

Floodplains & Environmental Documentation

A FHWA Hydraulic Engineer's Primer

Presented to

Midwestern Hydraulic
Engineering Conference

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Goal of Primer

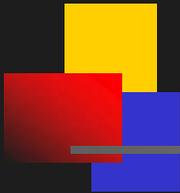
Provide a *brief* description of how FHWA got ...

- involved in
- responded to
- proceeds with

... floodplains & the environmental documentation process ...

What Floodplain?

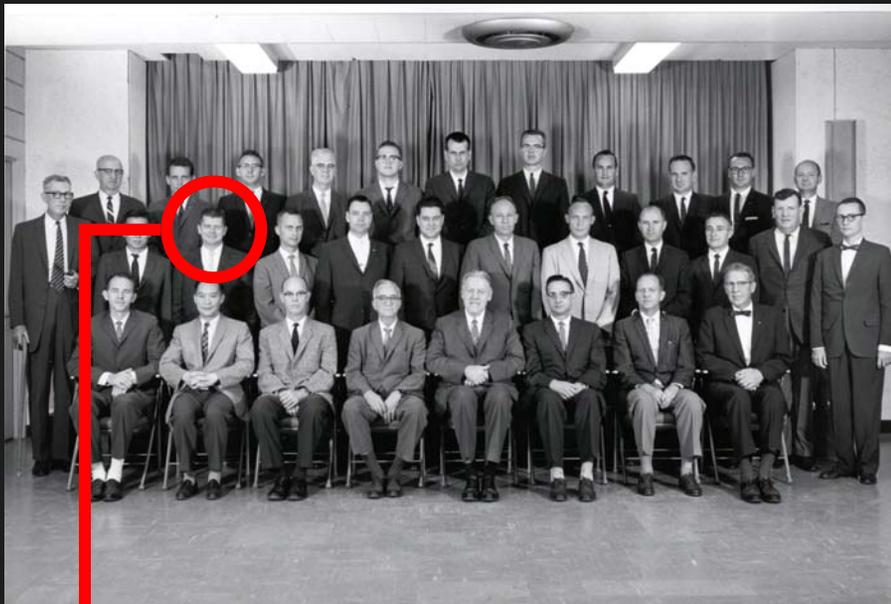




... That Floodplain ...



Floodplain "players"



- ❖ Transportation community
- ❖ Floodplain managers
 - Planners
 - NFIP communities
- ❖ Environmental stewards
 - Biologists
 - Fluvial geomorphologists
 - NEPA folks
- ❖ Regulators
 - FEMA
 - USACE
 - State & Local
- ❖ Public

How do Highway Hydraulic Engineers fit into the picture?

Cats and Dogs?

❖ Hydraulic engineer

- What is the backwater?
- Is freeboard a problem?
- Did that intern taking the pictures know how to swim?

❖ Floodplain manager

- Is community in the NFIP?
- Where is regulated floodway?
- Why do those highway folks put their #\$\$%& bridges in my nice floodplain?

Flood Event



Apples and Oranges?

Abutment Failure



- ❖ Hydraulic engineer
 - Is failure scour related?
 - What is the plan of action?
- ❖ Regulator
 - Are there NEPA issues?
 - Is bridge in historic register?
 - Why can't you engineers just simply "fix" it?

Mars and Venus?

❖ Hydraulic engineer

- What was design event?
- Was debris a factor?
- Superstructure still in good shape – can we drag it back upstream with a bulldozer?

❖ Biologist

- This isn't a bridge failure, it is a stream restoration opportunity!
- Hmm – would leaving bridge there result in a nice habitat?



Status Quo

- ❖ Highway hydraulics
- ❖ Floodplain management
- ❖ Environment stewardship
 - Different, diverse, and competing issues, policies, programs, and priorities
 - Confusion on requirements relating to federal-aid projects in encroachments
 - Technically, seems clear (as mud!), but what about public involvement and documentation?



