2020 Construction Conference
September 30 – October 2
Chicago, IL

TIMBER! Wood Building Construction – Its pros, cons, and claims

Executive Summary: Wood building is increasing in prevalence and complexity, both in commercial and residential markets. Over 44 TALL WOOD buildings are underway in the last six years - and with this boom comes a variety of claims ranging from construction defect to workers' compensation to subcontractor default. In this session we will explore the common elements that drive most wood construction claims. We will explore recent trends in wood construction: Changes in building code allowances (sometimes conflicting with fire department capabilities); the varying properties of wood; prefabricated and pre-engineered assemblies. Are we safe in these taller wood structures? What types of wood-related failures can we expect? Fire, decay, defect, pests, seismic events. We will discuss what has transpired in the past year on this emerging risk, continue to explore trends around how and why these claims arise, how they are managed (and mismanaged), and what the outcomes of these legal disputes can mean for the industry.

Generally, there are two types of wood construction to discuss: Stick-Build and Mass Timber (or Engineered Wood). Engineered wood comes in many forms, for example: Structural Composite Lumber (SCL), Dowel-Laminated Timber (DLT), Nail-Laminated Timber (NLT), Glue-Laminated Wood (Glulam), Cross-Laminated Timber (CLT), Laminated Veneer Lumber (LVL aka Microlam), CLT Plus (where steel is used in the core and for connecting braces, and concrete for the basement, ground floor and garage with two ground floor retail spaces). Tall mass timber is an industry term to identify mass timber buildings that exceed the height limit for wood buildings set by the current International Building Code.

A Short History of Mass Timber

Globally, glulam was first used in Europe in early 1890s, patented in Switzerland in 1901. As adhesives improved, applications expanded. NLT in use since the early 1900's and was reintroduced in Europe in 1970s. CLT was originally invented in the 1970's and introduced in Austria and Germany in the 1990s. In the mid-1990s, Austria undertook a research effort that resulted in the development of modern CLT. DLT was developed by in Switzerland in the early 1990s.

In North America, Oregon was the first state to incorporate mass timber buildings over 6 stories into codes – without requiring a special review process. Wood-frame building is allowed in Portland up to 8 stories/85 feet, not including the podium! T3 Minneapolis is the first modern tall wood building in US. 221,000-square-foot, seven-story mass timber office building. T3 stands for Transit, Timber, and Technology. Other T3 projects include T3 Midtown in Atlanta, which is just being completed. And T3 Bayside in Toronto. Timber structure was erected at a speed exceeding conventional steel-framed or concrete buildings, completed in just 2.5 months at an average of 9 days per floor. Milwaukee approved

re-zoning for tallest mass timber structure in North America – 21 story Ascent residential tower. One in Norway is 30' taller. This might be the 2nd tallest wood structure.

I. Market update on wood construction

A. Wood Construction

Over the past few years there has been a pronounced increase in both stick-build and mass timber for a variety of reasons. Mass timber systems are widely reported to be cost-competitive, carbon-efficient, sustainable and reliable, which stem from the scientific data generated from full-scale fire, seismic, durability, acoustic, and vibration tests being conducted internationally by researchers and engineers. Cost savings are related to smaller foundations, less labor, improved schedule, and fewer finishes. Other major benefits: Labor Demand, Speed of Construction, Design/Aesthetics, Sustainability (where steel and concrete consume 3x and 5x embodied energy respectively), Quality, Coordination and Prefabrication, and Seismic Protection. Stick build has many of these similar benefits, with the exception (of course) of the fire resiliency.

For all the benefits of wood, there are some major concerns still prevalent that promulgate into the construction defect arena. Major concerns include: Manufacturing, Transportation, Subcontracting, Water Management, Fire Management. Manufacturers must be vetted prequalified just like subcontractors. Transportation must be a consideration for the size, shape and transportability of the members. Subcontracting / placement must be carefully considered. Robust moisture protection during storage and erection is a must for panels, sequencing, water management plan critical. Hot work permits, protocols, fire protection design, and fire department access should be planned for.

A. Building Code Updates – What is allowable now?

The codes and standards that dictate what architects and engineers can design is not yet uniform; but in the broad sense, construction codes and standards in various countries have transitioned, or are transitioning to enable greater use of mass timber.

In August 2018 Oregon becomes the first state to codify timber high-rise buildings up to 18-stories, and just a few months later, in December 2018, the IBC (International Code Council) approved the same 18-stories. For context, the previous code was 5-stories residential, 6-stories for commercial...which does NOT include a concrete podium. This means you could have a 5-story concrete podium and then build an 18-story wood-frame building on top of it for a total 23-story structure, which can be problematic if your local fire truck ladders don't reach that high.

