary other floodway)



# FIS Report

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- FIS Report Includes
  - Community narrative
    - Purpose of study, Historic floods, Area and flooding source, Engineering methods
  - Vicinity Map
  - Tables summarizing flood data
    - Floodway Data Table
    - Summary of Discharges Table
  - Flood profiles



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# Flood Insurance Rate Map (FIRM)

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- Flood Insurance Rate Map Includes
  - Floodplain Delineation
  - Floodways
  - Base Flood Elevations (BFEs)
  - Cross Sections
  - Benchmarks
  - Base map data (roads, corporate limits, ect...)

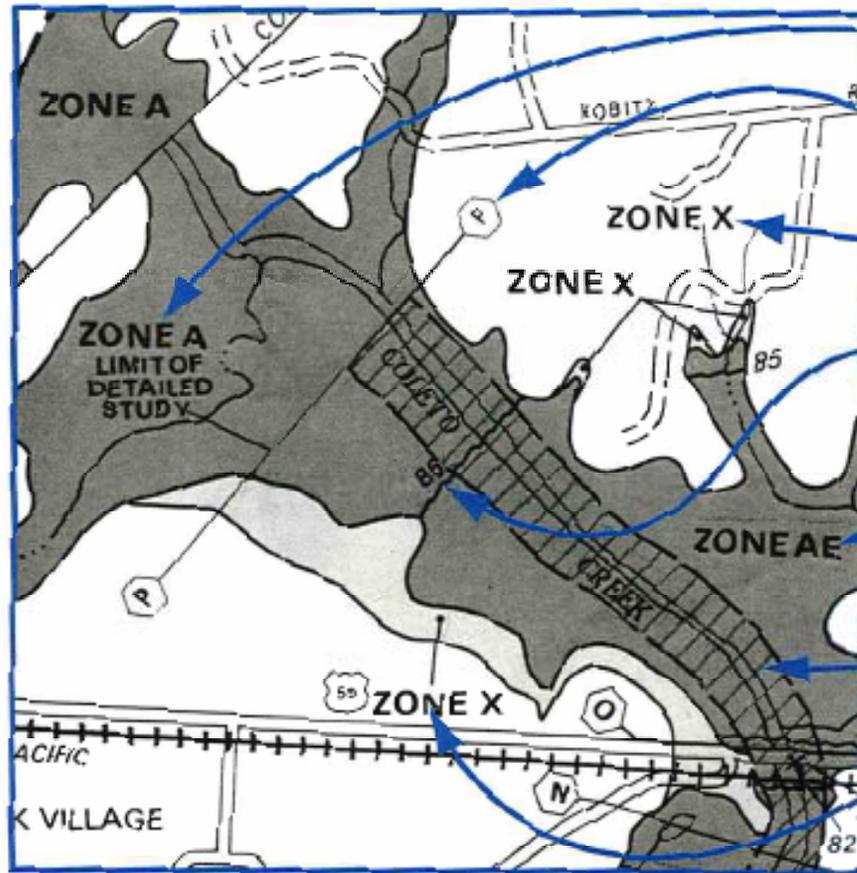


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# Flood Insurance Rate Map

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- 1 Zone A** (unnumbered) is flood hazard areas without BFEs.
- 2 Cross Section** location (see page 14).
- 3 Zone X** (unshaded) is all other areas considered low risk (formerly Zone C).
- 4 Base Flood Elevation (BFE).** Water surface elevation of the base flood at specific locations.
- 5 Zone AE is the 100-year** (1% annual chance) floodplain (also called Zone A, A1-A30).
- 6 The Floodway** is the "cross-hatched" area.
- 7 Zone X** (shaded) shows low risk areas affected by the 500-year flood (0.2% annual chance) floodplain (also called Zone B).

TEXAS QUICK GUIDE



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# Letters of Map Change - LOMC

MT-2 WORKSHOP

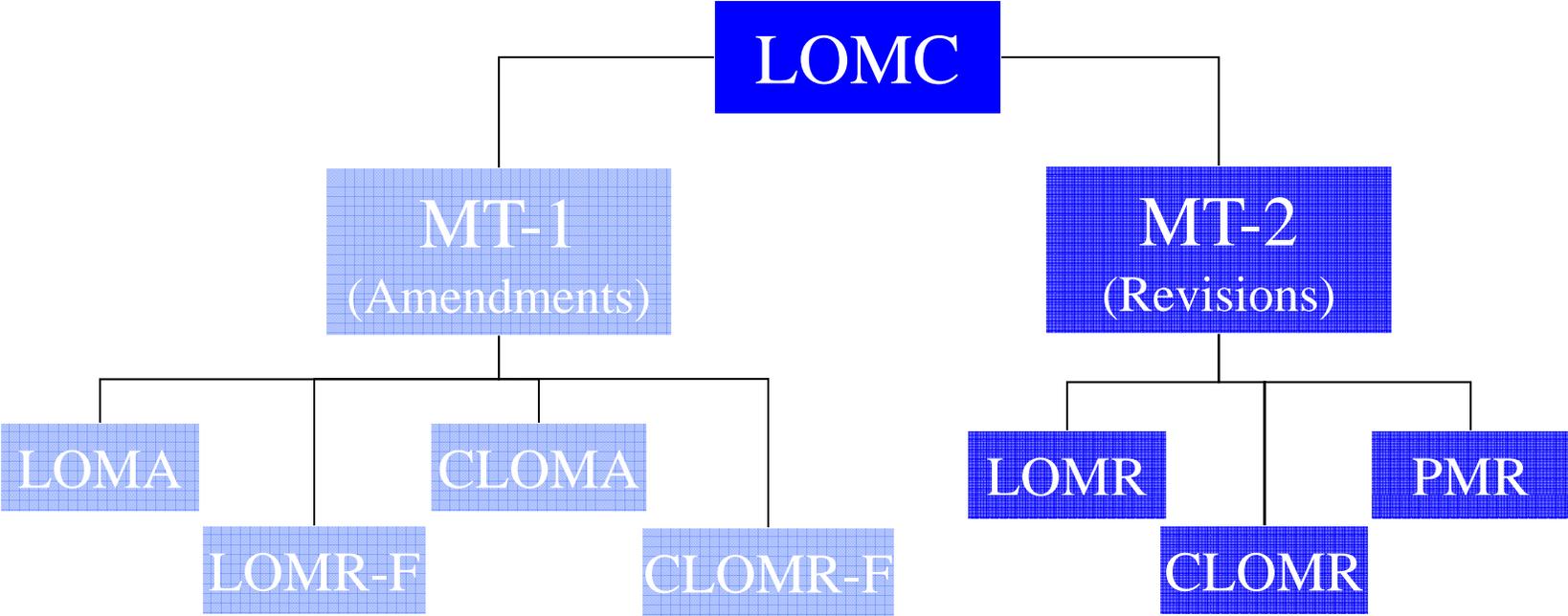
- The FIS and FIRMs are prepared with rigorous technical standards
- Although – Changes are sometimes necessary
  - Improved techniques
  - Physical changes
  - New Data
  - Limitations of Scale
- LOMC processes allow to revise the FIRM and FIS.



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# Letters of Map Change - LOMC



# Letters of Map Change - LOMC

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- **Amendments:**
  - Structures or legally defined parcels
  - Based on the effective FIRM and FIS
  - Does not typically involve an engineering analysis
  - Does not involve changes in BFE
  - Can not be used for properties in some flood areas (alluvial fan)
  - Requires submittal of MT-1 Forms
- **Revisions:**
  - More complex map changes
  - Not usually lot or structure specific
  - Typically involves H&H analysis
  - Requires submittal of MT-2 Forms
- **MT-1:**
  - LOMA
  - LOMR-F
  - CLOMA
  - CLOMR-F
- **MT-2:**
  - LOMR
  - CLOMR
  - PMR



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# Revisions – MT-2 Process



- LOMR – Letter of Map Revision
  - Revises the effective map to show changes in BFEs, floodplains, and floodways
  - FIRM and FIS report are not republished, but annotated maps, profiles, and tables are attached to letter
  - Must be based on as-built or current existing conditions
- CLOMR – Conditional Letter of Map Revision
  - CLOMRs are for proposed projects prior to construction
  - FEMA’s comment on the effects that a proposed project would have on the FIRM and FIS
  - Does not revise FIRM and FIS; must be followed by a LOMR request when the project is completed



- **PMR – Physical Map Revision**
  - FEMA review of hydrologic/hydraulic analyses and mapping submitted by community
  - The review is conducted under the MT-2 process but the FIRM and FIS revisions are produced separately
  - Republish FIRM and FIS report to incorporate changes in BFEs, floodplains, or floodways
  - Resolves protests and technical appeals
  - Revalidate LOMAs/LOMR-Fs as needed



# LOMR verses PMR

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- **LOMR:**
  - Typically
    - Revision is Small
    - Decreases or minimal increases
  - Advantages
    - Faster
    - Less Expensive
  - Disadvantages
    - Limited Distribution
- **PMR:**
  - Typically
    - Revision is Extensive
    - Flood hazard increases or new flood hazards are established
  - Advantages
    - Larger Distribution
  - Disadvantages
    - More Expensive
    - Slower
    - Dependant on Regional Funds



