

Title Effect of Connecting Bridge on Seismic Response of Tall Buildings

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Researcher Wanassanun Karlken

Research Supervisor Dr. Naveed Anwar

Abstract

Connected structures consist of two or more towers connected with connecting portions or sky bridges. They have been developed for many purposes, such as walkways and activity spaces. However, the towers with connecting bridge cannot be designed separately because the bridge between towers may significantly change structural responses of single buildings. The bridge can cause several effects on the towers during a strong earthquake. Moreover, the effects are more significant when the bridge is relatively large, and large eccentricity between center of mass of towers may lead high torsion. This study presents the effects of connecting bridge on two different height towers connected. Also, the effect of eccentricity is included. The analytical models are performed and analyzed based on performance based seismic design approach for tall buildings. Response spectrum analysis, simplified modal pushover analysis and time history analysis are employed to study the seismic response of the buildings with different levels of earthquake. The comparisons of structural responses of individual towers before and after connecting are demonstrated. The results reveal that shear forces transfer significantly from tall tower to short tower at the bridge level. Therefore, base shear, displacement and drift of the short tower are found to be higher than that before connecting. Furthermore, torsion due to the eccentricity causes higher shear forces at the bridge connections.

Keywords Connecting Bridge; Seismic Response; Tall Buildings; Performance based design; Response spectrum analysis.