Use Cross Laminated Timber for Construction of Tornado Resistant Homes

*Wei Tong and Ali Memari

There are approximately 1200 tornado events that take place in the United States each year according to statistics from the National Oceanic and Atmospheric Administration (NOAA). Tornado events are responsible for an average annual loss of $982 million in the US according to the insurance catastrophe data from 1949-2006. Furthermore, there is a considerable risk of casualties associated with tornadoes reported yearly. The high risk of extensive property damage and potential casualties is because most of the residential buildings in high tornado regions were not designed to resist tornado loading and its effects. Understanding common failure modes of residential buildings under tornado loads from post-disaster reports and laboratory testing can help develop design guidelines for new construction as well as strategies for retrofitting existing houses.

CLT (Cross-laminated Timber), one kind of engineering composite massive timber, could be a superior choice of material for residential wood-frame structures in high tornado-risk regions because of its excellent sustainability, enhanced strength, and durability. Besides the excellent qualities found in previous studies, the combination with novel materials can bring further improvements to the design. Proper CLT-type choice results in economic benefits in the premise of ensuring the effectiveness of the application. Further overall simulation and physical model testing are required for CLT applications in residential structures under tornado loading. This poster aids in introducing the general situation of tornado occurrence in the United States and shows the necessity of tornado-resistant residential structure design. Pointing out the potential and advantage of CLT applied as tornado-resistant design materials.