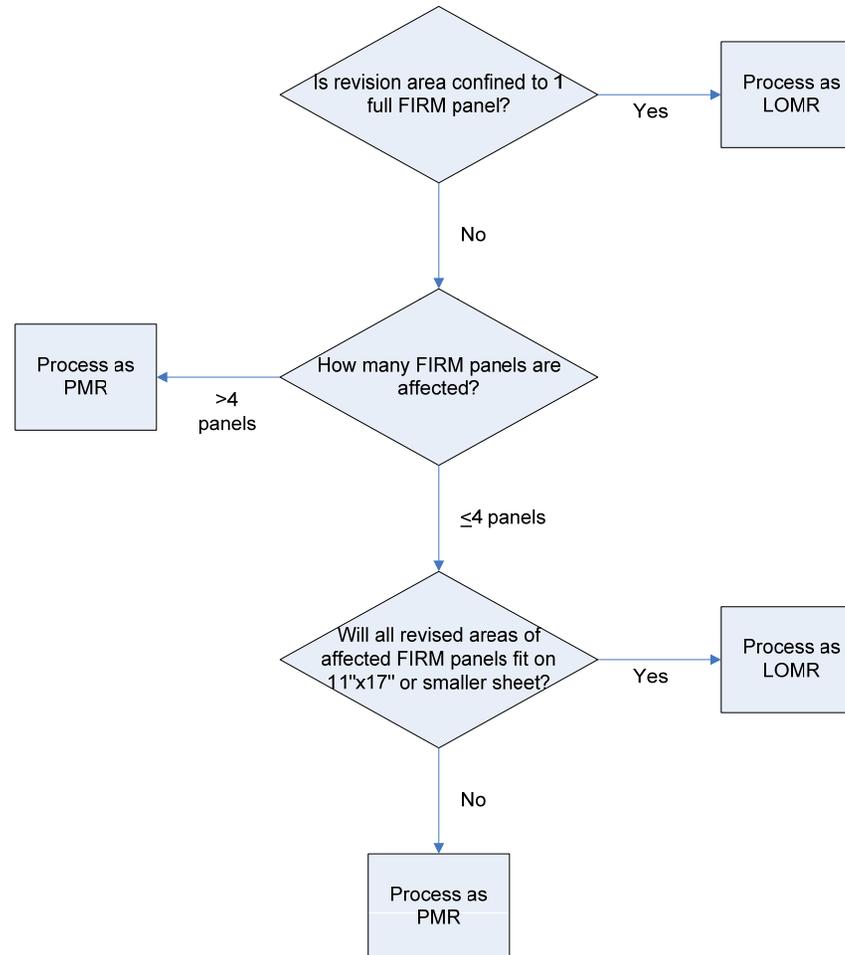
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# LOMR verses PMR

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Decision Work Flow for Differentiating LOMRs and PMRs



Refer to Handout



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- **Basis for Revisions:**
  - **New or More Detailed Analyses**
    - Updated hydrology
    - Additional hydraulic information (more cross sections, etc.)
    - New topographic information
    - No previous study (Zone A)
  - **Physical Changes**
    - Projects (bridge/culvert, channelization, levee, etc.)
    - Natural Changes (erosion, subsidence, bridge/culvert removal, etc.)
  - **Error Corrections**



- When is a LOMR Required
  - Any change (increases or decreases) in BFE resulting from physical changes.
  - Requests involving:
    - Floodway changes
    - Changes or properties In alluvial fan areas
    - Changes in coastal high hazard areas
  - A LOMR following an approved CLOMR must be submitted within six months after the project has been completed



- **When a CLOMR is Required**
  - Proposed projects that:
    - Encroach upon the floodway and cause an increase  $> 0.00$  ft
    - Encroach upon a floodplain when a floodway has not been established and causes an increase of  $> 1.00$  ft
      - Includes all existing and anticipated development - 60.3(c)(10)
      - Includes Approximate Zone A
        - May require development of a model
  - What is an increase
    - Comparison between pre-project (existing conditions) and post project (proposed conditions) model



# CLOMR Requirements

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- **Project Built without CLOMR**
  - Coordination with FEMA Headquarters and Regional Office
  - Coordinate with Floodplain Administrator on submitting a no-rise analysis
  - Mitigate increase
  - Return to previous condition
  - Possible violation
  - Possible probation/suspension from NFIP



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# CLOMR/LOMR Requirements

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- Required for All LOMRs and CLOMRs
  - MT-2 Forms
    - Available at: [http://www.fema.gov/plan/prevent/fhm/dl\\_mt-2.shtm](http://www.fema.gov/plan/prevent/fhm/dl_mt-2.shtm)
  - Fee
    - Check [www.fema.gov/plan/prevent/fhm/frm\\_fees.shtm#2](http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm#2) for latest fees
    - Some request are eligible to be fee exempt
  - Project Narrative
    - Optional, but very helpful
  - Annotated FIRM and/or FBFM
  - Data certified by a registered professional engineer or licensed surveyor
  - Revision request acknowledged by all impacted communities



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- Mapping or analysis error
- Effects of natural changes
- Adding detail to a Zone A
  - Not including manmade modifications
    - Bridges, culverts, fill, grading, drop structures, etc.
- Flood-control projects that are 50% Federally funded
- Improved data
  - Not including manmade modifications
    - Bridges, culverts, fill, drop structures, etc.
- Floodway Revision



# Obtaining Backup Data

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- Map Service Center
  - FIRMs, FISs, and most completed LOMCs
- FEMA Library
  - Backup FIS and LOMC data
- Mapping Information Platform (MIP)
  - LOMCs, DFIRM data
  - Future – Backup FIS and LOMC data



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# Obtaining Backup Data - MSC

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- Effective FIRMs and FISs
  - FEMA Map Service Center - <http://msc.fema.gov>
    - Copies of Effective FIRMs (FBFMs), and FISs
    - Can order paper copies, or be obtained online
    - PDF copies of most completed LOMCs

The screenshot shows the FEMA Map Service Center website. At the top, there is a navigation bar with the FEMA logo and the text "Map Service Center". Below this is a red banner with links: "Product Catalog | Map Search | Quick Order | Digital Post Office | Help".

The main content area is divided into several sections:

- Product Search by...:** A search form with tabs for "Address" and "Map Panel ID". Under "Address", there is a dropdown menu for "1) Select a Product:" (currently showing "Flood Maps") and input fields for "2) Enter an Address:" (Street, City, State, Zip). A "Search by Street Address" button is at the bottom.
- New to the FEMA Map Service Center?:** A list of links for new users: Homeowners/Renters, Real Estate Flood Determination Agents, Insurance Agents, Engineers/Surveyors, and Federal Exempt Customers.
- What are you looking for?:** A list of links: Flood Maps, FIRMettes, DFIRM Databases, MapViewer - Web, and Documents, Publications & Forms.
- More Information:** A list of links: How do I find the flood map for my area?, What is a FIRMette?, How do I find a LOMC?, Definitions of FEMA Flood Zone Designations, Product Information, Price List, How to Order, and Need Assistance?
- Announcements:** A section titled "Fee Changes For FEMA Contractors" with a sub-header "Starting May 4, 2009 all FEMA Contractors will now pay for paper products. Digital products will remain the same. Please refer to PM 48 for more information."
- FIRMette - Desktop (F-MIT):** A section titled "Update. The Map Service Center now has version 2.3 of the FIRMette - Desktop viewer (formerly F-MIT) available for download. This new version supports FIRMette creation for both two color and black and white maps. You can download it here. (learn more)"
- MapViewer - Desktop (Beta):** A section titled "FEMA is developing a simple tool for viewing GIS flood data. A beta of this tool can be downloaded here. (learn more)"
- Log On:** A login form with fields for "User ID (email address):" and "Password:", and buttons for "Log on" and "Clear". There are also links for "Forgot Password?", "Register", and "Why register?"
- NFHL:** A section titled "National Flood Hazard Layer (learn more)" with links for "View the NFHL Online using MapViewer - Web", "Order NFHL GIS Datasets by state on DVD", "Use Web Map Service in your own GIS application", and "Use Web Map Service in Google Earth™".
- FIRMette Tutorial:** A section titled "Learn how to create FIRMettes. They're free!" with a small map image and a link "Click here to learn how to create a FIRMette."
- Los Angeles County Unincorporated and Incorporated Areas, California Letter of Map Revision Available:** A box with "Case Numbers: Several - Click to View" and "Effective date: September 29, 2008".
- San Bernardino County, California Letter of Map Revision Available:** A box with "Case Number: 08-09-1595P" and "Effective date: August 29, 2008".
- City of Sacramento, Sacramento County, California Letter of Map Revision Available:** A box with "Case Number: 07-09-0266P" and "Effective date: February 21, 2007".
- City of North Platte, Nebraska Letter of Map Revision Available:** A box with "Case Number: 07-07-0322P", "Effective date: July 7, 2008", "- and -", "Case Number: 04-07-A439P", and "Effective date: May 4, 2006".



