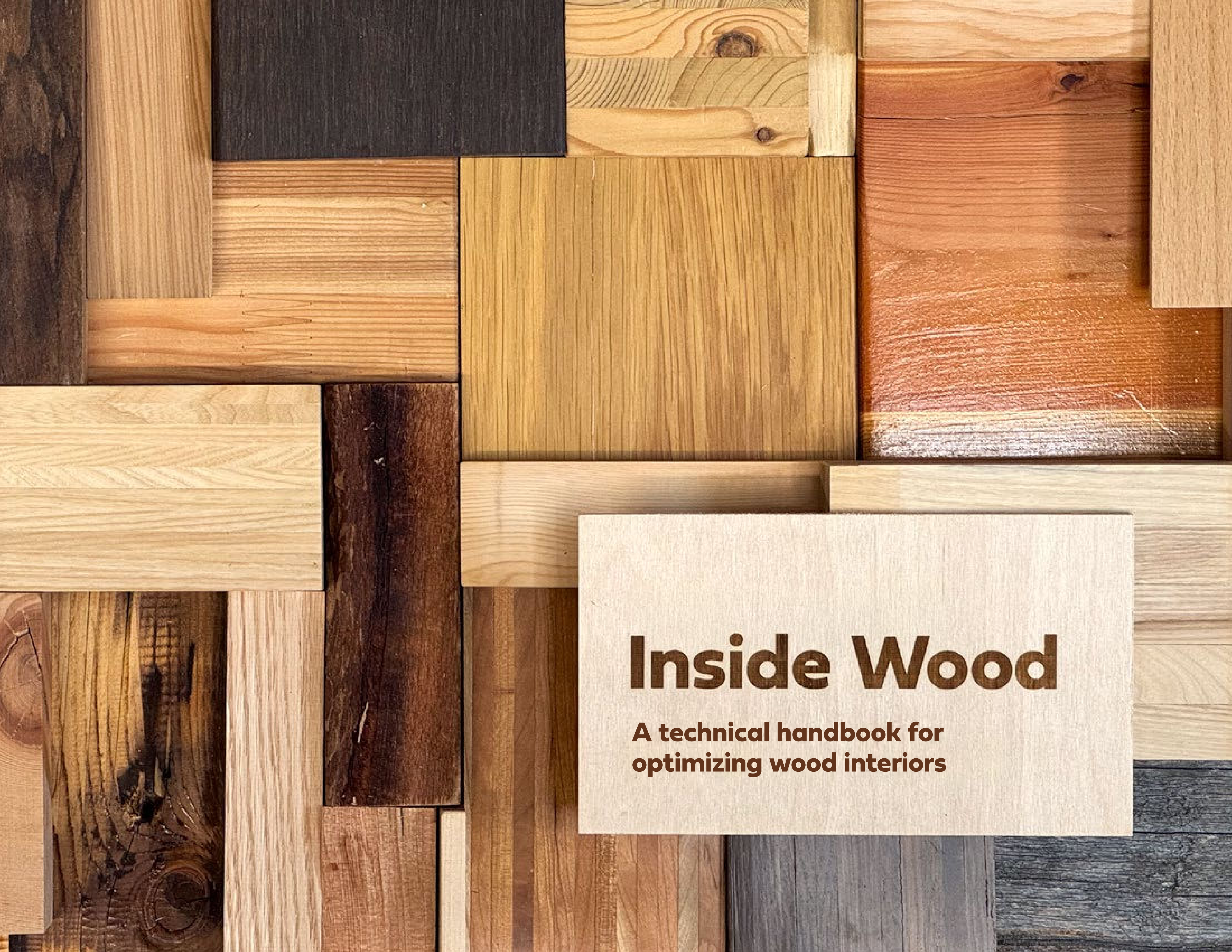


Inside Wood

A technical handbook for optimizing wood interiors

Authored by

ZGF is a design firm with a focus on architecture, interior design, and planning. Our practice connects communities and is committed to the stewardship of people, place, and the environment. With our roots in the Pacific Northwest, our culture is one of innovation, intellectual curiosity, and collaboration. www.zgf.com

With contributing authors, GHL Consultants, a part of J.S. Held.

Contributors

This research is based on insights from more than 40+ interest holders—from owners and operators to designers—representing a variety of building types including residential, healthcare, education, institutional, commercial and community projects. *Inside Wood* was made possible by their generous contributions, time, and expertise.

- City of Vancouver
- Dialog
- Fraser Health Authority
- HCMA
- KPMB Architects
- MGA | Michael Green Architecture
- Naikoon Contracting Ltd.
- Oxford Properties
- Perkins&Will
- Provincial Health Services Authority
- Ronald McDonald House
- Stephane Laroye Architect Inc. | SLA
- Structurlam
- University of British Columbia
- Vancouver School Board

About Inside Wood

The growing interest in exposed wood surfaces, driven by biophilic design and low-carbon materials, is challenging the design community to explore new ways to deliver more wood in interior spaces. ZGF, commissioned by FII, developed this technical handbook, *Inside Wood,* to offer innovative, practical, and elegant solutions for optimizing the use of wood in interior spaces.

Recognizing the growing body of evidence linking wood and biophilic design to health, employee productivity, and long-term value, Forestry Innovation Investment (FII) has commissioned this work to build biophilic design literacy and technical design capacity in British Columbia (B.C.). This effort supports B.C.'s leadership in translating biophilic research into real-world application through a growing library of content, enabling more confident, durable and code-compliant use of exposed wood in buildings.

Inside Wood presents key themes, including design decisions that leverage the unique material characteristics of wood and methods to protect, maintain, and repair it for long-term performance. It explores how to optimize wood use through partnerships and sustainable sourcing, and how to navigate building codes and regulations to unlock the environmental benefits of exposed wood in interior spaces.

FII is B.C.'s market development agency for forest products. As a Crown corporation of the B.C. government, FII helps to diversify markets domestically and abroad. To communicate the merits of building with wood from B.C.'s forests, FII developed naturally:wood, a comprehensive information resource providing the latest insights in timber design, construction, wood performance and sustainable forest management practices in British Columbia.

For more visit www.bcfii.ca or www.naturallywood.com

Table of contents

Additional resources
Hyperlinks have been included throughout the handbook, indicated by the blue document symbol. A full list of resources and where to find them is included at the back of the book.

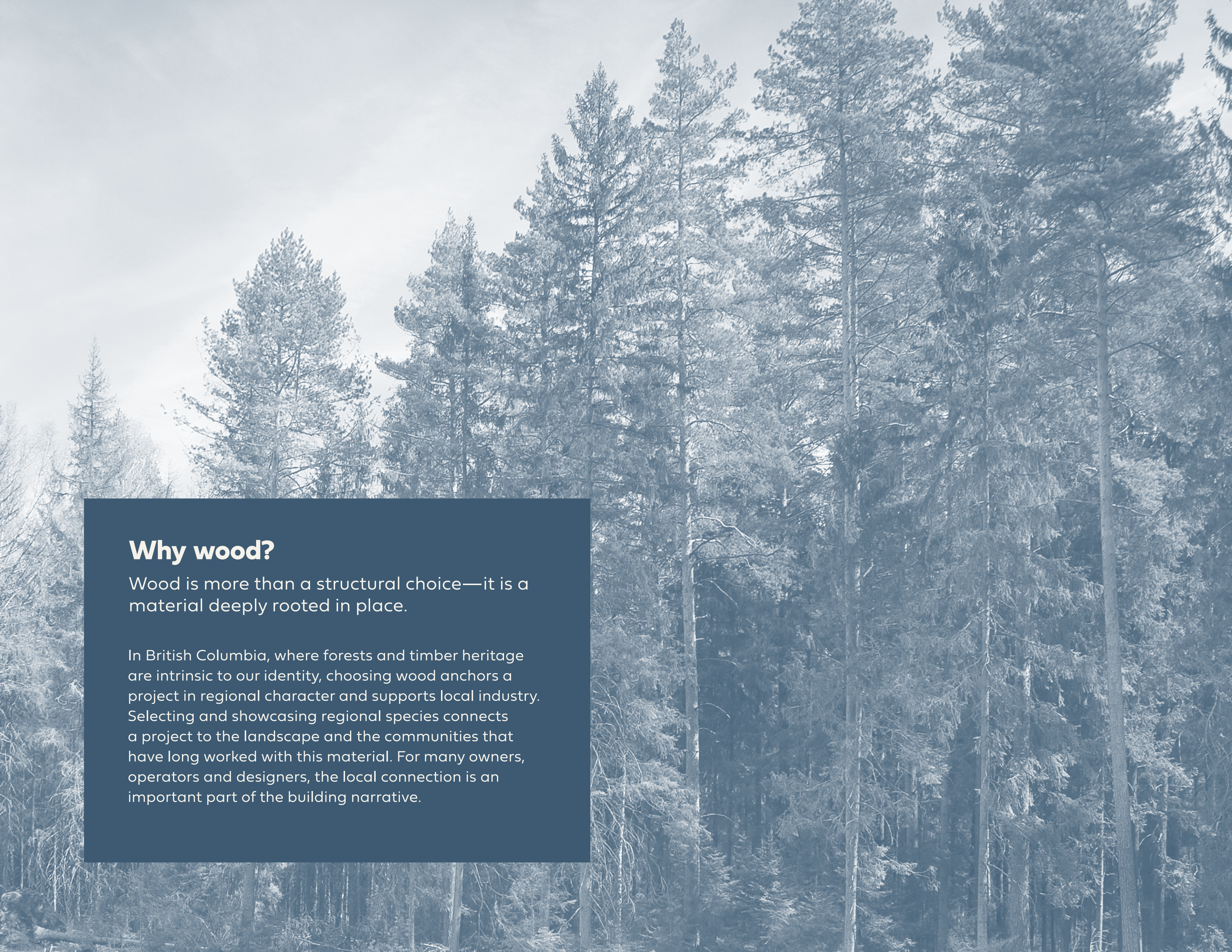
This work was created on the traditional, ancestral, and unceded territories of the xʷməθkʷəy̓əm *(Musqueam),* Sḵwx̱wú7mesh *(Squamish), and* səlilwətaɬ *(Tsleil-Waututh) Nations. We are grateful for those who have lived on and cared for these lands and forests for millennia before us.*

West Vancouver Community Centre | West Vancouver, B.C.

The District of West Vancouver replaced a 35-year-old recreation centre and civic pool with a new community centre in 2009. Wood decking from the previous community centre was salvaged and used along the length of the interior circulation spine, providing a warm aesthetic and embedding community memory in the architecture. *(HCMA, 2009)*

Designing with wood

How design decisions can leverage the unique qualities of wood



Why wood?

Wood is more than a structural choice—it is a material deeply rooted in place.

In British Columbia, where forests and timber heritage are intrinsic to our identity, choosing wood anchors a project in regional character and supports local industry. Selecting and showcasing regional species connects a project to the landscape and the communities that have long worked with this material. For many owners, operators and designers, the local connection is an important part of the building narrative.

Wood is a material that is rooted in British Columbia and Canada, where forest and timber heritage are intrinsic to our identity.

Exposed wood in interior spaces is a durable and adaptable material that can be a cost-effective option when detailed and finished appropriately. It resists wear, can be repaired in place and often becomes more attractive with age. Below are key reasons owners, operators and designers choose wood.

Health & wellness

Biophilia, the innate human affinity for the natural world, describes our tendency to seek connections with nature. Wood is one of the most direct ways to bring nature into a building: its grain, colour and texture create a sensory richness that is hard to replicate. Wood supports health and well-being by helping reduce stress and heart rate, improving cognitive function, and enhancing overall occupant experience. These benefits are valuable in all building types and especially important in spaces for children, students, and places of healing, where connection to nature and daylight supports learning, performance, and recovery. For owners, this translates into spaces people enjoy spending time in, with happier occupants, higher productivity, and public interiors that feel welcoming.

Culture, community, regional expression

Wood carries social and cultural meaning. It is valued as a warm, natural material that feels welcoming. During engagement sessions for civic building projects such as community centres and libraries, the public frequently asks for exposed wood. In public projects, wood is used to represent

Marine Building Renovation | Vancouver, B.C.
As part of the renovation of this 1930 heritage building, Oxford Properties selected walnut flooring for the elevator lobbies on each office floor to enhance the experience and reinforce the building's heritage character. The wood flooring on each floor emphasizes warmth and hospitality. The main floor lobby maintains the original ceramic tile flooring, which is well suited to its high-traffic nature.
(McCarter & Nairne 1930, DIALOG 2015)

Indigenous traditional building values and is integrated into sacred spaces where materiality supports cultural expression and ceremony. In residential and commercial projects, wood is often treated as a premium material and exposed in feature spaces.

Sustainability

Using exposed wood supports sustainability goals on multiple levels. Timber is a renewable building material that stores biogenic carbon and has a lower embodied carbon footprint than steel, concrete and many other interior finish materials. Choosing regional wood reduces transport emissions and supports local economies. British Columbia and Canada are globally trusted providers of wood products from responsibly managed forests, many of which are certified to one or more independent global forest certification programs (such as SFI®, PEFC™ and FSC®).

Because timber is durable, repairable, and amenable to reuse, thoughtful design and detailing extend service life and reduce life-cycle impacts. Using exposed wood also helps projects earn credits in green building programs such as LEED®, Living Building Challenge, and WELL™, and can contribute to meeting embodied carbon regulations such as the City of Vancouver's Embodied Carbon Guidelines.

LEED v5: What does a new era in green building standards mean for the use of wood?

