



STEFEE KNUDSEN, AIA, LEED AP | AUGUST 28, 2026

# Caring for Mass Timber (It's Not That Fragile)

A White Paper Series: Part 2 of 3

Timber buildings are gorgeous, tapping into humans' natural affinity for wood. Unlike standard painted walls, wood's natural beauty often inspires more reverence than typical interior finishes, moving people to treat it with care and respect.

At the same time, because wood feels more "special," does this mean it needs more protection from normal wear? How does wood hold up against touching, spills, and nicks? Is it resilient to rare events like fire and water damage that may occur in the life of a public building?

Such questions come up more frequently as we consider mass timber structures in high-use environments like schools and libraries. This paper includes two sections on durability and resilience:

- **Section 1** (page 2) of this paper explores ordinary maintenance concerns through a comparison of wood to the ubiquitous painted gypsum board wall, then examines how to minimize maintenance without increases in construction cost.
- **Section 2** (page 7) addresses significant but uncommon events that may require more substantive repairs. We will see through research and hands-on testing that as a material, wood is not as fragile as we may think.

**ABOVE** Teen space at Multnomah County Library's Holgate Library (Photo credit: Lara Swimmer)

## ABOUT THE AUTHORS



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Stefée is a Principal at Bora, as well as the firm's K-12 education leader. Her work on Portland Public high schools is leveraging mass timber to cut the carbon impacts of construction while championing healthy, enduring facilities.



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Scott is an Associate Principal at Bora with deep experience on complex education and research projects. A leading mass timber advocate, he has contributed expertise to more than 30 precedent-setting projects nationwide and spoken internationally on the material's design and sustainability benefits.



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Emily is an Associate and an active mass timber leader at Bora. Her work on public schools and libraries advances the material as a tool for healthy and joyful learning and civic environments.

# SECTION 1 | COMMON MAINTENANCE CONCERNS

## VANDALISM AND WEAR

### The Touch Zone

An inherent aim of mass timber construction is to reveal the wood as much as possible. While the wood deck, beams, and girders are overhead (typically out of reach of building occupants), wood columns extend to the floor and stairs pass close to beams on occasion. It's within the material's "touch zone"—roughly seven feet above the floor, especially in the first three feet where people, spills, carts, and housekeeping may touch or nick the wood—that wear and tear primarily occurs.

Furthermore, wood's novelty and beauty often entices more touching than would be the case with a typical wall. Over time, this can lead to a build-up of hand oil, stains, and nicks on the wood, especially in public buildings like schools where hundreds of people impose natural wear on a building annually.

As noted below, wood's natural grain minimizes the visibility of most nicks and scrapes. For extra care, a simple sealer applied within the touch zone (see page 4) absorbs into the wood and will protect the surface from oils and most marks.

### Wood Grain as Camouflage

"Soft woods," tested to conform to U.S. codes and standards for mass timber, include fast-growing coniferous species like fir and pine as opposed to slow-growing "hard woods" like oak or maple. Name aside, soft woods are just as durable and by far the most common structural wood used in America.

The two most prevalent mass timber species in North America are Douglas Fir and Southern Yellow Pine, among the hardest and strongest of the conifers. While a fingernail or key can leave a mark on either, the natural color variation and grain pattern of wood makes such marks far less visible than they would be on a painted gypsum wall. This inconspicuousness is one of wood's key practical benefits: it withstands the incidental scratches, nicks, and bumps of daily use without noticeable compromise to its beauty.

### Aging Gracefully

Wood's character naturally increases with the patina of time and use, darkening with exposure to ultraviolet light. Marks on the wood lend a welcome historical character, having witnessed generations of people using it. Even well-used wood structures still maintain a warm and earthy beauty, and often it is the character of age that gives a building more meaning.

Bora's own office in the Volta building in Portland is a wood structure approaching 100 years old. Its columns have seen significant wear and tear over the years, but their structural integrity remains and their worn-in look adds to the character of our studio. But Volta's columns are "whole sawn" timber, cut from a single large tree. How does mass timber, which is engineered from laminated smaller pieces, hold up over time?