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# Obtaining Backup Data - Library

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- **FIS and LOMC Backup Data**
  - External Data Requests must be in writing
    - Send requests via U.S. mail
    - Forms and instructions available on the FEMA web site [http://www.fema.gov/plan/prevent/fhm/st\\_order.shtm](http://www.fema.gov/plan/prevent/fhm/st_order.shtm)
  - Average Request takes 2 to 3 weeks to fill
  - Initial cost of \$150
    - Additional hourly costs of \$33 per hour
    - Average total cost is \$190
  - FEMA Library – (703) 236-7461



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# Obtaining Backup Data - MIP

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- MIP – Mapping Information Platform
  - <https://hazards.fema.gov>
  - Data Available Now
    - LOMC Reports
      - Under Tools & Links/Public Reports
    - DFIRM data
      - Access through Arc GIS
  - Data Available in the Future
    - FIS Backup Data

The screenshot shows the Mapping Information Platform (MIP) website. The header includes the title "Mapping Information Platform" and the FEMA logo. A navigation menu contains links for Home, Map Modernization, News & Events, Tools & Links, Learning, and Map Viewer. The main content area is divided into several sections: "Tips and Tutorials" with links to "How to Read a Flood Map", "Read a Flood Insurance Study", and "Become a Cooperating Technical Partner"; "Tools For Professionals" with links to "DFIRM Production Tools" and "WISE (includes Scoping Tools)"; "Questions?" with contact information for technical support; "News and Highlights" with links to "DFIRM Production Tools Now Online" and "Expanded WISE Modules Available"; "Upcoming Events" listing conferences in Los Angeles, San Francisco, and Reston, VA; "Grant Opportunities" with a link to "To help communities prepare for and respond to disasters, FEMA has three mitigation grant programs..."; and a "Map Viewer" section with input fields for Street, City, State, and ZIP Code, and buttons for "Create Map" and "Proceed to Map Viewer". A "Contact Center" section is also present with links to "Contact Center Main Page", "Application Assistance", "Flood Map Knowledge (MSC)", "Community Information", and "FAQ's".



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## “Guidelines and Specifications for Flood Hazard Mapping Partners”

- [www.fema.gov/plan/prevent/fhm/gs\\_main.shtm](http://www.fema.gov/plan/prevent/fhm/gs_main.shtm)
- 3 Volumes with 14 Appendices
  - Volume 2: Map Revisions and Amendments
  - Appendix C: Guidance for Riverine Flooding Analyses and Mapping

## National Flood Insurance Program (NFIP) Regulations

- [www.access.gpo.gov/nara/cfr/waisidx\\_02/44cfrv1\\_02.html](http://www.access.gpo.gov/nara/cfr/waisidx_02/44cfrv1_02.html)
- Chapter 44 of the Code of Federal Regulations (44 CFR)
  - Parts 60, 65, and 72 apply to MT-2 LOMCs



# Roles in the Review Process

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- Technical Review of Request
  - Michael Baker Jr., Inc. – FEMA Region 8
- Final Review and Signature
  - FEMA Headquarters
- Technical assistance and violation resolution
  - FEMA Regional Offices

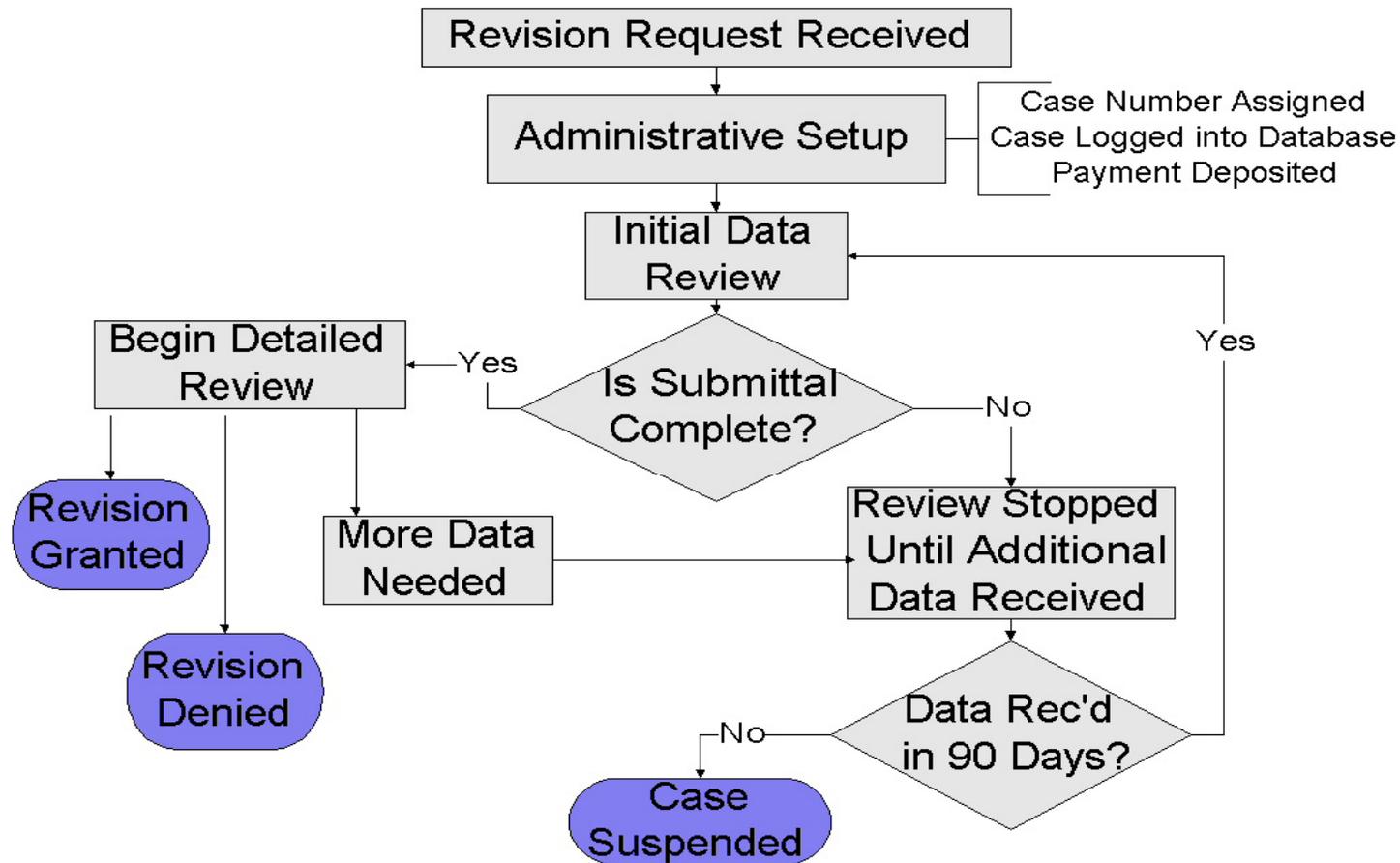


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# The FEMA Review Process

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# When is my LOMR Effective

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- LOMRs

Revision Type	Circumstances	Effective Date
SFHA and/or BFEs Decrease	None	Effective on Date of LOMR
SFHA and/or BFEs increase	Property owner notification and acceptance, community has compliant ordinances	Effective on Date of LOMR
SFHA (only) increase	Property owner notification, no acceptance, community has compliant ordinances	Effective 30 days after Date of LOMR
SFHA and/or BFEs increase	Property owner notification, no acceptance, community has compliant ordinances	Effective after 90 day appeal period elapses
SFHA and/or BFEs increase	Property owner notification, no acceptance, community does not have compliant ordinances	Effective 6 months after Date of LOMR