The hidden economic value of using exposed wood in different sectors

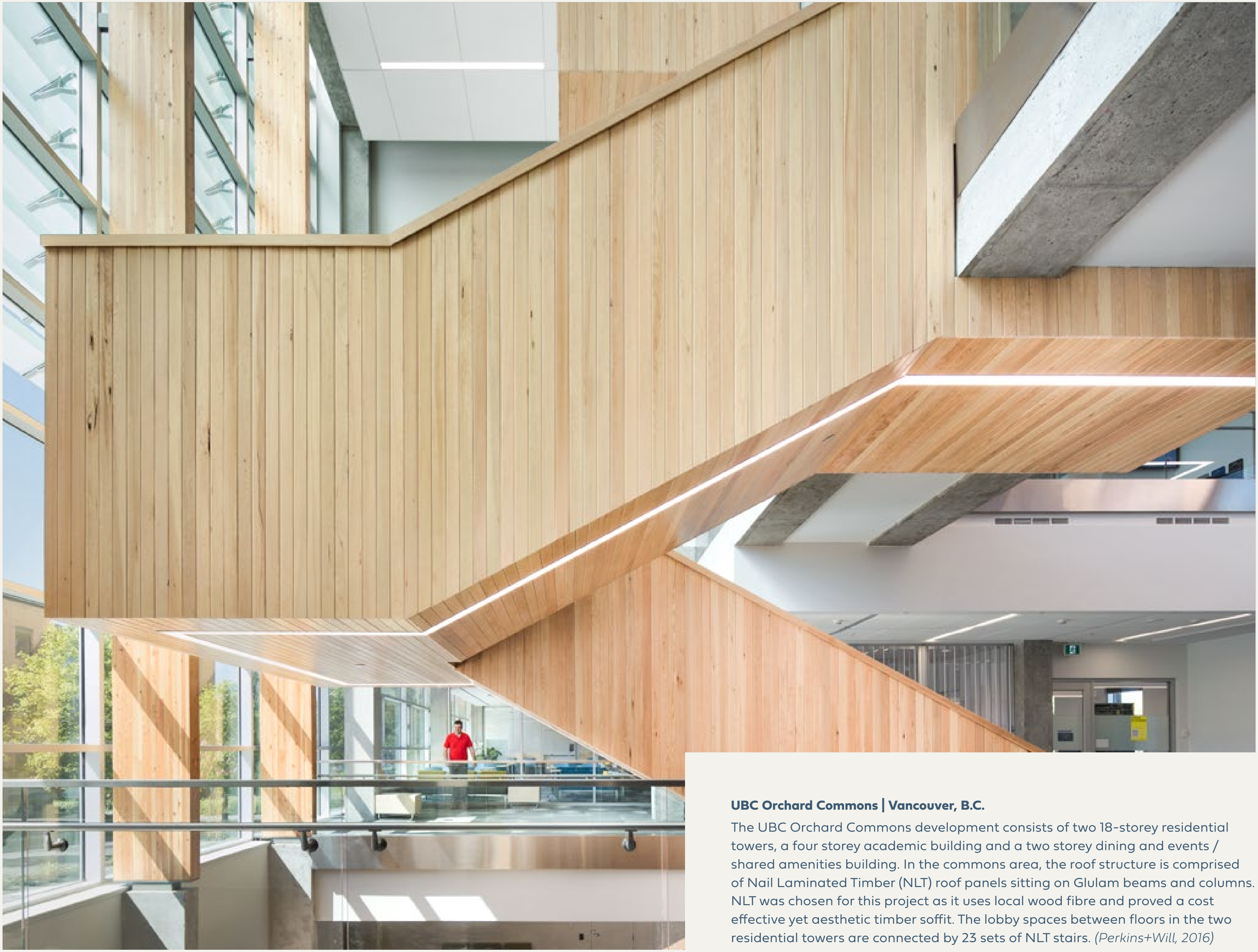
	Health & well-being indicators	Economic / financial impacts
Community	Increased perception of safety, well-being and social cohesion	
Education	Improved attention, learning rate, test performance	Higher graduation rates, lower absenteeism
Healthcare	Faster healing, less pain medication, lower stress	Higher patient turnover, higher staff retention, better reputation
Hospitality	Increased relaxation, satisfaction, loyalty	Higher real estate value, less crime, increased tax base
Office	Reduced stress, improved presenteeism, productivity and satisfaction	Increased employee retention, fewer sick days higher revenue per employee, rent premiums
Retail	Increased shopper attention, dwell time, mood	Higher sales, increased brand perception, repeat visits

The Economics of Biophilia - Terrapin Green

Material properties

Wood adds warmth and durability to interior spaces. Successful and effective use begins with an understanding of the nature of the material.

The physical properties of wood can contribute to the sensory experience of a space, including the tactile experience from the grain and surface texture, smell, and surface reflectance. As a natural material, the colour variation and character marks of wood should be expected and accepted.



UBC Orchard Commons | Vancouver, B.C.

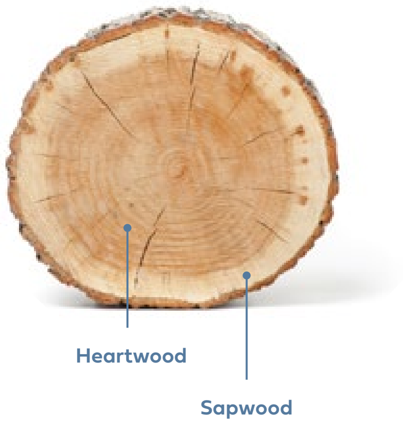
The UBC Orchard Commons development consists of two 18-storey residential towers, a four storey academic building and a two storey dining and events / shared amenities building. In the commons area, the roof structure is comprised of Nail Laminated Timber (NLT) roof panels sitting on Glulam beams and columns. NLT was chosen for this project as it uses local wood fibre and proved a cost effective yet aesthetic timber soffit. The lobby spaces between floors in the two residential towers are connected by 23 sets of NLT stairs. *(Perkins+Will, 2016)*

Colour

The hue of wood primarily presents in the yellow, red, and brown, with tones ranging from light to dark. Depending on species, size, and how it was sawn, wood can present colours that are consistent or varied within one piece. Grain and character marks can affect the perceived colour. Most wood products, including engineered wood, have significant visible variation in colour across each panel. The intended colour and finish should be defined early to ensure consistency in the final appearance.

Heartwood & sapwood

Sapwood forms the outer layers of a tree and is responsible for transporting sap to nourish the living structure. Heartwood is the darker central portion of the log; it is no longer living and primarily provides structural strength. As the tree grows and adds new rings to the outer sapwood near the bark, older sapwood gradually transitions inward and becomes heartwood.



Colour range of some regional wood species available in B.C.

creamy, pale to light beige

pale yellow to honey, sometimes slightly reddish

light to medium brown with golden or honey tones

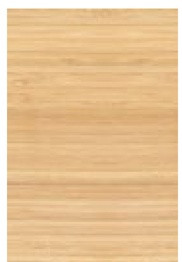
light to medium reddish-brown with warm undertones

warm reddish-brown that deepens with age


Aspen

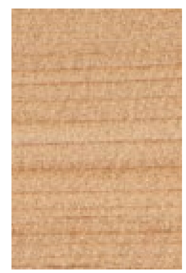
Birch

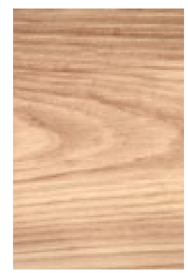

Spruce

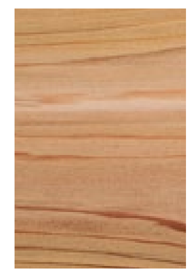

Pine


Alder


Yellow cedar


Hemlock


Douglas-fir


Western red cedar

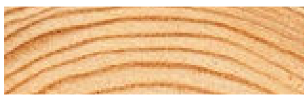
[Assessing Preferences for Wood Characteristics in Visual Applications]

Grain pattern

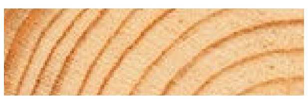
The appearance of wood in a finish application is primarily influenced by its grain. The grain is dictated by the growth rings that originate and progress outward from the centre of the tree. Cutting perpendicular to this growth pattern produces an end-grain appearance, whereas cutting parallel produces either an edge- or flat-grain appearance.

Wood veneer cut from solid lumber is typically less than 3 mm thick. Veneer is more stable than solid wood for large flat areas and is more economical because of how little wood is required to create it. As a result, each layer is susceptible to damage and difficult to repair.

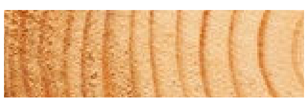
Depending on how it is cut, each face will have a distinct grain pattern.



Plain/flat sawn
End grain is 0°–45°



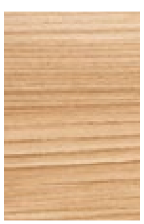
Rift sawn
End grain is 45°–60°



Quarter sawn
End grain is 60°–90°

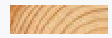
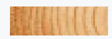
End grain

Flat grain



Edge grain

Descriptions of some common cutting techniques and resultant grain patterns

Solid Wood	
Plain Sawn / Flat Sawn 	Most common; most efficient; produces flat grain pattern on board face
Rift Sawn 	Not radial; produces a straight grain pattern on board face; end grain is angled
Quarter Sawn 	Radial cut; more dimensionally stable; produces a straight grain pattern on board face; end grain is vertical; premium cut

Veneer	
Flat Sliced	Creates a long-section of the log
Quarter Sawn	Creates a more even and linear grain pattern
Rotary Cut	Typical for plywood and results in a continuous wavelike grain pattern

Assessing Preferences for Wood Characteristics in Visual Applications

Grade

Wood is graded to classify it based on its quality, appearance, and use. Appearance grades dictate factors such as the uniformity of the grain and colour, the number, size and type of knots, and the presence of sapwood and pitch pockets. Grades are established by industry standards to ensure consistency and quality in wood products. Designers should specify appearance requirements for every exposed wood surface, including structural elements when they will be exposed.

Mass Timber

The appearance of structural wood elements is driven by face lamination species, lamella grade and glue line visibility. Designers should specify sanded, quality appearance grade finish where exposed and commercial grade where concealed. Refer to table on page 15.

Architectural woodwork & veneers

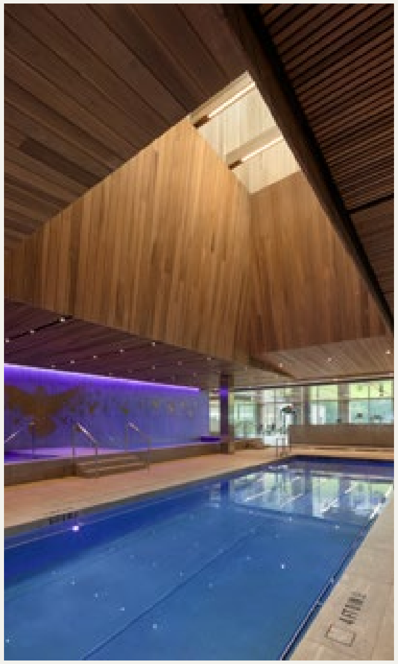
There are three quality levels of architectural woodwork as defined by the Architectural Woodwork Standards.

- Specifying Appearance for CLT, NLT and Glulam
- B.C. Coastal Species and Lumber Grades
- AWS Architectural Woodwork Standards 2nd ED

Identifying wood defects in interior B.C. species lumber

Higher appearance grades reduce visible defects, simplify finishing and have a more uniform look. Lower grades will have more knots and colour variation, and are suitable when a rustic or varied appearance is desired.

Product type	Appearance or finish	When to specify	Key characteristics / typical requirements
CLT *Cross-laminated timber*	**Architectural**	Where appearance matters (visible ceilings/ floors/ walls)	• Knot holes/voids >3/4" filled • Face layers free of loose knots • Voids on face surface filled • Smooth surface; no misses permitted
	Industrial	Where look is secondary (exposed but not refined)	• Edge voids need not be filled • Loose knots and small holes permitted • Surface smooth only on faces • Occasional wane/misses acceptable
	Project specific negotiated options	Custom negotiated between designer & manufacturer	• Define exposed versus non-exposed requirements (knot size, checking, colour, etc.) • Use supplier sample boards to set expectations
NLT/DLT *Nail/Dowel-laminated timber*	**Custom specified**	Always defined in project specs	• No standard classification • Surface characteristics to define may include species, lumber grade, edge treatment eased or sharp, cross-section size
Glulam *Glue-laminated timber*	**Premium**	High-visibility architectural elements	• Highest finish quality • Minimal defects, filled voids,smooth sanded surface • Often custom order
	Architectural	Important aesthetics but not primary	Good finish with controlled defects; ready for clear or stain finishes
	Industrial	Limited appearance requirement	More visible manufacturing marks allowed; less patching
	Framing	Low emphasis on appearance	Allows knot holes, glue squeeze, surface irregularities; basic surfacing only
	Surface texture	Smooth versus rough	Rough texture may need about twice as many finish coats as smooth surfaces



This hydro-therapy suite in the Baltimore Raven's training facility is a high-humidity environment where the owner was interested in incorporating biophilia to enhance the experience for the athletes. ZGF selected a thermally modified magnolia that did not have to be sealed, so the athletes can also smell the wood in the space. *(ZGF Architects 2025)*

Smell

Some species of wood, such as cedar, are highly aromatic. In interior spaces, the smell of wood is primarily experienced when the wood is left unfinished. The aroma is temporary and typically lasts three to six months unless the wood is re-sanded, heated, or exposed to moisture. That is why the use of cedar in saunas retains its aroma. The aromatherapeutic properties of woods such as cedar represent an underexplored opportunity.

⚠

Cedar wood produces essential oils to serve as a defense against insects and fungi. Prolonged exposure to these compounds can adversely affect human health when inhaled or absorbed through the skin.

