Lower St. Francis Levee System 11 & 12
An Outside the Box Approach to Unlocking Large Systems

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The Challenge - Topography

- Massive Alluvial Plain
- Very Flat & Flood Prone except Crowley’s Ridge
- Population Centers and County Seats located on Crowley’s Ridge
- Any major Levee failure would inundate the plain
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The Challenge

- Over 130 Miles of Levees Deaccredited
- 8 Counties Affected
- 5 Counties Cannot be Modernized
- 3 Counties with Compromised Mapping
- Dozens of Levee Boards Involved
- Seclusion and LAMP options
The Challenge - Deaccredited Levee Systems

System 11

- Minor Deficiency in Missouri - Not even in our Region of Concern

- Yet - Entire System Deaccredited

- Robust USACE Levee System Evaluation Report (LSER) completed in 2010 for the NFIP
The Challenge - Deaccredited Levee Systems

System 11 & 12

- Both had USACE Levee System Evaluation Reports (LSER) completed for the NFIP

- Both Systems 11 and 12 were evaluated as robust systems with only very minor deficiencies.
The Solution - “Pre-LAMP Process”

- Held multiple conference calls with USACE – MVM, FEMA HQ, FEMA Region VI, AR CTP

- Attempting to address deficiencies in LSER documents
  - USACE
    - Documentation and structural concerns
  - AR CTP
    - With / Without Levee modeling (Natural Valley)
    - Internal Drainage Analyses
    - Breach Analyses (where needed)
Natural Valley Approach

The Challenge:

- 1-Dimensional Approach
  - Works initially, but then problems start to appear

- We need to get creative (outside the box)
- Mississippi River Levee System
- St Francis River
- Start of Crowleys Ridge
- Drainage canals
- ~ 60,000 ft
- ~ 22 feet
St Francis River
Drainage canals
Natural Valley Approach

The Final Solution:

- Quasi 1-D / 2-D Approach
  - Constant discharges
  - 2D mesh for the geometry
  - No breaklines in the mesh
  - Used over 40 different meshes (130+ miles)
Internal Drainage Analysis

- This project coincides with previously planned Discovery Project in the Watershed

- Using a 2-Dimension BLE Analysis to develop Internal Drainage
  - Levee holds
  - Pump Stations and other drainage structures operate
  - Large Areas that are interconnected ~ 2,000 – 2,500 mi²
  - Application of rain on grid
  - Grid
    - North area ~ 350,000 cells
    - South area ~ 375,000 cells
Breach Analysis

- Goal: Determine if deficient areas impact Arkansas Counties
  - Hint: Looks like it!!

- Used Hybrid 1-D / 2-D Analysis to reflect breach inundation extents
  - Combined BLE and USACE models with new overbank LiDAR
Status Update & Next Steps

- Received modeling information from USACE on tributary
  - Impacts Levee System 12 Deficient Extent (Upstream)

- Natural Valley Scenario: Completed

- Internal Drainage Scenario: Completed

- Breach Scenarios:
  - Working through final calibration results when compared to large historic events
    - 2011: Storm of Record on System 11
    - 2008: Between 2 – 10% event in the system overall
Status Update & Next Steps

- Breach Scenarios:
  - Have draft scenarios started for determining impacts to AR

- Wrap up results of technical data

- Outreach:
  - Attend stakeholder meetings with quality and technically reliable data
  - Achieve buy-in with local stakeholders
Questions?

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