



Insuring Timber

**Breaking Down Barriers
to the Advancement of
Timber Construction**

The Canadian Wood Council

Acknowledgments & References

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Page 4: Partially charred glulam column pre (left image) and post (right image) 2-hour fire test	David Barber, Arup
Page 5: Fire Hydrant	ville.chateauguay.qc.ca/en/
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Timber is Timeless

Although presented as a new trend in the commercial, industrial, institutional (ICI) sector in recent years, timber construction has been a staple building component for centuries, sharing the structural stage with stone, iron, and masonry. It wasn't until the latter half of the 19th century when advances in manufacturing gave way for inexpensive, mass-produced steel and concrete, altering the way buildings have been designed. As a result, steel and concrete became synonymous with the urban environment, creating the proverbial "concrete jungle."

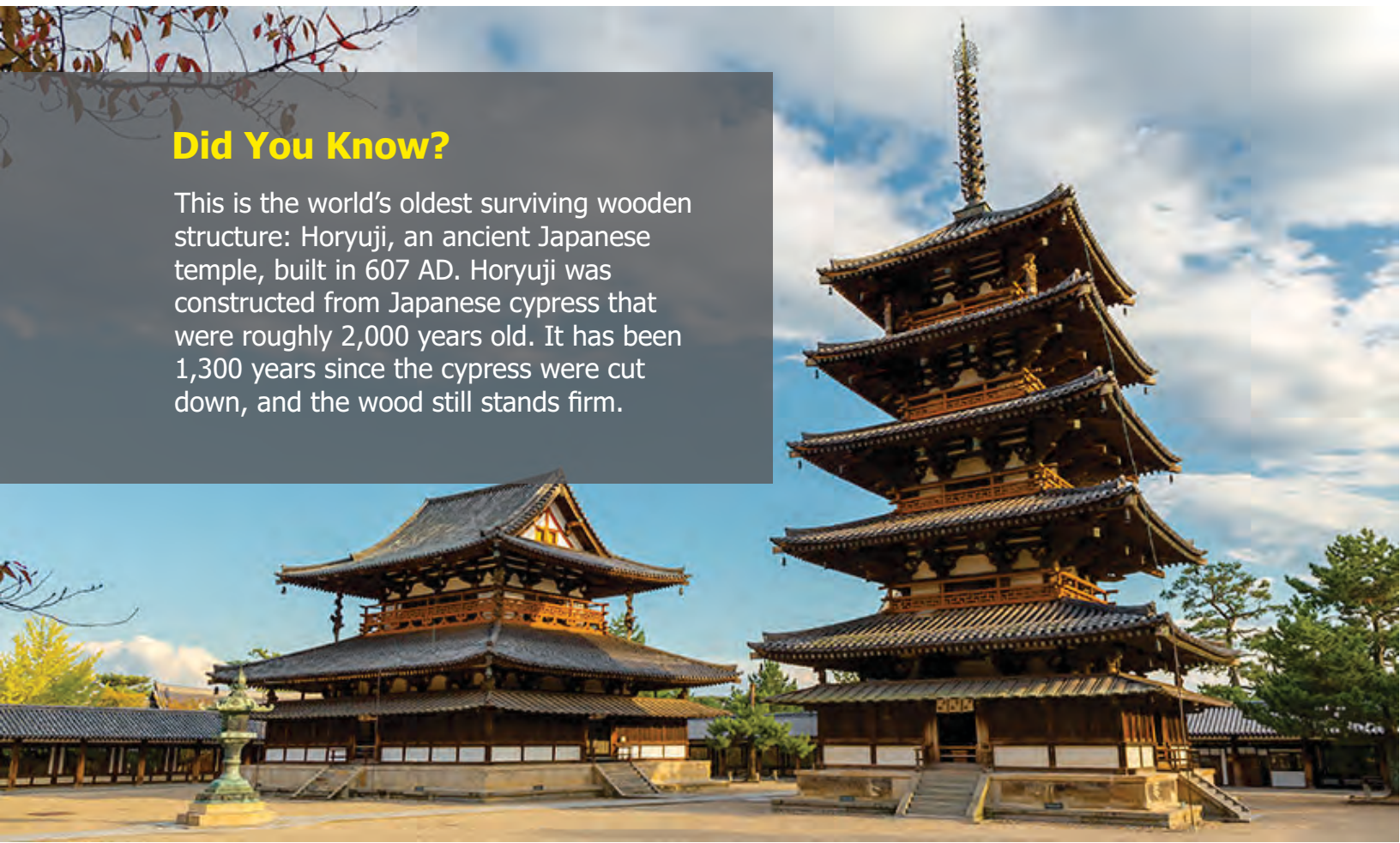
Timber is experiencing a revival for several reasons:

