

<b>Title</b>	Effect of Common Podium on Seismic Performance of Two Unequal Height Towers
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### **Abstract**

Multi-towers on a common podium are complicated building structures in terms of designing the towers and the podium. The complication of this type of structure is the interrelationship between the towers and podium as well as between towers. Common practice of analyzing multi-tower podium structures is analyzing one tower at a time on the podium. Analyzing one tower at a time on the podium may not capture the realistic results since the interactions between the towers are omitted. Therefore, understanding the interactions between towers under seismic excitations is important.

This study focuses on analyzing the tower interactions between two unequal height towers on a common podium. The case study building consists of two high-rise towers, podium and a basement. Story number of one tower is fixed at 40 stories above the podium and the story number of the second tower is varied between 15 to 40 stories. Responses of the taller tower is analyzed and the most critical height difference between the towers is identified.

The structure with the most critical configuration is designed in ETABS for design basis earthquake (DBE) using ACI code. Then the nonlinear model is created in Perform-3D. Two additional models are also modeled by deleting one tower at a time on the podium. Nonlinear dynamic analysis is carried out for all three models by using seven ground motions. Mean values of the seven ground motions are used to evaluate both global and local responses of the structures.

It has been found that responses of the shorter tower is affected by the taller tower. Mainly, story shear along the minor direction of the tower and shear hinge rotations of the diagonal coupling beams are reduced when both towers are analyzed together. Analyzing one tower at a time on the podium overestimates story shear along the minor direction of the shorter tower and shear hinge rotations of the diagonal coupling beams of the shorter tower.

**Keywords** Multi-towers, podium, earthquake, tower interactions, nonlinear time history analysis, ETABS, Perform-3D