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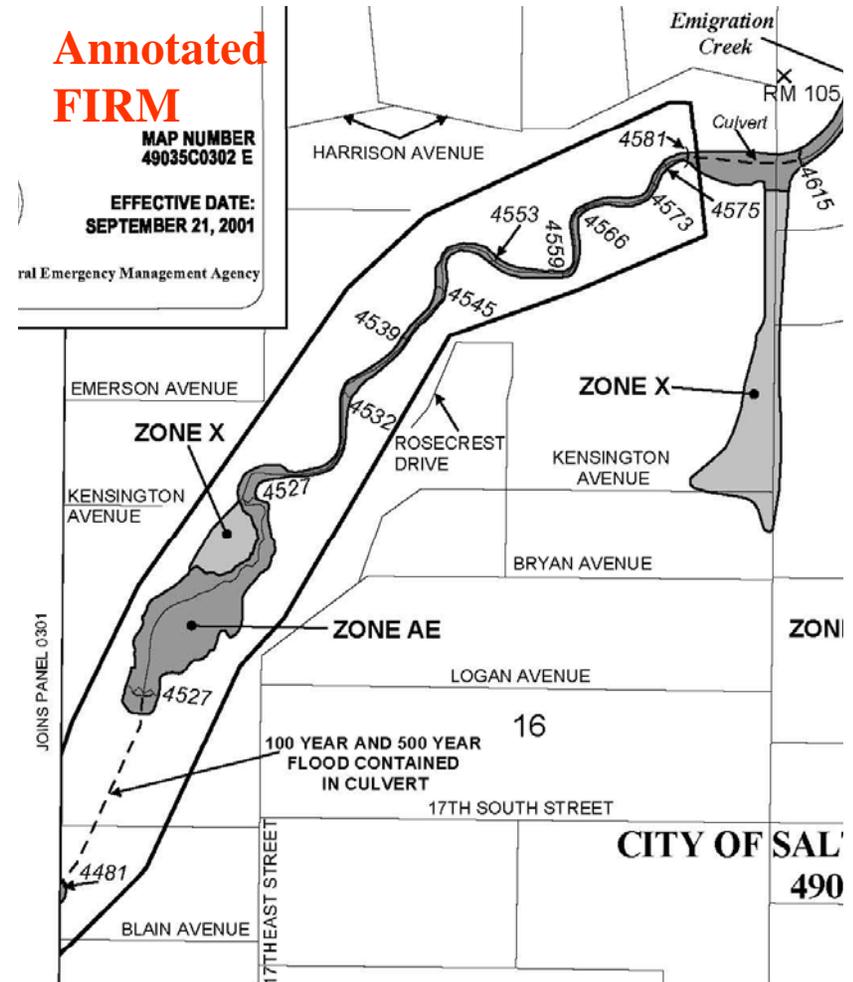
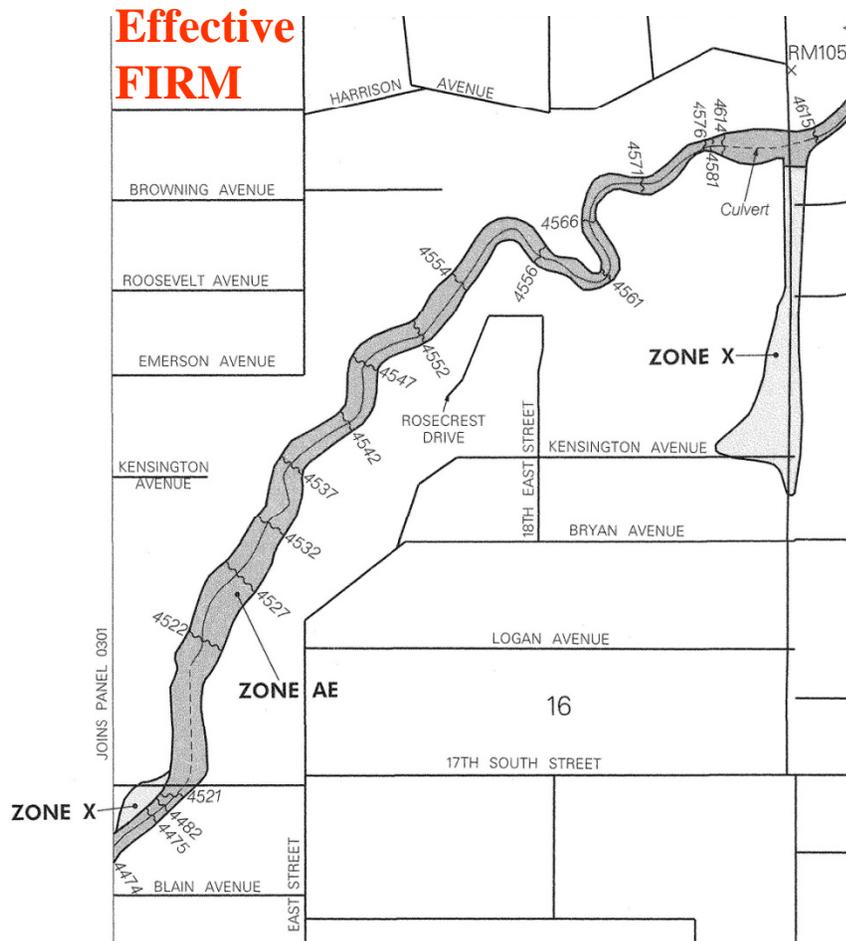
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# Examples



# LOMR Example – Detention Pond

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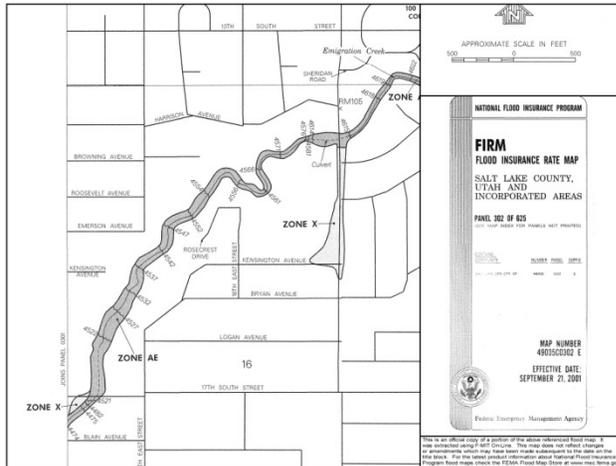


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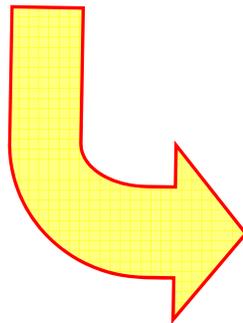
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# Creating Annotated Maps

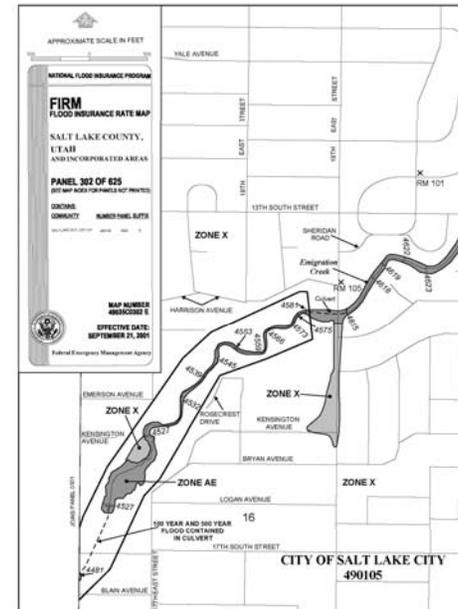
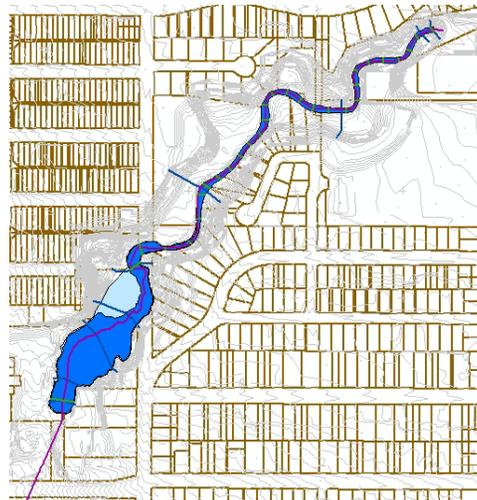
MT-2 WORKSHOP



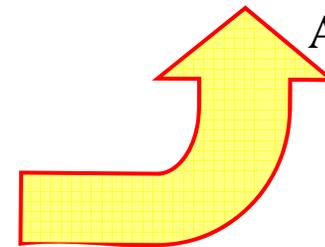
Effective FIRM



Work Map



Annotated FIRM

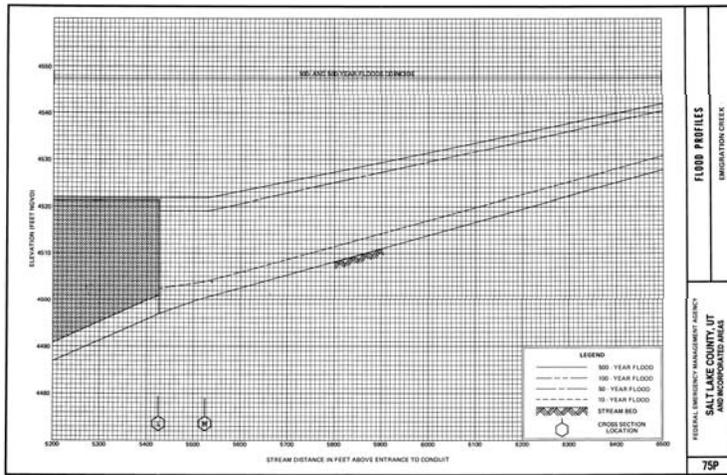


FEMA

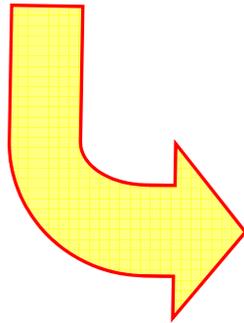
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# Creating Annotated Profile

