

Distinguished Speaker Series

University of Louisville
Sponsored by ASCE Student Chapter and KGEG



BRIEF OVERVIEW OF THE SEISMIC THREAT POSED BY THE NEW MADRID, SOUTH CENTRAL ILLINOIS AND WABASH VALLEY FAULT ZONES

J. David Rogers, Ph.D., P.E., R.G.

In late 1811 and early 1812 a series of more than 2000 felt earthquakes emanated from the New Madrid Seismic Zone in southeastern Missouri and northeastern Arkansas. Four of these quakes were in excess of Magnitude 7.5, shaking an area over 1 million square miles and causing liquefaction to about 10,000 square miles. Chimneys in Cincinnati were toppled at a distance of 350 miles.

The most likely earthquake facing the American Midwest is a Magnitude 6.0 to 6.8 event, emanating from any one of three fault zones. The speaker will summarize the potential impacts of a range of synthetic ground motions generated from three fault zones for long span bridges across the Missouri River near St. Louis, Missouri. A series of Magnitude 6.0 to 6.8 events were modeled at ranges between 115 and 232 km. Response spectra generated for these sites suggest that lower magnitude quakes generate increased magnification of spectral accelerations, as would be expected. A ten-fold magnification of spectral accelerations occurs in weaker ground motions at great distance, similar to what occurred at Mexico City in 1985. Weaker base rock motions cause greater site amplification because those sites don't suffer from nonlinear behavior, which tends to damp out seismic energy trapped in the sediment pile. The resulting site response spectra exhibit a classic bimodal distribution resulting from the resonant frequency of the sediment pile lying on top of the Paleozoic bedrock. The trailing peaks coalesce around periods of about 1.5 seconds, which is bad for simply supported multiple span bridges with similar fundamental periods. This news means that Magnitude 6.4+ quakes at ranges of 200 to 260 km could be expected to trigger foundation liquefaction and resonant frequency problems for multiple span bridges and tall buildings (10 to 25 stories) in old channel corridors with 100 to 150 feet of unconsolidated sediment.

Date: March 8, 2005
Social Hour: 5:30 – 6:00
Presentation: 6:00 – 7:00

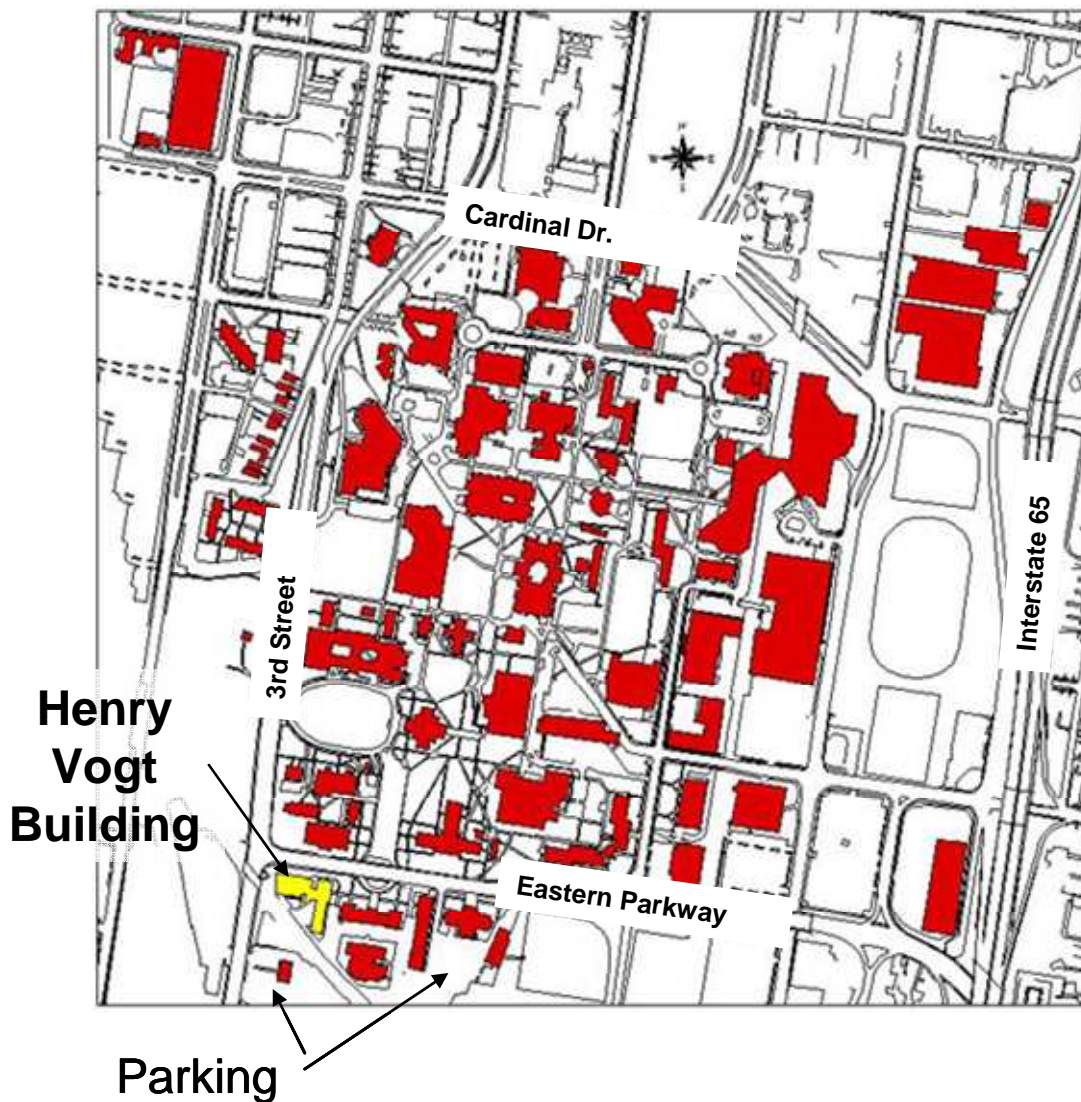
Location: Henry Vogt Building, West Wing, Room 311
<http://www.louisville.edu/a-s/geog/gis/vogt-h.htm>



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