- Wider use of mass timber
- Changes in building codes
- Lower construction costs
- Speed of construction
- Sustainable product life cycle
- Stimulates the national economy
- Superior safety
- Durability & longevity
- Health & wellness benefits
- Aesthetically pleasing
- Supports local supply-chains

When thinking of timber construction, particularly mass timber, most simply correlate the trend as an alternative to concrete and steel; however, it is in fact a growing global industry. As champions of sustainable forest management, Canada is in a position to solidify our global leadership by advancing mass timber adoption and its associated supply chains. The Canadian Wood Council (CWC) recognizes this opportunity and will spearhead efforts on behalf of Canada and our stakeholders.

Did You Know?

This is the world's oldest surviving wooden structure: Horyuji, an ancient Japanese temple, built in 607 AD. Horyuji was constructed from Japanese cypress that were roughly 2,000 years old. It has been 1,300 years since the cypress were cut down, and the wood still stands firm.



Cannot See the Forest for the Trees

Builders are required to obtain Builder's Risk Insurance, also known as "Course of Construction" Insurance, when constructing a building to ensure the project can be completed in the case of fire, flood or other perils. Builder's Risk Insurance usually represents less than 1% of a project cost; this is not the case for mass timber.

Insurance rates for timber have been reported to be 4-10 times higher.

Builders and developers who are motivated to build with timber have been reluctantly willing to tolerate the higher fees and inconveniences. With rising rates and cost uncertainty, others have been considering reverting back to concrete or steel.

Why are the insurance rates higher for timber builds? Research Indicates that there are multiple reasons rooted in lack of historical data and education, primarily:

- 'Unknowns' associated with repair; there have been very few claims for timber buildings. Although this is a great track record, it translates to uncertainty, which is accounted for in the increased rates;
- Design and build teams are unprepared or unfamiliar with the needs of the insurance industry (i.e. comprehensive fire and safety plans);
- Lack of education on different timber products;
- Limited insurance capacity (maximum liability that an insurance company is willing to assume) for timber construction in the market.

To continue to grow wood use in mid-rise and tall wood structures, a number of factors need to be aligned:

- Projects must make economic sense for developers, including the builder's risk insurance premiums;
- Code officials and fire and emergency services must develop a level of understanding of the system employed in building larger and taller with wood;
- Engineers and architects need to become more familiar with the wood and hybrid building methodologies;
- Insurers must be familiar with the risk involved in order to be willing to underwrite wood projects, for both course of construction and post-construction insurance;
- Dedicated research and testing of repair and restoration scenarios.

"If you're working on the frontier, if you're leading, or adopting something new, you've signed up for some additional friction while the industry adapts. That's one of the prices of innovation. When it comes to insuring mass timber projects, there are premiums that need to be understood early so they don't impede adoption. This is evolving over time, but today it's really about communicating the plan as much as it is about acting out the plan on site"

Mark Gaglione,
EllisDon

Debunking Timber Myths

Although there is ample evidence, white papers, and case studies that demonstrate comparable, and in some cases, superior safety and performance standards of timber construction in relation to steel and concrete, misinformation is still circulating. The most common assumptions are related to fire, moisture & water damage, wind & earthquake resistance, and construction site management. Here are the facts:



There is a misconception that timber is more vulnerable to fire. No material is immune to the effects of fire. Once a building, regardless of the materials used, is completed and occupied it is conforming to the high safety standards of building codes. In fact, numerous tests have been done that prove timber can achieve 2+ hour fire resistance ratings and meet or exceed the standards of building codes. If timber is vulnerable, it is during construction. Ensuring a fire safety plan is in place and care is given during construction, we can greatly mitigate the risk of fire.



