Wood: On Safety and Meeting Building Code

Deciding what materials to build with involves numerous questions about the safety and durability of building materials. Today, wood buildings are being constructed to meet—and even exceed—the stringent requirements of fire codes. Buildings made from wood can also stand up to earthquakes and wind. Wood. It’s a better way to build.

FIRE SAFETY

- **Wood building has a proven safety record** and performance record for fire protection.¹
- **Heavy timber has a particular advantage** in a fire because wood chars on the outside while retaining strength, slowing combustion and allowing time to evacuate the building.²
- **Building codes for fire require all building systems to perform to the same level of safety**, regardless of material used. Adding sprinkler systems, fire-resistance-rated wall, floor and ceiling assemblies, and open spaces around a building, can help to increase fire safety.³

EARTHQUAKE RESISTANCE

- **Wood can meet the most demanding earthquake design requirements**, and wood-frame construction can meet or exceed building code development for earthquakes.⁴
- **Wood is substantially lighter than steel or concrete**. Earthquake forces tend to have a greater impact on heavier buildings.⁵
- **Wood-frame structures are inherently more flexible** because of numerous nailed joints than those with rigid connections. A wood structure can more easily yield and deform without fracturing in the presence of earthquake movements.⁶

WIND RESISTANCE

- **Wood is an ideal construction material** in areas prone to high wind. Its elastic limit and ultimate strength are higher when loads are applied for a short time, which tends to be the case in high-wind events. When structural panels such as plywood or oriented strand board (OSB) are properly attached to lumber framing, they form some of the most solid and stable roof, floor and wall systems available. When used to form diaphragms and shear walls, they are exceptional at resisting high winds.⁷

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³ Building codes for fire require all building systems to perform to the same level of safety, regardless of material used. Adding sprinkler systems, fire-resistance-rated wall, floor and ceiling assemblies, and open spaces around a building, can help to increase fire safety.
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**CASE STUDY**

**Arena Stage, Mead Center for American Theater, Washington, DC**

When Arena Stage at the Mead Center for American Theater reopened in 2010, it was the first modern building of its size to use heavy timber components in Washington, DC. The design includes 18 parallel strand lumber (PSL) columns around the perimeter of the glass façade, each measuring 45 to 63 feet tall and supporting steel roof trusses. Designed to brace the façade against wind loads and to carry roof loads up to 400,000 pounds, the columns have no internal steel support.

Local code authorities were skeptical about fire safety, so the design team used computer modeling to show that effects of a fire on the structure would be minimal, and there would be plenty of time for safe building evacuation. The design team also did a char analysis, and showed code officials how char actually protects the interior of the wood columns.  

**RESOURCES:**

reThink Wood resource library:  
http://www.rethinkwood.com/resource-library/list

WoodWorks—Education, resources and technical support on non-residential wood building design:  
http://woodworks.org/

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2 Ibid.  
3 Ibid.  
5 Ibid  
6 Ibid  

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