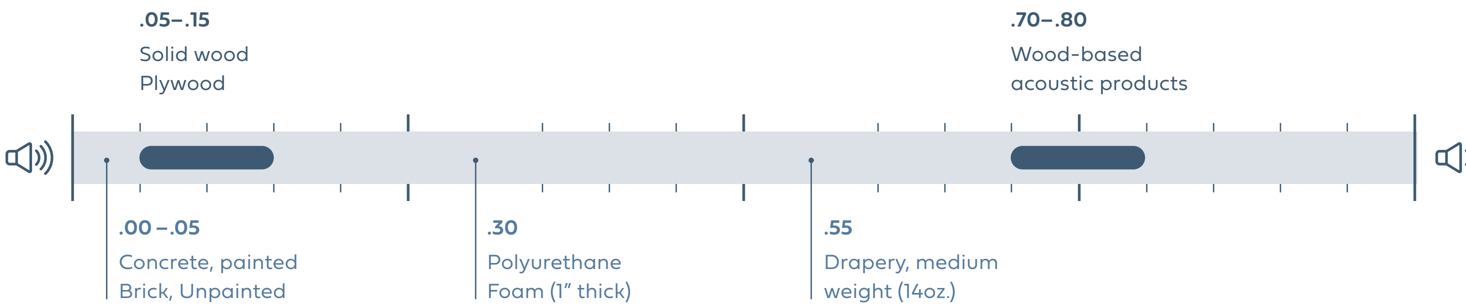
Wood in Healthcare Design Version 1.2 (p.19)

Acoustics

Wood can be used as an acoustic element when it is exposed on the surface of a room, influencing how sound is experienced. It can dampen, reflect, and diffuse sound. Wood's acoustic performance is impacted by the thickness, density, and porosity of the material. Less-dense species tend to absorb slightly more energy than very dense species, but these differences are small relative to what can be achieved with acoustic detailing. As a relatively rigid material, solid wood surfaces are more reflective than highly absorptive materials. The absorptive properties of wood are based on the porosity of the material. Typical laboratory-measured NRC (noise reduction coefficient) values for continuous, unperforated wood surfaces are low—on the order of 0.05–0.15 for solid wood and plywood—meaning only about five to 15% of incident sound energy is absorbed. By contrast, purpose-built acoustic assemblies that combine wood facings with perforation, cavity depth, and absorptive backfill (mineral wool, glass wool) can achieve much higher NRC ratings suitable for reverberation control (often 0.50–0.90, depending on design).

Refer to Integrating Acoustics (p.30) for factors to consider when designing with wood-based acoustic surfaces.

Noise Reduction Coefficient (NRC) values for some common building materials:

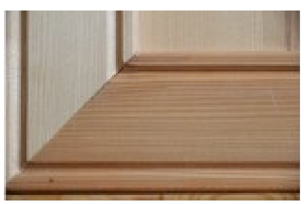


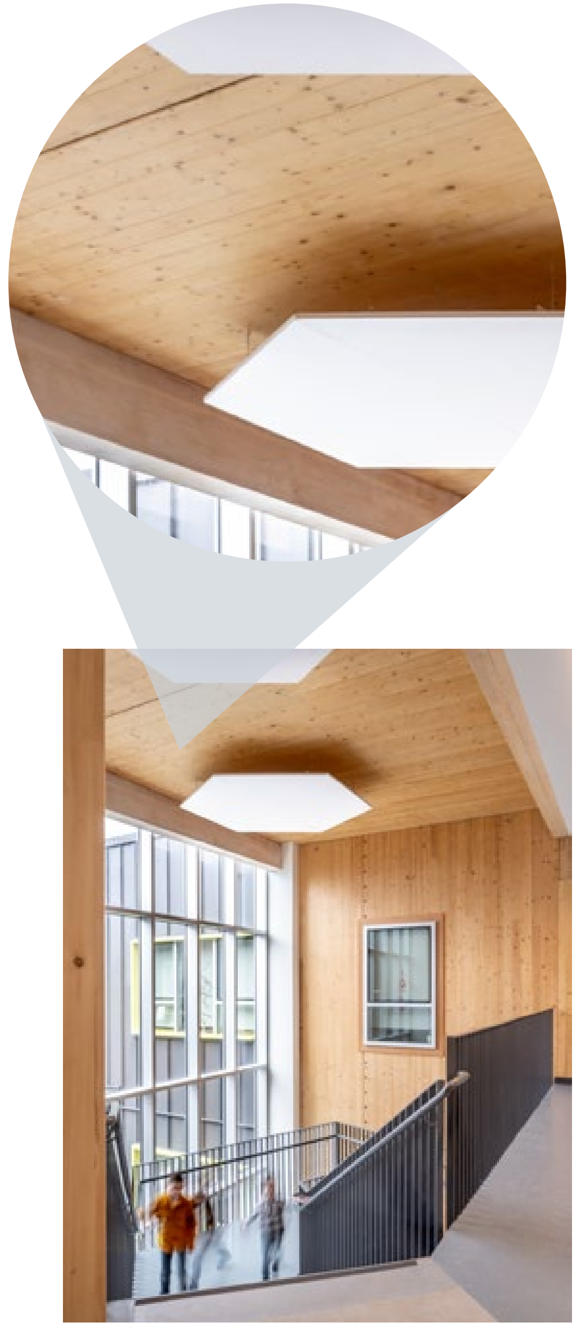
Surface reflectance

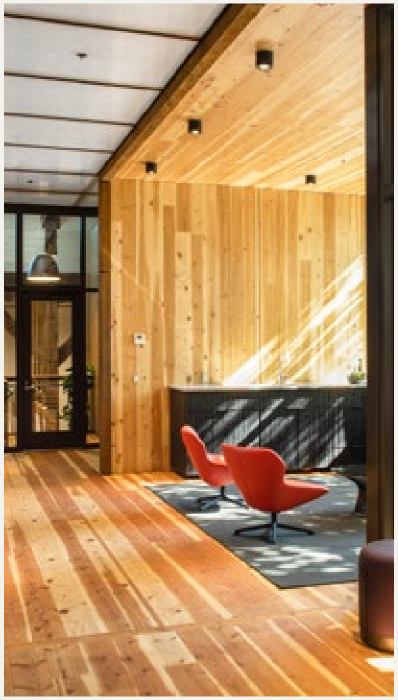
One distinctive quality of real wood is its lustre—its tendency to change appearance with the angle of light and the viewer. This variable reflectance gives wood a depth and richness that is hard to replicate and is often the telltale sign of genuine timber.

It occurs because light penetrates the near-surface fibres and reflects inside the cell walls, when light and the viewer align with the grain, the surface looks brighter, and when they cross the grain, it appears darker. The effect varies by species and by grain direction within the same piece, which is why adjacent parts of a panel can show slightly different tones if the grain is aligned vertically or horizontally.

Wood appears brighter when the light source is in line with the grain direction and darker when it is perpendicular to the light source.







Exposed CLT flooring used in private office spaces. Since it is a soft wood, it will wear and dent. This was acceptable to the owner since it was a low-traffic space. Allowing the structural diaphragm to remain exposed, in addition to the walls and ceiling, and completing the design intent of a "wood box". *(ZGF Architects, 2017)*

Strength & hardness

Wood has unique mechanical properties depending on how it is sawn in relation to the grain. The hardness of the wood determines how resistant it is to scratches, dents and other wear. Generally, hardwoods are more dense than softwoods and are used for walking surfaces and heavy-wear or impact areas. Mass timber products are primarily made of softwoods such as Douglas-fir, which are more susceptible to indentation. For this reason, mass timber panels (CLT, NLT, DLT) are generally not suitable for exposed floor applications in high-traffic areas.

Hardwoods (oak, maple, walnut) can be used in applications such as flooring due to how hard and durable they are, regardless of the direction they are impacted. Even hardwood will be damaged in a high-traffic or high-impact installation. Most wood flooring is now engineered with a hardwood veneer of a limited depth that can be refinished a set number of times before needing replacement.

Hardness—the Janka Rating scale

A standardized test that is commonly used to measure the relative hardness of wood. This test is based on the force required to embed half the diameter of a 0.44-inch/11-mm steel ball into the wood. The higher the number, the harder the species.

Strength in 3-dimensions

Wood's mechanical properties are highly directional. They vary depending on whether stresses are applied along the grain (lengthwise) or across the grain, and they are further influenced by grain orientation. For example, flat-grain lumber will exhibit different strength characteristics than vertical-grain lumber under the same loading conditions.

Western red cedar | White pine | White spruce | Red alder | Yellow cedar | Western hemlock | Douglas-fir | White birch

Moisture & movement

Wood is hygroscopic: it continuously exchanges moisture with the surrounding air. As relative humidity rises, wood absorbs moisture, and as it falls, wood releases moisture, resulting in predictable dimensional movement.

Moisture content is the primary driver of dimensional movement in wood, with temperature playing a secondary role by influencing relative humidity and moisture transfer rates. In modern buildings, climate-control systems and high-performance envelopes moderate interior conditions, limiting wood movement and making it more predictable.

Wood expands and contracts mainly in thickness and width, and the magnitude of this movement varies by species. Understanding both the direction and relative magnitude of movement is essential when detailing exposed elements, particularly where wood interfaces with more dimensionally stable materials.

For most interior environments, kiln-dried solid wood with a moisture content of approximately seven to 12 percent will remain stable under average indoor relative humidity conditions. These characteristics apply primarily to solid wood. Engineered and composite products, such as plywood and veneered panels, exhibit reduced movement due to cross-lamination and adhesive restraint. Where exposed surfaces require tight tolerances or large, uninterrupted areas, these composite products generally offer improved dimensional stability over solid timber.

Surface finishes influence the rate of moisture exchange and therefore affect dimensional performance. Film-forming finishes slow moisture ingress and egress and increase stability, while permeable or penetrating finishes allow greater interaction with ambient humidity. However, no finish will prevent movement entirely.

Natural humidity control

Research indicates that exposed wood can reduce peak indoor moisture loads by approximately 10–25% *(Bornhagget et al., 2001)*, depending on species, surface area, and finish. End-grain surfaces provide particularly strong buffering, while unfinished or permeable finishes enhance this effect.

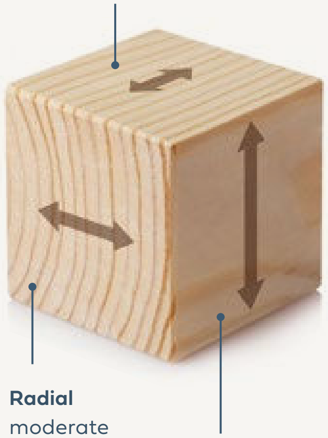
[Antimicrobial Characteristics of Untreated Wood: Towards a Hygienic Environment]

[Wood for Health]

Moisture content of approximately 7–12% will remain stable under average indoor relative humidity conditions.

Movement relative to grain direction

Space for movement should be considered in design details by understanding the direction and amount of movement when wood shrinks or swells. Movement varies according to the orientation of the wood cells. As water molecules enter and leave the cell walls of wood, the resulting shrinkage and swelling is mainly perpendicular to the cell walls and does not influence their length.



Ronald McDonald House at BC Children's Hospital | Vancouver, B.C.

Home-like warmth supports emotional recovery.
A place where kids don't feel like they're in a hospital.

(Michael Green Architecture 2012)

Antimicrobial properties

Wood exhibits natural antimicrobial properties that counter the common perception of wood as a non-hygienic interior material. Research shows that since wood has a porous structure, its surface tends to reduce the transfer of microbes through touch more than materials such as plastic, concrete, painted gypsum, steel, and glass. These properties originate from the tree's natural defense mechanisms and persist, to varying degrees, in finished wood products. While not sterile, exposed wood can perform well from a hygiene perspective when properly detailed and maintained, in environments with good ventilation and where moisture is controlled.

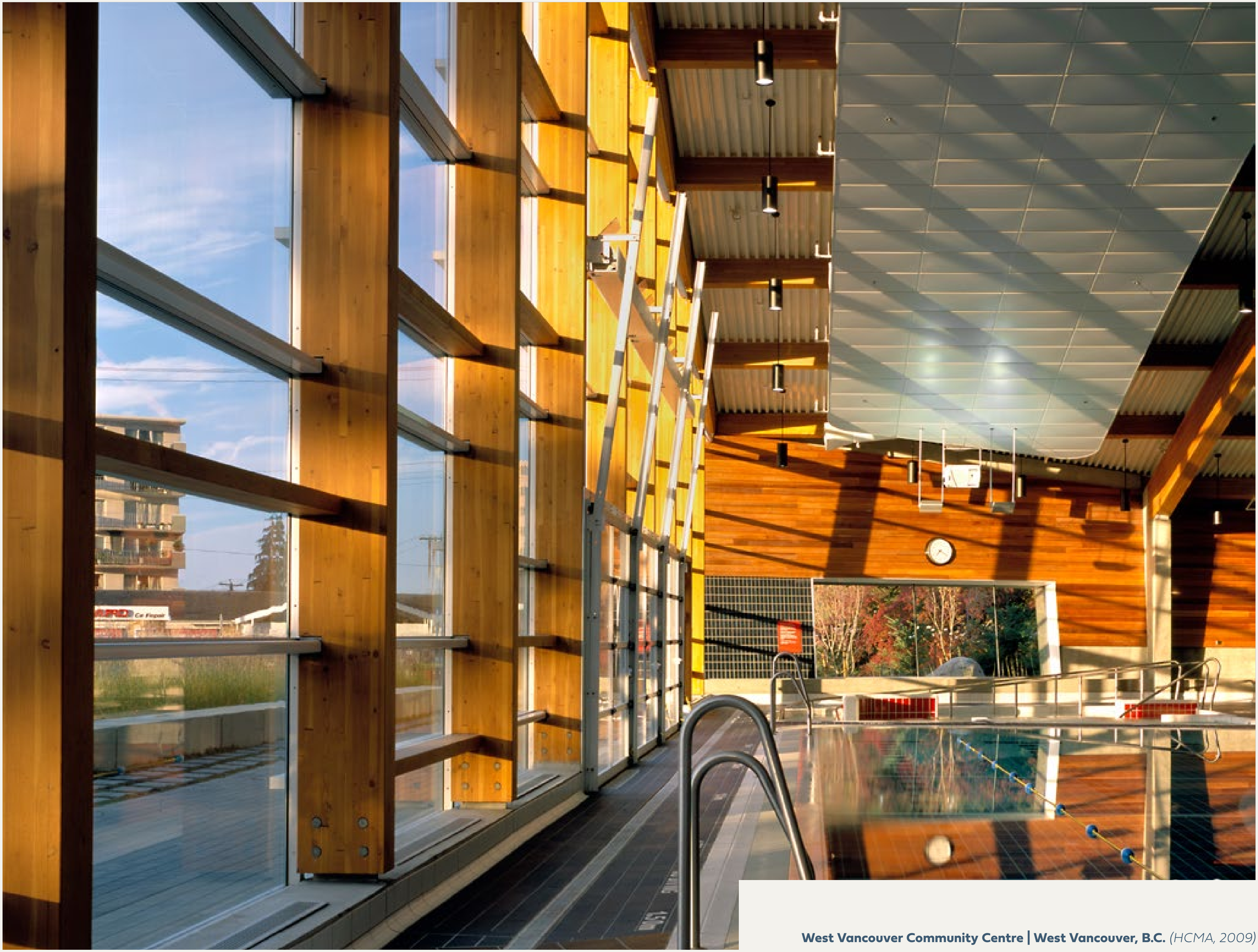
Antimicrobial Characteristics of Untreated Wood: Towards a Hygienic Environment

Ronald McDonald House at BC Children's Hospital | Vancouver, B.C.