The Diane Gregg Memorial Pavilion (facing page) at Lewis & Clark College in Portland, completed in 2011 by Bora, offers a compelling case study. Much of the 3,000 board feet of wood incorporated into the Pavilion's figured screen wall and hallway slat wall are Douglas Fir milled from five trees that stood on the site itself. The glulam columns were carefully detailed such that the wood is raised to sit above the reach of floor-cleaning equipment. However, sealer was not yet commonly used on wood columns in 2011, so the touchzone shows evidence of small-scale wear from purse or bookbag hardware leaving small dents and scratches, darkening from hand oil that has collected dirt and dust, and scratches and smudges where cleaning was attempted.



Even with this wear and tear, and now well into its second decade of use as a multi-purpose gathering space for performances, lectures, and worship, the Pavilion's wood surfaces have aged gracefully. Their warmth and character have only deepened by years of occupancy. The Pavilion demonstrates how wood can hold up well after more than a decade of use, even without sealer in the touch zone.

Learning from this example, we now take more steps to minimize maintenance, improve the appearance of mass timber in the touch zone, and make cleaning easier.



### Protection Strategies

Our goal is to expose as much wood as possible so occupants can see and experience its warmth and biophilic benefit. For columns within the touch zone, the amount of protection needed depends largely on where it lives in the building and how much natural supervision it receives. We think about this as a spectrum:

- In high-visibility, well-supervised spaces, sealing the wood within the touch zone is typically all that's needed. A good sealer is nearly invisible and requires no additional material or design intervention.
- In areas that are harder to supervise, such as corridors, stairwells, or high-traffic entries, wrapping wood columns in the touch zone with a protective material is a practical solution that doubles as a design opportunity. School projects have used these moments for student artwork, spirit graphics, and community storytelling.
- In the most vulnerable locations, where damage is likely due to lack of supervision (such as restrooms), embedding the column in the wall is the cleanest solution to protecting the wood entirely.

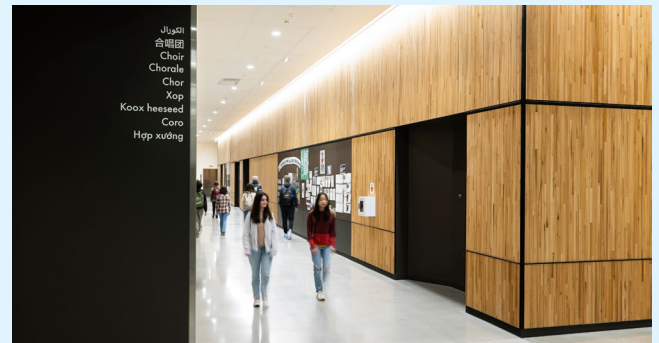
**ABOVE** The Diane Gregg Memorial Pavilion at Lewis & Clark College, completed in 2011 by Bora

**INSET, ABOVE RIGHT** Portland Public Schools' Lincoln High School (Photo credit: Alex Grummer)

**INSET, LOWER RIGHT** Image of column in Van Asselt school, Seattle Public Schools

**OPPOSITE PAGE, CLOCKWISE FROM TOP LEFT** Exploring the "touch zone" of mass timber; Close-up of the "whole sawn" timber columns at Bora's studio at Volta; Volta retained the structure's original wood trusses (Photo credit: Josh Partee)

## CASE STUDIES | Maintaining Wood Finishes in Schools



Bora interviewed two school districts, Portland Public Schools (PPS) in Portland, Oregon, and Seattle Public Schools (SPS) in Seattle, Washington, on their experience with wood within their respective schools' touch zones. Below are their observations.

### Portland Public Schools

- Lincoln High School (shown above) features reclaimed and sealed hardwood paneling in common areas. After several years in place, it is holding up well compared to other finishes. Maintenance staff report that wood is actually easier to clean than other surfaces, requiring only a simple wet cloth.
- Students are not targeting the wood for damage or vandalism the way they do with painted surfaces or wood furniture.

### Seattle Public Schools

- SPS has multiple mass timber buildings and is pleased with how the wood is holding up after more than three years of use.
- Mass timber columns are seeing minimal damage overall.
- Generally, SPS does not bother fixing scratches in the timber because they get lost in the color and pattern of the wood. When repair is needed, 80-grit sandpaper handles the occasional touch-up.
- Wood stairs and handrails require far greater maintenance than the mass timber structure itself. SPS does not recommend wood for these elements.
- Due to ongoing concerns with painted gypsum board wear and tear, SPS no longer allows it within five feet of the finished floor.
- The biggest issue SPS identified is gum stuck in recessed connectors—something they plan to address in future projects.



