

## **2023 Montana Geohazards Workshop – April 26-27, 2023**

### **Action Items:**

1. Form Montana Earthquake Working Group:
  - Obtain Letters of Interest from each organization expressing common goals to collaborate to better understand and reduce earthquake hazards. This working group would provide the initial step towards establishing a MT Seismic Safety Commission.
2. Earthquake Working Group develop:
  - Strategic Plan/guidance document to present at next legislative session. Update every 2 years (model after Utah)
  - A story document (e.g. Utah’s “Putting Down Roots in Earthquake Country”).
  - Safety Assessment Program (SAP) – coordination across state agencies.
    - Templates: Back to Business (B2B); Building Occupancy Resumption Program (BORP); Functional Occupancy and Recovery Work Agreement for Reducing Downtime (FORWARD).
3. Benefit-Cost Analysis for Helena.
  - Use Helena School District as a pilot location for generating an inventory (geodatabase) of seismically vulnerable buildings (“high risk structures”).
  - Helena School district apply for DES grant (FEMA pass through) to assess Helena Schools.
  - Public outreach/education campaign as a deliverable.
  - Volunteer help from structural engineers.
4. Choose location for next meeting: Bitterroot Valley? Missoula? Kalispell?

### **Key Points:**

- MBMG has a recently established Geohazards Program:
  - Active faults program (Quaternary – last 2.6 Ma).
  - Earthquake monitoring.
  - Landslides – mapping and site-specific investigations.
  - Bitterroot fault study: Recent work suggests 2 earthquakes in the last 10-15,000 years.
- MBMG has secured funding from USGS-NEHRP and FEMA-NERHP through MT-DES to map landslides by county using LiDAR datasets.
  - Completed: Jefferson and Deer Lodge.
  - Funded: Powell, Ravalli, Lincoln.
  - Montana Elevation Working Group with support of the USGS 3-DEP plans to acquire 1 m resolution LiDAR of entire state by 2025 available through the Montana State Library.
- Montana has a history of damaging earthquakes (e.g. Helena 1935; Hebgen Lake 1959).
  - MT is within the Intermountain Seismic Belt extending from Utah through western Wyoming into Montana; extends from Butte to Bozeman and passes through Helena (trends approx. N-S) and the Centennial Tectonic Belt which extends through southwestern-most MT into Idaho (trends E-NE/W-SW).
- MBMG is working on a suitability and logistic regression models for mapping landslide potential.
- MBMG’s seismic network contains predominantly “antiquated” equipment that does not provide full waveform data for larger events.
  - MBMG currently has a DNRC Reclamation and Development Project Grant to add 10 modern digital seismograph stations to the network.
- Montana’s growing population in areas with earthquake hazards provide more tangible funding opportunities with federal and state agencies to investigate hazards.

- Disaster response requires massive coordination across state agencies.
  - Following disaster, damage estimates are needed.
  - Recovery time for an earthquake/disaster is years.
  - Ability to reoccupy structures following a disaster makes the community more resilient. Buildings facilitate communities; therefore, we rely on buildings to “bounce back” following a disaster.
  - Disasters affect communities physically, socially, psychologically; can destroy social fabric. Disasters can diversify and strengthen our economies.
- Earthquake preparedness is in competition with preparedness for fires and flooding, impacts of which are more tangible for many folks (especially given recent fires and flooding events).
  - We need to be poised and ready to respond as soon as something happens.
  - Need to get information out to local community – Great Shakeout – need to focus on education/outreach.
  - Change will come from within communities before it comes from leaders
- Earthquakes can affect energy transmission, water availability, etc.
  - Things break down within 24 hours without energy
  - Is infrastructure designed for seismic safety?
  - GIS team is developing at DEQ – overlay infrastructure with seismicity.
- MDT has designed structures for seismic risk and has also completed seismic retrofit projects
- Challenges with non-federal dams:
  - Owners of private dams prefer to spend money on tangible items like construction or monitoring instead of studies.
  - Few engineers specialize in seismic analysis of dams.
  - Dams follow probabilistic design criteria, which is an issue because many faults in MT are blind (hidden, no surface expression).
- FEMA NEHRP Priorities:
  - *Current* – Building codes and design guides; Outreach campaigns; Disaster support and post event studies; Supporting state earthquake programs; Training
  - *Future* – Earthquake insurance; Building inventories; Support states to access retrofit funds (e.g., BRIC); Linking with other programs; GIS and risk modeling
- FEMA-NEHRP funding to support earthquake mitigation activities
  - Develop seismic mitigation plans; develop inventories/perform seismic safety inspections of critical structures/infrastructure; update building codes; education re: earthquake insurance; assist Multi-State groups with any of the above
- FEMA Hazus model and USGS earthquake response products:
  - USGS Prompt Assessment of Global Earthquakes for Response (PAGER)
  - Hazus is a model that highlights mitigation opportunities. Accounts for impacts to an area given a specific earthquake hypocenter/magnitude and population/infrastructure
- MT-DES funding streams: BRIC; Hazard Mitigation Grant Program (HGMP); NEHRP; FEMA High Hazard Potential Dam Project
- MT-DES structural retrofit examples: Helena’s water reservoirs; UM-Western Main Hall; MSU Creative Arts Complex
- Table top exercise: 2025 Helena Valley Earthquake Sequence– see notes on the Panel Discussion on the Earthquake Scenarios for Helena Valley (Mw 6.3 and Mw 6.0).

***Please see minutes of the meeting for more complete details on the 2023 MT Geohazard Workshop.***