Working with wood

How designers are leveraging a deep understanding of wood and its unique properties to solve challenges and bring value to projects.

Consider exposed wood, especially exposed mass timber, as a fully designed system, not just a finish.



West Vancouver Community Centre | West Vancouver, B.C. *(HCMA, 2009)*

Optimizing placement

The placement of wood elements in interior spaces can be used to create spatial identity and reinforce hierarchy of spaces. When deciding where to expose wood, consider traffic and use:

- Prioritize **visibility** in common or featured areas—entrances, lobbies, major circulation routes, and gathering spaces—so that the warmth and biophilic benefits can be shared.
- Use wood **where people gather** or interact daily. These are the places where touch, texture and a sense of warmth matter most.
- Select **high-touch applications** (handrails, seating, counters) where tactile warmth is impactful and users will interact with the material daily.
- For flooring, utilize dense, durable hardwood species such as oak or maple.

Avoid heavy knot patterns or strong grain contrast on ceilings and large wall planes, especially in smaller spaces (offices, classrooms, residential rooms) where wood surfaces with a lot of character elements can appear visually "noisy" and be distracting. Favour clear-grade, evenly toned wood to support visual comfort and calmness.

Ceilings
Wood ceilings are among the most effective use of exposed timber across building types. Since people tend to look up when they enter a space, a visible wood ceiling plane at an entrance or assembly area will be high impact and low maintenance.

Millwork

Exposed wood millwork is one of the most common ways to introduce timber into interiors. Prioritize millwork that users are frequently in contact with, such as receptions desks, benches, counters, handrails and working areas, to maximize warmth and tactility.

Floors

Wood flooring is successful in gathering spaces such as lounges and meeting rooms where warmth and comfort are priorities. In lobbies, service areas or other zones that experience heavy traffic or significant moisture exposure, consider alternate materials. For gymnasiums and multi-purpose rooms, sprung wood floors offer a balance of resilience, acoustical moderation and comfort; they reduce echo and contribute to a comfortable environment for a variety of activities.

Detailing

When detailing with wood, provide fabricators and installers with information on species, grade, grain direction, edge conditions, connections and fasteners, and finishes.

Detailing for movement

Exposed wood that is rigidly restrained and unable to move will tend to split, warp, or fail at connections. Detailing should always account for the primary directions of wood movement, rather than attempting to suppress it; allowing movement is a fundamental design requirement. Effective detailing provides tolerances for shrinkage and lateral movement, for example:

- Gaps at panel edges and movement allowances at panel-to-panel connections.
- Clearances and expansion gaps at material transitions, especially where wood meets dissimilar materials such as drywall.
- Connection methods that accommodate cross-grain movement, including slotted fasteners or floating assemblies.
- Thermal breaks in wood structure where it is continuous from exterior to interior.
- Detailing aligned with the primary direction of wood movement, rather than attempting to restrain or suppress natural movement.

Movement gaps at walls where wood meets drywall.
(ZGF Architects 2023)

Bayview Elementary School | Vancouver, B.C.

Allow gaps at panel edges and plan for movement at panel-to-panel connections. *(Francl Architecture, 2023)*

UBC Biosciences Renewal | Vancouver, B.C.

Wood ceiling panels installed in the lecture theater are subjected to variable temperature and humidity conditions. Allow for gaps between wood finishes where they meet other finish types to accommodate wood movement and ensure that finishes do not fail. *(Diamond Schmitt, 2019)*

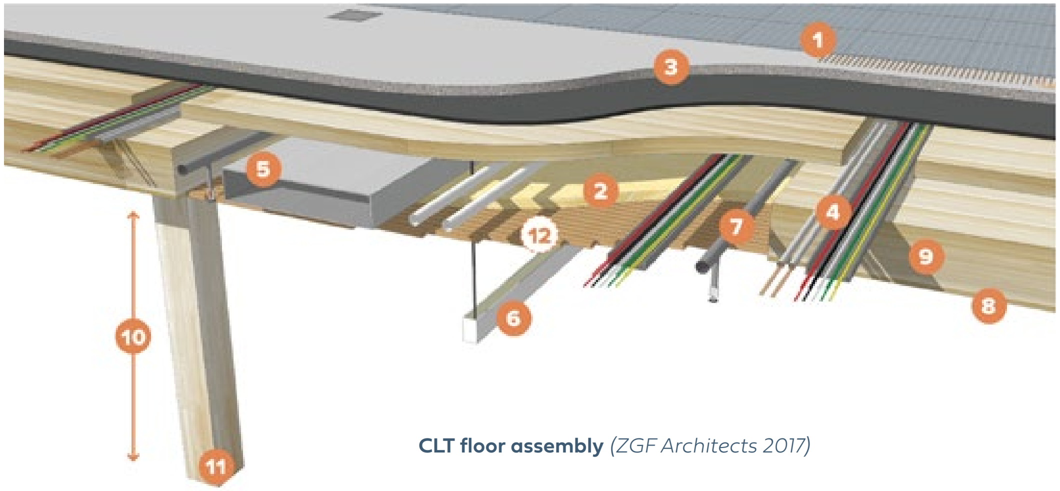
Integrating systems

Consider exposed wood, especially exposed mass timber, as a fully designed system, not just a finish.

When structural wood remains visible, especially in ceilings, the placement and routing of mechanical, electrical and plumbing systems, lighting and acoustics has a direct impact on aesthetics and long-term maintenance. Achieving a coherent result requires early, multi-disciplinary coordination among architects, structural engineers, MEP engineers, acousticians, code consultants, fabricators and constructors, so that all parties understand design priorities.

Designers should begin with coherent system and space hierarchies that are established early in design—identifying areas designated as service zones where distribution loops, risers and large mechanical equipment are concentrated. These spaces can utilize bulkheads with access panels or T-bar ceiling tiles to hide services.

For priority spaces where services must be carefully coordinated with exposed wood ceilings, intentionally leaving service chases between CLT panels creates continuous pathways for conduits, ducts and sprinklers without surface penetrations. Designers should ensure that the detailed design allows significant tolerance for design changes.



CLT floor assembly *(ZGF Architects 2017)*

1. Heat (electric resistance)
2. Acoustics
3. Thermal mass (concrete)
4. Conduit for electrical & IT
5. Ventilation air
6. Lighting
7. Fire suppression
8. Exposed ceiling
9. CLT with beetle kill
10. Reduce building height
11. Natural materials
12. Future flexibility

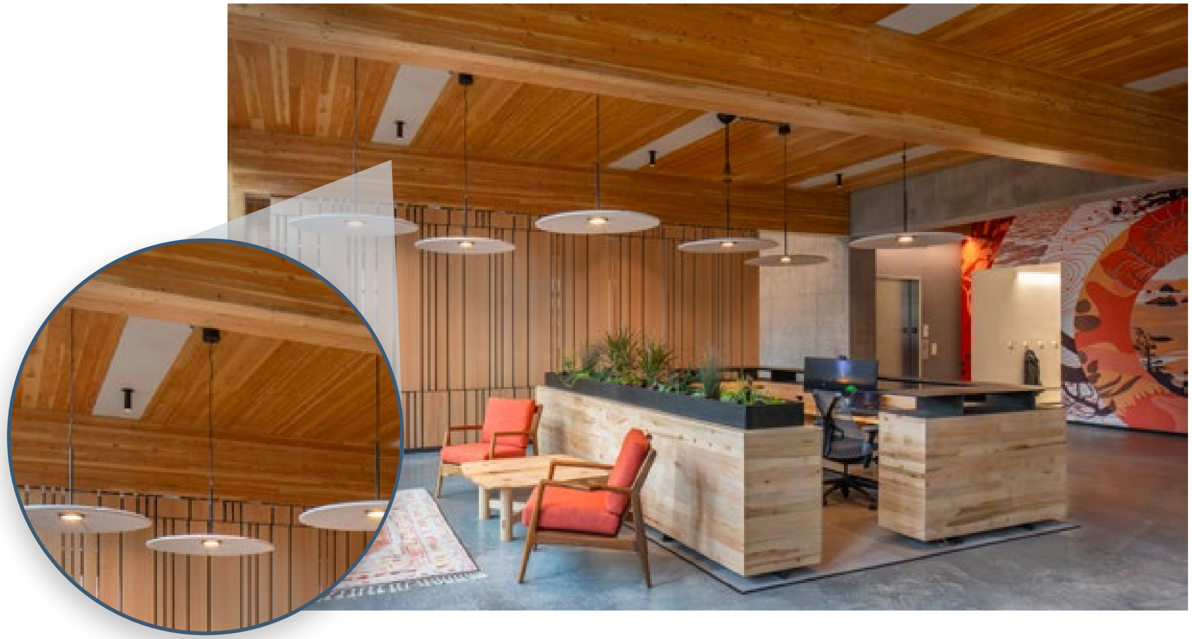
Take advantage of wood's machinability and prefabrication potential by integrating coves and recessed strips into the material.

This can be done during off-site fabrication, which will ensure a higher quality finish, but can also be done on-site. Avoid ad hoc field penetrations through finished, visible wood where possible—they are costly to patch and can detract from the aesthetic. Early engagement with fabricators will ensure tolerances are captured during design.

In both examples, removable acoustic panels can be used at the gaps. These can be wood slats with acoustic backing to retain a wood look.

Design for access
Access for maintenance of services is often required for wood ceiling or wall finishes.

- Ensure that panel sizes and mounting systems enable safe removal by one person for convenience and safety.
- Avoid oversized or heavy ceiling panels as they are challenging to remove. UBC's facilities team recommends panel sizes of 2'x4' or 2'x6' in their technical guidelines.
- Clearly describe access to fasteners and panel numbering in as-built documentation for maintenance teams.
- Mechanical and electrical equipment that requires regular servicing should not be placed above wood ceilings.



Service chases provided in gaps between CLT panels with integrated acoustic material allows services to span above glulam beams. *(ZGF Architects 2021)*

UBC Earth Sciences Centre | Vancouver, B.C.

Integrated acoustics and lighting into ceiling baffles. *(Perkins & Will, 2012)*

Integrating acoustics

Large flat wood surfaces are acoustically hard, smooth and reflective, so unarticulated ceilings and large wall planes will increase sound reflections and reverberation. Ceilings are the most influential surface for a room's acoustic character; therefore, careful consideration of design details to improve acoustic performance must be addressed when exposing mass timber surfaces.

Design strategies that maximize wood appearance and acoustic control include: acoustic baffles mounted vertically to maximize visible wood surface, wood slats with acoustic backing to maintain a wood aesthetic, DLT products with integrated acoustic material (such as those produced by StructureCraft) and NLT with staggered cross-sections with acoustic material in cavities.

There are many prefabricated baffles or panel systems that include mounting hardware and integrated acoustic backing. These can reduce site labour, so installation speed should be considered when evaluating the cost of these systems.

NLT guide Version 2

Specialized environments

Corrosive environments and high humidity

Interior exposed wood can be an effective material choice in corrosive, high-humidity environments such as swimming pools and steam rooms. Designers select wood for aquatic facilities because it performs reliably in warm, moist air when detailed correctly. As a hygroscopic material, wood naturally absorbs and releases moisture, allowing it to equilibrate with surrounding conditions rather than trap condensation. This characteristic helps reduce the risk of corrosion and material degradation that commonly affects metals in chlorinated or salt-laden atmospheres.

In these spaces, structural connections and fasteners must be selected to prevent corrosion and staining, typically by using stainless steel, epoxy-coated hardware, or concealed connections protected with wood caps.

West Vancouver Aquatic and Community Centre | West Vancouver, B.C.
More than 20 years old, the facility's exposed wood continues to serve with durability and resilience. *(HCMA 2009)*

Quw'utsun Valley Hospital / Quw'utsun Hulitun-ew't-hw | Duncan, B.C.
The two-storey Community Hall acts as a social seam for the project, inspired by traditional Coast Salish Longhouses, the Community Hall utilizes timber framing, wood platforms, and vertical poles to form a signature armature of wood through the heart of the hospital. *(ZGF Architects, est. completion 2030)*

Healthcare & infection prevention and control (IPAC)

There is ongoing debate about the use of exposed wood in healthcare environments where infection prevention and control requirements are stringent. Wood has been viewed as unhygienic due to its porous nature. In these environments, there is a preference for smooth, non-porous materials that are perceived as easier to clean and disinfect. This perception has shaped many healthcare design standards, despite the evidence of the therapeutic benefits of wood in supporting patient recovery, reducing stress, and improving overall well-being in healing environments. See page 20 for more on Antimicrobial Properties.

