

# ARCHITECT

## PROJECTS

### Support for Tall Timber Reaches New Heights in the Building Code

Prescriptive requirements for wood structures up to 18 stories were among the additions preliminarily approved for the International Building Code following the work of the International Code Council's ad-hoc Tall Wood Buildings Committee.

By [MICHAEL KILKELLY](#)

[https://www.architectmagazine.com/technology/support-for-tall-timber-reaches-new-heights-in-the-building-code\\_o](https://www.architectmagazine.com/technology/support-for-tall-timber-reaches-new-heights-in-the-building-code_o)



(Left) NaturallyWood.com Brock Commons, a student residence hall at the University of British Columbia, in Vancouver, Canada

Wood is widely recognized as a carbon-neutral building material, but its use as a structural material has been mostly limited to residential and low-rise buildings due to its combustible nature. Through recent advances in manufacturing and engineering, wood in the form of mass timber products is increasingly attracting interest as a structural system for tall buildings.

Portland, Ore., recently saw the completion of the eight-story [Carbon12](#), currently the tallest wood building in the United States. Still, progress has been slow in this country as compared to Europe or Canada, where the 18-story-tall [Brock Commons](#), in Vancouver, stands as the tallest timber structure in the world. One significant issue inhibiting widespread adoption in the U.S. is prescriptive building codes, which currently limit the height of wood buildings to 85 feet, or six stories. In December 2015, the [International Code Council \(ICC\)](#) formed an ad-hoc committee to study the impact of tall wood buildings on the building code with the membership voting on the adoption of proposed changes on Oct. 24.

#### Code Definitions

The ICC's [International Building Code \(IBC\)](#) classifies a high-rise building as any building with an

SENT TO LSU AGCENTER/LOUISIANA FOREST PRODUCTS DEVELOPMENT CENTER - FOREST SECTOR / FORESTY PRODUCTS INTEREST GROUP  
occupied floor 75 feet above the lowest level at which fire department vehicles can access. The 2018 IBC defines heavy timber structural members as Type IV construction, which also includes a range of wood products, such as solid sawn timber, glue-laminated members, and composite wood members. The term mass timber, however, comprises both heavy timber as well as engineered products, many of which the IBC does not reference, such as cross-laminated timber (CLT).

Heavy timber construction is currently limited to a height of 85 feet. Architects can design taller wood structures, but they must demonstrate that the design meets the prescribed code and performs as well or better than a similar concrete or steel structure. This can be a costly and time-consuming process, requiring extensive testing and documentation on the part of the design team and building owner.

## Revisiting the Code



(left) Andrew Pogue courtesy Path ArchitectureCarbon12, an eight-story condominium tower in Portland, Ore., features retail space, underground parking, and 14 residential units.

The [American Wood Council \(AWC\)](#), a trade association for the wood industry based in Leesburg, Va., recognized both the potential for tall wood buildings in the country as well as a business opportunity for its industry. In accordance with the [ICC Council policies](#), the AWC requested that the ICC investigate the viability of wood-based structural systems for tall buildings.

In December 2015, the ICC formed an ad-hoc committee to study advances in tall wood construction technology and to propose code changes for the 2021 edition of the IBC. A previous proposal to investigate tall wood buildings in the 2015 code cycle did not make it through the initial ICC approval process.

Stephen DiGiovanni, an ICC member and fire protection engineer for Clark County Department of Building and Fire Protection in Las Vegas, chaired the [Tall Wood Buildings](#)

[Committee](#). Also a member of the ICC's [Fire Code Action Committee](#), he had long been tracking tall timber structures prior to the formation of the ad-hoc committee.

Having designed four of the first mass timber buildings in the country, Susan Jones, FAIA, of [Atelierjones](#) in Seattle, was asked by the AIA to join the Tall Wood Buildings Committee, which she did in spring 2016. A first-time member of an ICC committee, Jones says she found the process invigorating: "It's a great thing for architects to realize how knowledgeable we are, and how powerful that knowledge



26 October 2018



SENT TO LSU AGCENTER/LOUISIANA FOREST PRODUCTS DEVELOPMENT CENTER - FOREST SECTOR / FORESTY PRODUCTS INTEREST GROUP is if you give your time to it, pull your head up ever so slightly from your computer, and see what kind of change you can make.”

The committee of 19 architects, engineers, fire professionals, and industry representatives “met in multiple meetings and multiple conference calls with this group in addition to between 100 and 200 additional stakeholders several times” to determine the extent of changes required to integrate mass timber structural systems in the existing code, Jones says. “It was a rigorous process.” Ultimately, the committee proposed 14 changes and additions to the existing code.

### **Testing the Fire**

Inside and outside the ad-hoc committee, much of the questions focused on the combustible nature of wood. “There’s understandably a great deal of concern, especially when you take a combustible product and use it in a high-rise,” DiGiovanni says, and both he and Jones say that the concern was given top priority by the committee. “We had a very strong contingent of people from the fire service,” DiGiovanni says. “As chair, I have to take as neutral an approach as possible, but if I leaned any way, it was to make sure the fire services issues were addressed.”

