

## Improving building construction Researchers work to combat natural disaster

One hundred years ago, on April 18, 1906, the San Francisco Earthquake wreaked havoc in the San Francisco Bay area. The earthquake and resulting fire are thought to have caused thousands of deaths. A hundred years later, researchers at WSU continue to strive to improve construction techniques so that buildings and other structures hold up under future seismic events.

\* **J. Daniel Dolan**, professor of civil and environmental engineering, is involved in writing and updating design and building codes in the U.S. He is one of nine experts in the country who review proposals for technical changes to the residential building code.

Working with FEMA, Dolan is publishing a book on home building and design to mitigate for seismic hazards. The guide gives suggestions for homeowners, designers and builders on the mitigating steps they can take to protect their home from earthquake damage and for the first time includes cost-benefit information.

He was recently featured in a one-hour documentary entitled, "Disaster-Resistant Housing" that has begun airing on Public Broadcasting Corporation television stations in the U.S.

In his research, Dolan works to model in real time the forces a low-rise structure experiences from hurricane-force winds or earthquakes, and tests full-scale components of buildings to determine effective methods for improving the performance of these buildings.

One current project that Dolan is working on is to introduce new composite materials that will tie building parts together more effectively to make buildings stronger and tougher when subjected to natural hazard loads. Dolan hopes the work will eventually lead to improved structural performance of buildings without driving building costs significantly higher. Dolan can be reached at (509) 335-7849 or [jddolan@wsu.edu](mailto:jddolan@wsu.edu)

\* **Dave McLean**, chair of civil and environmental engineering, is a structural engineer who specializes in concrete structures and bridges.

McLean has worked to retrofit existing bridges to make them better able to withstand earthquakes. In the earthquake-prone Seattle area, he and his colleagues have designed and worked with the Washington State Department of Transportation on retrofitting projects that have been implemented on hundreds of bridges.

The researchers designed a solution for the problematic Spokane Street overpass, located in South Seattle, just off I-5. Using computer modeling combined with laboratory verification to determine the optimal retrofit, McLean's group developed circular steel jackets to cover the bridge's knee joint, similar to a brace on an actual knee injury.

The steel jacket overlaps with another steel jacket that was developed to strengthen the column base. To allow for the dissipation of energy that an earthquake would create, the researchers cut a two-inch bare spot between the two steel jackets. McLean can be contacted at (509) 335-9578 or [mclean@wsu.edu](mailto:mclean@wsu.edu)

\* **Adrian Rodriguez-Marek**, assistant professor of civil and environmental engineering, researches various areas of geotechnical earthquake engineering, including the amplification of seismic waves by local soil deposits, characterization of earthquake strong ground motions, numerical modeling of soil-structure interaction, and the development and analysis of case-histories from field observations of earthquake damage.

In 2002 Rodriguez-Marek taught a course in Bolivia on earthquake engineering, which was the first course in the country and served to raise awareness of seismic hazard in the country. Rodriguez-Marek can be contacted at 509-335-7088 or [adrian@wsu.edu](mailto:adrian@wsu.edu)