A growing body of research challenges the assumption that non-porous materials are inherently more hygienic. Studies indicate that wood's porous structure can reduce the survival and transfer of certain pathogens, limiting their ability to persist on the surface. In contrast, hard, non-porous materials can allow pathogens to survive longer and transfer more readily through touch. While wood is not appropriate for all healthcare applications and must be carefully detailed and maintained, research suggests that, when used in appropriate locations, exposed wood does not increase infection risk and can be compatible with IPAC objectives while contributing positively to patient and staff experience.

- Wood for Health
- Antimicrobial Characteristics of Untreated Wood: Towards a Hygienic Environment

Key takeaways

How design decisions can leverage the unique qualities of wood.

Why wood?

- Use wood to strengthen biophilic connections and support stress reduction, cognitive performance, and occupant comfort, placing it intentionally to enhance overall experience and wayfinding while aligning with broader wellness and satisfaction goals.
- Evaluate opportunities to use wood as a warm, welcoming material that reflects community preferences, supports Indigenous cultural expression, enhances premium or signature spaces, and reinforces regional identity where appropriate.
- Consider wood's embodied carbon advantages, design for durability and future reuse, and ensure selections support relevant sustainability frameworks and embodied carbon regulations.
- Plan for the sensory experience of wood—tactile grain, natural aroma, variable surface reflectance, and inherent colour variation. Considering how grain and character marks influence appearance.

Material properties

- Utilize end grain, edge grain, or flat grain to best suit design intent. understand how growth rings and grain patterns create visual variation.
- Use thin veneers for economical, stable coverage of large surfaces, recognizing their susceptibility to damage.
- Follow industry grading standards, and define appearance requirements for all exposed structural and non structural wood.
- Understand that solid wood is reflective with low sound absorption and improve acoustic performance using perforation, cavities, etc.
- Account for natural luster, which shifts with light angle and viewing position, expect tonal variation between panels with different grain orientations, and use reflectance to enhance visual richness.
- Match species hardness to durability requirements and anticipate wear even in hardwood under heavy use.
- Design for moisture driven wood movement and choose finishes based on desired moisture exchange.
- Leverage wood's natural antimicrobial tendencies and ensure appropriate detailing and maintenance in hygienic environments.

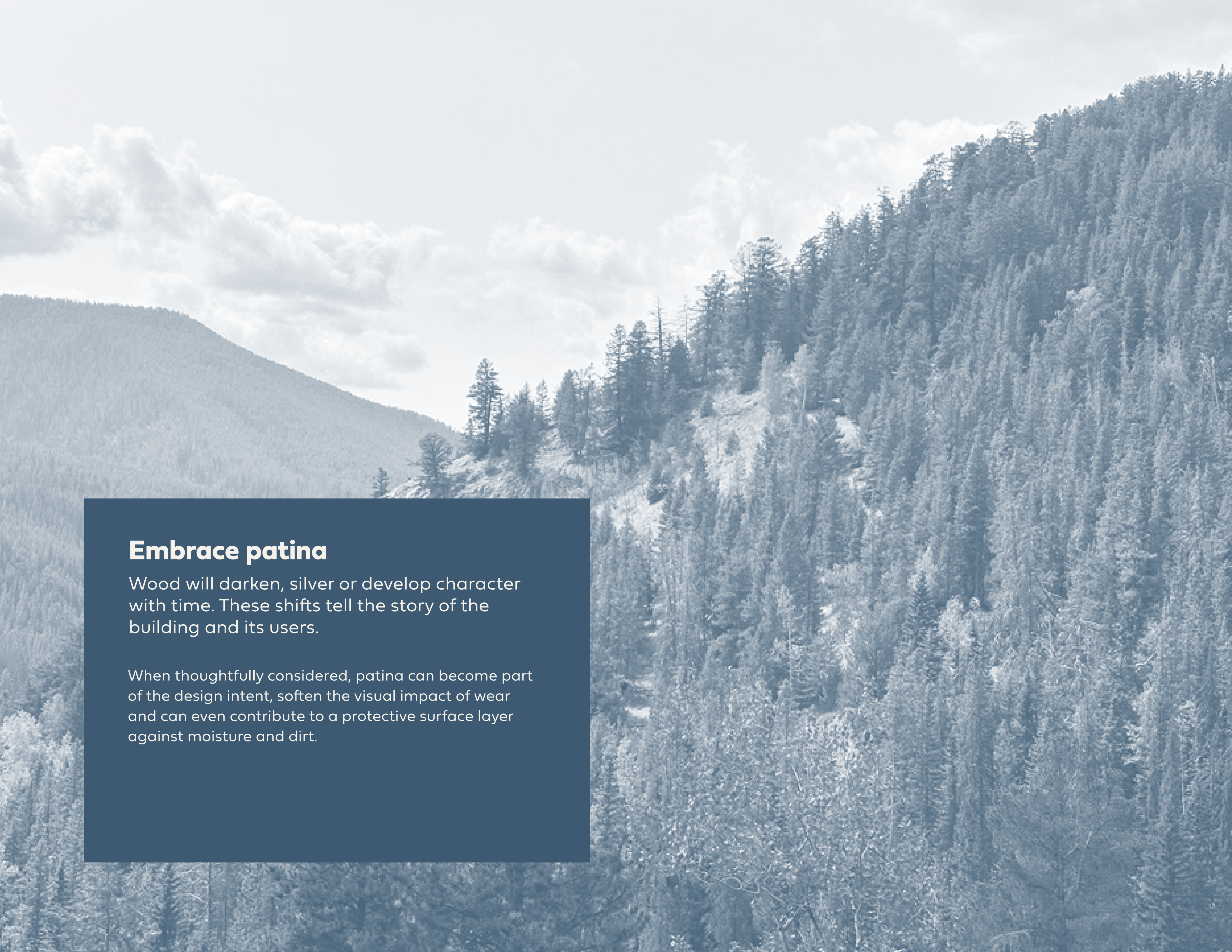
Working with wood

- Prioritize exposed wood in high visibility or high interaction areas, use durable hardwoods for flooring and touchpoints, and place wood intentionally to reinforce spatial identity and hierarchy.
- Provide tolerances for shrinkage, expansion, and lateral movement and avoid details that restrict natural wood movement.
- Treat exposed mass timber as a coordinated system requiring early integration with MEP, lighting, and acoustics. Involve fabricators early, and avoid unplanned field penetrations.
- Use wood in humid environments with proper detailing, leveraging its moisture balancing properties, and pair it with corrosion resistant or concealed hardware.
- Apply exposed wood selectively in clinical settings to leverage therapeutic benefits while satisfying project requirements. Ensure appropriate detailing and maintenance while considering research on reduced pathogen transfer compared to non porous materials.

Hillcrest Community Centre | Vancouver, B.C. *(HCMA 2010)*

Taking care of wood

How to protect, maintain, and repair wood to ensure long-term performance and resilience



Embrace patina

Wood will darken, silver or develop character with time. These shifts tell the story of the building and its users.

When thoughtfully considered, patina can become part of the design intent, soften the visual impact of wear and can even contribute to a protective surface layer against moisture and dirt.

Wood is a living material; it moves, breathes, and records time through its surface. When well cared for, it can be one of the longest-lasting materials in a building.

All materials wear over time. As wood wears, it maintains an acceptable appearance while enhancing visual complexity. In contrast, non-natural materials can look worn with age.

As a building material, wood continues to respond to **light, humidity, touch and abrasion**—its surface changes in colour, texture and sheen. These changes, collectively called patina, are not defects but a natural and often desirable evolution that can enrich the character of an interior.

The causes and appearance of patina will vary: UV from sunlight alters pigments and can darken or silver timber; oxidation from exposure to air changes surface colour and tone; changes in moisture and humidity can alter texture; repeated touch and friction polishes and darkens contact areas.

Solid sawn wood generally develops a deeper, more attractive patina than plywood or thin veneer. Painted or heavily pigmented finishes suppress patina.

Project examples demonstrating how specific wood species and applications will look over time can be shown to owners to help set expectations and build understanding of acceptable patina.

Designers can also communicate design intent about patina in project operation and maintenance (O&M) manuals by outlining why wood was left unfinished or given a particular finish and what aging to expect.

Ronald McDonald House at BC Children's Hospital | Vancouver, B.C.
The wood surfaces in the dining space 10 years after completion.

Reclamation of 200,000 board feet of timber from a warehouse previously located on the site provides a dramatic interior environment.

UBC Forest Science Building | Vancouver, B.C.
Patina marks on the 30-year-old columns.

Ronald McDonald House at BC Children's Hospital | Vancouver, B.C.
Patina marks after 10 years of foot traffic on the stair risers.

Placement & detailing

Thoughtful placement, robust detailing and consideration of maintenance practices can reduce the risk of premature failure, uneven aging and costly repairs.

Where wear is expected, design elements should be repairable or replaceable. For example:

- Use metal or sacrificial wood trim, or removable panels.
- Use repetitive or replaceable details in ceilings, wall panels and millwork so individual sections can be replaced rather than entire assemblies.
- Incorporate accessible fasteners to support future maintenance—especially in public or institutional settings where upkeep is ongoing.

Alliance Francaise Vancouver | Vancouver, B.C.
(Mcfarland Marceau Architects 2024)

UBC Life Science Centre | Vancouver, B.C.
The atrium space is heavily used, and the horizontal surfaces of the wood benches deteriorated quickly due to moisture. Because they were difficult to replace, they were instead covered with an engineered quartz product. When selecting finishes for wood features in such areas, choose durable materials that can withstand intensive use and exposure to moisture or design wood elements for repair or replacement.

(Bunting Coady 2004)

Floors & stairs

Grit and moisture are the primary threats to durability of wood flooring. Consider using durable, non-wood flooring (such as tile or stone) in high-exposure corridors, stroller/service aisles, and other wet or abrasive zones. Install heavy-duty entry mats at both outside and inside doors to capture grit and reduce wear.

Wood stair treads tend to concentrate wear (typically unevenly in the middle of the tread). This worn patina can have a biophilic value in a space. Designers can also detail to mitigate this if it is considered unacceptable.

Approaches include the following:

- Treads designed for disassembly, allowing them to be removed for refinishing or replacement.
- Removable lumber or LVL treads that can be taken off without disassembling other stair components.
- Protective metal nosings or tread plates, where appropriate, to reduce wear.
- Use of end-grain wood for treads, which is harder and more resistant to wear.
- Use of thermally modified wood for stairs, which offers improved durability.

Wall surfaces & millwork

Place wood where it can age gracefully and remain protected from the most aggressive forms of exposure. Exposed wood often elicits greater respect and care from users, contributing to more gentle use and reduced vandalism.

Wood is frequently used as wainscoting on lower wall surfaces with higher impact, where it tends to outperform drywall over time. Wear patterns and patina that develop through contact and rubbing are generally more visually appealing than the cracking, denting, or surface damage typical of painted gypsum assemblies.

For visible wall panels and millwork, specify high-quality plywood or solid hardwood cores that can be repaired, refinished, or replaced as needed over the life of the building. Avoid exposed engineered wood products that are vulnerable to moisture, such as MDF and particleboard, which are prone to swelling, delamination, and premature failure when wet.

Protect wooden surfaces from excessive moisture to prevent warping and mold growth. Assume that some moisture exposure is inevitable, and design details to promote drying as well as resistance. Include drip edges and slope all

Detailing should minimize exposure to risks and provide sacrificial elements where wear is expected.

horizontal surfaces so water sheds rather than ponds, and avoid any junctions where water can collect.

Rounded or chamfered edges wear better and are more comfortable to touch. For millwork, specify solid hardwood or robust edging (1/8"–1/4") with eased corners, rather than thin tape or PVC edge banding which delaminates over time.

At vulnerable interfaces, for example at the base of wood walls and millwork, protect wood to prevent damage from mopping with durable wall bases, metal or sacrificial rims or toe-kicks. Design details that allow localized repair—replaceable face panels, removable slats, or modular millwork—make it easier to address dents, scratches or water damage without sacrificing the overall aesthetic.

