RECOMMENDATIONS OF THE JOINT SHA/MDE PANEL OF HYDRAULICS EXPERTS

Changes to the SHH Division Hydraulics Procedures June 22, 2017

Notice to Potential Users: Due to the ongoing work of the Hydraulics Panel some parts of this presentation may be modified in a near future.





Eliana Rios Vidal, PE Water Resources Engineer, RK&K



Kristianne Sandoval Water Resources Engineer, RK&K



Andrzej ("Andy") Kosicki, PE Chief, Structure Hydrology and Hydraulics Division

PRESENTERS



OBJECTIVES

Today's session

- Inform SHHD engineers and open end consultants of changes to the hydraulics analysis procedures.
- Review "lessons learned" from pilot project.
- Fully implement revised hydraulics procedures for new OOS SHH Division projects.
- Get participants input (**TODAY**). Please see handouts.

OBJECTIVES



BACKGROUND

Executive order 11988 (1977) - FEMA

MDE Regulations concerning flood plain and channel construction (COMAR, Title 26)

FEMA Remapping

Panel: Idea was born in 2007, Funded and started in 2015

- Kaye Brubaker (U. Maryland), Chair
- Will Thomas (Baker), Secretary
- Peggy Johnson (Penn State), Former Chair
- Glenn Moglen (VA Tech, USDA), Former Secretary
- Eric Brown (FHWA)
- Tucker Clevenger (AMEC)
- Dave Guignet (MDE)
- Jon Janowicz (FEMA)
- Andy Kosicki (MDSHA)
- Art Parola (U. of Louisville)
- Bill Seiger (MDE)

ORIGINAL HYDRAULICS PANEL MEMBERS 2015

Contributors <u>Topic: Grouted Culverts</u> David Black (Century Eng.) Paul Busam (MDE)

Topic:Integrated SHA/FEMA Models Eliana Rios Vidal (RK&K) Kristianne Sandoval (RK&K) Pawel Mizgalewicz (SHA) Ben Kaiser (AECOMM on FEMA's behalf) Bob Pierson (FEMA)

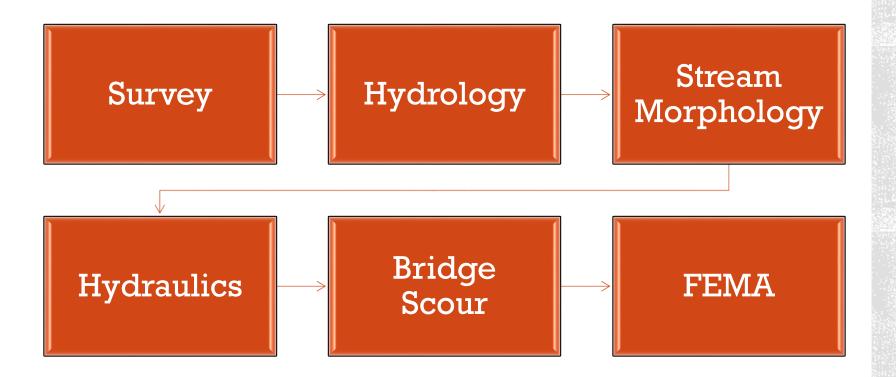
- Critically review MDE regulations to identify obsolete parts (e.g. FEMA, fish passage, channel stability, what elevations should be used to define flood plains: WS or EG?) etc..
- Draft suggested changes, submit to MDE leadership for consideration.
- Develop efficient hydraulics analysis procedures by integrating FEMA and MDE models into one and provide respective guidance. The process will result in cost and time savings, and benefit the communities by yielding improved models and flood plain mapping.
- Test the procedures on selected projects (MD Route 144 @ Evitts Creek).

