Levees: Past, Present, and Future

Andrew Shields, PE, CFM
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Agenda

• FEMA and Levees
• Levee Accreditation Reviews
• Proposed Changes to the FEMA Levee Policy
FEMA and Levees
FEMA and Levees

- FEMA does **NOT** own or operate any levees
- Establishment of appropriate risk zones under NFIP
- Accredited levees can show protection from the 1% event on the FIRM
- For a levee to be accredited it must be under the jurisdiction of
  - Federal agency
  - State agency
  - An agency created under federal law
  - An agency of a community participating in the NFIP
Levees: Past, Present, and Future

Title 44 Code of Federal Regulations
Section 65.10

• 44 CFR 65.10
  – Establishes the minimum standards under which a levee may offer protection under the NFIP
    1. Freeboard
    2. Closures
    3. Embankment protection
    4. Foundation stability
    5. Settlement
    6. Interior drainage
    7. Other Design Criteria

• Accreditation procedure clarified by FEMA PMs 34, 43, and 63
Procedure Memorandum 34

• Issued August 22, 2005
• Reiterates that it is the community’s responsibility to provide the data necessary for accreditation
• Establishes a clear flow chart of requirements for levee accreditation
• Allows for the issuance of a deadline to the community
Procedure Memorandum 43

• Issued March 16, 2007
• Without proper documentation, areas behind the levees will be redelineated on the new FIRMs
• Establishes the “Provisionally Accredited Levee” (PAL)
• Community has 24 months to provide full documentation of the certified levee

WARNING: This map contains levees, dikes, or other structures that have been provisionally accredited and mapped as providing protection from the 1-percent-annual-chance flood. To maintain accreditation, the levee owner or community is required to submit documentation necessary to comply with 44 CFR Section 65.10 by August 8, 2009. Because of the risk of overtopping or failure of the structure, communities should take proper precautions to protect lives and minimize damages in these areas, such as issuing an evacuation plan and encouraging property owners to purchase flood insurance.
Procedure Memorandum 63

• Issued September 2, 2010
• Establishes a clear, universal, review checklist for mapping partners
• Is a completeness check and NOT a technical review
• Allows the reviewer to request additional data from the submitter at three levels of the review process
Procedure Memorandum 63 Checklist Items

• Tier 1
  – All Items Signed by a P.E.
  – Freeboard Check

• Tier 2
  – Regulations
  – Operations and Maintenance
  – “With Levees” and “Without Levees” Analysis

• Tier 3
  – Levee System and Cross Reference Check
  – Interior Drainage Analysis
  – Structural Design Requirements
  – Inspection Reports

• Final Completeness Check
Levee Reviews
Levee Reviews

• 44 CFR 65.10 Completeness Reviews
  – Signed and Sealed by a Professional Engineer
  – Contains ALL the necessary sections
  – The sections comply with the 44 CFR 65.10 guidelines

• Show the Proof!
Levee Reviews

• Freeboard
  – Riverine 3’ above BFE
    • Additional 1’ within 100’ of inline structures
    • Additional 0.5’ at the US end of the levee
  – Coastal 1’ above the 1% wave height or maximum wave runup

• Freeboard Exceptions
  – Must provide:
    • Freeboard must be greater than 2’
    • Engineering analysis proving adequate protection
    • Statistical uncertainty analysis in the BFE and 1% discharge
    • Debris, sediment, and ice accumulation potential
Freeboard Example 1

Road with 3' of Freeboard
Freeboard Example 1

Road with 4’ of Freeboard
Freeboard Example 2

2.88 Feet of Freeboard
Closures

• All openings must be provided with closure
Levee Reviews

- **Containment**
  - Levees must tie in to adjacent high ground within 0.1’
  - Embankment designation of high ground
    - Back slope of shallower than 6:1
    - Natural, unimproved ground that’s higher than the BFE
    - Can have the levee designation removed if the BFE does not reach the elevation on the landward toe of the levee
Containment Example 1

Flooding Source

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Levee Reviews

• Operations and maintenance
  – Must be officially adopted by the governing body
    • Must state activities to be performed and the frequency of the performance
    • Must name a responsible individual by name or title

• Typically, levee inspections are done annually and after major event

• Should document the maintenance record
Levee Reviews

• Interior Drainage
  – Often confused with “interior drainage systems”
    • Included within “Other design criteria” in 44 CFR 65.10
  – Should show what the floodplain will look like after the levee is accredited
  – Common to claim that interior drainage analysis is not necessary
Interior Drainage Example
Levee Reviews

• Structural, Geotechnical, and Seepage Calculations
  – Calculations should be well organized and “Black-Box” outputs are not desirable
    • Well organized submissions will expedite the review process
  – Should address the “as-built” levee conditions
    • As-built plans should be included
  – Calculations of seepage exit gradients should be provided
    • This is a frequent omission
Proposed Changes to FEMA Levee Policy
Previous FEMA Approach for Levee Analysis

“With Levee” and “Without Levee” Analysis

– FEMA G&S Appendix H
– Technically sound, yet can be conservative

If levee accredited, landward area mapped as Zone X

If levee isn’t accredited, landward area mapped in SFHA
Resistance to Effective Approach

- Map Mod Maps became effective
- Increased awareness of levee hazards
- February, 2011 Congress requested that FEMA re-evaluate methodology
LAMP

• In December, 2011 FEMA made a proposal to use a “best fit” approach using multiple methodologies

• Revised Analyses Levee Scenarios
  – Sound Reach
  – Freeboard Deficient
  – Overtopping
  – Structural-Based
  – Natural Valley
Mapping of a Levee with Multiple Scenarios
National Academy of Sciences Review

• NAS Report questioned some of the LAMP approaches
  – Stop-gap solution
  – Does not go far enough
  – Potential to create confusion within the communities

• Recommendation that FEMA move directly to a modern risk-based analysis procedure
Collaborative Efforts Leading Current Proposals

- July 6, 2012 Biggert-Waters Flood Insurance Reform and Modernization Act
- Flood Protection Structures Accreditation Task Force
  - FEMA
  - USACE
  - NCLS
- Create a comprehensive approach to levee safety
Thank You

andrew.shields@aecom.com