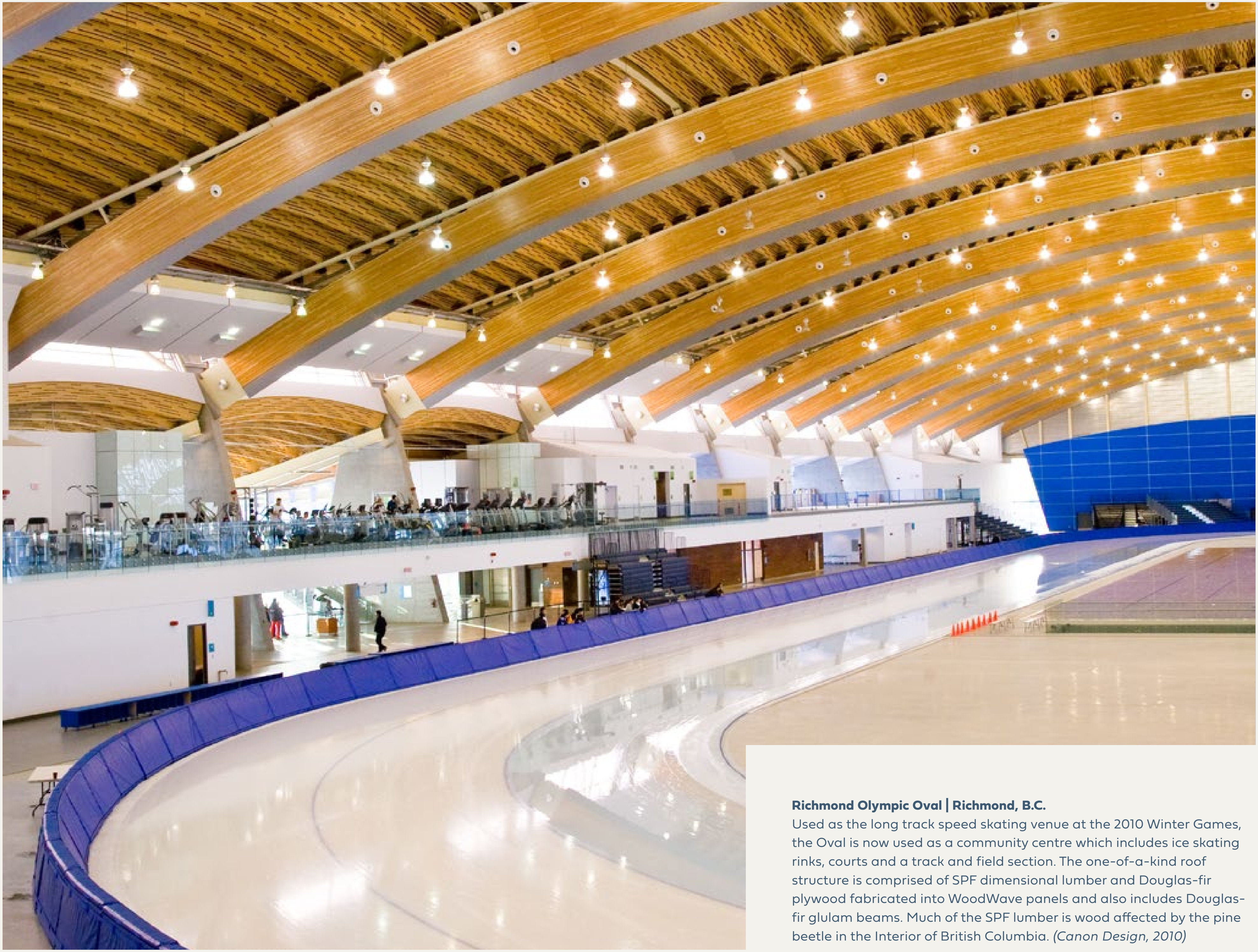
[Architectural Woodwork Standards Edition 2]

Wood material on millwork was banded at the base with pickled metal to ensure it was not damaged from maintenance of the concrete flooring. *(ZGF Architects, 2023)*

Finishes & treatments

Applying the right finishes and treatments is essential to balance longevity, appearance and the way wood will age in a space.

They can be used to slow patina, improve moisture and UV resistance, increase surface hardness and cleanability, or provide fire resistance. Choose treatments with a clear objective, and coordinate product selection and application method during design, with an understanding of maintenance expectations.



Richmond Olympic Oval | Richmond, B.C.
Used as the long track speed skating venue at the 2010 Winter Games, the Oval is now used as a community centre which includes ice skating rinks, courts and a track and field section. The one-of-a-kind roof structure is comprised of SPF dimensional lumber and Douglas-fir plywood fabricated into WoodWave panels and also includes Douglas-fir glulam beams. Much of the SPF lumber is wood affected by the pine beetle in the Interior of British Columbia. *(Canon Design, 2010)*

Finishes

Designers should consider what they want the wood to look like when selecting finishes. Wood's look changes over time as a result of wear, oxygen exposure, and tannins migrating to the surface; finishes can slow or accelerate those changes. Finishes can be used to achieve a desired colour and sheen. **This section focuses on finishes that protect wood from wear, moisture, staining, and UV exposure**.

Finishes such as lacquers, varnishes, oil, wax and polyurethanes have different performance characteristics, including durability, repairability, abrasion resistance, finish clarity and moisture resistance.

- **Penetrating oils** (natural oils, waxes) emphasize natural grain and allow patina to develop.
- **Film-forming finishes** (varnishes, polyurethanes) slow visible aging and improve abrasion resistance, but can alter the tactile quality of the wood and impact repairability.

Types of finishes	Characteristics
Penetrating oils *(natural oils such as tung and linseed, waxes, and specialized oil systems)*	For spaces where natural aging is desired, choose penetrating oils—enhances grain, easier to touch up, allows patina to develop, less abrasion resistance and requires more frequent re-application.
Film-forming finishes	
Oil-modified or solvent based polyurethanes	Deeper tone, richer colour, longer-lasting protection and robust resistance, higher VOCs (therefore strong odour), longer curing time, good for floors and heavy often used for millwork where durability is a priority
Water-based polyurethanes or acrylics	Low Volatile organic compounds (VOCs), low odour, clear and colour-stable appearance, and fast drying times, they are often easier to clean than oil-based finishes, but typically require more frequent refinishing. For high-traffic public spaces, a robust, three-coat water-based polyurethane or acrylic system is common.
Waterborne oil-based finishes	Hybrid finish that combines the benefits of both oil based and water based finishes.
Varnishes / UV-cured systems	Very durable, quick-curing, often factory applied, good for floors and prefinished elements.

Specification of complete coating systems, with consistency maintained throughout. Do not mix manufacturers, as compatibility is critical for adhesion, long-term performance and often warranty compliance. Coordinate finishes with coating manufacturers to confirm compatibility with future maintenance products and protocols.

Use of factory finishing for quality control, ensuring factory-applied finishes are compatible with any site-applied finishes. Field finishing can introduce greater variation and requires stricter site controls. Include manufacturer contacts in the operations and maintenance (O&M) manual for future reorders and technical support.

Full-scale mock-ups, using the specified finish, lighting conditions and adjacent materials to confirm colour, sheen and reflectance.

Avoidance of high-gloss sheens in public areas, as glossy finishes make scratches more visible and reflective glare can obscure the wood grain. Matte or satin sheens are generally preferable.

Consideration of UV protection, recognizing that clear finishes provide limited long-term protection because pigments physically block sunlight. Opaque finishes, such as paint or solid-colour stains, offer the best UV protection. Semi-transparent stains and clear varnishes provide limited protection unless specially formulated with UV-absorbing additives and will require periodic reapplication.

Quw'utsun Valley Hospital / Quw'utsun Hulitun-ew't-hw | Duncan, B.C.

The design team developed in-situ mockup guidelines for finishing the exposed mass timber, with an emphasis on enhancing the natural character of the wood. Working closely with the coating manufacturer, they tested multiple products across the project's varied wood species to identify a unified colour for both interior and exterior applications while maximizing UV protection and cleaning chemical resistance. Mockups were created in a concealed area, with all surfaces properly prepared (sanded) prior to application, and were reviewed under both interior and exterior lighting conditions. *(ZGF Architects 2030)*

The design team selected an acrylic-infused engineered walnut for the central stair surface. The acrylic infusion in the wear layer of the wood increases its hardness, making it more durable to resist daily wear from keys, laptops and backpacks.

(KATO Architects + ZGF Architects 2021)

Thermal treatment

Thermally modified wood is heated to high temperatures to alter the wood's chemistry and cell structure, reducing its ability to absorb moisture and improving dimensional stability, decay resistance and hardness. The process darkens the wood, providing a consistent colour throughout, not just on the surface layer. The higher the temperature, the darker the colour. This process improves the stability of wood without using chemicals.

Colour range of thermally modified eucalyptus wood

Natural	140°C	160°C	180°C

Fire-retardant treatment

Structural wood members can be designed to account for charring and achieve flame-spread ratings. (Refer to Working with Building Codes: Flame Spread Rating on p58). Where additional protection is required by code, fire-retardant treatments can be used.

Intumescent coatings form a protective film on exposed wood that swells and chars in a fire, insulating the wood. They are available in clear and pigmented finishes. Clear coatings can meet fire-resistance requirements while preserving a timber appearance, although tone and gloss will change. Some fire treatments can affect adhesives, finishes, and engineered-wood glues, so it is essential to coordinate with product manufacturers and structural engineers.

Both factory- and field-applied options exist: field application is preferred for exposed wood, while factory treatments (typically applied by pressure impregnation) are generally used for concealed members.

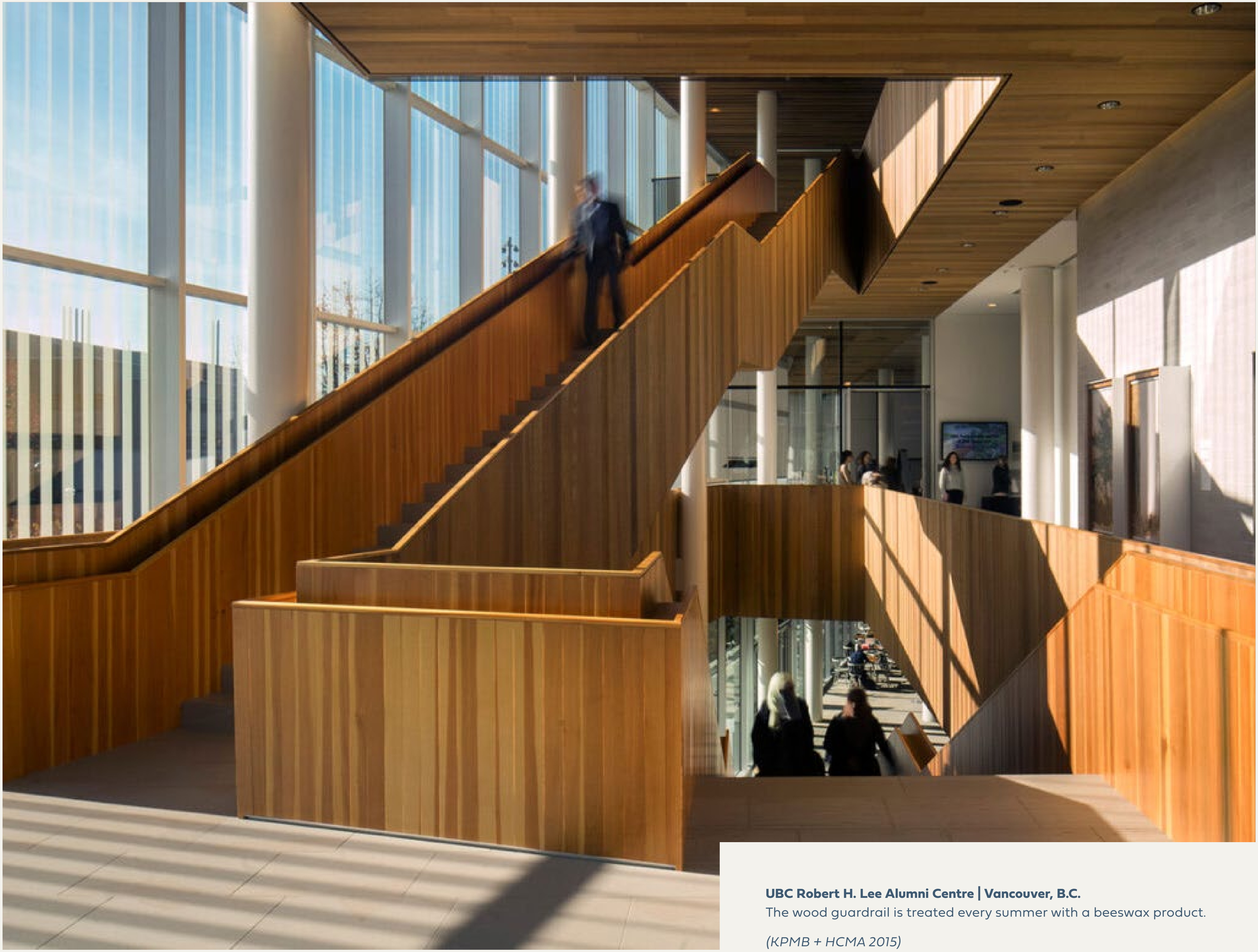
Fire retardant coatings may complicate later repairs or refinishing. Document the required re-application and repair procedures in maintenance documentation.

Bayview Elementary School | Vancouver, B.C.
The CLT structure was exposed in the exit stair and had to achieve a flame-spread rating of not more than 25. The ceilings and walls of the exit stairs were provided with a coating to limit the flame spread rating to a maximum of 25 (CAN/ULC-S102). *(Francl Architecture 2023)*

Maintenance

Regular and simple maintenance can extend the life and enhance the beauty of wood over time. A well-considered strategy will protect the initial investment, preserve intended patina and performance, and make future repairs predictable and less expensive.

Oxford Properties integrates cleaning protocols into staff training. Their operational plan is written into the building's asset management schedule, treating maintenance as preservation rather than repair. UBC's custodial team uses light dry cleaning and spot refinishing, focusing primarily on handrails and high-traffic areas.



UBC Robert H. Lee Alumni Centre | Vancouver, B.C.
The wood guardrail is treated every summer with a beeswax product.

(KPMB + HCMA 2015)

Maintenance practices should be considered and planned for during the design stage, including refinishing cycles.

- **Surface damage** such as scratches can often be addressed with light sanding and refinishing or spot filling and colour blending for minor gouges.
- **Solid wood floors and wood structural elements** can be sanded and restored multiple times over their lifespan. When large restorations are needed, engage the original finish manufacturer or a specialist to match coatings and application methods.
    - *Specify extra thickness to accommodate sanding repairs that may be required in the future.*
- Wood surfaces tend to capture dust when not sanded fully smooth, requiring more dusting.

Abrasive cleaning pads and strong alkaline cleaners, bleach, high-alcohol sanitizers and solvent-based products can strip oils and finish layers or trigger tannins to bleed to the surface and change the colour of the wood (pink staining). Avoid these unless the wood is finished with a product for which the manufacturer has confirmed compatibility.