How Did We Get Here?



- ❖ 1950's and early 1960's
 - No Federal involvement in flood insurance
 - Very little privately available flood insurance

- ❖ Executive Order 11296 – August 10, 1966
 - Floodplains and Federal Agencies

- ❖ Housing & Urban Development Act of 1968
 - Public Law 90-448, Approved August 1, 1968
 - "National Flood Insurance Act"
 - National Flood Insurance Program (NFIP)

- ❖ Housing & Urban Development Act of 1969
 - Public Law 91-152, Approved December 24, 1969

- ❖ Flood Disaster Protection Act of 1973
 - Public Law 93-234, Approved December 31, 1973

What about Highways?

- ❖ National Flood Insurance Program
 - Applicability to property owners & communities
 - No applicability to Federal Agencies
 - FHWA developed own approaches

- ❖ Executive Order 11988 – May 1977
 - Floodplain Management for Agencies
 - Agencies to develop approaches

- ❖ Water Resources Council
 - Floodplain Management Guidelines – February 1978
 - Advisory in nature – watershed orientation

- ❖ DOT Order 5650.2
 - Policies & Procedures on Protection and Management of Floodplains – April 1979





... finally reaching FHWA ...

Two elements ...



- ❖ Federal-Aid Highway Program Manual
 - FHPM 6732 - Location & Hydraulic Design of Encroachments on Floodplains - November 1979

- ❖ 23 CFR 650 Subpart A
 - Location & Hydraulic Design of Encroachments on Floodplains - November 1979



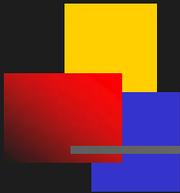


Engineering & Regulations aside –

What are FHPM 6732/CFR 650A elements?

- ❖ Policy
- ❖ Definitions
- ❖ Applicability
- ❖ Public Involvement
- ❖ Location Hydraulic Studies
- ❖ Only Practicable Alternative Finding
- ❖ Design Standards
- ❖ Design Study Content

Element order is not necessarily order used in project!



Policy

- ❖ To encourage:
 - Prevention of uneconomical, hazardous, or incompatible use or development of floodplains
- ❖ To avoid:
 - Longitudinal encroachments (where practical)
 - Significant encroachments (where practical)
 - Support of incompatible floodplain development
- ❖ To minimize:
 - Impacts of highway agency actions adversely affecting base floodplains
- ❖ To restore & preserve:
 - Natural and beneficial floodplain values
- ❖ To incorporate:
 - WRC floodplain management into FHWA procedures
- ❖ To be consistent:
 - *Where appropriate*, with NFIP standards and criteria

FHWA (not FEMA) decides where is "appropriate"

Definitions

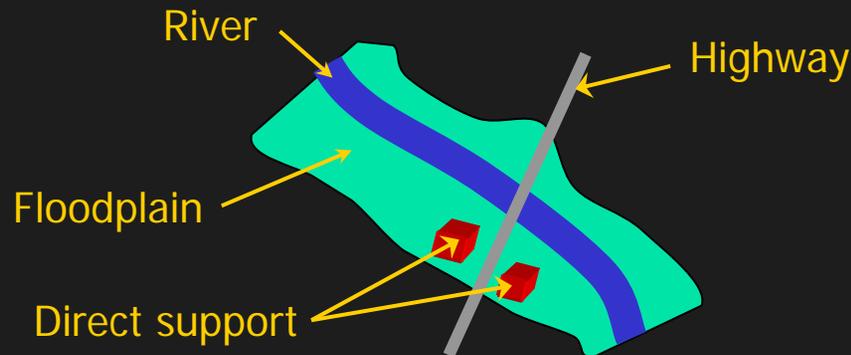
❖ “Freeboard”



Definitions

❖ “Significant encroachment”

