

Seismic Damage Evaluation for Low-Rise RC School Buildings in Taiwan

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Abstract

A databank for a total of 157 typical low-rise RC school buildings damaged in the 1999 Chi-Chi earthquake in Taiwan is presented. Damage and structural information include original design drawings, ground motion intensity, and damage records are collected. Most of the buildings have 2~3 stories, with classrooms lie along a cantilever corridor and separated by masonry walls, as shown in Fig.1. The high similarity in structural system causes common failure pattern that they are much more vulnerable in the longitudinal direction than in the transverse direction. Therefore, statistical approach with properly chosen samples is employed for attempt on establishing a motion-damage relationship. Peak ground acceleration (PGA), the ratio of column area at ground floor to total floor area, and a five-level damage index are used to define ground motion, structure, and damage characteristics, respectively. Although the correlation between them is not as clear as expected, as shown in Fig.2, a reasonable tendency is observed. For the 77 samples with only columns and no walls in the longitudinal direction, despite the absence of ground motion, relationship between average column area ratio and damage state shows approximately linear correlation, as shown in Fig.3. Possible sources for error and bias in the databank and analysis are discussed. It is expected that the databank could be useful for both empirical and analytical researches on seismic assessment.

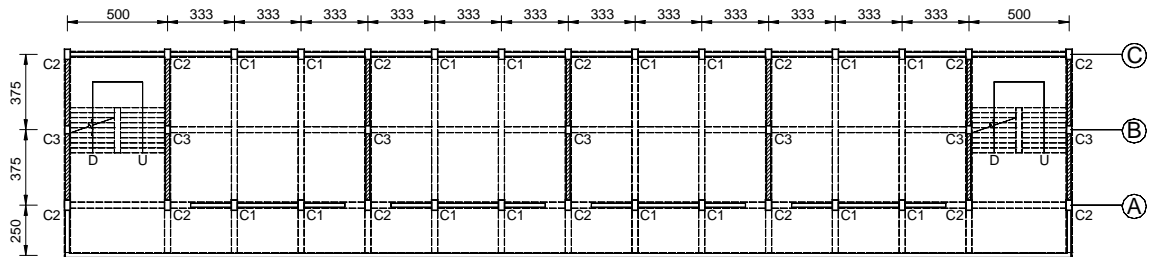


Fig. 1 Typical Plan of School Buildings in Taiwan

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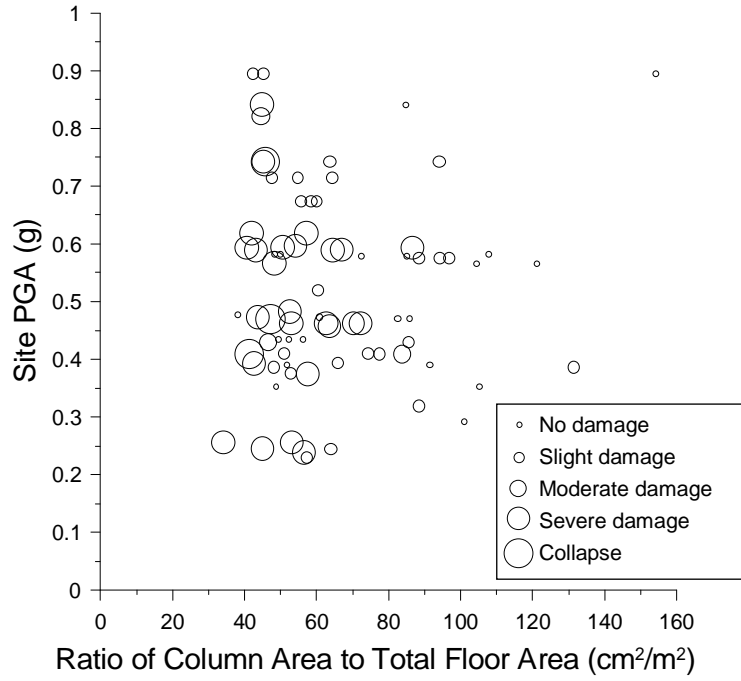


Fig. 2 Relationship between Site PGA, Column Area Ratio, and Damage State

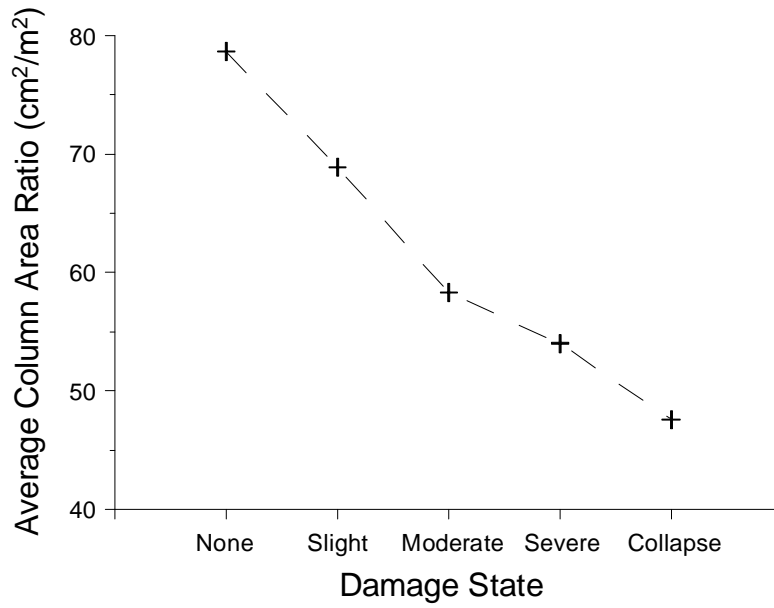


Fig. 3 Relationship between Average Column Area Ratio and Damage State