GOALS OF THE PANEL

Initial review issues:

- 1. Grouted culverts
- 2. Use of FEMA models





PAST PROCEDURE

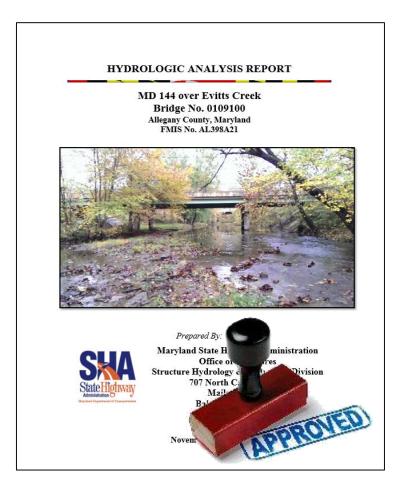
Separate MDE and FEMA models



PAST PROCEDURE

- MDE Studies Reviews /Approvals
- FEMA Model update and LOMR/CLOMR submittal if applicable
- MDE Studies -> Later FEMA model; and oops we have a problem!
- MDE regs allow increases up to 0.10 ft. on improved properties (a.k.a. Insurable Properties -FEMA)
- Not so for FEMA must be 0.00 ft. (no increase or "no rise" allowed* – period!)*

<u>* - unless there are no impacted insurable structures,</u> or SHA buys the impacted property

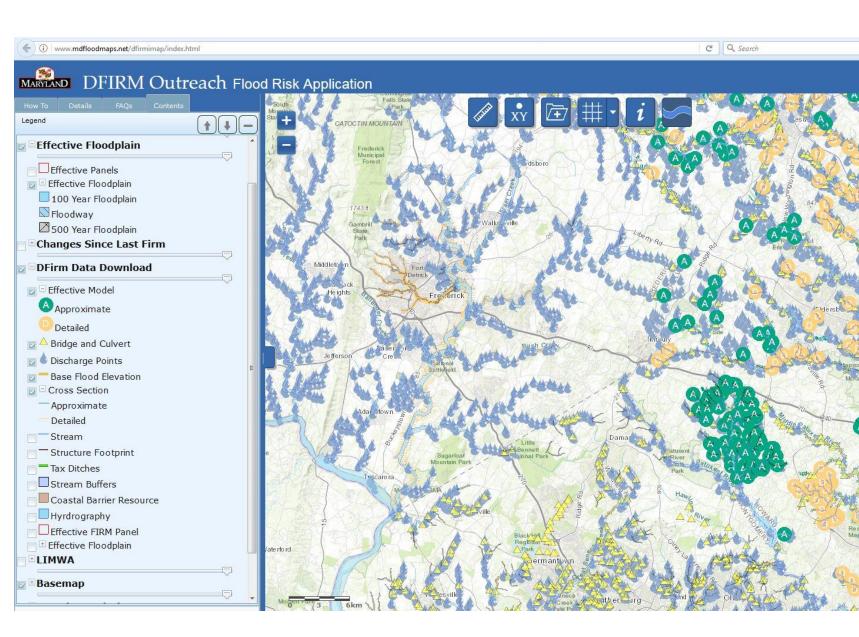






BEVOLUTION OF THE PROCEDURE

Available Tools and Resources Improved Procedures



MD FLOOD MAPS

www.mdfloodmaps.net

New data repository for Maryland FEMA models and mapping.



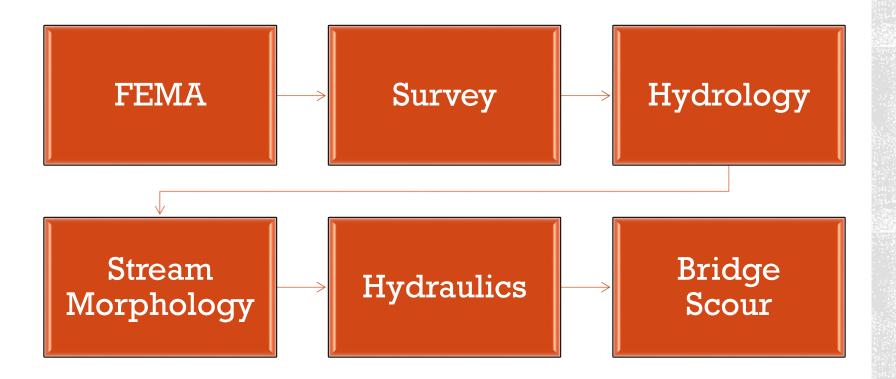


Maryland Floodplain Mapping

DFIRM Fact Sheet (Updated February 2017)

