

## Development of a Do-It-Yourself Tornado Safe Room from Commodity Wood Products

Every year in the United States, tornadoes result in more than 80 deaths and 1,500 injuries. These numbers could be reduced if tornado safe rooms were more common. Although many safe room designs exist and function adequately, they are either very expensive or require professionals to construct. The development of an economical safe room constructed of commonly available wood building materials and buildable by a do-it-yourselfer would help make the availability and use of these structures more widespread.

### Background

A safe room must be able to withstand loads generated by the high winds of tornadoes and the impact of windblown debris associated with these events. Large missile impact testing is a valid way of assessing the acceptable performance of assemblies and materials used in safe room design, according to the Florida Building Code and the International Building Code. In these standardized tests, the safe room is subjected to the impact of a 2- by 4-inch lumber stud weighing 15 pounds and traveling at 100 miles/hour.

### Objective

This project focuses on developing a tornado safe room constructed of commodity wood products including lumber, oriented strandboard (OSB), and plywood. The design of the safe room is such that it can be constructed by anyone with basic construction skills using a nail gun, portable circular saw, and screw gun.

### Approach

Impact tests are conducted on 8-foot-wide by 7-foot-high wall panel. The initial design incorporates 2- by

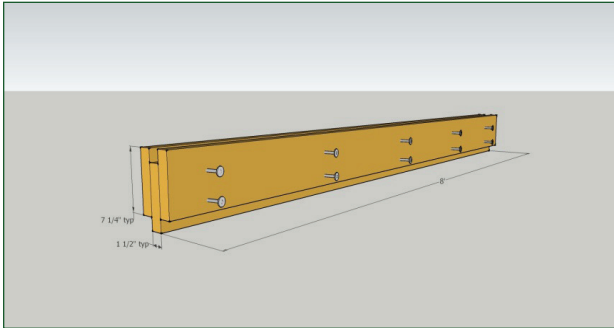


Lumber safe room wall prior to impact testing.

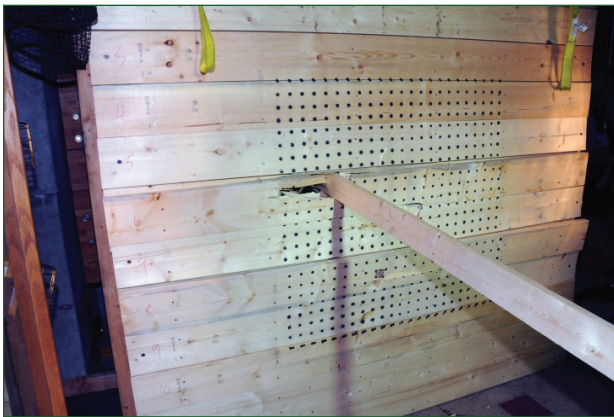
8-inch lumber nail-laminated into interlocking wall panel sections for easy transport and assembly. This design makes it feasible to construct the safe room in an existing basement or garage. After wall sections tests are completed, an 8- by 8-foot safe room will be constructed and tested using the test panel configuration that passes the impact tests. A dynamic finite element computer model is being developed to simulate impact forces and help develop a better understanding of energy absorption characteristics of the wall design.

### Expected Outcomes

Tests performed to date indicate that a safe room wall constructed of interlocking nail-laminated 2- by 8-inch lumber and sheathed with either OSB or plywood will pass the most severe impact tests. Testing is continuing to refine the design and to develop standard plans for these designs.



One design being considered incorporates interlocking nail-laminated wall sections.



2 by 4 missile imbedded in wood safe room wall.

## Timeline

The project began in July 2013 and will be completed by October 2015.

## Contact Information

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