The 2021 IBC code changes include three new types of construction:

1. Type IV-A Max 18 stories, GWB on all mass timber elements
2. Type IV-B Max 12 stories, limited exposed mass timber walls and ceilings allowed
3. Type IV-C Max 9 stories, all exposed mass timber designed for two-hour fire resistance.
4. Type IV-C similar to IV-HT with almost all interior mass timber allowed to be exposed, but most structural building components have to have a 2 HR FRR in addition to minimum timber sizes.

B. Recent Notable Losses

1. Peavey Hall, Oregon Delamination and Collapse – Oregon State University's School of Forestry building was being built using mass timber (CLT) manufactured by supplier DR Johnson, who had no previous experience with a CLT project of this size and complexity and only recently obtained and installed the equipment to perform the fabrication yet. OSU was adamant about using DR Johnson. In March 2018, a 1,000-pound section (20x4ft) of the third floor buckled and crashed onto the floor below. Engineers traced the panel's failure to the glue and determined at least 5 other panels showed signs of delamination. The closer they looked, the more defective CLT panels they found; by August, at least 85 were marked for replacement. DR Johnson took responsibility for the bad panels. An internal audit revealed that crews had been instructed "to warm the lumber in stacks under tarps," that were then glued together to make the panels. "Some temperature variations inadvertently caused premature curing of the adhesive, resulting in poor bonding," the company said. In the end, almost all of the panels needed to be replaced mainly because there is no standard for testing the strength of such members, and they were required to be replaced out of an abundance of caution since they were all treated the same way in the manufacturing process.

2. Wake Forest Pedestrian Bridges Notched Joint Failure. The purpose of using mass timber for this application was to blend with the trees and their canopies in environmentally sensitive surroundings. The bridges were glulam girders and trusses (fabricated in British Columbia) with a concrete on metal deck walking surface. The glulam's were too long to ship in one piece, so splices were designed 36 feet apart, centered over span. In November 2014, failures on both bridges occurred while the concrete pedestrian walkway was being poured. One person was killed and 4 were injured on the first bridge. No injuries on second bridge. The cause of the failures of the bridges was the structural design flaw in that the glulam girders were severely notched at each end to facilitate the end connections. The notches were not in compliance with the applicable ANSI/AF&PA NDS-2005 standard.

3. Avalon Bay Fires – In Edgewater, NJ in January 2015 a low-rise (3-4 story), 240-unit OCCUPIED apartment building burned to the ground in 45 minutes. This is the second time this complex has burned down; the first was in 2000 while under construction. The cause was identified as a spark from a maintenance workers torch while he was fixing a leak. The fire department could not even slow it down, they just had to let it burn. Many Avalon Bay buildings have met same fate. When asked, "Why does Avalon Bay continue to use these materials?", the representative said, "2 reasons: cost, and because the building code allows it". January 2017 another Avalon bay apartment burned down in Maplewood, NJ. Other locations with major apartment building fires in recent years: Denver; Los Angeles; Princeton; Boston; Lakewood (NJ); Haverhill, MA; Waltham, MA; Charlotte, NC; Warner Robins, GA; Midvale, UT; Oakland, CA; Dorchester, MA; Lawrence, MA; East Hollywood, CA; Lowell, MA; Waterbury, CT, Emeryville, CA; St. Petersburg, FL; Arlington, VA; College Park, MD; Overland Park, KS; and Raleigh, NC.

II. A Forensic View on the Risk

A fire damages a recently constructed 12-story tall wood residential building. Damage to the structural wood members is limited to the upper two stories; however, water damage to finishes and contents has occurred throughout the building.

The public adjuster (PA) requests a site meeting with the insurance adjuster and his consultants. During the meeting, the public adjuster reports that his wood-expert believes that much of the building needs

to be replaced, including all of the mass timber members, due to wood decay damage caused by elevated levels of moisture in the wood structural members since the fire occurred six months ago. Since the fire occurred, the building has been vacant with the HVAC turned off, and debris and finishes, such as carpet, had only been recently removed. Moisture tests show high moisture levels, in excess of 20%, in many of the wood structural members. In addition, the PA says that repairing the water staining on the exposed mass timber members, including exposed columns, walls, and floors, including floor soffits is so costly that the refinishing costs alone justify essentially rebuilding the building. The PA says, "What do you expect when you pour hundreds of thousands of gallons of water in this all-wood building and then let it sit and cook for that many months!"