County	Preliminary Date	Effective Date	Coastal Preliminary Date	Coastal Effective Date	
Allegany County, MD*	September 2015	Scheduled Fall 2017	NA	NA	
Anne Arundel, MD*	September 2009	October 2012	May 2013	February 2015	
Baltimore City, MD	NA	February 2012	NA	April 2014	
Baltimore County, MD	NA	August 2011	NA	May 2014	
Calvert County, MD*	September 2009	December 2011	March 2013	November 2014	
Caroline County, MD**	August 2013	January 2015	SYNCHRONIZED	SYNCHRONIZED	
Carroll County, MD*	June 2010	October 2015	NA	NA	
Cecil County, MD*	April 2010	July 2013	August 2013	May 2015	
Charles County, MD	September 2011	September 2013	September 2013	May 2015	
Dorchester County, MD*	March 2009	May 2011	May 2013	March 2015	
Garrett County, MD	September 2011	October 2013	NA	NA	
Howard County, MD	November 2009	August 2013	NA	NA	
Harford County, MD	July 2014 & Nov. 2014	April 2016	SYNCHRONIZED	SYNCHRONIZED	
Kent County, MD**	September 2012	June 2014	SYNCHRONIZED	SYNCHRONIZED	
Prince George's County, MD**	Sept 2010 & Sept 2013	September 2016	SYNCHRONIZED	SYNCHRONIZED	
Queen Anne's, MD <mark>**</mark>	September 2012	November 2014	SYNCHRONIZED	SYNCHRONIZED	
St. Mary's County, MD	NA	October 2004	March 2013	November 2014	
Somerset County, MD*	December 2008	March 2011	March 2013	February 2015	
Talbot County, MD	June 2011	August 2013	September 2013	July 2016	
Washington County, MD*	March 2015	Scheduled August 2017	NA	NA	
Wicomico County, MD**	August 2009	August 2015	SYNCHRONIZED	SYNCHRONIZED	
Worcester County, MD**	July 2013	July 2015	SYNCHRONIZED	SYNCHRONIZED	
Baltimore City, MD (Gunpowder)*	Scheduled Winter 2017	TBD	NA	NA	
Frederick County, MD	N/A	N/A			
Montgomery County, MD	N/A	N/A	Additional Mapping Upda	Additional Mapping Updates Planned or Underway	
Conocoheague-Opequon	TBD	TBD			
Gunpowder-Patapsco	Scheduled Winter 2017	TBD	Watershed Basin Study		
Monocacy	TBD	TBD			

*Denotes MDE lead through mapping process ** Denotes coastal study now set for release and includes community riverine study SYNCHRONIZED – The counties where the FEMA studies for Riverine and Coastal DFIRM's were combined and released in one mapping product. These counties have one Preliminary DFIRM release and effective date.



NEW PROCEDURE

Integrated SHA/FEMA Hydraulic Modeling Process

Table 1 Office of Structure Milestones

OFFICE OF STRUCTURES MILESTONES

INVOLVEMENT OF THE STRUCTURES H & H DIVISION

IN THE DEVELOPMENT OF DESIGN PROJECTS

Pre-TS&L

Fre-	15&L
1.	Establish in writing design objectives and priorities; note any environmental commitments.
	Determine if project is located in a FEMA floodplain. If so, rerun and evaluate the FEMA model.
3.	Hold concept meeting. Determine In-Kind vs. Out-of-Kind design approach, seek preliminary approval
	from Deputy Director of OOS.
4.	Request Mapping and/or Surveys.
5.	Conduct hydrologic analyses. Obtain MDE approval of design discharges ⁽¹⁾
6.	Update the FEMA hydraulics model to meet SHA standards. ⁽²⁾
7.	Obtain FEMA/MDE concurrence ⁽¹⁾ , accept updated FEMA model as Existing Conditions model. ⁽²⁾
8.	Conduct Stream Morphology Studies: evaluate channel stability, obtain design information for hydraulics and scour studies. Evaluate Aquatic Organism Passage (AOP) constraints.
9.	Evaluate the need to redesign the road profile (AASHTO and/or design flow requirements) ⁽¹⁾ . Alternatively, obtain a design exception approval from the OOS Director.
10.	Develop proposed bridge/culvert design options; develop conceptual and subsequently semi-final
	designs for channel stability and AOP design (if applicable). Enter proposed design into the Existing
	Conditions model to create the Proposed Conditions model. ⁽¹⁾
	Develop preliminary scour study.
	Make presentations/obtain concurrence of environmental and regulatory agencies. ⁽¹⁾
	Obtain community concurrence for FEMA submission ⁽¹⁾ .
TS&	L
1.	Review the approved TS&L to confirm no changes are required in hydraulics model, or update the model
	as necessary. Discuss the acceptability of changes with FEMA/MDE reviewers; if changes are acceptable
	this now becomes the new effective FEMA/MDE model. ⁽¹⁾
2.	Prepare Hydraulics report and submit to MDE to obtain approvals. ⁽¹⁾
3.	Prepare FEMA Forms and CLOMR Application and submit to FEMA to obtain CLOMR. ⁽¹⁾
4.	Request Soil Borings. Continue Scour Studies using borings results.
5.	Develop maintenance of flow sequence during construction.
FOU	INDATION REPORT
1.	Complete scour studies, prepare Final Scour Report. ⁽³⁾
2.	Prepare recommendations for design of scour countermeasures as needed.
3.	Provide information for Joint Permit Application to OED.
STR	UCTURAL REVIEW
1.	Resolve any outstanding issues pertaining to scour and scour countermeasures design.
	AL REVIEW AND PS&E (Design Plans)
1.	Review design plans for consistency with MDE approved hydraulics model including temporary
	measures during construction. Prepare H/H Data Sheet.
ADV	TERTISE AND AWARD PROJECT
1.	Confirm receipt of FEMA approval and MDE/COE permit. ⁽¹⁾
CON	ISTRUCT PROJECT
1.	Obtain as built plans.
2.	Submit LOMR to FEMA. ⁽¹⁾