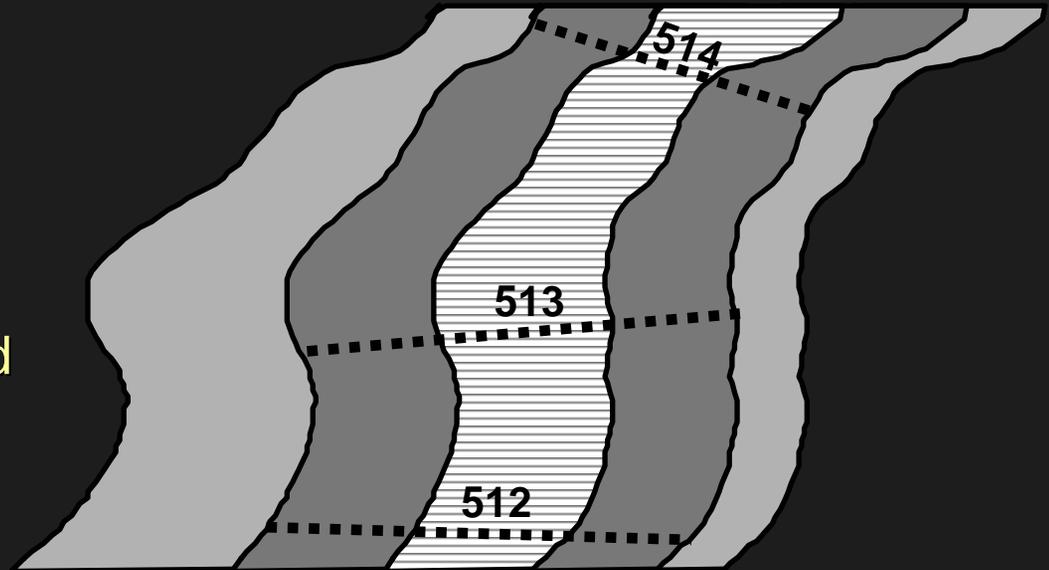
- Interruption of transportation facilities used for
 - Emergency vehicles
 - Evacuation traffic
- Risk
 - Consequences of flooding
 - Loss of life or property damage
- Impact on floodplain values



"Imputed" Definitions

❖ What is a Floodplain?

- Area subject to flooding by the ***base flood***
 - ***base flood*** – flood or tide having 1 percent annual exceedance probability



Applicability

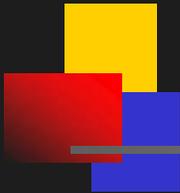
❖ All:

- Encroachments
- Actions that affect base floodplains

❖ Except:

- Emergency fund repairs during or after a disaster





Public Involvement

- ❖ National Environmental Policy Act
 - Public law 91-190 (NEPA) - 1969
 - Specifically 23 CFR 771.111 (h)
- ❖ Some elements of NEPA
 - Public notification & meetings
 - Agency coordination
 - Environmental documents
 - Environmental assessments (EA)
 - *Damage assessments (DA)*
 - Finding of no significant impacts (FONSI)
 - Environmental impact statements (EIS)

Location Hydraulic Studies

- ❖ Determine encroachment
 - NFIP maps
- ❖ Evaluate longitudinal encroachment alternatives
- ❖ Discuss risk/environmental impact of alternatives
 - Risks associated with actions
 - Impacts on floodplain values
 - Support of incompatible development
 - Measures to minimize impact
 - Measures to restore floodplain values
- ❖ Evaluate practicable alternatives to significant encroachments
- ❖ *Summarize in environmental documents*
- ❖ Consult with regulatory agencies for consistency
 - FEMA standards
 - State standards
 - Community standards

Only Practicable Alternative

- ❖ Applicability:
 - Significant Encroachments
- ❖ Must be:
 - Found to be “only practical alternative”
 - Included in environmental document (FONSI/EIS)
- ❖ Must include:
 - Reasons why
 - Alternatives considered
 - Whether conforms to state and local standard

Key to environmental documentation!