To study these concerns, the committee worked with the wood industry to develop a series of fire tests, which were conducted at the [Bureau of Alcohol, Tobacco, Firearms and Explosives Fire Research Laboratory](#) in Bethesda, Md. Five tests were conducted on a full-scale, two-story mass timber building. The test building simulated the proposed construction types and included various exposures of the mass timber structure, from fully enclosed to fully exposed. As detailed in an extensive [May 2018 report](#) by the U.S. Department of Agriculture’s Forest Products Laboratory, the structure provided more protection against fire than was presently required by code.

The most significant proposal by the ad-hoc committee was the addition of three construction types specifically related to mass timber—Type IV-A, Type IV-B, and Type IV-C—and a renamed Type IV-HT (heavy timber). The new construction types connect mass timber construction to a range of allowable heights based on its fire resistance. Type IV-A would require the most stringent fire resistance, necessitating a sprinklered building with all timber structural members fully encapsulated, and heights up to 18 stories or 270 feet. Type IV-B allows a percentage of mass timber components to be exposed, and can be up to 12 stories and 180 feet tall. Type IV-C, for buildings not exceeding nine stories or 85 feet tall, requires less restrictive fire resistance measures. All proposed types require at least a two-hour rating on exterior walls, structural frames, and floors, and at least a one-hour rating on roofs. AWC details the proposed requirements for each building type in its report [“Understanding the Mass Timber Code Proposals.”](#)

SENT TO LSU AGCENTER/LOUISIANA FOREST PRODUCTS DEVELOPMENT CENTER - FOREST SECTOR / FORESTY PRODUCTS INTEREST GROUP



NaturallyWood.com Brock Commons,  
University of British Columbia



(Left) Acton Ostry Architects Steel connector  
detail at floor-and-column intersection,  
Brock Commons

Despite the complexity and wide-ranging impact of the proposals, the committee's 14 changes and additions were approved by the code development committees at the ICC's annual [Committee Action Hearings](#). These committees did make recommendations to the ad-hoc committee, which were addressed and published in a [Response to Concerns](#) report.

Once the outcome from the Committee Action Hearings was published, a public

comment period was opened. ICC members could review the ad-hoc committee proposals and subsequent action committee comments, and make amendments or ask for disapproval of the proposals. The general membership appealed many of the ad-hoc committee's proposals, which were heard and addressed at the ICC's Final Action Hearings on Oct. 24 in Richmond, Va. At the conclusion of the meeting, the proposals were put to a member vote. In a major step forward, all 14 of the ad-hoc committee's proposals were approved.

Not surprisingly, the AWC was delighted with the vote. In a [press release](#), AWC vice president of codes and regulations Kenneth Bland said, "The tremendous support of tall mass timber construction seen at the ICC public comment hearings, and the positive outcome, is one more important step toward advancement of tall wood in the United States."



26 October 2018



SENT TO LSU AGCENTER/LOUISIANA FOREST PRODUCTS DEVELOPMENT CENTER - FOREST SECTOR / FORESTY PRODUCTS INTEREST GROUP  
The proposals will next be subject to an online vote beginning in November, with the final outcome expected in December.

**Tall Timber, Sanctioned**

If approved, the code changes won't take effect until 2021, when the next edition of the IBC is published. Even then, it will likely be several years before individual jurisdictions adopt it. Regardless, both DiGiovanni and Jones are optimistic. "We wanted to make the tall wood buildings perform like the buildings we're used to building out of the IBC [prescriptive codes]," DiGiovanni says. "We worked hard to meet the intent of the IBC for high-rise buildings. We're just using an alternative material to meet the same performance."

If validated by the ICC's process and available as a prescriptive option for tall buildings alongside conventional concrete and steel structural systems, mass timber will likely become a more viable and attractive option for architects and owners. Greater use of mass timber means that the carbon footprint of new buildings will be reduced. "If we can build using lower carbon emitting materials ... that sequester carbon, versus the choices we have today, then that's a big impact and we've made a difference as an industry," Jones says. "That's why I'm doing this."

*ABOUT THE AUTHOR*



[Michael Kilkelly](#)

Michael Kilkelly is a principal at [Space Command](#) in Middletown, Conn. Prior to founding the firm in 2012, he was an associate at Gehry Partners. He received his B.Arch from Norwich University and M.S. in Design and Computation from MIT. Michael writes about design and technology at [ArchSmarter.com](#).

-----  
Richard P. Vlosky, Ph.D.  
*Director, Louisiana Forest Products Development Center*  
*Crosby Land & Resources Endowed Professor of Forest Sector Business Development*  
Room 227, School of Renewable Natural Resources  
Louisiana State University, Baton Rouge, LA 70803  
Phone (office): (225) 578-4527; Fax: (225) 578-4251; Mobile Phone: (225) 223-1931  
Web Site: [www.LFPDC.lsu.edu](http://www.LFPDC.lsu.edu)



**President, Forest Products Society; President, WoodEMA i.a.**