OOS H&H Design Manual 2016 Revisions

TABLE 1: OFFICE OF STRUCTURES MILESTONES

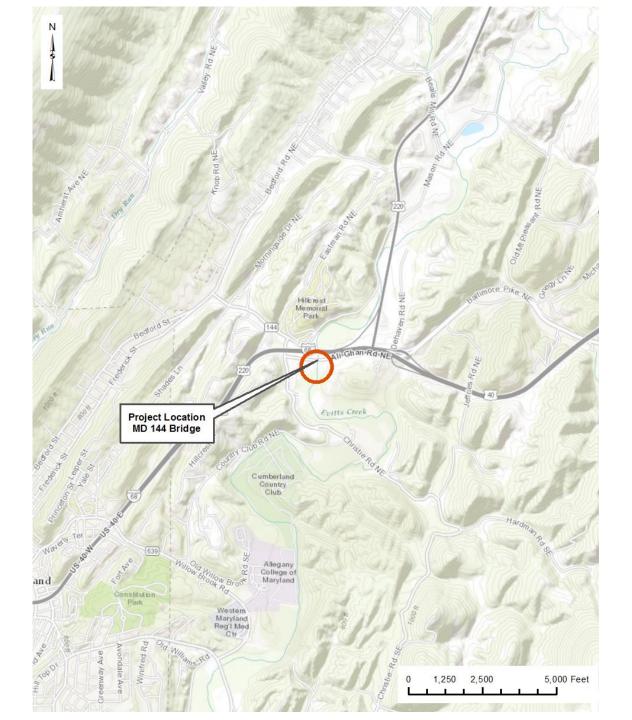
Involvement of the Structures H&H Division in the Development of Design Projects

Chapter 5: Project Development



MD Route144 over Evitts Creek





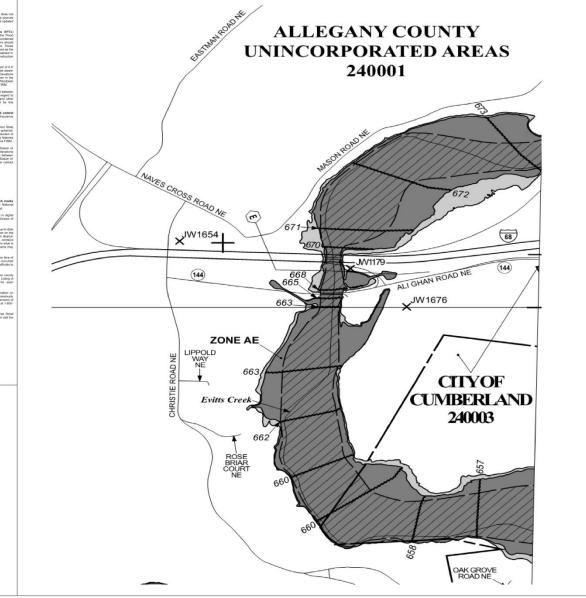
OVERVIEW

Location: Allegany County Watershed size: 79.4 mi² FEMA model to be effective Fall 2017 – Letter of Final Determination (LFD) has been issued