Design Standards

- ❖ Analyses of alternatives consider capital costs, risks (analyses or assessments), economic, engineering, social, environmental concerns
- ❖ 2% annual exceedance probability design flood on interstate lanes
- ❖ Bridge freeboard for debris and scour protection
- ❖ Consider flood control appurtenance flows
- ❖ Design consistent with FEMA, State, and local standards



Design Studies

❖ Detail:

- Commensurate with risk

❖ Contain:

- Hydrologic & hydraulic data & computations
- Risk analysis / risk assessment

❖ Show:

- On encroachment project plans
 - Magnitude & location of water surface elevations
 - Magnitude & location of base flood



... were we done yet?

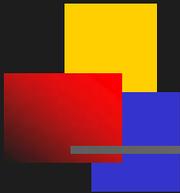
Heavens No!

FHWA v. FEMA

❖ Issues:

- Consistency
- Different agendas
- Turf battles





FHWA



FEMA

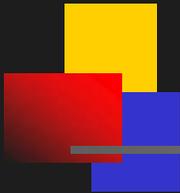


❖ Memorandum of Understanding



- “Procedures for Coordinating Encroachments on Floodplains with FEMA” – June 25, 1982
- Components
 - FEMA accepts FHPM 6732 / 23 CFR 650 A
 - Use NFIP maps (FHBM, FBFM, or FIRM)
 - Be Consistent with NFIP and Regulations
 - Revise Flood Insurance Maps and Studies as appropriate
 - Only Practicable Alternative
 - Compensate Property Owners
 - NFIP not incur additional liability

FHWA currently working on new MOA ...



Technical Summary

❖ Floodplain:

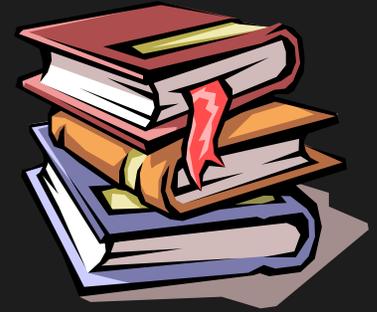
- Unidentified
 - Coordinate if Significant Encroachment
- On FHBM
 - Keep rise < 1 foot
 - If rise > 1 foot – LOMR and mitigation
- On FBFM/FIRM, but no floodway
 - Keep rise < 1 foot
 - If rise > 1 foot – LOMR
- On FBFM/FIRM & floodway
 - Avoid encroachment – no rise
 - Revise floodway – LOMR
 - Encroach – mitigate – LOMR



Environmental Documents

- ❖ FHWA Technical Advisory T 5540.8A
 - October 30, 1987
 - Summarize location hydraulic studies
 - Number of encroachments
 - Any support & impacts of incompatible development
 - Include information that
 - Displays alternatives
 - Base floodplain & (if applicable) regulatory floodways
 - If “substantial” impacts
 - More details on location, impacts, and mitigation
 - Discuss practical alternatives if:
 - “Significant encroachment”
 - Requiring particular structure size or type

Preferred Alternative

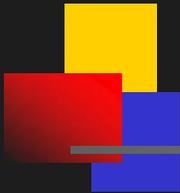


❖ Significant impacts

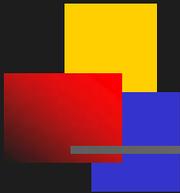
- Final EIS *must* include:
 - Finding of “Only Practical Alternative”
 - Refer to EO 11988 & 23 CFR 650 A
 - Have separate section indicating:
 - Reasons alternative located in floodplain
 - Alternatives considered & why not practical
 - Statement of applicability to State or local standards

Some floodplains still tough ...





Questions?



Possible Approach

- ❖ Location Hydraulic Studies
- ❖ Design Studies
- ❖ Design Standards
- ❖ Public Involvement
- ❖ Only Practicable Alternative Finding