## WOOD SEALERS

Sealers are fluid, applied compounds that bond with wood and, once dry, protect it from stains and spills. This renders the surface resistant to pens, markers, food, drink, and oils. With hundreds of products from dozens of manufacturers on the market, choosing the right sealer starts with knowing what you're trying to achieve.

### Side Effects of Sealers

Bora's mass timber designs aim to showcase wood's natural beauty, which means we avoid sealers that add sheen or noticeably darken the wood. Since maintenance concerns are concentrated in the touch zone, we focused our research on a sealer that would protect without altering the wood's appearance: very low sheen, minimum pigmentation, and subtle enough that coating only a portion of a column would be undetectable to the untrained eye.

### What else should be sealed?

While sealers are helpful, applying sealer to all sides of a piece of mass timber is costly, logistically complex, and in our experience, not necessary. Instead, a better strategy is to factory-apply sealer to the most absorbent edges, which are the end grains of the beams, columns and CLT panel edges. That said, mass timber is naturally resilient. Glulams, CLT, and MPP are dimensionally stable even when exposed to rain during construction, and any moisture absorbed during the process will dry.

Our recommendation is straightforward: field-apply sealer within the touch zone where the investment matters most. That's where occupants interact with the wood, where stains and marks accumulate, and where a good sealer makes a meaningful difference in long-term appearance and maintenance.

**RIGHT** Bora's in-house tests of a range of sealers

**OPPOSITE PAGE, LEFT** Research process diagram

**OPPOSITE PAGE, RIGHT TOP TO BOTTOM** Application of liquids to the CLT; Testing physical damage to the CLT; Orbital sander in use during testing

## SEALER COMPARISONS

### The Criteria

To move beyond project-by-project selection, Bora conducted an internal research study to compare sealers that we have used across multiple mass timber buildings, evaluating products side by side in real touch zone conditions. Prioritizing cost, maintenance, and occupant health, we set out to identify at least three sealers we could confidently specify. Our criteria for this research consisted of the following:

- **Protection:** Resists common spills, hand oils, and vandalism
- **Number of Coats:** Single-coat application preferred to minimize schedule and cost impact
- **Appearance:** Minimally affects the wood's natural color and sheen
- **Patchability:** Can be re-applied imperceptibly after sanding since touch zone repairs over a building's life are inevitable
- **Low VOC:** Minimizes volatile organic compound emissions for occupant health
- **Ingredients:** Plant-based compounds, health product declaration (HPD), and free of "red list" chemicals—consistent with Bora's commitment to healthier interior environments

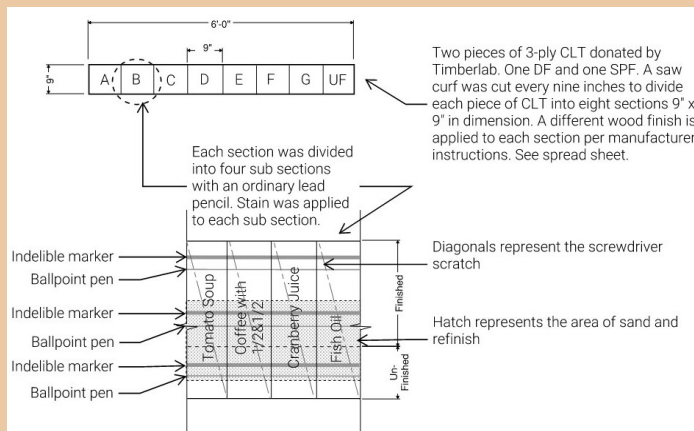


## THE RESEARCH

Our test bed consisted of two uniformly sized pieces of cross-laminated timber (CLT), one Douglas Fir, and one spruce/pine/fir (SPF), divided into uniform sections with a different sealer applied to each. An unsealed section served as a control throughout.

