Challenges With Seismic Retrofitting MLGW Facilities
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Presented By:
Jay Stressel, P.E.

Problems & Challenges

Problem:
• Any question or matter involving doubt, uncertainty, or difficulty.

Challenge:
• Difficulty in a job or undertaking that is stimulating to one engaged in it.
Technical Problem Verses Adaptive Challenge

Technical Problem:
• Often lend themselves to quick and easy (cut and dried) solutions.

Adaptive Challenge:
• Require changes in values, beliefs, roles, relationships, & approaches to work

Mitigation financials

• Since 1990, MLGW has spent nearly $81 million on seismic mitigation projects.
• MLGW secured a total of $6 million in FEMA grants to help fund improvements to the electric and water systems
Mitigation Projects

- Water Pumping Stations - building retrofits, wells, booster Pumps, electrical source, piping and equipment.
- Gas System – cast iron pipe replacement
- Electric Substations – power transformers
- Support Facilities – building retrofits, non-structural building elements.

Challenge #1: Understanding and Identifying Risks

- Structural Assessments
- Prioritize structural systems
- Business continuity
- Seismic performance required
Structural Assessments

- Allen & Hoshall Seismic Studies: (1989) All Facilities
- Burr & Cole Seismic Study (1994)
- EQE/ABS Consulting Studies:
  - Administration Bldg. Phase 1/Phase 2 (2001)
  - Retrofit Options Assessment of Existing Century Bldg. (2002)
- Multi-hazard risk assessment - 2006

Seismic Design Performance
Structural & Non-structural

**Design Case 1**
1. Earthquake Review Level: M7.0 with an epicenter located near Marked Tree, AR
   Performance Objective: immediate occupancy/ fully operational

**Design Case 2**
Earthquake Review Level: A 2,500 year return level event (2% in 50-yr probability of non-exceedance)
Performance Objective: Collapse Prevention
Challenge #2:
Support from Upper Management

• Involve upper management in formal decision process
• Expose seismic vulnerabilities
• Couple with other vulnerabilities & needs
• Explore financial options/FEMA Grants

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Challenge #3:
Long Range Plans & Budgets

• Develop long range master plans for future budgets.
• Prioritize building non-structural element retrofits.
• Assure seismic restraints are included on all new equipment.
• Maintain resiliency standard for future purchases.

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Challenge #4
Managing the design process

- Check for professional certifications, SE, SECB or design specialty of firm
- Check professional affiliations
- Quality assurance - peer review
- Require calculations to be submitted
- Pay for quality up front

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Challenge #5:
Managing the Construction Process

- Owner must manage the inspection effort
- Periodic observations verses continuous inspections.
- Special seismic inspections
- Team Communication!

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**Water system, structural retrofits**

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**Water system, structural retrofits**

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20 Booster Pumps
55 critical wells

Water system, non-structural elements
Water system, non-structural elements

Cast Iron Pipe Replacement
Substation Transformers

Facilities, Structural Retrofit
Structural inspections

Emergency Generator
Equipment anchorage

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Make sure you get what you pay for!

Questions?

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