New Research Under Way to Determine Earthquake Effects on Shear Walls

The cyclic testing equipment purchased this spring by APA—The Engineered Wood Association, Tacoma, Wash., looks formidable. But when operational, this mammoth machine will provide important, and previously unknown, information about the effects of earthquakes and high wind on shear walls.

For years, shear walls were constructed to resist lateral loads caused by wind and earthquake forces. The data that historically guided engineers and design professionals were based on one-directional force on an 8-by-8 wall. It worked very well. But now, with new testing equipment, APA can better determine the true effect of seismic activity on these walls.

“By providing two-directional forces on a wall, we will be able to better predict its performance in an earthquake,” explains APA Associate Engineer Tom Skaggs. “The test program we are about to embark upon should answer several important questions about the behavior of shear walls in high wind and seismic regions.”

The new testing program is revolutionary, says the association. Code officials, engineers and scientists have questioned how well one-directional laboratory tests of shear walls relate to the
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true behavior of a full-size wall subjected to seismic activity. With these new tests, APA will have powerful new data to guide design professionals.

The list of tests planned for the equipment has not been finalized, but several interesting studies are being considered. “We’re proposing tests to determine the effects of commonly used pneumatic-driven nails, and later on other fasteners, such as screws and staples,” Skaggs says. Also planned are tests of sheathing materials, panel orientation and frame-to-foundation hold-down systems.

APA, a nonprofit trade association representing manufacturers of engineered wood products, has been researching the behavior of wood panel framed shear walls for more than 40 years. Two years after the first APA technical report on shear walls—published in 1953—the Uniform Building Code recognized shear wall design values constructed with APA plywood sheathing. Building code recognition was later expanded to include other wood structural panels, including oriented strand board.

The results of the cyclic tests will help engineers improve design recommendations. Construction Dimensions will follow this story and report the results when they are available.