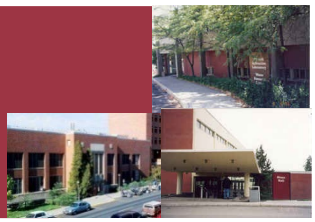
Civil & Environmental Engineering

Washington State University



Seismic Behavior of Tall Rocking Mass Timber Walls

Structures Faculty Candidate Seminar

With recent developments of engineered wood products, mass timber buildings with post-tensioned rocking wall lateral systems are becoming feasible in areas of high seismicity and offer benefits such as fast construction, unique architectural features, and the use of sustainable building materials. Additionally, these systems provide an opportunity to improve upon the usual collapse prevention performance for buildings in large earthquakes by developing design methods that enable resilient performance while maintaining an efficient design, creating a competitive lateral system. Thus, using mass timber post-tensioned rocking wall systems for buildings in the 2-5 story range is gaining popularity in research and in building projects around the world. However, little research has been completed on these systems for buildings in the 6-20 story range.

To study the response of these systems in tall buildings, a nonlinear numerical modeling methodology has bas been developed and validated using experimental results from a two-story shake table test. The modeling approach has been used help design a full-scale ten-story mass timber building to achieve strict resilience targets. The specimen will be tested at the NHERI@UCSD outdoor shake table, in what will be the tallest shake table test of a seismically designed building to date. That test, scheduled for fall 2022, will provide additional key data for validating the model and in particular for addressing some of the key modeling assumptions. The modeling approach is currently being applied to a series of archetype buildings to investigate the impact of critical design choices on the seismic response of realistic tall wood buildings. This presentation will describe the nonlinear numerical modeling methodology, present results from the two-story shake table test, describe the work that has been done for the ten-story shake table test that will begin construction this year, and preview the larger study of archetype buildings.

Date: March 10, 2022, 11:00 a.m. - 12:00 p.m.
Place: PACCAR Auditorium 202

Sarah Wichman
Predoctoral Research Assistant
Department of Civil and Environmental Engineering
University of Washington