

# NHERI TallWood

## Shake Table Testing of A Full-Scale Resilient 10-Story Mass-Timber Building Newsletter Issue 1: July 29, 2022

### Construction is Underway!

The foundation system, which consists of steel base beams for the rocking walls and cantilevered concrete pads for some gravity columns and exterior wall subassemblies, was installed in June. This was followed by a table tuning procedure that included trial runs of some of the largest motions that we plan to incorporate into the test program. Check out the video from one of the trials: 150% of the JMA Kobe motion (1995 Kobe Earthquake) <https://youtu.be/-V7KfHxTVVI>

Erection of the building, led by Swinerton with assistance from NHERI@UCSD site staff, started in earnest on July 13. The building will be erected in sets of stories: 1-3, 4-7, 8-10. The erection of the first three stories should be complete by the end of next week. So far, they have erected the first three story stairs and columns, beams and slabs, and temporary bracing in the first story. To finish the first set of stories, temporary bracing will be installed at levels 2 and 3, and then rocking wall panels will be installed. A temporary post-tensioning for wind restraint is required to remove bracing at the lower levels.



Left: Columns, stairs and temporary bracing; Middle: Level 1 beams and slabs; Right: Installation of Level 1 safety rails.



Left: Installation of Level 2 columns; Middle: Level 2 complete; Right: Installation of story 3 modular stair system unit with fire-rated wall panels.

### **Follow Construction Progress**

There are a few ways to follow or check in on construction progress on your own.

- All newsletter issues will be posted and archived on the NHERI Tallwood website when they are released.

<http://nheritallwood.mines.edu/>

- The site maintains a live webcam so you can check in on progress daily

<http://nheri.ucsd.edu/video/>

- Ling will be posting updates periodically on Twitter: @slpei

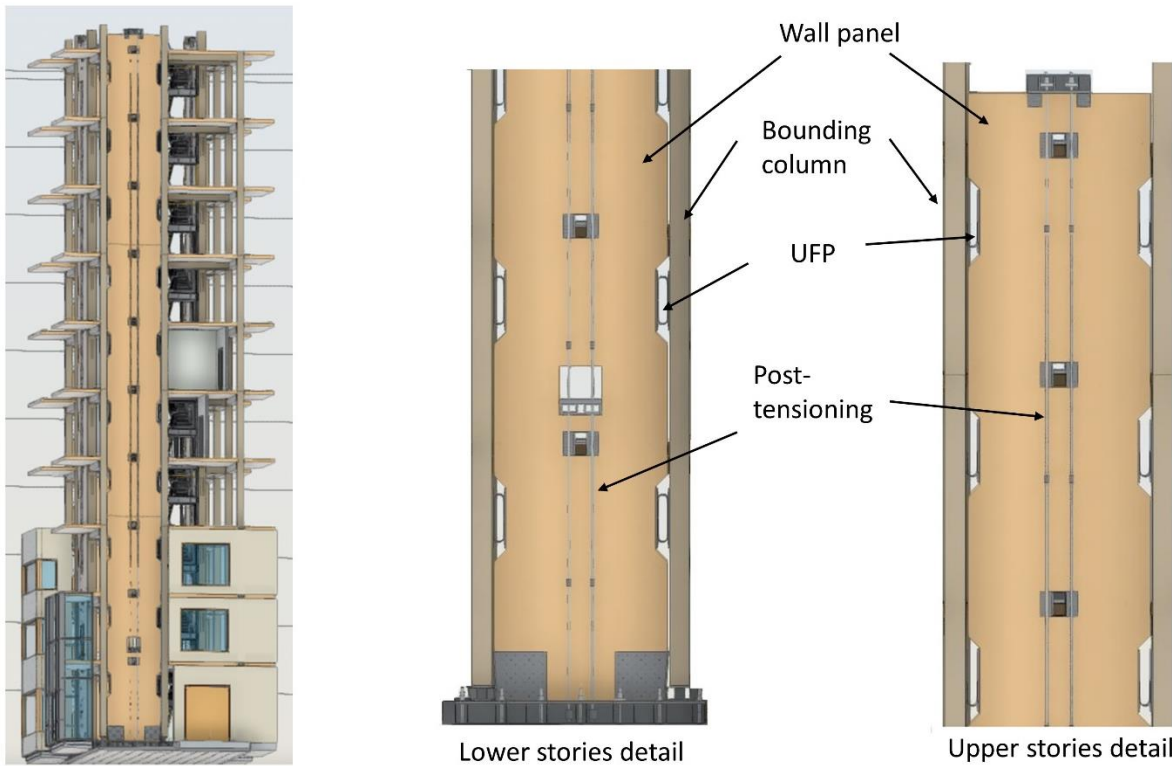
### **Test Feature Highlight: Rocking Wall System**

The test includes many unique aspects including post-tensioned rocking wall lateral system, gravity columns with true pin connection details, wood diaphragms built from several different types of mass timber products, a 10-story modular stair tower with drift compatible detailing, and a variety of different nonstructural wall subassemblies (both exterior and interior). This section of the newsletter will highlight one feature of the test so readers can become familiar with some of the technical details.

Today's feature is the post-tensioned self-centering rocking wall system. The main objective of the test is to validate mass timber rocking walls as a "seismic resilient" lateral system for mass timber buildings that can undergo a design level earthquake without structural damage. Following a successful test, we plan to develop and implement design guidance for mass timber rocking wall to be an official lateral system in the ASCE 7 and other timber design codes.

The building specimen includes two mass timber rocking walls in each direction. Walls in the N-S direction are built from mass ply panels (MPP) donated by Freres Lumber and walls in the E-W

direction are built from cross-laminated timber (CLT) donated by SmartLam. The MPP panels are slightly stiffer and thus have a slightly smaller cross-section. Each wall unit consists of the wall panel with bounding columns on each side. The walls are post-tensioned from the top of the wall to the foundation to provide a recentering force. U-shaped flexural plates or UFPs are installed periodically between the wall panels and bounding columns, and will dissipate energy as the wall rocks up off the foundation and induces relative movement across the UFP.



Left: Rocking wall overview; Middle: Lower stories detail; Right: Upper stories detail. Revit model by Aleesha Busch

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