Recognizing that moisture is of significant concern to both owners and insurers, extensive research has been done on this subject. Timber construction material is carefully conditioned and designed to achieve moisture content that ensures it is not susceptible to damage. Paying attention to construction scheduling and taking small, inexpensive precautions along the way can ensure the performance and longevity of the building. Detailed reports and best practices exist!



Mass-timber construction is substantially lighter and more flexible than concrete and steel, giving it inherent advantages in wind and earthquake performance. It is also stronger pound for pound than concrete or even steel; glulam has a strength-to-weight ratio over 3 times higher than concrete and almost 30% higher than steel. Extensive seismic tests have been done to ensure that the buildings, again, are meeting and exceeding code requirements.



The Missing Link: Can timber be repaired after a fire or flood event? Options vary depending on the severity of the damage, but can be as simple as sanding damage areas or as complex as replacing large sections. Guidelines have been established to lead repair efforts, with more research available every day.

Visit our website to learn more myth busting facts and get access to the latest research:
cwc.ca/how-to-build-with-wood/insurance/



Did You Know?

Contrary to popular belief, mass timber is inherently fire resistant. Mass timber construction chars before losing its structural integrity under fire loads.

Our Efforts to Date

Recognizing the barriers to adoption, the Canadian Wood Council has proactively mobilized a response strategy. As a first step, we have commissioned several studies to investigate and understand the workings of the Canadian and global insurance industry as it pertains to timber construction. As Canada's voice for wood products, we have taken it upon ourselves to begin correcting the assumptions and misinformation associated with timber construction, while providing technical leadership to the insurance industry, the construction sector, and our partners.

Over the past few years, we have:

- conducted industry surveys across the construction sector
- developed partnerships across public and private sectors
- commissioned studies and coordinated research
- synthesized data and disseminated information
- hosted workshops and participated in working groups
- created internal and external educational documents and presentation materials
- created a dedicated page on our website for insurance related knowledge and resources

The Demand is There

The CWC has been tracking timber projects across the country for over 20 years. In just the last 10 years, there have been:

750+ Mid-Rise Wood Buildings that are Completed / Near Completion

30 Tall Mass Timber Buildings (7+ storeys)

100s Buildings incorporating Mass Timber

“Mass timber gives us the opportunity to improve so many aspects of what and how we build. Not only can we be more sustainable, but we can build more precisely, more safely, with less waste, and in less time. One of our challenges, however, is that the built environment relies on coordination among a complex web of players. In order to make progress, we have to bring everyone along. That includes the insurance industry, which plays an important part in bringing new buildings to life. We need to make sure they have the data they need to understand mass timber and what makes it so unique.”

- Tanya Luthi, Entuitive

Sparking the Conversation: Live Fire Test

Although the evidence suggests otherwise, fire resistance is still a primary and consistent point of concern in relation to the performance of mass timber buildings. We recognize the apprehension to adoption and decided to debunk this myth by conducting a series of live fire demonstration tests to educate stakeholders and the broader community. The Canadian Wood Council has partnered with BC Forest Innovations Investment, CHM Fire Consultants, Natural Resources Canada (NRCan), the National Research Council of Canada (NRC), Ontario Ministry of Natural Resources and Forestry, GHL Consultants and FPInnovations, among others, in this endeavor.

The project represents an opportunity for the mass timber community to support education, research, sharing of information, and ultimately, approval of projects, in regulatory environments that are apprehensive and do not yet have a robust understanding of the fire performance of mass timber buildings. Large scale fire testing will likely be done in 2021 in Ottawa, and smaller fire tests in Vancouver; each are scaled to meet regional needs. We also hope to gather information on rehabilitation and repair costs after this type of fire event.