We subjected each section to an identical battery of real-world abuse: tomato soup, coffee, cranberry juice, fish oil, and indelible marker to simulate spills and vandalism; hammer claw drags to simulate key scratches; and 12 ounces of loose nuts and bolts dropped from eight feet to simulate impacts from backpack or purse hardware.

After staining, sections were cleaned with an all-purpose multi-surface cleaner typically used by our public clients. A month later, we used a 5-inch orbital sander with 120-grit paper to remove the surface, then re-applied the matching sealer to test patchability. In addition, the wood was exposed to UV light through a south-facing window for seven months (August 2024 – March 2025) to replicate real aging conditions. Finally, colleagues blind-judged the aesthetic results, ranking each section against the unsealed control.



## THE RESULTS

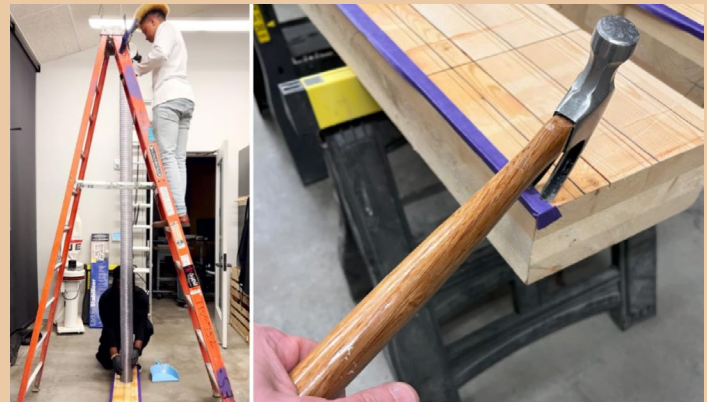
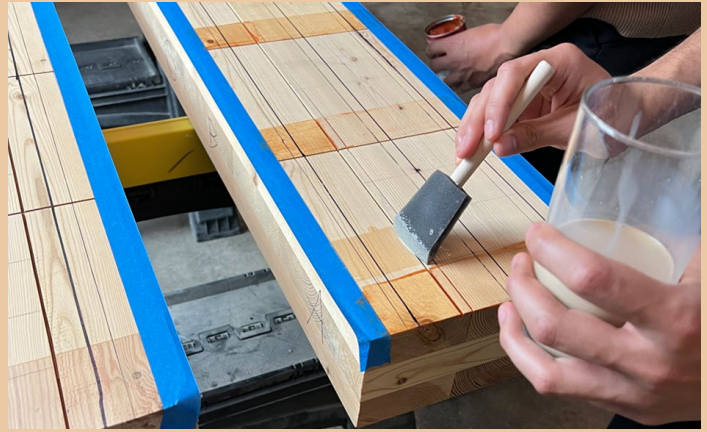
All sealers performed similarly well, tolerating stains and cleaning effectively, with indelible marker proving the most stubborn. Scratches and small dents were largely imperceptible due to the wood's natural color and grain variation, and sanding removed most physical damage entirely.

Final ranking:

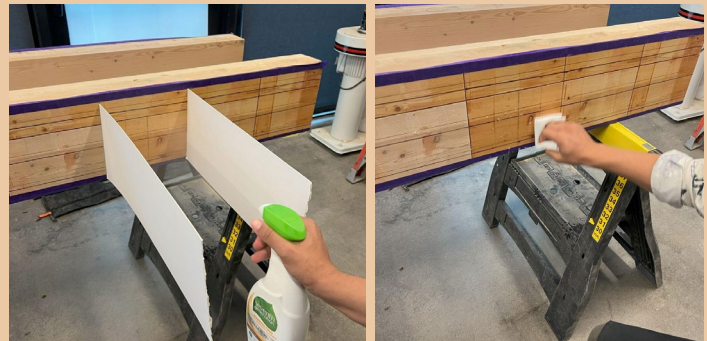
1. Eco Safety Products; Acry-Soy Penetrating Sealer
2. Sansin KP-12UVW
3. Timberpro UV Log & Siding Smooth
4. Sherwin Williams Woodscapes
5. Sansin KP-12UVW with a top coat of Sansin Glacier
6. Osmo Polyx Oil, Clear Matte

Acry-Soy ranked highest largely because it is the only product with a Health Product Declaration (HPD)—a level of ingredient transparency none of the others could match, and a standard Bora hopes will become the norm across the industry. The top three sealers are now listed in Bora's specifications as acceptable products, with Acry-Soy as the basis of design. We hope others will duplicate our methods and share their results.