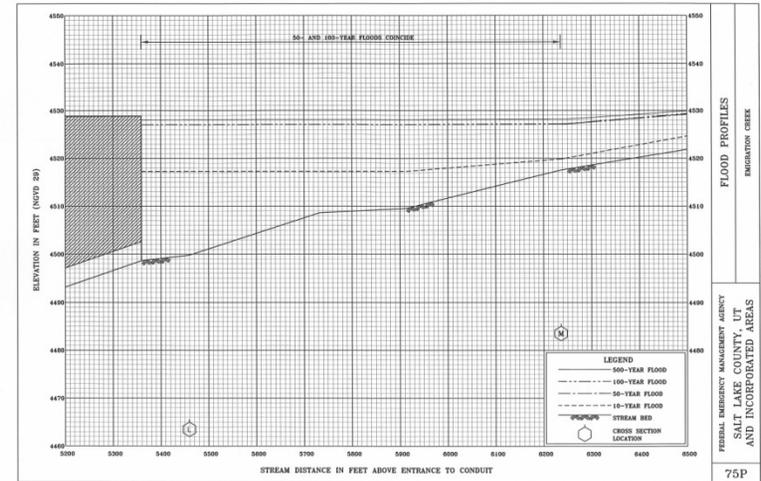
MT-2 WORKSHOP



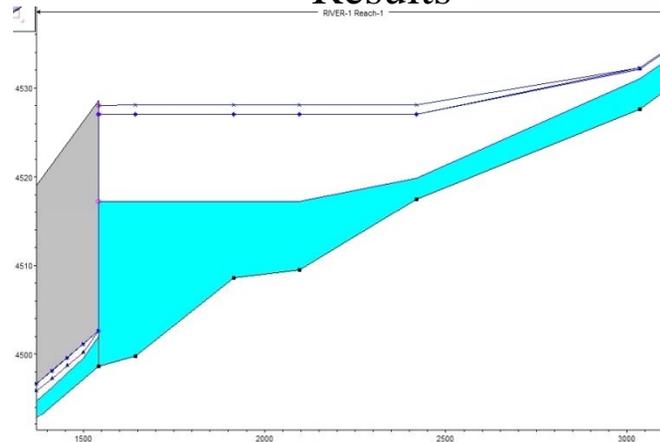
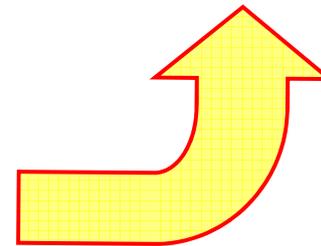
Effective Profile



Model Results



Annotated Profile



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# LOMR Determination Documents

MT-2 WORKSHOP

**Federal Emergency Management Agency**  
Washington, D.C. 20472  
January 26, 2009

**CERTIFIED MAIL**  
RETURN RECEIPT REQUESTED

**IN REPLY REFER TO:**  
Case No. 08-08-0719P  
Community Name: City of South Jordan, UT  
Community No. 480377  
Effective Date of This Revision: June 19, 2009

Dear Mayor Mayoy:

The Flood Insurance Study report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please see the national insurance map posted on the LOMR for flood insurance purposes and for all flood insurance policies and contracts issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures before to determine which documents are enclosed. Close attention specific to the request may be included or referred to in the Determination Document. If you have any questions regarding flood insurance regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Construction Coordination Office for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denver, Colorado at (303) 233-4834, or the FEMA Map Assistance Center toll free at 1-877-366-2677 (1-877-FEMA-MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,  
*Bob A. Norton*

Bob A. Norton, CFM, Program Specialist  
Engineering Management Branch  
Mitigation Directorate

For: William P. Blinnis Jr., CFM, Chief  
Engineering Management Branch  
Mitigation Directorate

List of Enclosures:  
Letter of Map Revision Determination Document  
Annotated Flood Insurance Rate Map  
Annotated Flood Insurance Study Report

cc: The Honorable Bill Applegate, Mayor, City of Everett  
Mr. Tom Bendure, P.E., Assistant City Engineer  
Mr. Brad Krause, P.E., City Engineer  
Mr. Kyle D. Monroe, P.E., Street Consulting Inc., City of South Jordan

Page 1 of 6 Issue Date: January 26, 2009 Effective Date: June 19, 2009 Case No.: 08-08-0719P LOMR-075

**Federal Emergency Management Agency**  
Washington, D.C. 20472

**LETTER OF MAP REVISION DETERMINATION DOCUMENT**

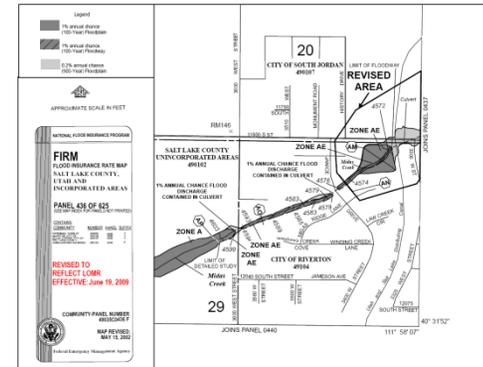
COMMUNITY AND LOCATION OF REVISION	PROJECT DESCRIPTION	AREA OF REVISION
COMMUNITY: City of South Jordan, Salt Lake County, Utah	COMMODIFICATION: COLLECTOR	FLOODING: HYDRAULIC ANALYSIS, NEW TOPOGRAPHIC DATA
COMMITTEE NO.: 0810A		
ENGINEER: Mike Cook (Signature)	APPROXIMATE LATITUDE & LONGITUDE: 40.351, -111.940	FORMER: Previous Insurance Studies: NONE (08-04)
ANNOTATED MAPS ENCLOSED:	ANNOTATED STUDY ENCLOSURES:	
TYPE: FIRM NO. 4803770007 DATE: May 19, 2009	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: May 19, 2009	
TYPE: FIRM NO. 4803770007 DATE: May 19, 2009	PROJECT'S ZIP CODE: FLOODING DATA VALUE: 11	

**FLOODING SOURCES & REVISION REACHES**  
Midas Creek - from approximately 750 feet downstream of 17025 South Street to approximately 150 feet downstream of Jordan Drive

Flooding Source	Structure Flooding	Revised Flooding	Increase	Decrease
Midas Creek	Zone A (Unshaded)	Zone A (Unshaded)	YES	YES
	Zone B (Shaded)	Zone B (Shaded)	YES	YES
	Zone C (Hatched)	Zone C (Hatched)	YES	YES

**DETERMINATION**  
This document provides the determination that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) is issuing a Letter of Map Revision (LOMR) for the area described herein. Using the information available, we have determined that it is in the public interest to issue the Flood Insurance Study (FIS) report and/or Flood Insurance Rate Map (FIRM) which is described herein. This determination is based on the information provided to FEMA and is subject to the approval of FEMA. Please see the enclosed determination document for more information regarding this LOMR for flood insurance purposes and for all flood insurance policies and contracts in your community.

Bob A. Norton, CFM, Program Specialist  
Engineering Management Branch  
Mitigation Directorate  
10000 S.A. 1280700-0 00-00-00



Cover Letter

Determination Document

Annotated FIRM

CROSS SECTION	DISTANCE <sup>a</sup>	FLOODWAY		WATER SURFACE ELEVATION		FLOODWAY		
		WIDTH (FEET)	DEPTH (FEET)	REGULATORY (FEET)	ACTUAL (FEET)	INCREASE	DECREASE	
MIDAS CREEK								
AA	12,036	73	144	6.5	4,457.0	4,457.0	4,457.1	0.1
AB	12,207	44	120	6.4	4,461.7	4,461.7	4,462.3	0.6
AC	12,972	115	169	5.6	4,466.6	4,466.6	4,466.7	0.1
AD	13,847	52	146	6.4	4,471.3	4,471.3	4,471.7	0.4
AE	14,205	27	88	9.9	4,476.1	4,476.1	4,476.3	0.2
AF	14,629	39	75	9.6	4,480.3	4,480.3	4,480.1	-0.2
AG	15,137	17	74	11.7	4,485.4	4,485.4	4,485.4	0.0
AH	15,777	27	86	10.1	4,500.2	4,500.2	4,500.2	0.0
AI	16,481	49	150	5.4	4,518.8	4,518.8	4,518.9	0.1
AJ	16,262	40	98	8.9	4,561.3	4,561.3	4,561.3	0.0
AK	16,812	40	98	8.9	4,561.1	4,561.1	4,561.1	0.0
AL	16,442	37	146	6.0	4,557.2	4,557.2	4,557.2	0.0
AM	16,091	33	402	2.2	4,570.6	4,570.6	4,570.2	-0.4
AN	15,637	12	123	8.3	4,574.8	4,574.8	4,574.6	-0.2
AO	15,426	28	144	6.3	4,576.0	4,576.0	4,576.7	0.8
AP	22,141	32	92	9.2	4,603.8	4,603.8	4,603.8	0.0

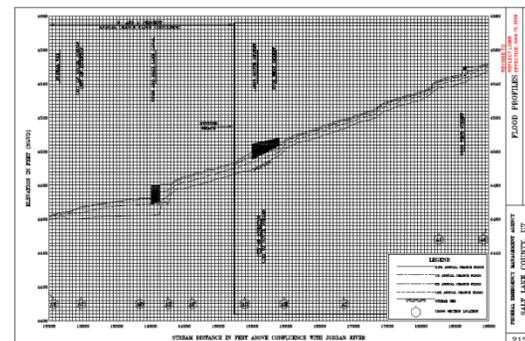
<sup>a</sup> Screen distance in feet above confluence with Jordan River