Stay tuned for upcoming announcements!

Strength in Numbers

While a live fire test is a compelling way to demonstrate one aspect of building safety, we recognize that systemic change will only come through a targeted and collaborative education and research campaign with the insurance industry. To that end, the Canadian Wood Council has committed to:

1. Improving access to and consolidating existing information regarding technical and safety performance.
2. Developing and/or expanding data on topics relevant to insurers, which includes identifying information gaps and taking steps with strategic partners to close them.
3. Engaging, and developing a network of insurers and brokers that have or expect to insure wood structures

Going one step further, we will be developing an action plan and comprehensive public market report outlining the current opportunities and challenges of timber construction as it relates to insurance rates and underwriting. To ensure a holistic and effective strategy, this will require expertise beyond our organization.

Some of the questions that we want to answer, include: how can a building be best designed to replace damaged timber without impacting its structural integrity? What mitigation strategies can we develop to reduce risk during the building process? What do we need to do as an industry to give insurers the confidence they need to support timber builds?

We need your help. If you represent one of the groups below, and are interested in working with us, we want to hear from you!

- Architects & Engineers
- Fire Safety Consultant
- Insurance Brokers & Associations
- Construction Managers
- Unions & Trades
- Health & Wellness Experts
- Municipalities
- Property Developers

We aren't stopping there. Over the coming months, the Canadian Wood Council will be:

- hosting exclusive round table sessions
- facilitating timber repair and rehabilitation research
- partnering with international associations
- developing standardized safety policies for our members and stakeholders



Did You Know?

Worldwide, mass timber buildings are now surpassing 20 storeys. The International Code Council has approved changes to the 2021 International Building Code that will allow up to 18 stories in the U.S. In Canada, our National Building Code allows for 6 storeys; an upcoming revision will allow for 12 storeys of encapsulated mass timber.

About the Canadian Wood Council

The Canadian Wood Council was established in 1959 and represents the wood products industry through a national federation of associations, including mass timber construction. On behalf of our members, we strive to expand market access and increase demand for wood products through excellence in codes, standards, and regulations, while delivering technical expertise and unparalleled market insight.

Visit our website to learn more:

cwc.ca/how-to-build-with-wood/insurance/

Interested in Learning More? Looking to Collaborate? Contact Us!

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Common Lumber Products

Light Wood Framing – The most common and traditional type of timber construction. This method of building uses dimensional lumber (2x4s 2x6s etc.) spaced at consistent intervals to create load bearing walls, floors, and roof structures. This framing type also incorporates structural composite lumbers (see below) and engineered wood products that increase the span and bearing capacities of these elements. Light wood framing is common in residential and small buildings but can be used in construction up to 6 storeys.

Structural composite lumber (SCL) – Structural composite lumber (SCL) is a term used to encompass the family of engineered wood products that includes laminated veneer lumber (LVL), parallel strand lumber (PSL), laminated strand lumber (LSL) and oriented strand lumber (OSL). With its ability to be manufactured using small, fast-growing and underutilized trees, SCL products represent an efficient use of forest resources as they help to meet the increasing demand for structural lumber products that have highly reliable strength and stiffness properties. SCL consists of dried and graded wood veneers, strands or flakes that are layered upon one another and bonded together with a moisture resistant adhesive into large blocks known as billets. The grain of each layer of veneer or flakes run primarily in the same direction. This method allows the SCL to be produced to lengths only limited by shipping constraints. SCL has been successfully used in a variety of applications, such as rafters, headers, beams, joists, truss chords, I-joist flanges, columns and wall studs.

