110-foot concrete bridge survives 8.0 earthquake simulation

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After conducting a series of eight earthquake simulations, a 110-foot long, 200-ton concrete bridge model at the University of Nevada, Reno managed to withstand a powerful jolting, which was three times the acceleration of the disastrous 1994 magnitude 6.9 Northridge, Calif. earthquake, and survived in good condition.

Researchers under Saiid Saiidi, principal investigator for the project and University of Nevada civil engineering professor, conducted the final test on this bridge Tuesday afternoon.

The bridge model is shaken with bidirectional forces to realistically simulate an earthquake.

The researchers mimic the Northridge earthquake using recorded data of the actual earthquake.

Computer programs direct the movements of the three large hydraulically-controlled shake tables in the University's world-renowned, large-scale structures laboratory.

"This is very satisfying to see how well the design and components worked. We estimated bridge failure at 8 inches of deflection, which is a lot, but we had 10 inches of deflection in the support columns and the bridge remained standing and usable, even with considerable internal stresses," said Saiidi.

"We know the bridge would have survived that quake in good condition and still be usable," he added.

The University of Nevada research team is experimenting with and testing a number of materials and innovations to potentially revolutionize seismic design of future bridges to help protect lives, prevent damage and avoid bridge closure even when there is a strong earthquake.

"We anticipate these designs and components would be used in future bridge and overpass construction," said Saiidi.

The 11-foot-high, four-span concrete bridge model was the third experiment in a series of these tests using innovative composite materials and construction to give superior seismic performance for bridges and highway overpasses.

"What is extraordinary about the construction techniques tested with this bridge is the use of glass and carbon fibers to support the bridge, precast columns, segmental columns and special steel pipe-pin connections in a high seismic setting," said Saiidi.

About 50 engineers and industry representatives, including Caltrans chief of earthquake engineering and several senior bridge engineers from Caltrans and NDOT, attended the test. (ANI)