REVISED TO REFLECT LOMR EFFECTIVE: June 19, 2009

FEDERAL EMERGENCY MANAGEMENT AGENCY  
SALT LAKE COUNTY, UT  
AND INCORPORATED AREAS

FLOODWAY DATA  
MIDAS CREEK

Annotated FIS Tables



Annotated FIS Profiles

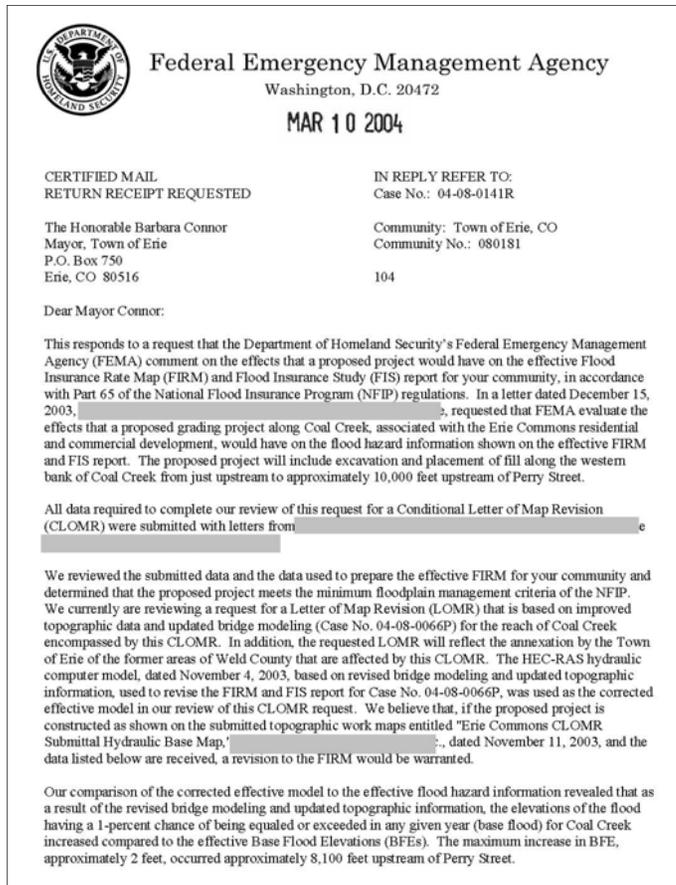


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# CLOMR 104 Letter

MT-2 WORKSHOP



## • Typical Elements of a CLOMR Letter

- Project Description
- FEMA's Comment
- Comparison of Changes
- LOMR submittal requirements
  - Include a copy of CLOMR letter with LOMR submittal (optional but helpful)
- Community Information



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# Common Mistakes in MT-2 Submittals



## → General

- Hydrologic
- Hydraulic/Mapping
- Hydraulic Modeling



- MT-2 forms
- Community Acknowledgement
  - Multi-community LOMRs
  - Annexation
- Complying with State and local regulations
  - Can be more restrictive than the federal standards
- Notifications
  - Increase in SFHA and/or BFE
  - Floodway public notice
  - CFR 44 Regulation 65.12
- Incorrect Fees
  - NEW fees as of January 13, 2010
  - [www.fema.gov/plan/prevent/fhm/frm\\_fees.shtm#2](http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm#2)



- No back-up provided
- No as-builts provided
- Incorrect effective Info
  - Check for effective LOMRs in revision area
- Levees
  - No 65.10 back-up
  - Not recognizing man-made structures as levees
  - Incorrectly modeling/mapping uncertified levees
- Not including an annotated FIRM



# Common Mistakes

MT-2 WORKSHOP

- General
- Hydrologic
- Hydraulic/Mapping
- Hydraulic Modeling



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- Unaccepted models/methodology
  - [www.fema.gov/plan/prevent/fhm/en\\_modl.shtm](http://www.fema.gov/plan/prevent/fhm/en_modl.shtm)
- Revisions based on changed discharges
  - Maps will not be revised when discharges change as a result of alternative methodology unless change is statistically significant
    - 50% confidence interval test (Guidelines and Specs – Appendix C)
    - 0.5 foot BFE test (Guidelines and Specs – Appendix C)
- No back-up for models
  - Time of Concentration (TC) calculations, Curve Number (CN) data, etc.



# Common Mistakes

MT-2 WORKSHOP

- General
- Hydrologic
- Hydraulic/Mapping
- Hydraulic Modeling



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# Hydraulic/Mapping Mistakes

MT-2 WORKSHOP

- Topographic Info
  - Not legible
  - Not extensive enough
  - No vertical datum
  - Not labeled
- Workmaps
  - Cross Sections not shown
  - 500-yr, floodway, etc. not shown
  - Stream centerline or streamline not shown
  - Extraneous information
  - Not providing digital copies

