The U-M Geotechnical Group & The U-M student Chapter of the Earthquake Engineering Research Institute

are pleased to host

**Professor Jonathan D. Bray**
CEE Department, University of California, Berkeley

**Title:**

Earthquake Engineering Design Near Active Faults

Thursday, October 15th, 2009

12:00 – 13:00 pm

Room 2355 GG Brown Building
Abstract

Facilities and lifelines that will be sited across or adjacent to active faults should be designed considering the hazards associated with earthquake surface fault rupture. Observations of surface faulting during earthquakes show how the resulting ground movements affect engineered systems. Similar to other forms of ground failure, such as mining subsidence and landslides, effective design strategies can be employed to address the hazards associated with surface faulting. These design measures include establishing non-arbitrary setbacks based on fault geometry, fault displacement, and site conditions; constructing reinforced earth fills to partially absorb underlying ground movements; using slip layers to decouple ground movements from foundation elements; and designing strong, ductile foundation elements that can resist the resulting earth pressures.

Forward-directivity in the near-fault region can produce intense, pulse-type motions that differ significantly from ordinary ground motions that occur further from the ruptured fault. These motions typically govern the design of structures built close to active faults, so the selection of design ground motions is critical for achieving acceptable performance without costly over-design. Structural performance is greatly affected by the peak ground velocity (PGV) and period of the velocity pulse ($T_v$) of near-fault motions. PGV varies significantly with magnitude, distance, and site conditions, and $T_v$ is a function of magnitude and site conditions with most of the energy being concentrated within a narrow-period band centered on the pulse period. Lower magnitude events produce motions with lower pulse periods, which may cause more damage to the stiff structures that are more common in urban areas.