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ZONE V	Coastal flood r	tone with velocity hazard (wave action); no Base Flood	
ZONE VE	Coastal flood Elevations dete	rmined. zerve with velocity hazard (wave action); Base Flood ermined.	
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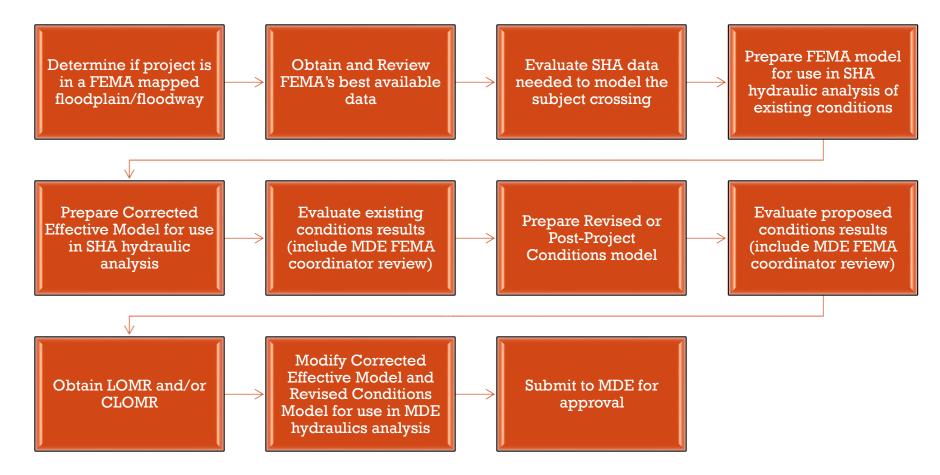
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EVITTS CREEK FEMA MAP

