

## UTAH EARTHQUAKE RESEARCH PRIORITIES FOR 2008

Below are the priorities defined by the 2006 Utah Earthquake Working Groups and the Utah Geological Survey for earthquake research in Utah in 2008, provided for consideration in responding to the U.S. Geological Survey National Earthquake Hazards Reduction Program (NEHRP) 2008 Request for Proposals.

### Faults

- Studies of faults should focus on those structures that have been identified as a priority by the 2007 Utah Quaternary Fault Parameters Working Group listed below:

#### Priority A (not in order of priority)

- Brigham City segment, Wasatch fault zone – timing of most recent event
- Carrington fault (Great Salt Lake)
- Provo segment, Wasatch fault zone – timing of penultimate event
- Rozel section, northern Great Salt Lake fault
- Utah Lake faults
- West Valley fault zone

#### Priority B (not in order of priority)

- Bear River fault zone
- Cedar City-Parowan monocline/Paragonah fault
- Clarkston fault
- Eastern Bear Lake fault
- Enoch graben
- Faults beneath Bear Lake
- Gunnison fault
- Hurricane fault zone (Cedar City section)
- Levan segment, Wasatch fault zone - trench
- Scipio Valley faults
- Wasatch Range back-valley fault

#### Priority C (study in progress; need for further study to be determined)

- East Cache fault, southern section
  - Nephi segment, Wasatch fault zone
  - Promontory section, Great Salt Lake fault zone
  - Washington fault
  - Weber segment, Wasatch 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).
- 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. Determine whether data are adequate for use in developing urban ground-shaking maps.
- 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.
- Consider passive instrumental monitoring to model basin effects on ground motions.
- Develop earthquake site-conditions maps for southwestern Utah.

### **Liquefaction**

- 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.
- Collect and perform geologic analyses of subsurface data to identify data gaps and data-collection requirements for future mapping in Utah Valley and other Wasatch Front valleys outside Salt Lake Valley.
- Organize and hold working group meeting to resolve issues related to appropriate earthquake ground motions for use in liquefaction and seismic slope-stability evaluations.

### **Planning**

- Develop planning scenarios and HAZUS loss estimates for Weber- and Provo-segment surface-faulting earthquakes, 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.