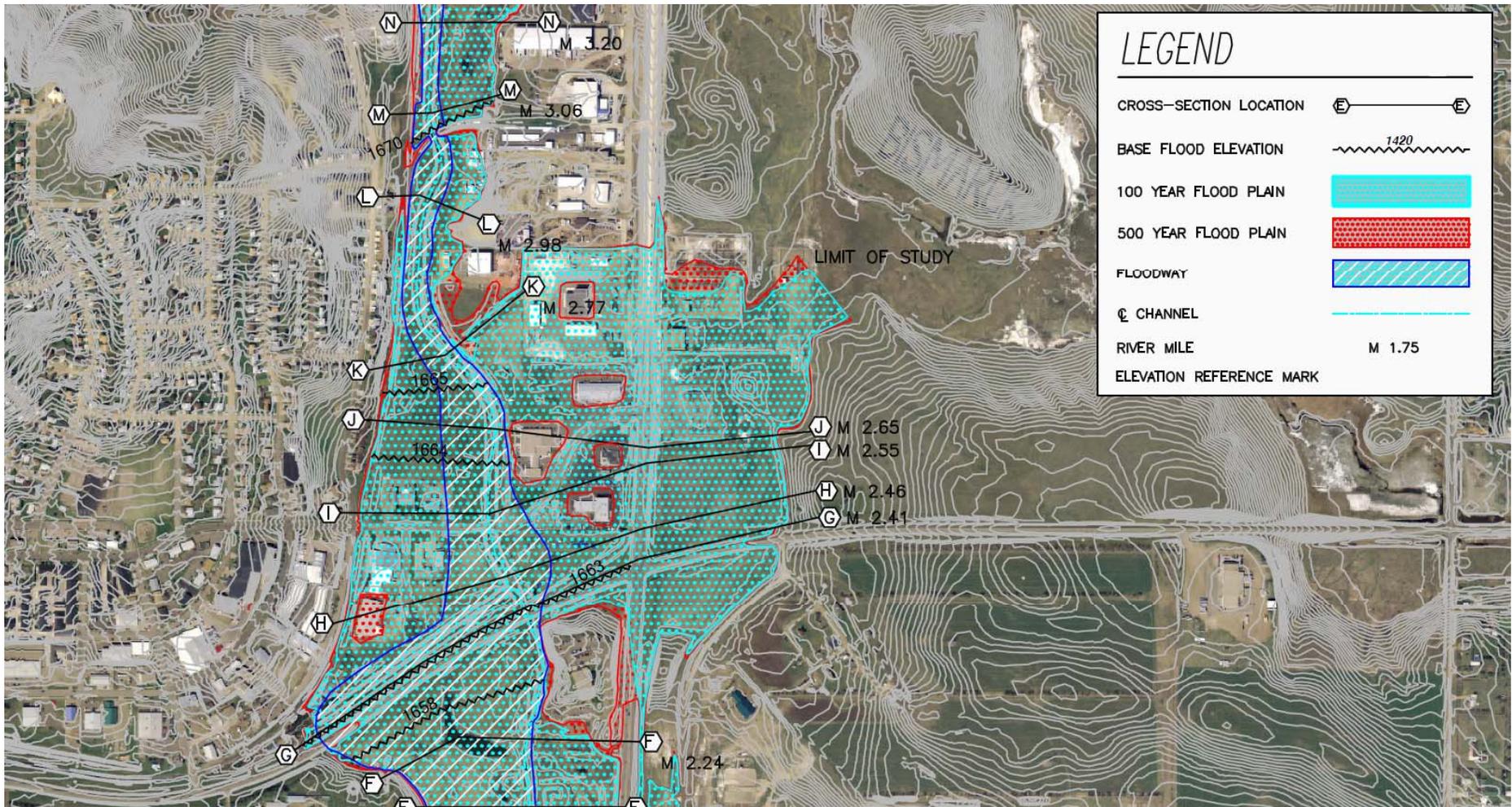


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# Example – Topo/Workmap

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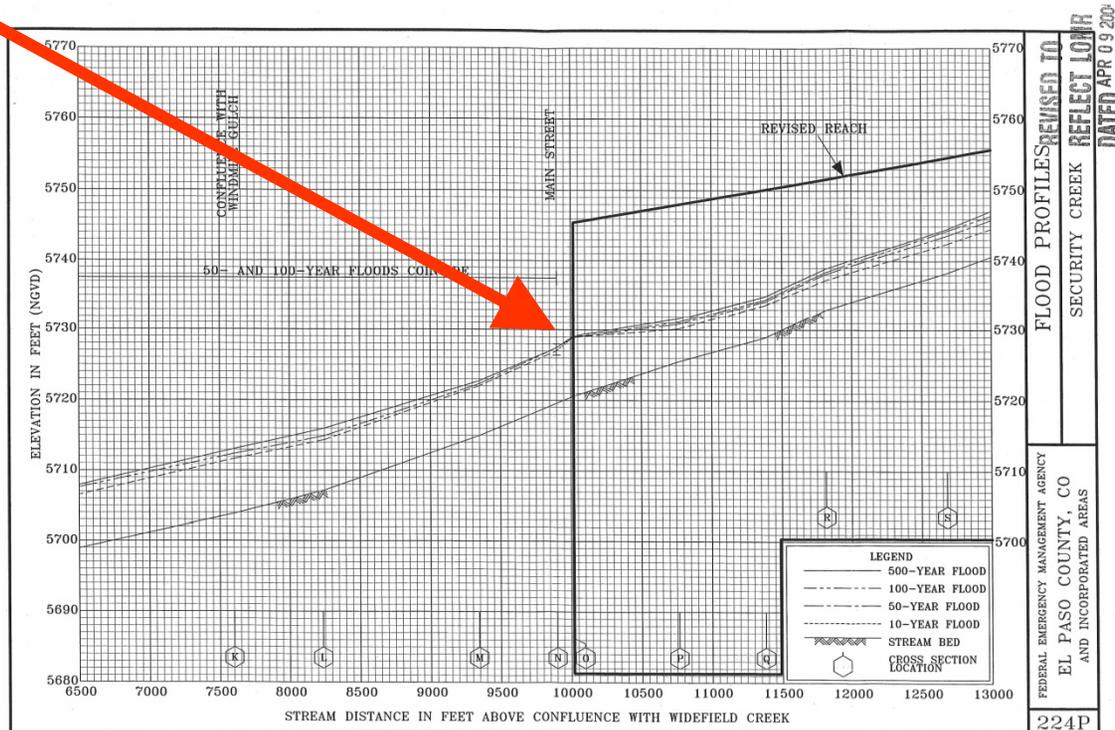
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# Hydraulic/Mapping Mistakes (cont...)

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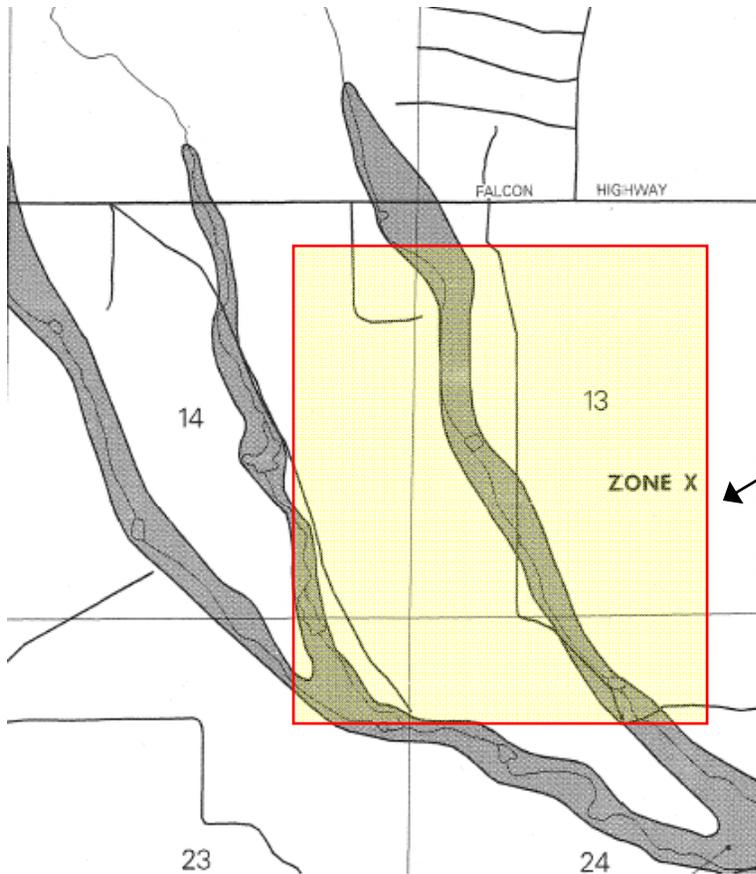
- Tie-ins
  - Detailed study
    - Profile (0.5 ft)
    - SFHA
    - Floodway
  - Zone A
    - SFHA



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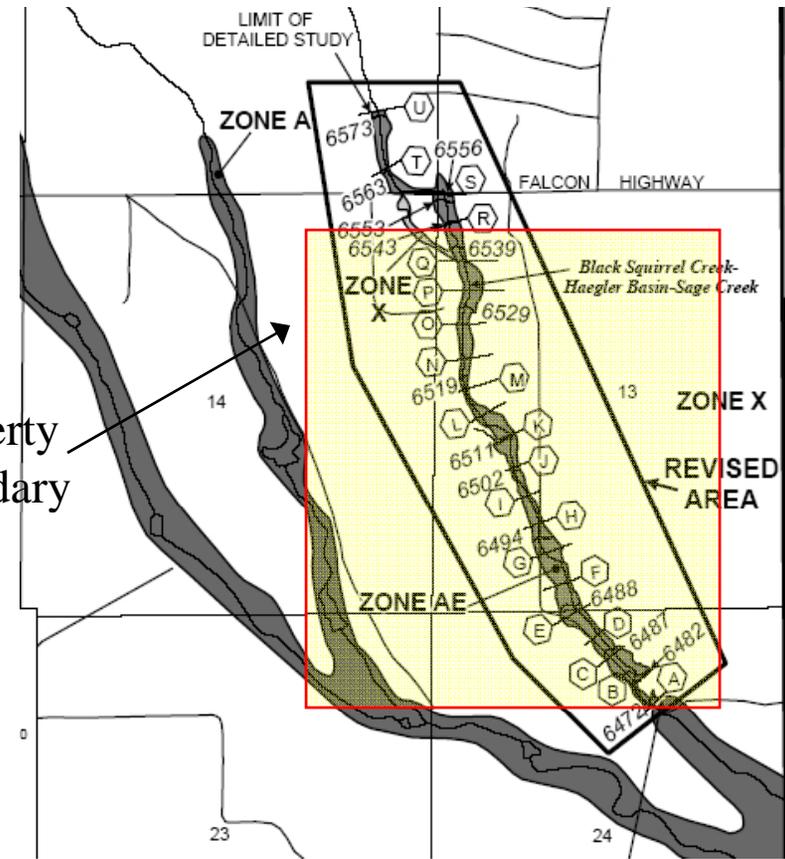
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# Example - Zone A Tie-ins



Effective FIRM

Property Boundary



Annotated FIRM

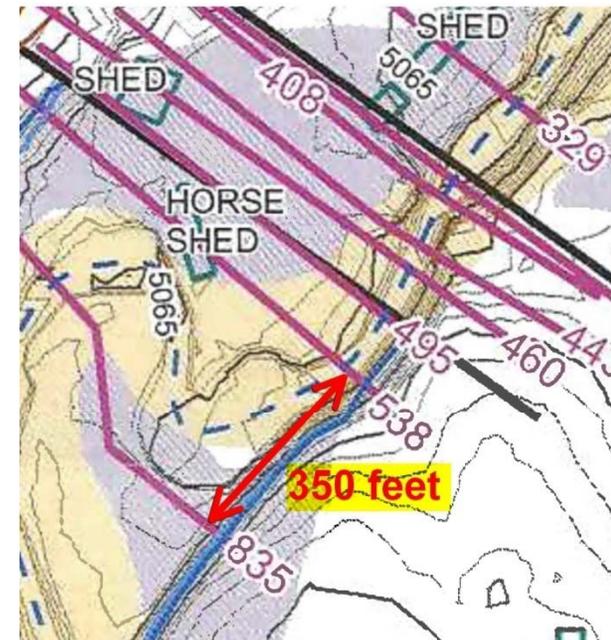
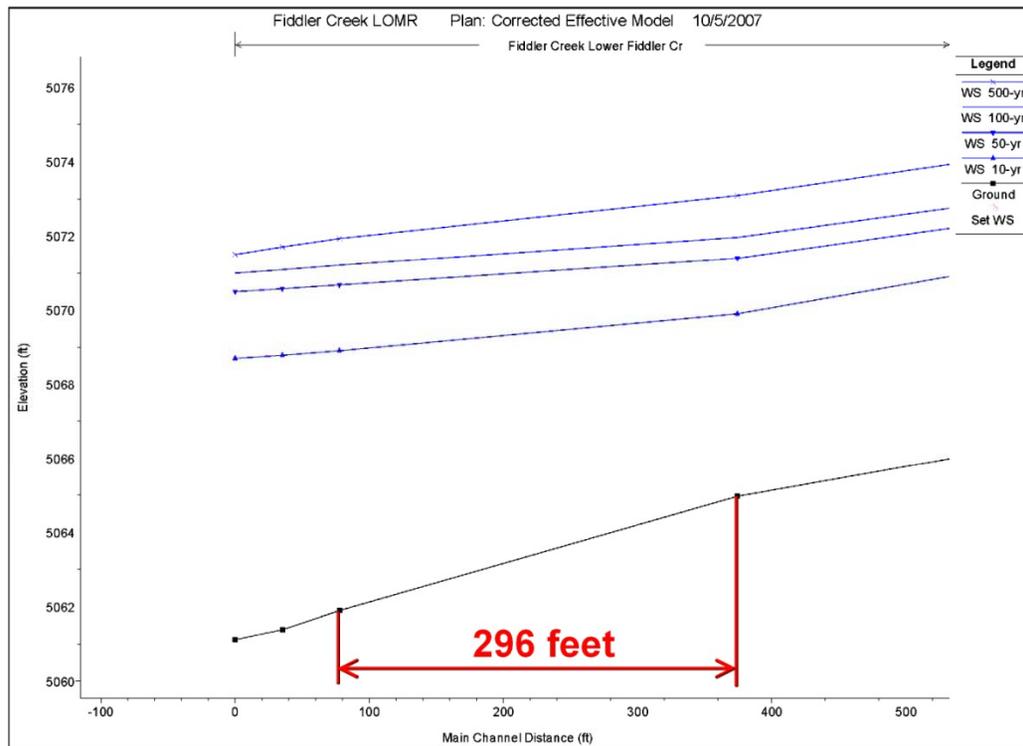