Cross-laminated timber (CLT) – CLT consists of dimensional lumber layered at right angles to one another and then glued to form structural panels with exceptional strength and stability (typically three, five, or seven plies). CLT can be used for complete wall, floor and roof slabs as a stand-alone system or with other structural products (e.g., post and beam). The structural elements can also be incorporated as the finish in the interior of the buildings. The alternating layers give CLT strength in two directions which allow for much more design flexibility. The material lends itself particularly well to prefabrication, and can be CNC'd to allow for quick installation of Mechanical, Electrical and Plumbing (MEP) systems. The large slabs allow for quick erection of the structural components with no need for curing or reshoring time.

Glued-laminated timber (glulam or GLT) – Glulam is composed of individual wood laminations (dimension lumber), selected and positioned based on their performance characteristics. The lumber is then bonded together with a durable, moisture resistant adhesive. Glulam has excellent strength and stiffness properties, and is available in a range of appearance grades. Its typical use is beams and columns, but more recently has been used in a on edge orientation for floor slabs or roof decking. It can also be curved, lending itself to the creation of unique structural forms. Pound for pound GLT equals or exceeds the strength of most building materials and can achieve impressive spans and load bearing capacities.

Nail-laminated timber (NLT) –NLT is created from individual dimension lumber members (2x4, 2x6 etc.), stacked on edge and fastened with nails or screws to create a larger structural slab. Commonly used in floors and roofs, it offers the potential for a variety of textured appearances in exposed applications. In addition to being prefabricated in a factory, NLT can also be created on site. Like glulam, NLT lends itself to the creation of unique forms by alternating lamination size. In addition to its use in floor and roof components NLT has been proven to be an effective material for elevator and stair shafts.

Dowel-laminated timber (DLT) – Similar in lay up to NLT, panels are made from softwood dimensional lumber (2x4, 2x6, etc.) like the laminations of NLT but friction-fit with hardwood dowels. The dowels hold each lamination side-by-side, while the friction fit adds dimensional stability. This allows for a 100% timber product using no fasteners or adhesives. This allows for no damage to CNC machines caused by nails. Some companies are even exploring NLT using hardwood 'nails'.

Mass Timber Pre-Design Checklist

Interested in building with mass timber, but don't know where to begin? The Canadian Wood Council is here to help you - review our industry insider tips for success.

Have these boxes checked and come to your insurer prepared. Work with your insurer to receive a desirable rate by providing them with the confidence and information they need to support your project, this can include: a history of claims from the contractor & timber subcontractor and proof of insurance, along with demonstrated product recall experience, from the timber subcontractor.

- Make the choice to design a timber building from the start. Have a committed client and design team engaged early on. It has been demonstrated that experienced design and installation crews have achieved lower rates of insurance as well.
- Engage a fire safety engineer as soon as possible. They will help you along the way with a variety of items concerning insurance.
- Have constructive discussions with the authorities having jurisdiction (AHJ) and get their support.
- Have a concise and clear fire safety plan in place. Distribute it to the entire team. Have copies on site. Ensure your site is clean and clear of hazards. Does this plan include sprinkler installation and activation timelines? Can you include temporary fire separation systems during construction?
- Be confident in how you are achieving the necessary building code provisions. How is the fire resistance rating being achieved? What does the assembly look like?
- Remember moisture can be as big of an insurance concern as fire. Have a moisture management plan in place. Keeping timber dry and protected until it is installed is optimal. How will it be transported and stored?
- Think about repairability strategies. In the unlikely event of damage during construction are you able to replace sections? What is the strategy?
- Coordinate with the building systems (MEP and fire protection) engineers and subcontractors. Careful detailing of mass timber systems can go a long way to mitigating risk. Including MEP and fire protection systems can help realize savings during construction and minimize construction conflicts.
- Given its ability to be prefabricated, timber structures can go up very quickly. This will allow for materials to be on site for a minimal amount of time. Ensure construction sequencing is given careful attention to ensure minimal exposure to the elements and allow you to install fire safety measures (gypsum wall board, sprinklers, etc.) as quickly as possible.



For over 60 years, the CWC has been Canada's industry voice for wood products, including timber buildings. We are committed to working with leaders from across sectors to provide the latest research, knowledge and resources in the advancement of mass timber buildings.

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