FEMA and USACE Collaboration on Levee Risk Communication
ASFPM’s Annual National Conference

June 2018
Setting the Stage

FEMA

USACE

NeDNR

Clarkson

Colfax County

NEMA
Setting the Stage

★ Participants

• FEMA – LAMP
• USACE – LSAC communication and FPMS Study
• NeDNR – CTP mapping effort
• NEMA – potential PDM grant
• Community – All of the above + more than we recognize
  ▪ Evacuation planning
  ▪ Levee O&M
  ▪ Risk Communication
  ▪ Local funding
  ▪ Etc. etc. etc.
• OA (Community Engineer)
Themes

- Clear Roles and Responsibilities
- Collaboration
- Context
Shared Responsibility for Levees

- Construction
- Operation
- Maintenance
- RR&R
- Risk Understanding
- Emergency Response
- Risk Mitigation
- Certification / Accreditation
- Floodplain Management

LEVEE SPONSORS

LOCAL GOVERNMENT
Shared Responsibility for Levees

- Construction
- Operation
- Maintenance
- RR&R
- Risk Understanding
- Emergency Response
- Risk Mitigation
- Certification / Accreditation
- Floodplain Management

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Levee Sponsors

Local Government
Shared Responsibility for Levees

- Construction
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- RR&R
- Risk Understanding
- Emergency Response
- Risk Mitigation
- Certification / Accreditation
- Floodplain Management
- Flood Insurance
Shared Responsibility for Levees

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Shared Responsibility for Levees

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SHARED RESPONSIBILITY OF LEVEE INFRASTRUCTURE

Construction
Operation
Maintenance
RR&R
Risk Understanding
Emergency Response
Risk Mitigation
Certification / Accreditation
Floodplain Management

Nebraska Emergency Management Agency (State Hazard Mitigation Office)
Nebraska Department of Natural Resources (State NFIP Coordinator)
US Army Corps of Engineers
USGS
FEMA
NOAA
NEMA
Nebraska Natural Resource Districts
Nebraska's Natural Resources Districts
The Importance of Clear Roles and Responsibilities

- Federal programs can be confusing
- Intersections of State and Federal work add complexity to understanding these relationships
  - NDNR working w/ USACE through FPMS
  - NDNR working w/ FEMA through CTP
  - NEMA working w/ FEMA through HMGP
  - Community Engineer frequent collaborator through NeFSMA
- Need to know who is on first – Who has what actions
  - Agency roles vs. community roles
  - Communities recognize they are ultimately responsible for taking care of their citizens, but hesitate to take action for two reasons.
    - Uncertainty if they are stepping on another agencies toes
    - Uncertainty if spending limited funds is being done efficiently and not duplicative of another effort.
Collaboration: Why We Need It

- **Wise use of resources**
  - Four agencies had work or planning underway in this project area.

- **Tax dollars at work**
  - We SHOULD be leveraging resources and efforts.

- **Community consideration**

- **Timeline alignment**

- **Getting to good mitigation requires cross-cutting programs**
  - Flood Exposure and Mapping (working together puts us all on the same page and timeline)
  - Risk assessment/vulnerability
  - Planning and coordination of authorities
Collaboration: How Does It Happen?

Have a process in place that facilitates collaboration.
“While we typically collaborate with USACE on our levee-related work, this was the first time we’ve jointly presented with a shared goal of communicating localized levee-related flood risk. And it made a real difference.”

- Rick Nusz, FEMA Region VII
The Big Picture Benefit of Collaboration
Context is Critical

THE CHALLENGE

Getting people to manage their risk as well as managing their community’s NFIP status, PL 84-99 status, and their levee’s accreditation

SOLUTIONS

- USACE LSAC screening findings = localized picture of risk
  - Potential consequences (financial, life safety, critical facilities)
  - Key drivers of risk for the levee (actionable information for the community)
- Meaningful maps
- Planning and mitigation are part of the conversation
- Current events and personal experience have an impact
How likely is the hazard to occur?
- **Probability** of Flood Loading

How will the levee perform during the hazard?
- Seepage
- Stability
- Erosion
- Closure systems

What are the **consequences** for non-performance?
- Loss of life*
- People at risk
- Community awareness and preparedness planning
- Economic damages to structures and contents
- Critical infrastructure affected

*Avoiding life loss is USACE’s top priority.*
Bayesian Updating

1. Absent any information, our best estimate of conditional performance would initially be based on the average rate of failure for all levees.