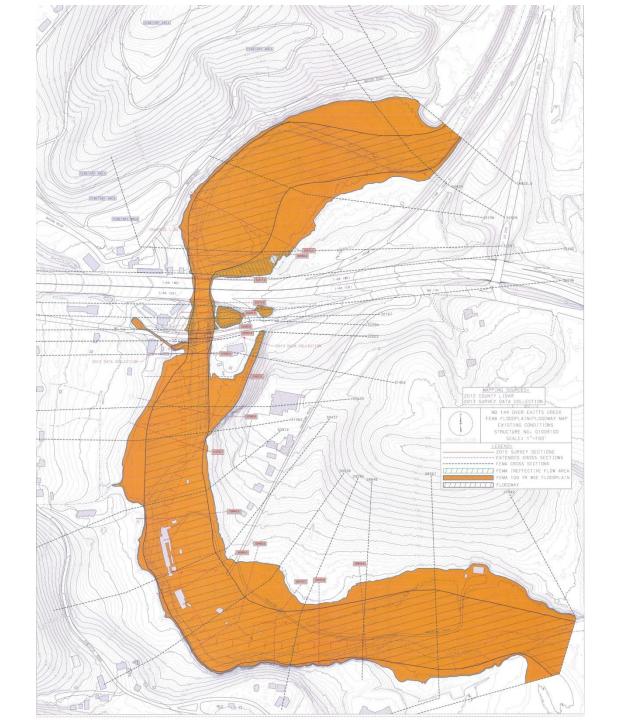
Best Available Data



PROCEDURE







FEMA'S EVITTS CREEK MAP

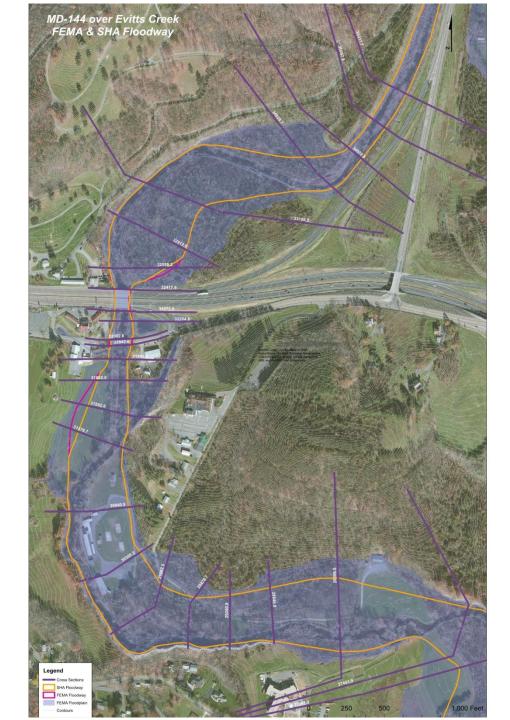
Original Model Extent





EVITTS CREEK MAP

Extended Limits and SHA's incorporated Cross Sections



EVITTS CREEK FLOODWAY

SHA vs FEMA's Floodway





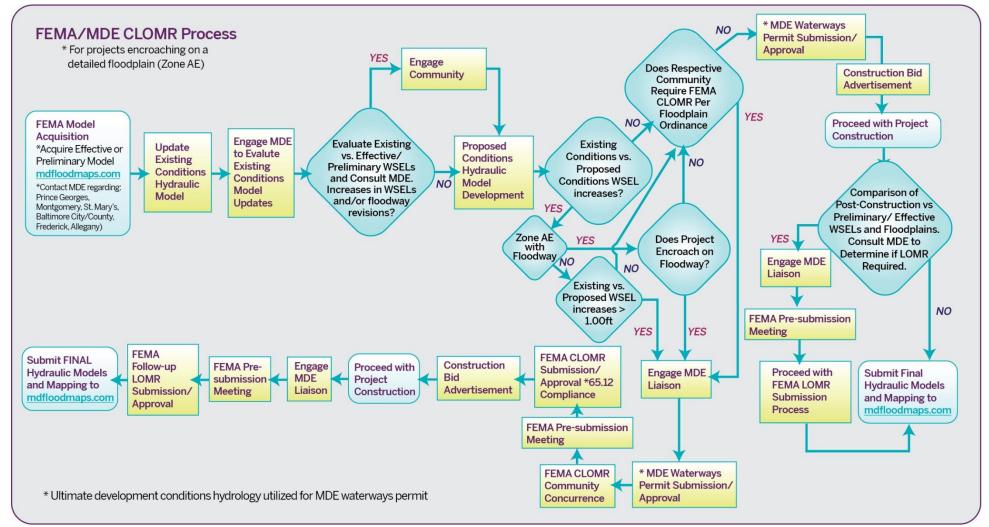
5) LATEST UPDATES

Integrated SHA/FEMA Hydraulics Modeling Process. OOS H&H Design Manual to incorporate the following:

- FEMA Report Outline.
- FEMA/MDE CLOMR Process Flow Chart.
- Table 1 Updates. OOS H&H Design Manual revisions Chapter 5, table 1 (2016; based on Panel discussions, subject to further revisions by the SHA/MDE Hydraulics Panel).
- Hydraulics Report Checklist Revisions.

NEW REFERENCE DOCUMENTS

FEMA/MDE FLOW CHART



UPDATES TO TABLE 1

Table 1 Office of Structure Milestones

OFFICE OF STRUCTURES MILESTONES

INVOLVEMENT OF THE STRUCTURES H & H DIVISION

IN THE DEVELOPMENT OF DESIGN PROJECTS

Pre-TS&L

- Establish in writing design objectives and priorities; note any environmental commitments.
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- Botenine in project is received in a Darian recorption in ecopy and it is a provide the result in the project is received in a provide the project is received in a project in a project is received in a project is received in a project in a project is received in a project in a project is received in a project in a projec
- Request Mapping and/or Surveys.
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- Update the FEMA hydraulics model to meet SHA standards. ⁽²⁾
- 7. Obtain FEMA/MDE concurrence ⁽¹⁾, accept updated FEMA model as Existing Conditions model. ⁽²⁾
- Conduct Stream Morphology Studies: evaluate channel stability, obtain design information for hydraulics and scour studies. Evaluate Aquatic Organism Passage (AOP) constraints.
- Evaluate the need to redesign the road profile (AASHTO and/or design flow requirements) ⁽¹⁾ Alternatively, obtain a design exception approval from the OOS Director.
- 10. Develop proposed bridge/culvert design options; develop conceptual and subsequently semi-final designs for channel stability and AOP design (if applicable). Enter proposed design into the Existing Conditions model to create the Proposed Conditions model.⁽¹⁾
- 11. Develop preliminary scour study.
- Make presentations/obtain concurrence of environmental and regulatory agencies.⁽¹⁾
 Obtain community concurrence for FEMA submission⁽¹⁾.

