MITIGATING AT ALTITUDE: REDUCING EARTHQUAKE RISK IN THE ROCKIES

Sean McGowan, PE
Earthquake Program Manager & Building Science Lead
FEMA Region 8
Outline

• Overview of earthquake risk and mitigation activities in Region 8 states
• Utah unreinforced masonry risk reduction efforts; tie-in to *National Mitigation Investment Strategy*
• Regional/National-scale challenges & opportunities
FEMA Region 8 = Rockies = America’s Crumple Zone™
What earthquakes? Don’t you mean...

- Flood
- Wildfire
- High wind
- Winter storms
- Terrorism & Active shooters

- Data breaches
- Dam breaches
- Pandemics
- Election security

[Image of flood, wild fire, and coronavirus]
Beautiful Scenery Hints at Hidden Earthquake Threat

Image source: US Forest Service

Image source: jacksonholenet.com
No geology degree required!

Wasatch Fault
Large Earthquakes in Mountain West

- **Colorado**: Estes Park, 1882: M6.6
- **Montana**: Hebgen Lake, 1959: M7.3
- **Utah**: Hansel Valley, 1934: M6.6
- **Wyoming**: Yellowstone National Park, 1959: M6.5

Eisenhower was President the last time we had a “real” earthquake!
Mother Nature Doesn’t Follow our Plans
Colorado

- Pre-earthquake: *Rapid Visual Screening* (FEMA P-154): FEMA-funded training to inventory critical facilities
- Post-earthquake: *Safety Assessment Program* trainings (2X/year)
  - Training donated by Dr. Keith Porter
  - ATC-20/45 manuals provided by FEMA
- Trained damage inspectors can:
  - Help state(s) during disasters
  - Promote mitigation *before* disasters
Montana

- Bitterroot Fault scarp discovery
  - Takeaway: proof fault is “young” and capable of producing a “cataclysmic” earthquake...right next to Missoula (2nd largest city in Montana)

Source: Stickney & Lonn, 2018
Wyoming

• Critical facilities Hazus analysis by EERI
• Followed up with tabletop exercise organized by FLASH
Red Alert: significant losses

2,000+ anticipated fatalities

Significant damage to utilities and critical infrastructure

Utah

FEMA 2020 National Earthquake Conference | Mitigating at Altitude
Disaster Movie-level Losses

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**Seattle Post-Intelligencer**

*THURSDAY, MARCH 1, 2001*

6.8 SHOCKER

- Strongest quake in half a century rumbles through the Northwest
- One dead, more than 200 hurt; damage could reach into billions

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Utah’s Killer Buildings: Unreinforced Masonry

Unreinforced Masonry (URM) Buildings don’t have any steel holding the brittle bricks together.

URMs experience life-threatening damage at low levels of shaking. They often fall outwards.

30,000+ URMs in Salt Lake City; 147,000 in 12 county Wasatch Front

IT WAS ONLY A MINOR EARTHQUAKE, BUT THE ETCH-A-SKETCH GALLERY WAS RUINED
Economics > Engineering

URMs persist because they are economically viable. Victorian, Tudor, Georgian, and brownstone style buildings are sought after as homes and workplaces.
Utah Unreinforced Masonry Summit Recap

- Strong engagement from ~100 attendees: emergency managers, building officials, local officials, press, & U.S. Congressional staff
- URM Summit + 2021 National Exercise are raising awareness of the threat in Utah
APPROXIMATELY 66 MILLION YEARS AGO...

WELL THAT LOOKS LIKE IT WILL COST A FORTUNE...
Post-Sandy, Government Accountability Office urged national coordination of mitigation investment to reduce future disaster losses.

National Mitigation Investment Strategy recommends setting resilience & mitigation investment priorities to benefit whole community.
National Mitigation Investment Strategy

Show How Mitigation Investments Reduce Risk

Coordinate Mitigation Investments to Reduce Risk

Make Mitigation Investment Standard Practice

Utah is the first Pilot!
What Are Utah’s Priorities Going Forward?

1. Developing a URM risk reduction strategy
   ▪ Strategy development kickoff in Utah Feb 13th
   ▪ Finalized strategy by Fall 2020

2. Outreach & engagement campaign targeting:
   ▪ Public
   ▪ Key decisionmakers
Don’t miss the next webinar scheduled for March 10:
*All Along the Wasatch Fault: Best Building Practices from Utah’s Earthquake Mitigation Efforts*

Bradley Bartholomew
Utah Division of Emergency Management

This webinar will feature guest speakers from Utah Division of Emergency Management and FEMA.

Sean McGowan
FEMA Region VIII

Register Now
Challenges

State and FEMA Regional Earthquake Program Managers usually have other non-earthquake roles
Challenges

Mitigation depends upon first knowing the hazard. States report funding trenching and seismic sensors is challenging.

- Seismic sensors and network equipment intended for Earthquake Early Warning (EEW) usage are now eligible for FEMA Mitigation funding.

Kyren Bogolub, CGS

Seth Wittke, WSGS
Challenges

Some groups oppose building code improvements, citing diminishing returns

- Mitigation Saves 2.0: building above code provides a 4:1 return on investment
- Homebuilder confidence in December, according to National Association of Home Builders, reached highest level in 20 years
Opportunities

Exercises can directly feed into mitigation – identify key risks to life safety & response capabilities

- What didn’t go well in the exercise? It can be fixed before a real earthquake happens.
Opportunities

Excellent case studies of national and state programs pooling funds

- Marriott Library at University of Utah
- Reach out to speakers from yesterday’s *Seismic Sorcery* session

Source: Reaveley Engineers
Conclusion

- We do, in fact, have earthquake risk in the Rockies
- Many of the tools for risk reduction are already in place
- Strong collaborative partnerships and innovative use of resources have been the keys to success
Thank You

Collaborators:

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