2. As we gain information, our estimate of conditional performance can be improved.

3. We can estimate this using Bayes’ Theorem (1763).
Historic Performance

- Has the levee breached?
- Has the levee overtopped?
- How many times has the levee been loaded to 25% of the levee height? 50% and 75%.
- Has heroic flood fighting occurred to prevent breach or overtopping?
Levee Screening Approach - Consequences

- Initial Distribution of People and Damageable Properties
  - Protected Area (National Levee Database)
  - HAZUS
  - Population at Risk and Economics

- Redistribution of People
  - Evacuation Effectiveness = f( )
    - Evacuation Planning
    - Community Awareness
    - Flood Warning Effectiveness
    - Population Density

- Fatality rates from Dutch (Jonkman) Research
Assessing Risk

Levee Condition: excellent
Flood Probability: low

Levee Condition: poor
Flood Probability: high

Nearby Population: small
# of Structures: low

CONSEQUENCES

Nearby Population: large
# of structures: high

FEMA
Increasing Resilience Together
### Example Levee District
Protects community of East Community, Flood State

<table>
<thead>
<tr>
<th>Population at risk</th>
<th>Weighted fatality rate</th>
<th>Performance index prior to overtopping</th>
</tr>
</thead>
<tbody>
<tr>
<td>425 (day), 483 (night)</td>
<td>1.0%</td>
<td>9.48E-05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life loss estimate</th>
<th>Economic Damages</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Overtopping Breach) = 0.02</td>
<td>$44,714,179</td>
</tr>
<tr>
<td>(Breach Prior to Overtopping) = 7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Toe annual chance exceedance (ACE)</th>
<th>Design capacity ACE</th>
<th>Overtopping ACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00E-00 (1 year)</td>
<td>1.00E-02 (100 year)</td>
<td>5.00-03 (200 year)</td>
</tr>
</tbody>
</table>

FEMA

RiskMAP
Increasing Resilience Together
(Example) Recommendations

▶ The non-federal sponsor should focus on operation and maintenance activities.
  • These activities should include removing unwanted vegetation, removing encroachments, improving the animal control program, verifying the condition of the culverts, monitor sod cover and repairing any depressions on the levee surface.

▶ Updating the emergency response manual to provide updated evacuation routes and times.
Understanding Your Flood Risk

- Clarkson has already experienced flooding.
- The ultimate goal is to help you understand the risk and the actions you can take to protect your flood risk.

How can this project help?
- The Natural Valley analysis shows the potential impact for the city if the levee was not present – through determining flood elevations and depths.

USACE Risk Framework for Levee Systems

- **How likely is the hazard (flood, earthquake) to occur?**
  - Probability of Flood Loading

- **How will the levee perform during the hazard?**
  - Seepage
  - Stability
  - Erosion
  - Closure systems

- **What are the consequences for non-performance?**
  - Loss of life
  - People at risk
  - Community awareness and preparedness planning
  - Economic damages to structures and contents
  - Critical infrastructure affected

Mitigation Matters

- Mitigation Priorities highlighted for the City of Clarkson in the 2014 Lower Elkhorn Natural Resources District Multi-Jurisdiction Hazard Mitigation Plan Update
  - Levee floodwall construction and/or improvements
  - Grade control structures
  - Stormwater system and drainage improvements
  - Flood-prone property acquisition
  - Create a city/village-wide plan to prioritize all flood-related projects
  - Participate in the Community Rating System
  - Public Awareness
  - Comprehensive city disaster/emergency response plan
  - Formal evacuation plan
Outcomes

The meeting resulted in several actionable next steps: **Flood profile** provided by FEMA to help the community make its accreditation and mitigation decisions.

The community requested additional **information on insurance policies** from FEMA.

The fire chief acknowledged the **importance of developing an evacuation plan** and requested support in developing one, which the Omaha District provided.

The **city continues to assess** the feasibility of its bridge mitigation project and will use the data being developed.

Updates will continue between all stakeholders on **data development, timelines** and mitigation efforts.
Takeaways

1. Smaller communities = Consolidated roles = Efficient decision making

2. Getting the right people in the room

3. The value of conversations; pre-meeting information gathering

4. Forest top-of-mind