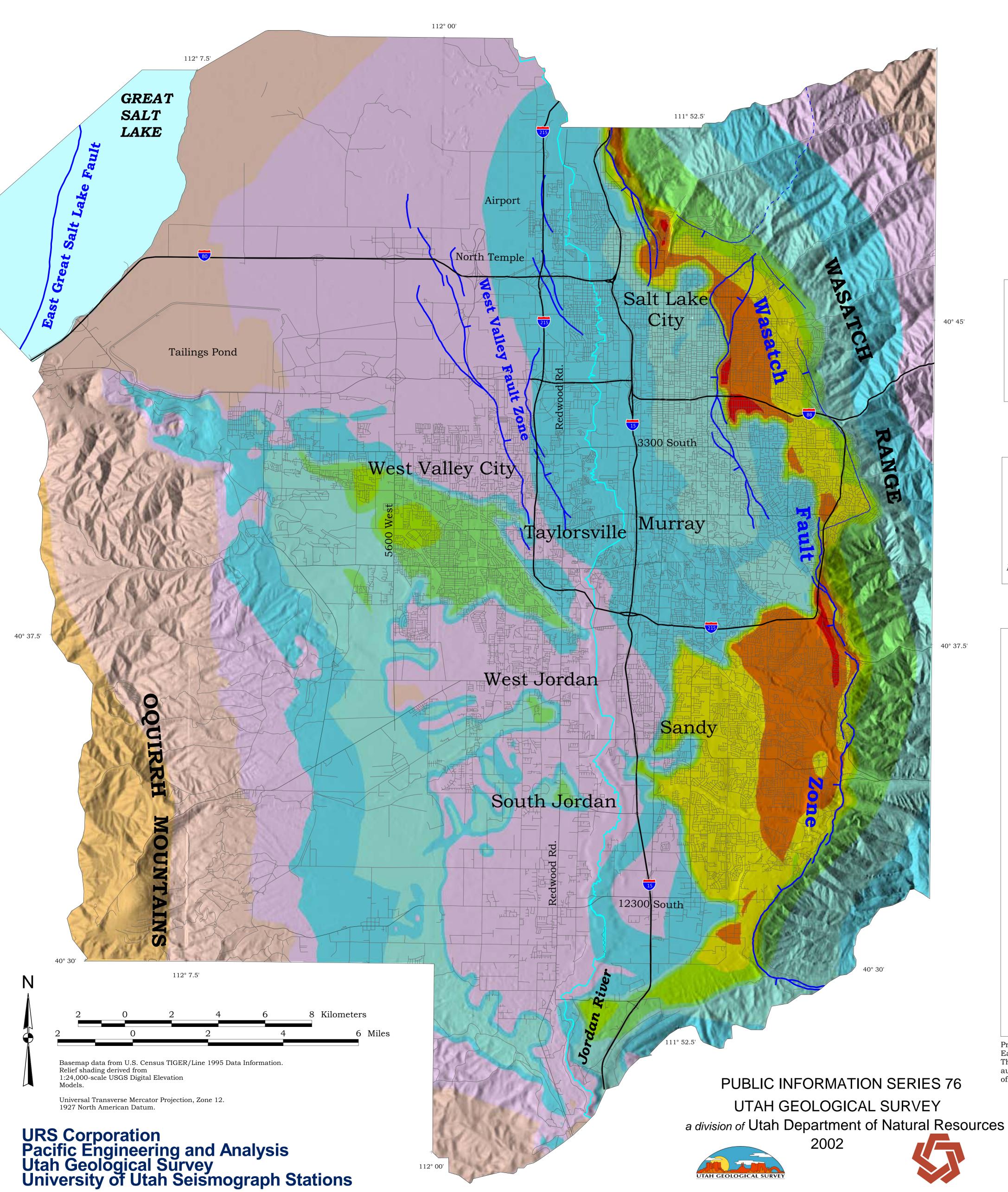
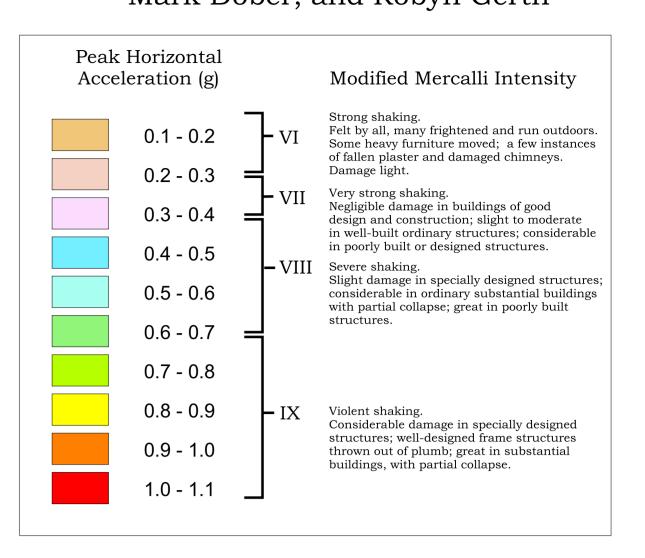
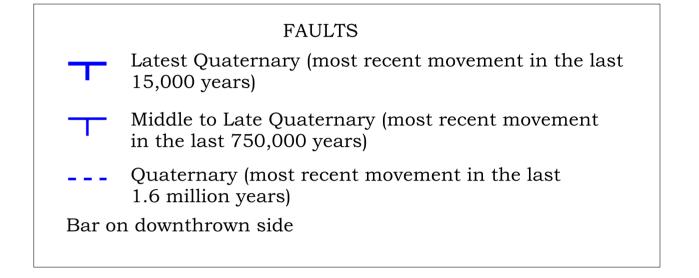
GROUND-SHAKING MAP FOR A MAGNITUDE 7.0 EARTHQUAKE ON THE WASATCH FAULT SALT LAKE CITY, UTAH, METROPOLITAN AREA

