

RISK INSIGHTS

TALL WOOD BUILDINGS

Recent years have seen the rise of tall building structures made of wood. Mass timber is used for tall wood buildings. Light frame construction is not suitable for tall structures. Currently, the maximum height limit for tall wood buildings across Canada is 6 storeys, as per the *National Building Code of Canada (NBCC) 2015*. Some provinces allow municipal jurisdictions to permit a mass timber structure taller than 6-storeys if experts can successfully demonstrate how the wood structure meets the same performance criteria as other types of structures.

CANADA CURRENTLY HOLDS THE RECORD FOR THE WORLD'S TALLEST MASS TIMBER BUILDING IN THE WORLD!

Located in Vancouver, *Brock Commons Tallwood House* is an 18-storey student residence completed in 2017. Tokyo, Japan is planning to build a 70-storey wooden residential and commercial tower.

What is mass timber?

Mass timber is proven to meet or exceed fire-resistance ratings. Mass timber products are cross-laminated timber (CLT), glued-laminated timber (GluLam), and structural composite lumber (SCL). These are large pre-manufactured wood panels used for floors, beams, columns, walls, and roof assemblies. Thanks to cutting-edge construction technologies and modern mass timber products, the construction of tall wood buildings is not just possible but well under way.

Why use wood for tall buildings?

Wood is a renewable resource that is easily accessible and cost-effective. It is very durable and has good resistance to earthquakes. Wood is lighter in weight compared to other building materials such as steel, concrete, and aluminum. From an environmental perspective, timber stores carbon and requires less energy to produce and assemble. Whereas the production of other building materials contributes to CO₂ emissions. Since wood assemblies are prepared in factories, the building process is faster on construction sites, and there is less noise and disruption to surrounding areas during construction. These buildings typically incorporate new technology to improve temperature resistance and acoustic performance.

The advantages of mass timber

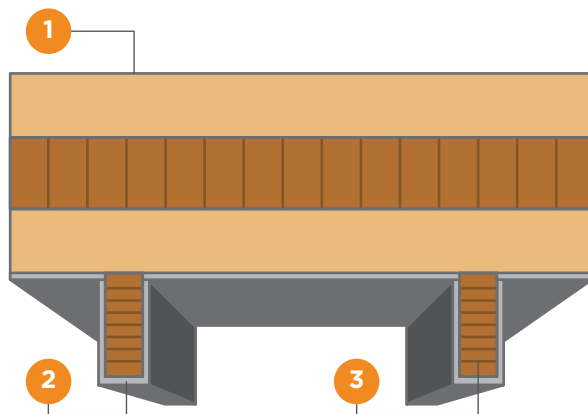
- **High fire resistance** - Modern wood-frame and mass timber buildings have a proven fire safety record, especially when paired with fire protection systems, such as sprinklers, fire alarms, and smoke detectors.
- **Higher dimensional stability** - Wood maintains its original dimensions when there are changes in temperature and humidity.
- **Less load on soil** - Timber is lighter in weight compared to other building materials. Therefore, wood causes less subsidence (when land caves in or drops). As buildings sink overtime, subsidence can lead to flooding, erosion, changes in drainage pattern, and more.
- **Cost-effective and time-saving** - Mass timber products are premanufactured and can be a way to cut costs and speed up building construction, with the bonus of being a renewable resource.

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Necessary conditions for tall wood buildings in Canada

Here are some of the conditions required for constructing tall wood buildings. For full details, please refer to the *National Building Code of Canada (NBCC) 2015*, as well as your provincial building code.

- **Install sprinklers** – In accordance with *National Fire Protection Association (NFPA) 13: Standard for the Installation of Sprinkler Systems*, tall wood buildings are to be equipped with sprinkler systems and fire protection. The entire building's sprinkler system must be metal piping only, no plastic piping.
- **Fire-resistance rating** – Ensure each floor has a 2-hour fire resistance rating.
- **Occupancy type** – Build for commercial or residential occupancy only.
- **Maximum floor area** – 1500 m²
- **Interior partition material** – Use mass timber and non-combustible material. However, do not install solid wood partitions for exits or vertical service spaces (elevators, chutes).
- **Exterior walls** – Use non-combustible cladding.
- **Roof requirements** – Roof is accessible by stairs. Don't build green roofs.
- **Gypsum board protection** – Gypsum-insulated structural elements are to be incorporated in mass timber elements. See image below.



1. Mass timber construction elements
2. Gypsum board protection placed around beams and ceilings
3. Large wood beams

Fire prevention during construction

All buildings are most vulnerable to fire during construction. It is important to involve all parties and establish proper communication for an effective fire prevention plan. The keys to success include adopting best practices and having proper surveillance by dedicated staff.

- Develop a construction fire safety plan that is adhered to by construction workers, contractors, stakeholders, visitors, and other personnel on site. Require signoffs and logging of activities.
- Prior to construction, demonstrate to all personnel how the structure will be built, the materials you will be using, and housekeeping rules. Make sure all parties involved are properly trained on fire safety measures for all situations.
- For site protection, ensure local fire departments are made aware of the construction process and schedule so they can respond efficiently should any issues arise.
- Have on-site security that periodically checks all rooms and floors during construction, including after hours.
- Install surveillance cameras with infrared capabilities and night vision.
- Require hot work permits, fire watches, and activity logging for any limited hot work that occurs.
- Remove waste and debris off site on a regular basis.
- Enforce a no smoking policy.
- Where possible, install non-combustible materials, such as a gypsum board, to limit and reduce combustible surfaces that could contribute to fire growth.
- Make sure standpipes and hose valves are installed progressively.
- As the building increases in height during the construction process, install temporary fire doors with a latching mechanism.
- **For additional fire prevention tips**, please refer to *Risk Insight - Fire Prevention on Construction Sites* and *Risk Insight - Construction Site Management*. Please ask your Risk Consultant to provide you with this material.

Summary

Tall wood building construction presents an economically advantageous option for wood-producing countries such as Canada. The combination of new technologies and modern construction methods has made wood just as safe and high performing as any other material for tower structures.

For more information on making your business safer, contact our Risk Services team at **1.833.692.4111** or visit us at www.northbridgeinsurance.ca.