American Water Resources Association
Philadelphia Metropolitan Area Section
Levee Evaluation and Certification under the NFIP
November 18, 2010
Agenda

- Background and Overview
- Flood Insurance Rate Maps (FIRMs) & Levee Accreditation by FEMA
- Provisionally Accredited Levees (PALs)
- Consequences of De-Certification
- Role of FEMA and USACE
- Technical Requirements for Certification
- Questions
Background and Overview

1968 – National Flood Insurance Program
- Established by the National Flood Insurance Act
- Requires mapping of flood prone areas
- Reduced rates on flood insurance for communities participating in the NFIP
- Participating communities must adopt floodplain management ordinances complying with minimum NFIP criteria

1973 – Flood Disaster Protection Act
- Mandates purchase of flood insurance for insurable structures within flood prone areas as a condition of receiving federal or federally-backed financing (currently based on the 100-year standard)

1986 – 44 CFR 65.10 Adopted
- Provides requirements for FEMA accreditation of levees
Background and Overview

August 22, 2005 – FEMA Issues Interim Procedure Memorandum (PM) 34

- Established guidance for inventorying levee systems and levee review protocol

August 29, 2005 - Hurricane Katrina

September 25, 2006 – FEMA Issues Procedure Memorandum (PM) 43

- Established Provisionally Accredited Levees (PALs) providing additional time (2 years) for levee sponsor to submit certification information
- Levee is shown on the FIRM as providing 1% annual chance (100-year) protection on a “provisional” basis
- Levee sponsor is responsible for preparing and submitting certification documentation to FEMA

Map Modernization

2004

2009 Present

Risk Map
Flood Insurance Rate Maps (FIRMs) & Levee Accreditation by FEMA
Provisionally Accredited Levees (PALs)

- If CFR 65.10 certification material submitted and approved → PAL designation removed
- If certification not achieved → levee de-accredited
Consequences of De-Certification

- Mandatory Flood Insurance Requirements
- Floodplain Management Requirements
- Property Values and Tax Base
- Public Perception

**RESIDENTIAL (A ZONES)**

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Source: www.floodsmart.gov

**NON-RESIDENTIAL (A ZONES)**

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Source: www.floodsmart.gov
Does Certification Always Make Sense?

- Sometimes levee certification may not be fiscally reasonable
- Cost-benefit analysis appropriate to make determination
- AMEC typically takes a phased approach to certification evaluations
Role of FEMA and USACE

- FEMA does not certify levees; it is the responsibility of the levee owner or local sponsor requesting accreditation to provide technical information demonstrating compliance with 44 CFR 65.10

- Generally, other than active federal projects, the USACE:
  - Is not funded, staffed, or mandated to conduct certification evaluations; and
  - Does not have jurisdiction to perform certifications (per the Thomas Act), except:
     - On a direct cost reimbursable basis with funding from local sponsors or communities
     - If local sponsor provides documentation that certification services cannot be procured “reasonably and expeditiously” through ordinary business channels
44 CFR 65.10 Requirements
44 CFR 65.10 Requirements

- **Freeboard**
  - Detailed hydrologic and hydraulic analysis @ 1% annual chance (100-year) standard
  - Standard Minimum – 3 feet minimum overall; 4 feet within 100’ of structures; + ½ foot at upstream end of levee based on “expected” flow
  - Absolute Minimum – 2 feet minimum for “expected” flow with uncertainty analysis which considers:
    - Discharge-frequency uncertainty (i.e. confidence limits);
    - Stage-discharge uncertainty (i.e. roughness & geometry); and
    - Sensitivity to downstream assumptions, sediment transport, and debris/ice jams.
44 CFR 65.10 Requirements

- **Closures**
  - All openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice
  - Structural and mechanical evaluation
44 CFR 65.10 Requirements

- Embankment Protection
  - No appreciable erosion during 1% flood from currents, waves, ice loading, impact of debris, flood duration, and bends
  - Anticipated erosion will not result in embankment or foundation failure
Embankment and Foundation Stability

- Demonstrate that seepage into or through embankment will not jeopardize stability
- Factors include depth of flooding, embankment geometry, length of seepage path, materials, compaction, penetrations, drainage layers, woody vegetation, etc.
44 CFR 65.10 Requirements
44 CFR 65.10 Requirements

- **Settlement**
  - Demonstrate that minimum freeboard will be maintained with potential future settlement
  - Analysis must consider embankment loads, compressibility of soil (embankment and foundation), age of levee, and compaction method during construction
  - Analysis per USACE EM 1100-2-1904 must be submitted
44 CFR 65.10 Requirements

- **Interior Drainage**
  - An analysis must be submitted that identifies the sources of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevations of the 100-year flood
  - Analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwater
  - Mechanical and electrical evaluation
  - Failure mode analysis
44 CFR 65.10 Requirements

- Operations Plans
  - Closures
  - Interior drainage systems (i.e. pumps, storage areas, backflow prevention, etc.)
  - Flood warning systems
  - Actions and assignments of responsible personnel
  - Training
  - Periodic testing and operation (1-year intervals maximum)

- Maintenance Plans
  - Maintain stability, height, and overall integrity of levee and associated structures
  - Replacement of mechanical and electrical parts per manufacturers specifications
Questions

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