## STEP 1: Testing Wear and Tear



## STEP 2: Cleaning



Applying multi-surface cleaner to vandalized surface

After ten second of waiting, ten uniform wipes of paper towel

## STEP 3: Repair



## SHARING FINDINGS

We brought our results directly to Portland Public Schools (PPS), setting up a side-by-side comparison of a fresh sample of sealed Douglas Fir mass timber alongside a mock-up of gypsum board in the district's standard white paint. We invited the client group to mark both surfaces with markers and scratch them with car keys, then step back ten feet to assess the damage. Marks were visible on both, but consistently less objectionable on the wood, where color and grain mitigated the visual impact.

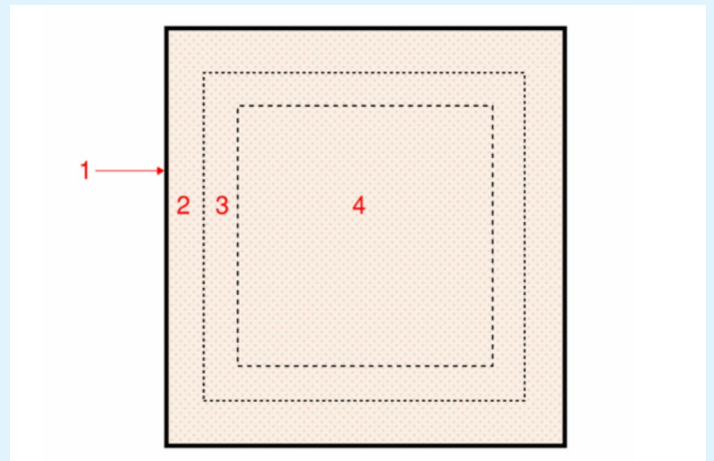
PPS then cleaned both surfaces with their standard peroxide-based cleanser. While it faded the marks but didn't remove them entirely, they were again, less noticeable on the wood. Bora then sanded the wood by hand: 80-grit for two minutes on the damaged area, followed by 150-grit across a wider area to even the surface. After reapplying the sealer, the patch was nearly imperceptible. The total time, including re-sealing, was 5 to 6 minutes plus a couple of hours to dry, which is roughly the same as patching and repainting gypsum board.



## WILL SCRATCHES OR SANDING CAUSE A STRUCTURAL PROBLEM?

No. As shown in the diagram, a mass timber member consists of several layers beyond the structural core: a surface zone, extra material, a char layer, and finally, the structural area. Because members are sized to account for safety factors, fire resistance, and standard dimensions, there is substantial material between the surface and anything structurally critical. Routine scratches, nicks, and sanding affect only Zone 1 and reach nowhere near structural territory.

The structural engineer can note the depth of the extra material (Zone 2) in the construction documents so maintenance staff have a clear benchmark. Should damage somehow reach the char layer (Zone 3), which would require significant force, the area can be patched by fastening new wood in place, behaving much like the original glulam. The same repair applies to fire-damaged timber, where char is burned away but the structural area (Zone 4) beneath typically remains intact.



**Mass Timber Member Zones**

Zone 1: Surface

Zone 2: Extra Material (layer depth provided by design team)

Zone 3: Char Layer

Zone 4: Structural Area

# SECTION 2 | RARE DAMAGE CONDITIONS: FIRE & WATER

## SMALL FLAMES

Large-dimension wood does not easily catch fire; that's why you start a campfire with kindling, not a big log, and why a student with a lighter could not ignite mass timber. In our own testing, when we held a burning stick against each of our top four sealed sections for ten seconds, the timber didn't catch, and the flame self-extinguished once removed. The only evidence was a brown patch the size of a fifty-cent coin. The soot wiped off easily, and the patch was removed with light sanding.