All the benefits of tall mass timber buildings -- cheaper overall cost of construction, sustainability of materials, and the beauty and warmth of exposed wood members-- could come crashing down in a claim like this. While this may (or maybe not) be a possible extreme claim, evaluating damage to a tall wood building, and developing appropriate, code-compliant repairs could be challenging. This is a new construction system and we don't know what problems and issues may arise (but we can imagine given our experience on claims!).

We will discuss some of those possible challenges, like how to repair fire- or water-exposed mass timber members. If the member is lightly charred or soot-stained, does it need to be replaced? With soot-stained/water-stained exposed wood members will there be a line of sight issue, i.e., though only one small section of the large office lobby was soot-stained, the owner wants entire lobby re-finished because the finish will not match the original.

III. Claims and Litigation Perspective

A. Legal Strategy and Court Considerations

Joint and Several Loophole – Plaintiffs getting creative with strategy. Since designers have less insurance (and may have exhausted limits), they settle them out which removes them from the case, effectively making the case joint and several.

B. Design Issues

Design is an issue with root cause both in original construction and in subsequent repairs. In many cases it is well documented that cladding contractor, framer, and others built per plans, but extensive leaking occurred, and that subsequent repairs per plans also had extensive leaking. Wood moves. Many cladding materials are brittle and adjoining materials don't or do so at different rates. That has to be designed for. It often isn't, and there is insufficient money in the design team. The fallback position of designers is that they don't have to detail all problematic areas, that the burden is on the GC and subs to submit Requests for Information where designer has omitted difficult details, or even where the design is wrong. This ultimately makes contractors partial insurers of designers.

C. Root Cause Evasion

Experts can struggle to chase and capture the root cause(s) of damage in these kind of cases, or, actively try to avoid identifying root cause(s) because they want to keep as many pools of money in the case as possible. Identifying the root cause(s) of damage, especially moisture intrusion damage, can be difficult and expensive and against a party's self-interest. Root cause issues can also be

confusing and complex for the experts themselves and can be a challenge to present to a jury. (From the defense side, however, design issues with wood frame construction are relatively simple to present to a jury, and easy for a jury to understand. For example, it is a much easier presentation to say the wood frame moved, which caused the stucco to crack, which let in moisture, which caused the OSB to swell, which caused more stucco cracking than to explain how multiple layers of flashing at a window corner are supposed to fit together and why they did not.

Some Plaintiff attorneys have experts who put in the time to at least minimally identify factual issues and offer opinions to support claims against as many trades as possible (I've represented the person who installed doorknobs before). The idea being more pools of money means more money at mediation. Other Plaintiff attorneys find results of moisture intrusion, and broadly rely on Code provisions broadly stating that buildings should not leak instead of identifying causation, to support claims against the general contractor and subs. There is a fight to be had in the latter cases for moving to exclude these experts as unhelpful to the lay witness – e.g. anyone can look at rot and say the building is leaking/has leaked.

Another issue with wood framed buildings, especially in coastal regions, is that even a small amount of moisture intrusion can lead to quite large damages or start a vicious cycle of ever-worsening moisture intrusion. For example, building wraps/drainage planes are designed to drain small amounts of water quickly. It does not take much to overload drainage planes, and once overloaded the cycle may be difficult to stop in a wood framed building because it sets off a cycle of wood rot/expansion that further compromises the drainage plane, leading to more damage, etc. Further, in a coastal environment, wood can rot quite quickly, producing a large amount of damage before the problem is discovered. Add in an abundance of termites that periodically swarm, Plaintiff friendly laws in several states (effectively no Statutes of Limitation or Repose), and these cases write themselves.

From the defense counsel side, it is important that we do a better job of finding experts who can and will testify that wood framed mid-rise building (or higher) can be built to current Code and still leak – that is to say Design teams and builders do not fully understand how to consistently design and construct these buildings so they do not leak. For example, it used to be customary for elevated lightweight concrete balconies to be framed in wood with no slope. A T-bar or Z-angle termination would be used with the membrane overlapping the horizontal leg of the termination, which created the now infamous bathtub effect, which was often also coupled with no end dams/kickout flashing. After years and a multitude of cases, it was finally determined that creating purposefully designing a condition where water would be trapped on a membrane, where the membrane was all that was preventing the water from rotting the wood, was a bad design. There are many other issues like the bathtub design that have not yet been solved, and many that almost certainly have not been identified. We need to do a better job of arguing that the responsibility for identifying and correcting those issues lie not with the contractors, but with the designers (who need to design for effectiveness and not just minimum Code) and the owners (who are motivated to build as cheaply as possible).