Different finishes require different care

Type of Finish	Suggested Care
Unfinished, natural wood	Use gentle, pH-neutral wood cleaners with occasional re-oiling or buffing.
Oiled or waxed surfaces	Clean with gentle, pH-neutral cleaners and reapply oil or wax on a scheduled basis or when the surface looks dry. Light buffing between full re-oils extends service life.
Film finishes *varnish, polyurethane*	Wipe with mild detergent or manufacturer approved cleaners. Small scratches can often be repaired with touch-up kits or spot re-coating; full refinishing is less frequent than with oiled surfaces but more complex when required.
Thermally modified wood	Lower maintenance frequency is necessary due to reduced moisture uptake and dimensional movement, but finishes and cleaning regimes should still follow manufacturer's recommendations.

Cleaning protocols should be compatible with the wood type and finishes. Designers should **document all finishes in operations and maintenance manuals** and can also include information on cleaning protocols that are compatible with finishes.

Key takeaways

How to protect, maintain, and repair wood to ensure long-term performance and resilience.

Embrace patina

- Wood continually responds to light, humidity, touch, and abrasion, developing a natural patina—changes in colour, texture, and sheen—that enriches character and should be understood as an expected and often desirable evolution of the material.
- Patina forms through UV exposure, oxidation, moisture changes, and repeated touch, each affecting colour and texture differently, with solid wood typically developing a deeper and more attractive patina than plywood or thin veneer.

Placement & detailing

- Place wood where it can age gracefully and avoid harsh exposure, leveraging users' tendency to treat exposed wood with care, and use it where its wear patterns outperform typical damage seen in other materials.
- Specify high quality plywood or solid hardwood cores for visible wall panels and millwork to allow repair and refinishing over time, and avoid moisture sensitive products in exposed conditions.
- Protect wood from excessive moisture by designing details that promote drying because some moisture exposure is inevitable.
- Use rounded or chamfered edges, hardwood edging, and protective base details to improve durability. Design millwork with modular components to allow localized repair.

Finishes & treatments

- Choose finishes and treatments that balance longevity, appearance, moisture and UV resistance, hardness, cleanability, and fire performance.
- Finishes influence how wood ages—slowing or accelerating changes from wear, oxidation, and tannin migration—use them to achieve the desired colour and sheen while protecting against wear, moisture, staining, and discolouration.
- Select finish types based on performance: penetrating oils highlight natural grain and allow patina to develop, while film forming finishes increase durability and slow aging but alter tactile qualities and reduce repairability.
- If using intumescent coatings or other fire retardant treatments that preserve appearance, coordinate with manufacturers to avoid compatibility issues and plan for repair and maintenance.

Maintenance

- Plan a clear maintenance approach early to preserve wood's appearance and performance, incorporating regular cleaning, refinishing cycles, and repair methods into operational practices.
- Recognize that many surface issues can be addressed through light sanding, refinishing, or spot repairs, and specify sufficient wood thickness to support future sanding, engaging finish specialists when large restorations are required.

ZGF Vancouver Office Marine Building | Vancouver, B.C. *(ZGF Architects 2017)*

Working with building codes

Understanding the limitations and opportunities that shape how we use wood in interior spaces

Regulatory framework

- Opportunities and strategies for success

Flame spread ratings

- Thickness of wood
- Occupancies

Combustible interior finishes

- Combustible construction
- Non-combustible construction

Regulatory framework

Wood is a combustible material by classification and its use is regulated by the British Columbia Buidling Code (BCBC) because of this.

In addition, local municipalities and the Authority Having Jurisdiction (AHJ), will have requirements for review and sign-off by the local fire department that will impact decision-making on the use of wood.

The use of exposed interior wood is limited for buildings beyond a certain size and height due to the classification of its flame-spread rating (FSR) and combustibility.

This guide is not intended to provide specific regulatory information. A comprehensive regulatory review should be undertaken early in project planning, and this guide should inform design decisions that align with all relevant code requirements.

Opportunities and strategies for success

- **Recognition that code requirements influence design details,** particularly for exposed wood structures. Requirements for fire stopping, sprinkler systems, fasteners, and connections will affect both detailing and appearance.
- **Early identification of the code compliance path,** including any required testing to support alternative solutions.
- **Understanding jurisdictional acceptance,** recognizing that fire code interpretations vary by authority having jurisdiction (AHJ) and that alternative solutions are not accepted consistently across jurisdictions.

In certain occupancy types, exposed connections are not allowed. One design solution is to cover them with a wood plug or a "char layer" of sacrificial wood.

Flame spread ratings

The objective of regulating flame spread is to control how quickly fire will spread between surfaces, to minimize occupant exposure to harm, and to prevent fire from spreading beyond its point of origin.

In the BC Building Code 2024, flame-spread ratings (FSR) classify how rapidly flame travels across the surface of an interior finish material or assembly. It is determined by CAN/ULC-S102, *Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies* and CAN/ULC-S102.2, *Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies*. FSR values for select generic materials are available in Section D-3 in Division B, Appendix D of the BC Building Code 2024.

In Canada, flame-spread rating of materials is tested using the protocol outlined within the CAN/ULC-S102 standard. Fundamentally, flames are fanned across the subject test material for 10 minutes to assess the rate of movement of flame across a combustible surface.

Surface finishes, such as paint and wallpaper, contribute to overall flame-spread rating of a material, but as they are typically less than 1 mm thick, they have negligible impact on the total FSR (Canadian Wood Council, 2014). FSR can be reduced by special fire-retardant paints and coatings, which is especially useful for renovations to older building that may have non-compliant finishes.

Typically only the FSR of wall and ceiling finishes is regulated by the code.

In room fires, the flooring is typically the last item to be ignited, as the air is coolest near the floor (Canadian Wood Council, 2014). FSR of floor finishes are not typically regulated for this reason, except for certain areas in high buildings and elevator cars.

Interior wall and ceiling finish materials are typically evaluated based on testing in accordance with CAN/ULC-S102 to determine flame-spread rating and smoke-developed classifications.

Evaluated finishes are assigned a numerical, dimensionless flame-spread rating (FSR) or smoke-developed classification.

Materials with lower FSR are less likely to spread fires.

Thickness of wood

Typically, wood products are tested using a 19 mm-thick specimen. The 1996 publication *Fire Safety Design in Buildings* by the Canadian Wood Council shows that different wood species have different flame-spread ratings, with FSR ranging from 49 to more than 200 depending on the species. Most softwood finishes achieve a flame-spread rating of no greater than 150, which is generally permitted for use as interior wall finish in sprinklered buildings, except for exits and exit lobbies.

The FSR of wood decreases the thicker the wood. Cross-laminated timber (CLT) and structural composite lumber (SCL) have been tested and show lower FSR when they reach certain thicknesses, as demonstrated in the study, *Surface Burning Characteristics of Massive Timber Assemblies* by Christian Dagenais, Eng., M.Sc. For example, uncoated 3-ply, 105 mm-thick CLT tested to an FSR of 35, while coated CLT of the same thickness tested to an FSR of 25.

Occupancies

Certain areas in buildings and specific occupancies have maximum flame-spread rating (FSR) requirements. For example, exits, lobbies, and vertical service spaces are limited to a maximum FSR of 25. Corridors are limited to an FSR of 75 for interior wall finishes in public corridors, corridors used by the public in Group A assembly occupancies (such as theatres, restaurants, and schools), and corridors serving classrooms.

Group B detention, treatment, and care occupancies (such as prisons, hospitals, and care homes) are subject to more stringent FSR restrictions. These occupancies are considered more sensitive because occupants may be incapacitated, not fully able-bodied, or otherwise unable to evacuate independently in an emergency.

High buildings have a separate set of FSR maximums, which are noted in Table 3.1.13.2. However, as most high buildings are sprinklered, they do not need to follow this table, except for elevator cars and Group B occupancies.

Fire Safety Design in Buildings: Typical Flame-spread Ratings for Wood Products (p.216/217)

Fire testing has shown that some types of engineered wood have a lower FSR when used in thicker assemblies. This is an area of the code that has yet to catch up with modern testing and could use improvements to allow the use of exposed wood of higher thicknesses. Some of this is captured in updated provisions expected in future codes.

The reference to battens is understood to clarify that FRT boards up to 25 mm thick can be used, with traditional battens covering the joints such that the total thickness can be up to 50 mm, consisting of 25 mm-thick boards with joints covered by battens up to 25 mm-thick.

Key limits and rules

Certain building areas and some occupancies are subject to maximum flame-spread ratings (FSR) that limit the use of exposed wood:

FSR 25

- Exits
- Lobbies
- Vertical service spaces

FSR 75

- Interior wall finishes of public corridors in Group A assembly occupancies (e.g., theatres, restaurants, and corridors serving classrooms).

Group B occupancies

(Detention, treatment, and care occupancies. E.g., prisons, hospitals, care homes)

- Must meet even stricter FSR limits because many occupants may not be able to escape on their own in an emergency.

For details on the different types of occupancies, refer to the occupancies table on p.61, 62.

Combustible interior finishes

The Building Code currently limits combustible interior finishes used within non-combustible buildings to a thickness of 25 mm.

Combustible construction

Heavy timber construction and combustible construction is an option for most low- to mid-rise buildings, **dependent on area, occupancy type, and building height**.

Heavy timber construction is permitted regardless of building construction and occupancy type if the building does not exceed two storeys in height and is sprinklered.

- **Heavy timber construction** can be used for combustible buildings with a fire-resistance rating of 45 minutes or less.
- **A roof assembly in a building up to two storeys in building height** is permitted to be of heavy timber construction, regardless of the building area or type of construction required, provided the building is sprinklered.

Full details on heavy timber construction are discussed under Article 3.1.4.7 and Article 3.2.2.16 in the BC Building Code 2024.

Non-combustible construction

Occupancies that are of non-combustible construction can utilize exposed wood, provided they meet specific requirements.

The Building Code generally prescribes non-combustible construction for buildings above a certain area, height, or occupancy type. Non-combustible construction comes with limitations on combustible interior finishes to reduce the spread of fire within interior spaces and to prevent finishes from contributing to compartment fires.

Combustible interior wall finishes (other than foamed plastics) are permitted provided they meet these requirements:

- Are 25 mm-thick or less.
- Have a flame-spread rating of not more than 150 on any exposed surface, and
- Have a flame-spread rating of not more than 150 on any surface that would be exposed by cutting through the material in any direction.

These apply to locations that are not exits and exit lobbies. Exits and exit lobbies have more stringent provisions to protect occupants.

Combustible interior ceiling finishes (other than foamed plastics) follow similar requirements as wall finishes:

- Are 25 mm-thick or less.
- Maximum FSR of 25, and
- No more than 10% of the ceiling area within each fire compartment may have a FSR of not more than 150.

Similarly to above, these only apply to areas that are not exits and exit lobbies.

CLT is not directly permitted in a non-combustible building as an acceptable solution. However, the principles of fire dynamics for exposed timber provide strong support for alternative solutions for feature elements of these buildings.

For a summary on flame-spread ratings of interior finishes for various occupancies and spaces within a building, refer to the summary shown in the table *Tallest Sprinklered Combustible Building for each Occupancy* on pages 61 and 62.

Full details on flame-spread ratings can be found in Subsections 3.1.12 and 3.1.13 in the BC Building Code 2024.

<table>
<tr><th rowspan="2">Tallest sprinklered combustible building for each major occupancy*</th><th rowspan="2">Construction article</th><th rowspan="2">Max. bldg area (m²)</th><th rowspan="2">Max. bldg height (storeys)</th><th colspan="3">Required fire-resistance rating</th><th rowspan="2">Max. Flame Spread Rating (sprinklered)***</th></tr>
<tr><th>Floors</th><th>Mezzanines</th><th>Roof</th></tr>
<tr><td colspan="8">All occupancies</td></tr>
<tr><td colspan="7">Heavy timber construction is permitted regardless of building construction and occupancy type if the building does not exceed two storeys in height and is sprinklered, as per Article 3.1.4.7.</td><td>• Exits and exit lobbies: 25
• Covered vehicular passageways, except for roof assemblies of heavy timber construction in the passageways: 25
• Vertical service spaces: 25
• Walls and ceilings of public corridors: 150
• Walls and ceilings of elevator cars: 75</td></tr>
<tr><td colspan="8">Group A: assembly occupancies</td></tr>
<tr><td>A-1 Motion picture theatres, opera houses, theatres</td><td>3.2.2.22</td><td>No limit</td><td>1</td><td>45 min</td><td>45 min</td><td>-</td><td>• Doors, skylights, glazing and light diffusers and lenses: 150
• Corridors used by the public: 150
• See also, "All occupancies"</td></tr>
<tr><td>A-2 Restaurants, gymnasia, churches, schools</td><td>3.2.2.26</td><td>2,400**</td><td>2</td><td>45 min</td><td>45 min</td><td>-</td><td>• Corridors used by the public, and corridors serving classrooms: 150
• See also, "All occupancies"</td></tr>
<tr><td>A-3 Arenas, indoor swimming pools, rinks</td><td>3.2.2.33</td><td>7,200</td><td>1</td><td>-</td><td>-</td><td>-</td><td rowspan="2">• Corridors used by the public: 150
• See also, "All occupancies"</td></tr>
<tr><td>A-4 Amusement parks, bleachers, stadia</td><td colspan="6">Combustible construction is not permitted for this occupancy</td></tr>
</table>

continued on next page »

* The list of examples per occupancy is not an exhaustive list; refer to the Notes to Part 3 in the BC Building Code 2024 for more examples. ** This construction article permits a larger building area if there are less storeys. This table shows the greatest number of storeys permitted and not the largest building area permitted. Refer to the construction article for full details. *** This column looks at general flame spread rating values for sprinklered buildings only. This is not a full exhaustive list; refer to Subsections 3.1.12. and 3.1.13 for additional details, including for high buildings.

