

NHERI TallWood

Shake Table Testing of a Full-Scale Resilient 10-Story Mass-Timber Building Newsletter Issue 6: May 1, 2023

Testing is Underway

We are so excited to announce that testing of the Tallwood building is now underway. From April 17-20, MTS was onsite and the table training exercises were completed. White noise excitations were applied in each of six directions (three translational and three rotational). These low-level broadband frequency inputs are used to determine the natural frequencies of the building in each direction. The results are then used to program the controllers to compensate for the building natural frequencies and to achieve better fidelity when replaying the earthquakes. The control algorithms were validated using small earthquake records, and we feel confident in the table's performance to kick-start the testing of the tallest full-scale building on the shake table, to date.

In the past week, we have finished connecting all sensors to the data acquisition system. With data collected during table training, the site and research team was able to debug and configure the sensor channels so that the data will be recorded appropriately. On Friday, we successfully completed a bidirectional (XY) shake with a record from the Ferndale Earthquake that represents an event with a 225-year return period. There is no noteworthy earthquake-induced damage to the building so far. In addition, several of the nonstructural subassembly joints have already exhibited the type of movement that we are hoping to see.



Figure 1: Finished structure unscathed after several small shakes

Phase 1 Test Program Overview

We expect to complete the Phase 1 test program in about 3~4 weeks starting May 1st. We will gradually increase the intensity of shaking to document performance of the structure at different shaking intensities, from frequent earthquakes to the maximum considered earthquakes (MCE_R). For each intensity level, we will perform tests with records representing different earthquake sources: crustal, interface, and intraslab. We will also run earthquakes in different directions, fully utilizing the 6DOF NHERI@UCSD shake table. This test program is possible mainly due to the resilience nature of the building design, which should not experience notable structural damage for design level earthquakes. Once Phase 1 is completed, there will be additional testing activities

with modified wall configurations and added dampers as part of another NSF-supported payload test.

Assuming the test program progresses smoothly, we expect to hold a Media Day event on May 9 to share the test program with general mainstream and print media. An Industry Day is planned on May 10 for industry collaborators and sponsors. Additional test viewing opportunities are also planned through WoodWorks as an invited workshop on tall mass timber buildings. UCSD site will also set up live stream on public testing events for people who cannot come in person. Detailed information of the live stream will be distributed as the events get closer.

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