IV. Insurance Coverage Considerations

Construction defect and Builders' Risk insurance claims involving wood frame construction naturally come with the usual coverage issues that confront any construction defect claim. General Liability Policies typically exclude coverage for damage to and the cost of repairing or replacing the insured's

own faulty work or product. They may also bar coverage for certain kinds of construction projects such as multi-family residential (apartment and condo) complexes. And, given the time that it takes for certain kinds of damage to develop and appear in wood frame structures, these cases may present complicated issues with respect to the trigger of coverage for projects that were built and operated across multiple policy periods.

Perhaps more important, however, are the unusual coverage issues that wood frame construction can present. It is important for carriers in the first instance and coverage counsel in the second to account for those concerns and address them adequately when issuing coverage for this type of project and handling claims.

A good example of this is the issue of wood destroying insects—termites. Various species of termites (dry-wood, subterranean, and Formosan) are common in large sections of the coastal Gulf South. To them, wood frame construction is simply delicious! That is particularly true when the wood is marinated as a result of water intrusion through the building envelope. Unless we build a wood frame structure from appropriately treated materials and protect it against termites during and after construction, these insects can cause major damage in a short time. Although Wood Destroying Insect Exclusions have been prevalent in homeowners and other first party property policies for years, they are not as common in commercial general liability coverages. Underwriters should carefully consider the risk they are writing and whether including such a policy provision by endorsement or otherwise makes sense at the outset of the project.

The earlier comments from this group about design issues in wood frame structures also present a serious potential coverage issue. As we noted, most designers take the position that they don't have to detail all problematic areas. They put that the burden on the GC and subs to design those details through shop drawings and submittals or to seek clarification from the design professional by submitting Requests for Information where designer has omitted difficult details. The trouble with that position is that it can quickly force a subcontractor with limited professional experience and resources into a position where they are actually designing critical components of the project such as flashings and the termination of water-resistant barriers at wall penetrations. Many times, multiple subs are involved in addressing the same penetration and none of them takes the time to design the interaction between all of the various component parts. Those situations quickly lead to conflicts between the subs and the design professionals.

Those conflicts are often a huge blessing for plaintiff's attorneys. They have the luxury of suing all of the involved contractors and design professionals and allowing the disagreements among the defendants to fester. By the time the case is ready for resolution, there is at least enough evidence to prevent any of the defendants from obtaining dismissal by way of summary judgment. At that point, the plaintiff's bar can choose to settle with some of the subcontractors and use the evidence they have developed to prove fault against the other rest of the defendants or against the GC in a failure to supervise claim.

The question, then, is how insurance carriers can effectively protect themselves against these difficult issues. There are really two good options available to carriers.

At the front end, close relationships between claims and underwriting departments allow the underwriters who are preparing policies for these projects to have a detailed understanding of the type of claims that are likely to arise. Working together, the two departments can carefully consider a proposed risk and make educated decisions about what endorsements and special provisions to add to the coverage for that project.

Once the claim comes in, claims departments can and should protect themselves by engaging coverage counsel and appropriate experts early in the evaluation of the claim. It is literally never too early to get a good expert! Retaining a local architect and an engineer to assist in understanding the local building codes and construction practices is an obvious way to enhance the carrier's understanding of what happened when a project encounters a problem. What may be less obvious is the benefit of hiring a local contractor to help understand and evaluate what happened on the job site, including design issues; construction scheduling; and materials changes or "value engineering." Having an expert who has actually supervised the construction of similar projects as a GC in the same area provides invaluable insight into the issues that the GC and subs may have faced while they were actually working on the project and can help the carrier understand why the contractors made certain decisions or sought particular change orders along the way.

Primary carriers should resist the urge to balk at hiring a "second set" of experts when they are already paying one set to help defend the insured. Excess carriers, meanwhile, should resist the urge to refuse to share the cost of hiring experts to assist in understanding the coverage side of the case with the primary carrier. We have found that, by working together and retaining the appropriate experts early on in the claim, primary and excess carriers can often find ways to resolve the case more quickly and cost-effectively than they could if they allowed both liability and coverage litigation to take on a contentious life of their own.

V. Conclusions and Takeaways

1. Fire and water protection & prevention during construction is of the utmost importance in preventing catastrophic events.
2. Wood moves – builders will need to pay close attention to penetration sealants and flashing details to ensure a weather-tight building.
3. Only time will tell if tall wood buildings can provide a shorter schedule, lower costs, and less impact on the environment. We are looking at a very small sample size right now, the boundaries of tall wood buildings have barely been breached, change is construction is a long and arduous process.
4. Hire a good expert, one who is proficient both on the analysis side and on the testifying side, who has design knowledge and a solid understanding of the issues with wood frame buildings. Then listen to them, have them prep you, and develop legal theories based on their advice.