

UTAH EARTHQUAKE RESEARCH PRIORITIES FOR 2009

Below are the priorities defined by the 2008 Utah Earthquake Working Groups and the Utah Geological Survey for earthquake research in Utah in 2009, provided for consideration in responding to the U.S. Geological Survey National Earthquake Hazards Reduction Program (NEHRP) Request for Proposals.

Faults

- Studies of faults should focus on those structures that have been identified as a priority by the 2008 Utah Quaternary Fault Parameters Working Group listed below:

Priority A (in order of priority)

- Provo segment, Wasatch fault zone – timing of penultimate event (priority 1)
- West Valley fault zone (priority 1)
- Washington fault
- Carrington fault (Great Salt Lake)
- Rozel section, northern Great Salt Lake fault

Priority B (not in order of priority)

- Cedar City-Parowan monocline/Paragonah fault
 - Enoch graben
 - Clarkston fault
 - Wasatch Range back-valley faults
 - Gunnison fault
 - Scipio Valley faults
 - Faults beneath Bear Lake
 - Eastern Bear Lake fault
 - Bear River fault zone
- In and adjacent to the urbanized areas, studies that are designed to better characterize the paleoseismic histories of major faults whose rupture histories will affect time-dependent models of Utah's seismic hazards.
 - Evaluate utility of newly acquired LIDAR imagery for the Wasatch Front for detailed mapping of faults, landslides, and areas of ground deformation.
 - Use geodesy to identify specific faults where strain is being localized as an indicator of high seismic hazard.
 - Investigate the dip of normal faults (using geophysics) to determine the best dip value(s) for converting vertical fault slip rates to extension rates for comparison with GPS data.

Ground Shaking/Site Conditions

- Update and maintain the Wasatch Front Community Velocity Model (CVM); include latest shear-wave-velocity data.
- Use Wasatch Front CVM to evaluate the importance of basin structure (e.g., depth of unconsolidated and semi-consolidated sediment, basin edge effects, steep basin boundary effects, focusing) on strong ground motions.

- Collect additional and/or re-analyze deep-basin-structure data (gravity, seismic, geologic).
- Expand Wasatch Front CVM to include Tooele and Rush Valleys to the west.
- In cooperation with the USGS National Seismic Hazard Mapping (NSHM) project, develop site-amplification and basin models to prepare large-scale probabilistic and scenario urban ground-shaking maps for the Wasatch Front.
- Characterize shear-wave velocities down to R1 (boundary between unconsolidated and semi-consolidated sediments) and R2 (boundary between semi-consolidated and consolidated bedrock) along the Wasatch Front.
- Use Advanced National Seismic System (ANSS) data in ground-motion studies along the Wasatch Front.
- Continue laboratory dynamic soil testing to model non-linear soil effects.
- Perform passive instrumental monitoring to better characterize geologic site conditions.
- Develop earthquake site-conditions maps for southwestern Utah.

Liquefaction

- Develop new techniques for mapping the liquefaction potential of under-sampled geologic units; collect and analyze geotechnical data and apply new techniques in Utah Valley and Davis County.
- Compile geotechnical databases and map probabilistic liquefaction potential and permanent ground displacement (lateral spread, settlement) for Utah Valley and other Wasatch Front valleys outside Salt Lake Valley.
- Conduct additional CPT investigations to resolve the origin of potential fault vs. lateral-spread offsets in downtown Salt Lake City, and provide additional data for cross-validation of under-sampled geologic units.
- Develop an “Importance Matrix” and hold working group meeting(s) to resolve issues related to appropriate earthquake ground motions for use in liquefaction and seismic slope-stability evaluations based on building use and displacement thresholds.
- Collect and analyze subsurface data for comparison of the liquefaction hazard mapped using the Liquefaction Potential Index and using probabilistic techniques in Salt Lake Valley.
- Develop techniques to evaluate liquefaction-induced large lateral deformations on gentle slopes by analyzing the Farmington Siding landslide complex, Davis County

Planning

- Develop planning scenarios and HAZUS loss estimates for surface-faulting earthquakes on the Wasatch fault zone.
- Update existing surface-faulting and other earthquake-hazard maps and prepare new maps where needed for use by local government planners along the Wasatch Front and in southwestern Utah; hold workshops to assist local government staff in using maps.