



## Observed Performance of Soft-Story Woodframe Building Retrofitted with CLT Rocking Walls

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Light Frame (Lumber+Panels)

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### Summary:

Many of the woodframe buildings in United States, particularly along the pacific coast, have more than one story with the first floor used either for parking or commercial space which require large openings and few partition walls at that level. This open space condition results in the earthquake resistance of the first story being significantly lower than the upper stories thus creating first stories that are both “weak” (low strength) and “soft” (low stiffness) in nature. This feature has the potential to allow formation of the soft first story mechanism during earthquakes. The United States National Science Foundation (NSF) – funded NEES-Soft project has been undertaken to develop and validate economical retrofit concepts for these types of buildings. Shake table tests on a four-story full scale model building were performed with different retrofit schemes as part of the experimental investigation. One of the retrofit measures investigated was addition of cross laminated timber rocking walls at the first floor level for increased seismic resistance. This paper focuses on the experimental performance of soft-story buildings retrofitted with cross laminated timber rocking walls. Moderate damage was observed at the first story level of the building while the upper three stories exhibited very little signs of distress. The focus of this paper is to establish correlation between the observed damage and drift. The Cross laminated timber (CLT) rocking walls were designed as per FEMA P-807 guidelines to satisfy the San Francisco mandatory softstory retrofit ordinance requirements. The tests confirmed the efficiency of CLT retrofit with expected levels of drifts throughout the structure.

Online Access: Free

### Resource Link

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