## MORE SERIOUS FIRE

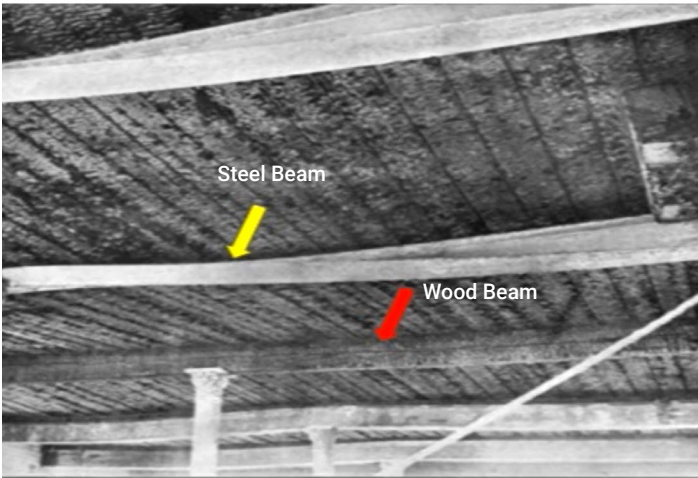
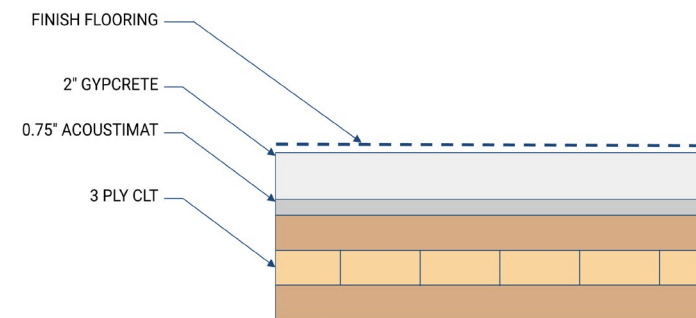
Fire is a danger for all buildings regardless of structural material, and building code requires the same fire-resistance rating for schools whether they are wood, steel, or concrete. It's worth noting that heavy timber was actually codified as the first fire-resistant construction type in 1835, and for good reason. Large-dimension wood burns slowly and predictably, charring on the outside while protecting the structural core within (see Zones 3 and 4 in the diagram on p. 6). In sprinkler-protected buildings, 96.2% of fires are contained to one room<sup>1</sup>.

Neither are steel and concrete immune. Steel doesn't burn, but it weakens, distorts, and can fail with heat exposure. Concrete's chemical composition changes under high heat and can then fail. In any fire, the bulk of what burns is furniture, paper, fabrics, and fixtures, not the structure itself. After a fire, a mass timber building may need less remediation than a steel or concrete equivalent, since exposed wood means fewer concealed spaces harboring smoke and water damage, and the wood member doesn't disort to lose structural performance.

## WATER, MOISTURE, AND MOLD

Wood is "hygroscopic," naturally absorbing and releasing moisture based on its environment, but this is less alarming than it sounds. Moisture content must exceed 20-30% for several weeks before fungal decay becomes a risk <sup>2</sup>, and the Pacific Northwest's ambient humidity alone does not support that threshold, even in exterior wood<sup>3</sup>.

For significant water events, such as a roof leak, plumbing overflow, or sprinkler activation, the most important response is simply to let the wood dry completely. Because mass timber buildings expose as much wood as possible, there are relatively fewer concealed spaces and layered finishes to trap moisture compared to steel or concrete construction.



: Boston Manufacturers Mutual Fire Ins. Co.

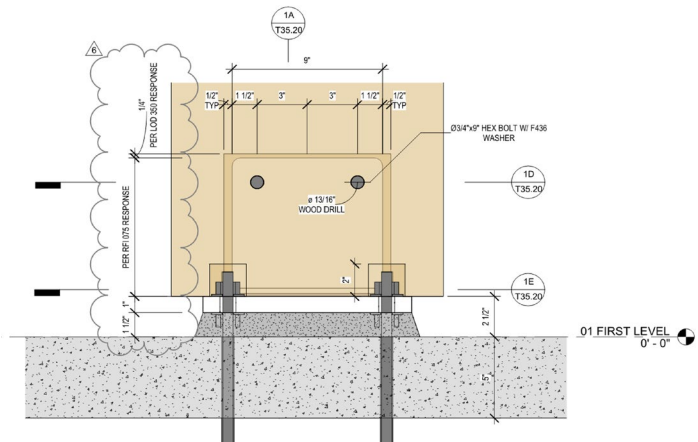
**OPPOSITE PAGE, LEFT + UPPER RIGHT** PPS Project Managers marking mass timber

