

Western States Seismic Policy Council
2014 Awards in Excellence
Award in Excellence for Research Projects

Administering Agency:	University of California San Diego Department of Structural Engineering
Program/Project Name:	<i>Performance of Hospital Components in Earthquakes and Fires</i>
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Program Summary

This research program is the first time a full-scale test building was subjected to both earthquakes and fires. The issue is that current building codes and standards for fire resistance assume that buildings are undamaged when fires start, yet many fire resistive features of new construction are not necessarily earthquake-resistant.

The project involved subjecting a five story concrete building with components that are common in hospitals to earthquake shaking followed by fires to evaluate how shaking-related damage compromises fire resistance. The building was initially supported on seismic isolators and experienced insignificant, repairable damage in a sequence of motions generated by the world's first and largest U.S. outdoor shake table. The building was subsequently fixed to the table and damaged in a sequence of motion to near collapse. Controlled fires were then set to study the impact of the loss of compartmentalization induced by the prior seismic motion sequence on the spread of smoke, temperature and fire. Several media events were held in April and May 2012 and tests were completed in May 2012. The international media exposure generated by these tests has demonstrated the project's relevance.

Extensive documentation using video cameras, more than 500 analog sensors and a GPS system has provided researchers, regulators and practicing engineers many insights into the tolerances and degradation of common building systems responding to movements during a range of earthquakes. Two 30 minute videos summarized the research and provided key outreach and informational tools to the public, regulators and policymakers. The final video was completed in October 2012, titled "Building it Better: Earthquake Resilient Hospitals for the Future" and is available at: <http://uctv.tv/shows/Building-it-Better-Earthquake-Resilient-Hospitals-for-the-Future-21399>. The \$5 million in funding for the project came from a number of sources, including the National Science Foundation, the Network for Earthquake Engineering Simulation, California's Alfred E. Alquist Seismic Safety Commission, the Charles Pankow Foundation, plus broad stakeholder in-kind donations and participation from industry and government.

Although proposals for improving regulations are pending the completion of the data evaluations and computer simulations, preliminary presentations to relevant standards-development organizations have already begun. Ultimately, the benefits to society will be the enhancement of earthquake safety and reduction in earthquake-induced direct losses from shaking as well as indirect losses from fires through improvements in awareness, design and regulatory practices.

More information is available at: <http://bncs.ucsd.edu/>