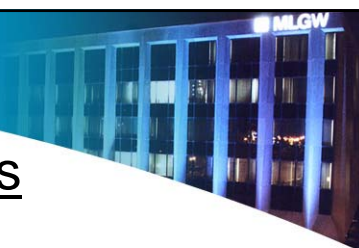




Challenges With Seismic Retrofitting MLGW Facilities

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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.



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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



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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



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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.



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Challenge #1: Understanding and Identifying Risks

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



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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



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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



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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



Water system,
structural retrofits



20 Booster Pumps
55 critical wells



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Water system,
non-structural elements



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Water system, non-structural elements



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Cast Iron Pipe Replacement



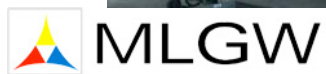
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Substation Transformers



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Facilities, Structural Retrofit



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Structural inspections



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Emergency Generator



22

Equipment anchorage



23

???



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Make sure you get
what you pay for!



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Questions?



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