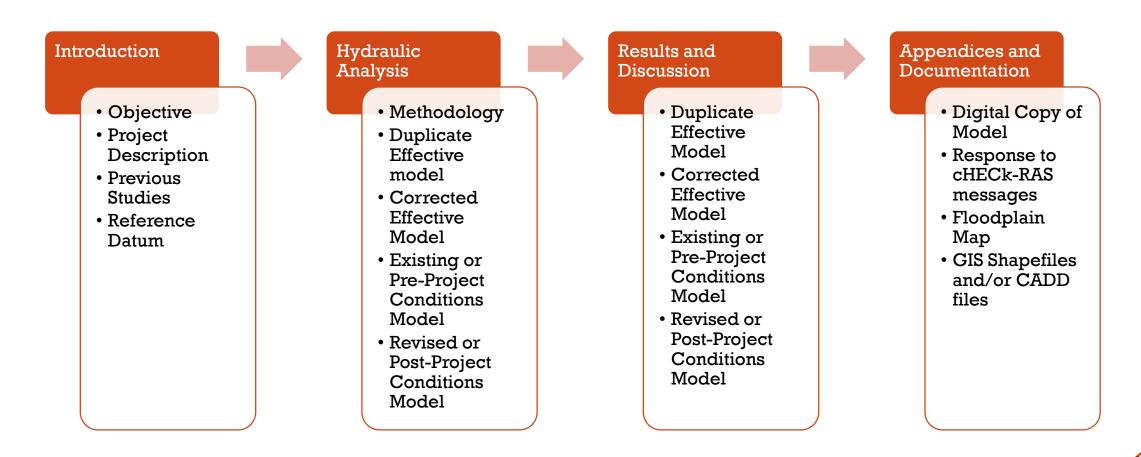
13. Obtain

- TS&L
- Review the approved TS&L to confirm no changes are required in hydraulics model, or update the model as necessary. Discuss the acceptability of changes with FEMA/MDE reviewers; if changes are acceptable this now becomes the new effective FEMA/MDE model.⁽¹⁾
- 2. Prepare Hydraulics report and submit to MDE to obtain approvals.⁽¹⁾
- 3. Prepare FEMA Forms and CLOMR Application and submit to FEMA to obtain CLOMR.⁽¹⁾
- 4. Request Soil Borings. Continue Scour Studies using borings results.
- 5. Develop maintenance of flow sequence during construction.

Based on FEMA's Best Available Data Use Truncated Model

Engage Community if Effective vs. Corrected Effective (Existing) vs. Proposed WSELs and/or Floodway changes.

FEMA REPORT OUTLINE





6 LESSONS LEARNED

- Obtain the latest ("best available data") FEMA model.
- Make sure we compare "apples to apples" (same datum, same cross section location).
- Survey request- consider FEMA's XS location (easier to compare if same alignment) but only if meets SHA analysis requirements – "within the bounds of sound engineering judgement."
- Keep FEMA model stationing / cross section numbering.
- Be conservative in estimating the length of the study reach.
- Can truncate the FEMA model for analysis, but ultimately the full model must be submitted to FEMA and mdfloodmaps.
- Expect to run the integrated SHA/FEMA model twice:

A) with FEMA Qs (usually based on existing land use)

B) with SHA/MDE approved Qs (ultimate land use)

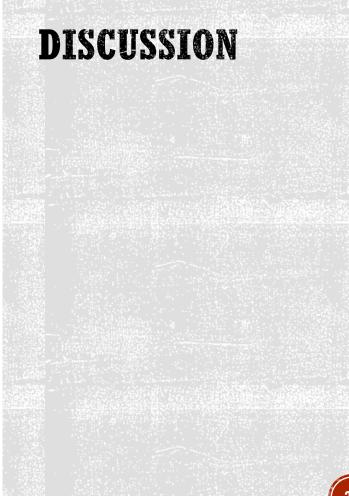
Prepare two separate but similar reports.

LESSONS LEARNED



DISCUSSION

- Audience input.
- Past experiences with FEMA.
- What do you think of table 1 in chapter 5?
- What do you think of the report checklists?
- FEMA/MDE flow chart and Table 1's flow chart (see handouts for charts)



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CONTACT INFO

If you have any question, feedback or comments please contact us