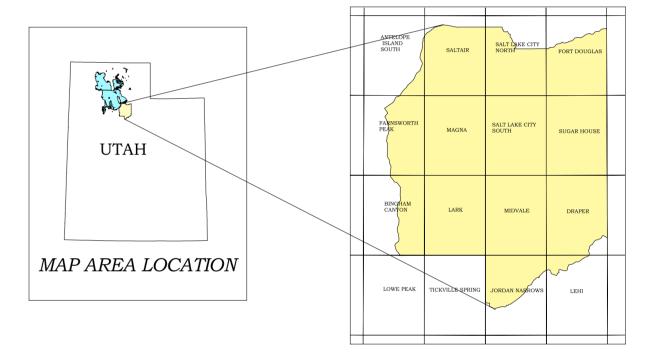


by

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EXPLANATION

This map illustrates the estimated intensity of ground shaking that would occur in a magnitude 7 earthquake on the Wasatch fault in Salt Lake Valley. The Salt Lake City metropolitan area is one of the most seismically hazardous urban areas in the interior of the western U.S., chiefly because of its location along the Wasatch fault. The fault extends westward beneath the metropolitan area from its location near the eastern edge of the Salt Lake Valley (marked on the map by a heavy line). The Wasatch fault has generated large earthquakes (magnitude 7 and greater) repeatedly during the past few thousand years. The elapsed time since the last large earthquake on the "Salt Lake City segment" of the Wasatch fault is about 1,200 years and is approaching the average time interval between large earthquakes (about 1,400 years) based on the geologic record for the past 6,000 years.

The ground shaking depicted on the map is in terms of "peak horizontal acceleration," which is the measure most commonly used by engineers. The higher the peak acceleration, the stronger and more damaging the ground motions. Ground motions are due to the passage of seismic waves which, like sound waves, consist of a range in frequencies. The "peak" refers to the maximum acceleration at very high frequencies (greater than 30 cycles/second), which are the most damaging to shorter buildings and structures (one to two stories). "Horizontal" refers to the direction of motion. Peak acceleration is often expressed in terms of the unit "g" which is the gravitational acceleration at the earth's surface (1 g = 980 centimeters/second/second). The onset of damage to structures is about 0.1 g. To help the reader translate g's into felt and structural effects from earthquakes, an approximate correlation with the Modified Mercalli intensity scale is provided above. The values depicted on the map are "best estimates" given our current state of knowledge. Uncertainties in these estimates are large because of the uncertainties in quantifying the factors which affect earthquake ground shaking in Utah.

The pattern of ground shaking on the map is primarily controlled by the distance to the fault and the different types and thicknesses of soil or unconsolidated sediments (for example, sands, silts, or gravels). The highest peak accelerations (greater than 0.7 g) shown on the map will occur in the bench areas adjacent to the fault because of their proximity to the fault and because the relatively thin (less than about 100 meters thick), dense gravelly and sandy soil will increase (amplify) high-frequency ground shaking. Although peak accelerations will be lower in the thick sediments of the central Salt Lake Valley compared to the bench areas, low-frequency ground shaking (not illustrated on this map) will be comparable in both areas. Low-frequency ground motions are more damaging to tall or long structures (for example, high-rise buildings and highway overpasses).

In all areas of the Salt Lake City metropolitan area, we expect that ground shaking will be strong to severe (greater than 0.1 g) and damage significant when a future magnitude 7 earthquake ruptures the nearby Wasatch fault. Also, many other faults along the Wasatch Front can generate strong ground shaking in the Salt Lake City metropolitan area, such as other segments of the Wasatch fault (the "Provo segment" for example) and the nearby West Valley and East Great Salt Lake faults.

This map is one of nine maps showing the ground-shaking hazard in the Salt Lake City metropolitan area at a neighborhood scale. These maps were developed in order to help raise the awareness of the general public to the earthquake "threat" in Utah and thus to help reduce the earthquake risk. All nine maps with an accompanying report can be found in Utah Geological Survey Miscellaneous Publication MP-02-5.

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