- Agreement problems (map vs. model)
  - Types:
    - Topwidths
    - Channel lengths
    - BFEs vs. contours
- All distance comparisons should be within 5% of the effective FIRM scale
  - Example: For a FIRM with a 500 foot scale, the tolerance between map and model would be 25 feet



# Example - Agreement Problems

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RAS vs. Model = 54 ft



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# Example - Uncertified Levee

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- **Modeling an Uncertified Levee**
  - Levee does not meet the requirements of Section 65.10
    - 65.10 basically defaults to USACE guidelines; listed in MT-2 forms
  - Hydraulic model should include a with and without levee scenario
- **Mapping an Uncertified Levee**
  - Gutters placed at the location of the levee
  - BFE from with levee scenario - mapped on riverward side
  - BFE from without levee scenario – mapped on landward side
  - Multiple profiles are plotted
  - Floodway data table lists multiple elevations



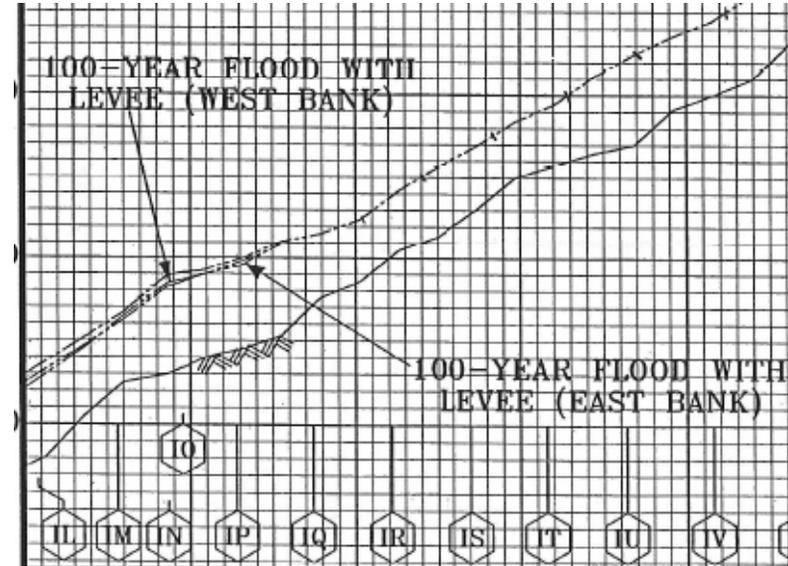
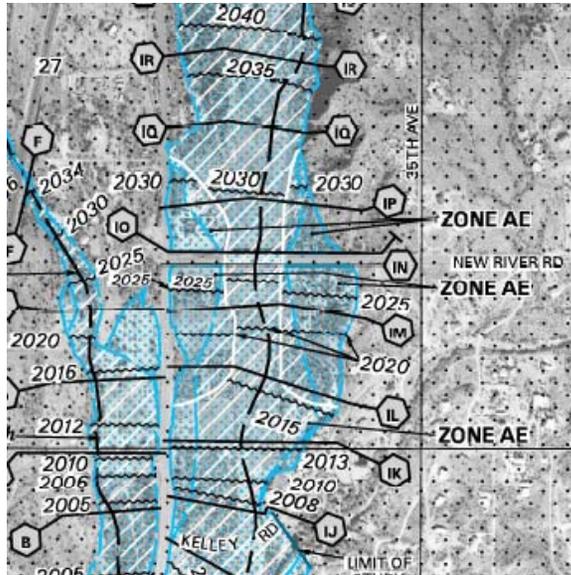
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# Example - Uncertified Levee (cont...)

## FIRM and FIS

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IK	32.925	700	4959	6.5	2,013.2	2,013.2	2,014.0	0.8
IL	33.019	860	3058	10.5	2,017.4 <sup>1</sup> / 2,015.9 <sup>2</sup> / 2,016.5 <sup>3</sup>	2,015.6	2,015.9	0.3
IM	33.114	535	2487	12.9	2,023.4 <sup>1</sup> / 2,023.0 <sup>2</sup> / 2,022.5 <sup>3</sup>	2,022.2	2,022.4	0.2
IN	33.168	396	3038	10.5	2,027.9 <sup>1</sup> / 2,026.9 <sup>2</sup> / 2,026.5 <sup>3</sup>	2,025.8	2,026.0	0.2
IO	33.184	381	2995	10.7	2,028.2 <sup>1</sup> / 2,027.3 <sup>2</sup> / 2,027.0 <sup>3</sup>	2,026.5	2,026.6	0.1

<sup>1</sup>Miles Above Confluence With Agua Fria River    <sup>2</sup>Floodway Not Computed    <sup>3</sup>Assessing    <sup>4</sup>With West Levee Holding    <sup>5</sup>With East Levee Holding



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- **Modeling Sequence:**
  - **Effective Hydraulic Model**
    - The hydraulic analysis used in the effective FIS
  - **Duplicate Effective Hydraulic Model**
    - A copy of the effective model reproduced on the requestors computer
    - Should not be modified – unless required to allow model to run
    - Should reproduce effective profile w/in the appropriate tolerance
      - Within 0.1 foot if the effective model is available and the same modeling program is being used
      - Within 0.5 foot if the effective model is not available
  - **Corrected Effective Model**
    - Corrects errors in the duplicate effective
    - Adds cross sections
    - More detailed topography
    - Must NOT reflect man-made changes since the date of the effective model



- **Modeling Sequence:**
  - **Existing Conditions Model**
    - Modified version of the Duplicate or Corrected Effective model
    - Includes any modifications since the date of the Effective
    - If no modifications since the effective, then the Duplicate Effective or Corrected Effective becomes the Existing Conditions
  - **Post-Project Conditions Model**
    - Modified version of the Existing Conditions model
    - Includes modifications to reflect the project



- Why all the models?
  - Comparisons
- Effective FIS data vs. Duplicate Effective
  - If data from the effective model is available and the same modeling program is being used, should match within 0.1 foot at all locations
  - If the effective model is not available, the new model must be calibrated to match within 0.5 foot
  - Ensures:
    - The correct model is being used
    - The data was transferred correctly to the requestor's equipment
    - Revised data integrated into effective



- Duplicate Effective/Corrected Effective vs. Existing
  - How do they compare?
  - Are there any potential violations
- Existing vs. Post Project
  - What are the true impacts of the project
- Effective vs. Post Project
  - Impact on the FIRM and FIS
  - Adverse impact notification



# Common Mistakes

MT-2 WORKSHOP

- General
- Hydrologic
- Hydraulic/Mapping

→ Hydraulic Modeling



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# Hydraulic Modeling Problems

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- Extended XSs
- RAS version
  - 3.1.1 or higher
- Mixed or super-critical flow
- Incorrect structure modeling
  - XS location
  - Methodology
  - Coefficients
- Ineffective flow areas
  - Inappropriate
  - Not used
  - No explanation/documentation



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# Recommendations to Prevent Mistakes

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1. Closely review the MT-2 application instructions
  - Definitions
  - URLs
  - Example Notification Letters
2. Explanations/Back-up data
3. Internal Agreement Checks



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## LOMC Impacts on Insurance

- LOMA/LOMR-F
  - May change the flood zone of a property or structure
- LOMR
  - May change Base Flood Elevations (BFE)
  - May change the flood zones
- Conditional Map Changes
  - **No** changes to regulatory maps or impacts on insurance



## Questions and Wrap Up



# Contact Information

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