SHAKE TABLE TESTING AND ANALYSIS OF TWO-COLUMN BENTS

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The design of structural bridge elements like columns, beam-column joints, and cap beams has changed tremendously over the past 30 years. Many experimental tests have been done in order to determine the behavior of bridge bents under seismic loading. Most of those tests were performed under static-cyclic loading, whereas only a few of those tests were dynamic to simulate real-time earthquake effects. Based on the literature review, most studies have focused on retrofitting older columns and/or single columns versus new design criteria on systems. The main research objective is to investigate the seismic performance of two-column bridge bents with different aspect ratios using current Caltrans design criteria. Three bents have been tested. The three specimens are identical except for the column aspect ratios, which are 2.5, 4.5, and 6.64 (see Fig. 1). The specimens are 0.3-scale models. The mass of the system was applied through lead bricks. The paper will describe the behavior of the specimens as well as the how this compared with the performance objectives. The specimens were heavily instrumented. Correlation will be made with current design equations and procedures. Simplified models as well as computer models with be described and compared.