**OPPOSITE PAGE, LOWER RIGHT** Mass timber member zones

**LOWER LEFT** Proposed floor assembly for Portland Public Schools' Ida B. Wells High School Modernization

**ABOVE** Fire is a danger for all buildings, regardless of construction type

**BELOW** Column base detail for Multhnomah County Library's Holgate Library protects against water damage.



For a soaked floor assembly, removing the finish floor, gypcrete, and acoustic underlayment allows both faces of the CLT deck to dry. Dehumidification above and below until the wood reaches 16% moisture content is the target<sup>4</sup>. Any resulting discoloration typically blends naturally into the wood's character over time.

For everyday encounters with water, such as cleaning, spills, or column bases near floor drains, good detailing is the answer. We design column bases to sit above the finish floor, and columns buried in plumbing walls are isolated in a protective membrane. Prevention through thoughtful design eliminates most water risk before it starts.



**ABOVE** PCC Metro Center's glulam members in the fabrication facility before delivery onsite (Photo credit: Kalesnikoff)

## CONCLUSION

Wood is beautiful, and far more resilient than people assume. Its natural grain quietly absorbs the incidental marks of daily use in ways painted gypsum cannot, and today's sealers make touch zone maintenance straightforward. Districts already living with mass timber confirm this: Seattle Public Schools reports minimal column damage after years of heavy use, and Portland Public Schools maintenance staff find wood easier to clean than other surfaces.

For rarer events, the case for wood is equally strong. Mass timber's predictable charring protects the structural core in serious fires, and water, managed through good detailing and a straightforward drying protocol, poses no greater risk than in a steel or concrete building.

Mass timber is not that fragile. Designed and maintained thoughtfully, it will outlast the generations of students who learn within it.

## ADDITIONAL WHITE PAPERS + RESOURCES

We are always eager to share our research and lessons learned with others to advocate for mass timber as a viable, sustainable design solution.

- [Additional white papers in this series:](#)  
Paper 1: *Mass Timber in the Learning Environment*  
Paper 3: *Mass Timber Ceilings: Functional Beauty*
- [Getting Acquainted with Mass Timber](#), an introductory white paper for new mass timber building occupants
- *Mass Timber 101: A Podcast*, a user-friendly dialogue around key mass timber topics (available on [Spotify](#) and [Apple Podcasts](#))
- *Bora's Mass Timber Maintenance Guide*, a practical read on cleaning, stain removal, scratch/damage repair, and product/contractor recommendations for facilities teams seeking deeper guidance. Shareable upon request.

## FREQUENTLY ASKED QUESTIONS

### How do we know when mass timber has been damaged enough to need professional evaluation?

The structural engineer can note the depth of Zone 2 (extra material) in the construction documents, giving maintenance staff a clear benchmark for routine repairs. Only if damage visibly penetrates beyond that layer should a licensed structural engineer be consulted. Reaching that threshold through building use is extremely unlikely.

### Does mass timber require specialized maintenance staff or special cleaning products?

It does not. As our public school clients report, wood in the touch zone requires only a damp cloth for routine cleaning, and occasional scratches can be addressed with 80-grit sandpaper and a touch of sealer in about five minutes.

## LEARN MORE ABOUT FIRE & MASS TIMBER

- Wondering how to repair burned mass timber? This paper by Woodworks, [Repair of Fire-Damaged Mass Timber](#), goes into detail on time, cost, and methods of repairing mass timber after a fire.
- Check out Episode 4 of our [Mass Timber 101 podcast](#), which dives into fireproofing and timber.

## REFERENCES

1. [McGree, T. U.S. Experience with Sprinklers. National Fire Protection Association, April 2024.](#)
2. [Morris, P., and Winandy, J., 2002: "Limiting conditions for decay in wood systems"](#)
3. [Simpson, W., 1998: "Equilibrium Moisture Content of Wood in Outdoor Locations in the United States and Worldwide"](#)
4. [RDH Building Science Inc., 2025, 2023, 2022: Mass Timber Moisture Management for Construction](#)