Collapse Assessment of Concrete Buildings Under Seismic and Other Extreme Loads

Halil Sezen

Professor, The Ohio State University, Ohio, USA
Corresponding Author E-mail: sezen.1@osu.edu

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Abstract

Major factors contributing to collapse of building structures under lateral and gravity loads will be presented. While the ductility and redundancy are critical for the transfer and redistribution of loads after the failure of a member, one of the main reasons for the collapse of buildings is insufficient design and detailing of columns. Shear failure and gravity load collapse of concrete columns with poor seismic details will be discussed. Experimental evidence from laboratory tests of columns and examples from the field will be shown to demonstrate the importance of reinforcement detailing in earthquake resistant design. Ten existing buildings were tested by physically removing the first story columns or load bearing walls. Results from these field experiments will be presented. A quick overview will be provided for a current research project involving removal of columns from a reinforced concrete parking structure while its response was being monitored during the redistribution of loads from the removed column to the neighboring members in the structure.