« continued from previous page

Tallest sprinklered combustible building for each major occupancy*	Construction article	Max. bldg area (m²)	Max. bldg height (storeys)	Required fire-resistance rating			Max. Flame Spread Rating (sprinklered)***
				Floors	Mezzanines	Roof	
Group B: institutional occupancies							
B-1 *Jails, prisons, penitentiaries*	*Combustible construction is not permitted for this occupancy*						
B-2 *Hospitals, care facilities with treatment*	3.2.2.40	1,600**	2	45 min	45 min	–	• *150* • *High buildings: refer to Table 3.1.14.7.*
B-3 *Nursing homes, assisted living facilities*	3.2.2.44	1,800**	3	1 h	1 h	–	
Group C: residential							
Apartments, student dormitories, motels, hotels	3.2.2.51	1,500**	6	1 h	1 h	1 h	• *Interior wall and ceilings of bathrooms within residential suites: 200* • *See also, "All occupancies"*
Group D: business and personal services							
Banks, offices, beauty parlours	3.2.2.60	3,000**	6	1 h	1 h	1 h	*See also, "All occupancies"*
Group E: mercantile							
Department stores, shops, stores	3.2.2.67	1,800	4	1 h	1 h	–	*See also, "All occupancies"*
Group F: industrial occupancies							
F-1 *High hazard industrial: chemical manufacturing*	3.2.2.73	1,200**	3	45 min	–	–	
F-2 *Medium hazard industrial: factories, repair garages*	3.2.2.79	2,400**	4	45 min	45 min	–	*See also, "All occupancies"*
F-3 *Low hazard industrial: parking garages, storage*	3.2.2.86	3,600**	4	45 min	45 min	–	

Smarter not harder

How to work with partnerships, budgets, reuse, and supply chains to provide value

Value

» Strategic efficiencies & integrated design

» Flexibility & simplicity

» Design & fabrication collaboration

» Construction & installation

Stewardship

» B.C. Tree species

» Salvage & reuse

» Design for disassembly

Key takeaways

» Value

» Stewardship

Value

Wood is widely perceived as a premium material, and budget constraints often influence the extent to which it is used, underscoring the importance of making strategic decisions that maximize both visual impact and long-term value.

The value of using wood should be considered as a holistic investment that includes health and productivity benefits (biophilia), material lifespan and maintenance needs, embodied carbon benefits and regional supply advantages.

A modest amount of well-placed wood can provide significant benefits and perceived value. Where budgets drive trade-offs, prioritize wood where it will be seen, touched and cared for.

Strategic efficiencies & integrated design

As a lightweight material, wood can be faster to install and more adaptable than other systems when used strategically, saving both time and money. Maximize the value of every board or panel by **integrating multiple performance roles** into a single element: wood can serve simultaneously as structure, finish, an acoustics surface, and provide thermal resistance and humidity buffering.

Work with standard product sizes and supplier constraints early—panel widths, ply options, and standard sheet sizes will reduce waste and save cost. **Defining repeatable connection details** will simplify construction and accelerate installation.

Prefabrication and panelization can help reduce costs. Panelized ceiling systems, modular wall panels and repeating millwork modules can reduce site labour, improve schedule speed, simplify quality control and reduce material waste. Even with complex geometries, consider what can be panelized or prefabricated for better control and reduced site waste. Designing a panelized, modular system with repeated wood elements will also allow damaged sections to be removed and replaced instead of replacing the entire unit.

CLT roof slab was removed from the project because the acoustic requirements would result in the wood being concealed. The team decided to prioritize wood for the seating stairs where it would be seen and felt. *(ZGF Architects, 2021)*

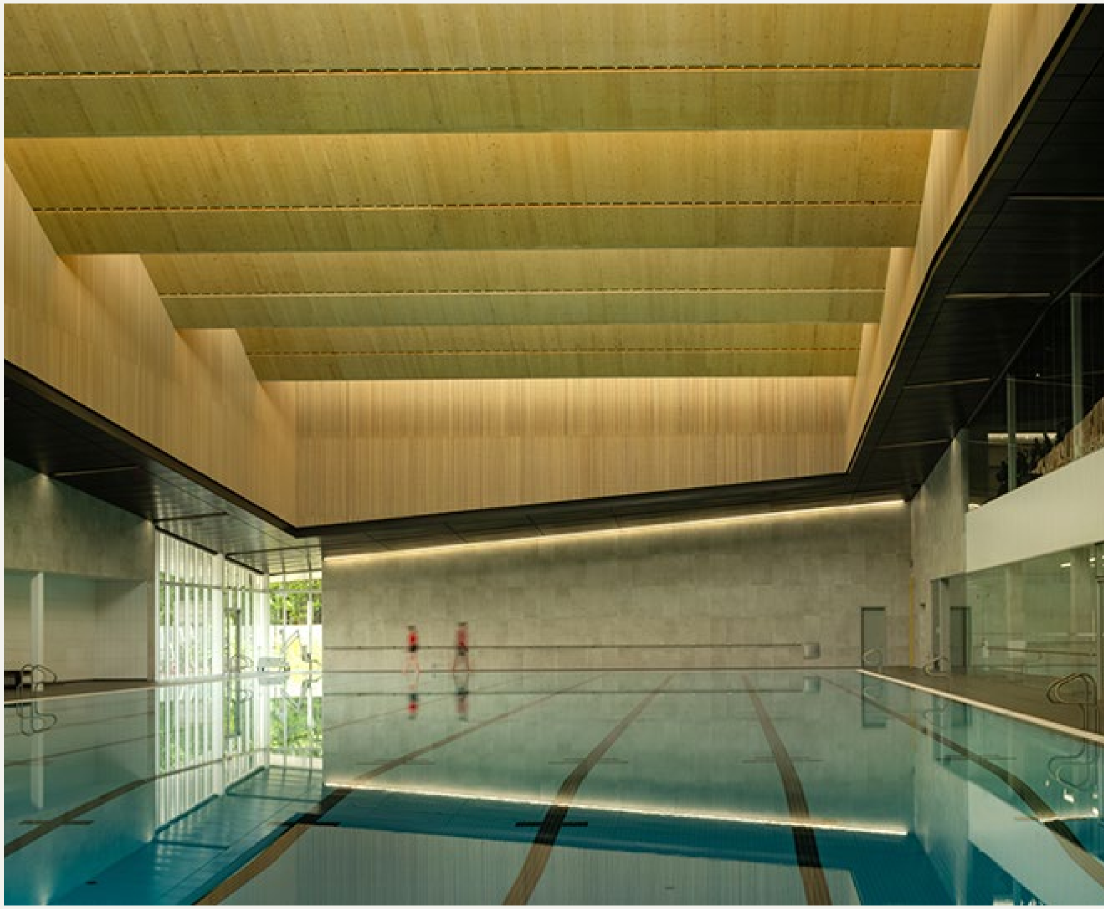
Bayview Elementary School | Vancouver, B.C.

Vancouver School Board millwork standards recommend adjusting details such as wainscoting height or cabinet dimensions to work with standard material sizes. This can deliver significant cost savings without loss of quality. *(Francl Architecture, 2023)*

təməsew̓txʷ Aquatic and Community Centre | New Westminster, B.C.
(HCMA, 2024)

təməsew̓txʷ Aquatic and Community Centre | New Westminster, B.C.

During design, potential cost-reduction measures were evaluated, including replacing the CLT roof structure with a steel deck system. CLT was ultimately prioritized for the long-span areas, particularly the natatorium. Wood is well suited to this environment, as it does not corrode in high-humidity conditions the way steel deck can. *(HCMA, 2024)*



Simplified ceiling systems
A modular wood slat ceiling-grid system option was faster than drywall and cheaper than custom metal ceiling. THERMO-MAGNOLIA with a JEM Joint clip system shortened installation time and reduced trade overlap. *(ZGF Architects, 2025)*

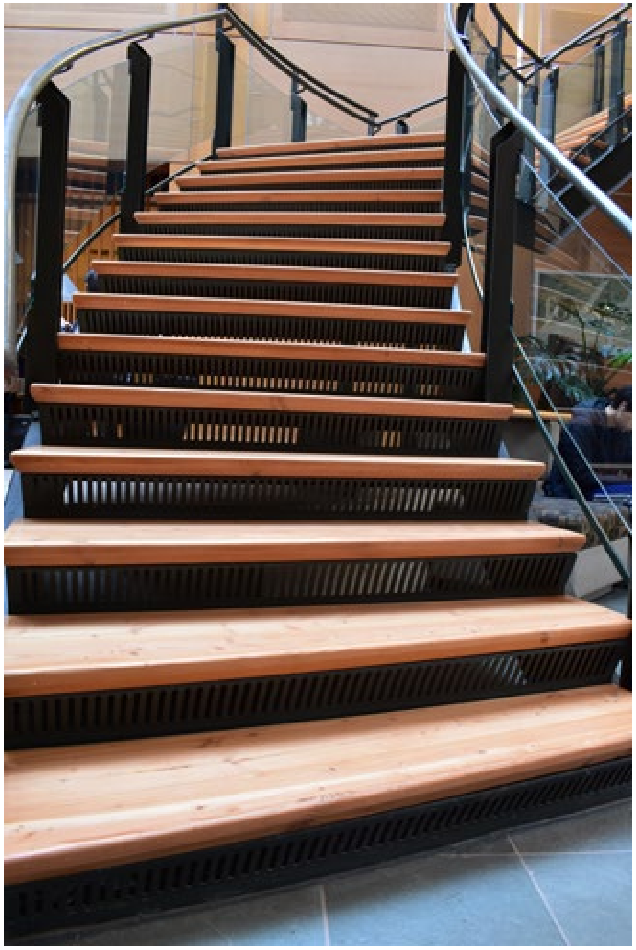
Flexibility & simplicity

Flexibility in wood species and product selection can reduce costs. Specifying a single rare species or unusual material size often increases procurement costs. A flexible design approach allows suppliers to use locally available alternatives without requiring redesign. Local species, standard dimensions and products can even become key design drivers.

Using wood and wood products in their simplest forms (such as standard dimensional lumber) can lower upfront costs and make future repairs or refurbishments less expensive. In contrast, highly engineered materials tend to be costly and may be difficult to source later.

Examples:

- Basic lumber slat walls are easier to replace than veneer wrapped MDF or plywood.
- Selecting less-premium species and lower finish grades can be an effective strategy to use wood finishes more extensively while staying within the project budget..
- Lumber or LVL stair treads can be pulled off without disassembly of other stair components.



UBC Forest Science Building | Vancouver B.C.
The treads of the open staircase are made of tongue and groove Douglas-fir boards that are easy to maintain and replace.

Design & fabrication collaboration

Building strong relationships between designers and industry partners—such as wood associations, fabricators, and contractors experienced with wood—is key to project success. Early engagement (ideally during schematic design or early design development) reduces risk, improves constructibility, and increases cost and schedule certainty. This is especially important for prefabricated mass timber elements and projects with complex geometry.

For exposed mass timber structures, involving experienced fabricators, contractors, and trades during design helps control costs and reduce uncertainty. Successful mass timber projects rely on early, transparent collaboration among designers, contractors, fabricators, and suppliers. Aligning goals from the start minimizes redesign, site improvisation, and cost overruns. For complex projects, owners should budget design fees to allow fabricators to prepare pre-shop drawings and participate in coordination.

Using wood associations, such as the Canadian Wood Council (CWC), to act as a liaison between suppliers and designers can provide the following benefits:

- Improved understanding of available materials, including products and standard sizes.
- Collaboration on detailing to support constructibility.
- Alignment on system integration goals, including which structural elements will remain exposed.
- Use of collaborative digital models with fabricators during detailed design, helping to reduce drawing volume and accelerate construction.

Verifying cost estimates with contractors or fabricators experienced in wood results in more accurate pricing that reflects sequencing, waste factors, and installation requirements. This is often more reliable than relying solely on quantity surveyor data.

CLT panel sizing can vary depending on the supplier. Local suppliers offer a range of panel sizes that are limited by trucking transportation regulations, whereas European panel sizes are limited by shipping container sizes and are therefore often smaller in width. Currently, maximum CLT panel lengths are around 16 m–19.5 m. DLT and NLT panels can be produced in lengths exceeding 20 m.

Early engagement with experienced timber partners resulted in more accurate pricing. Initial estimates from a general contractor with limited mass timber experience nearly eliminated CLT from the project, but cost verification from a trusted mass timber trade partner showed CLT could match stick framing costs. General contractor was open to collaborating and building a relationship with the mass time trade partner. *(ZGF Architects + Salazar Architects, 2025)*

VanDusen Botanical Garden Visitor Centre | Vancouver, B.C.

The architects collaborated directly with the fabricator using a shared 3D model, which significantly reduced the need for traditional 2D drawings. This model-based workflow improved coordination, shortened design time, and minimized fabrication errors. *(Perkins + Will 2011)*

Construction & installation

For projects where the mass timber structure will be exposed as interior finish materials, careful consideration of how to care for and protect the wood throughout construction is required. It is important for owners, designers, contractors and construction trades to build a shared vision of the exposed wood structure in the project.

Designers should specify protection for exposed mass timber during construction that considers the following:

- **Factory-applied coatings and membranes**, where appropriate, to reduce on-site exposure, including a vapour barrier on the top surface.
- **Defined delivery and handling requirements**, recognizing that many surface blemishes occur during transport rather than installation. This may include packaging, wrapping, handling sequence, and expected surface condition on arrival.
- **A weather protection plan prepared by the contractor**, including:
  - **Early coverage to protect the wood**, coordinated with construction sequencing so the building envelope protects the timber structure shortly after installation and avoids prolonged exposure.
  - **Monitoring and testing**, such as installing moisture sensors or data loggers on the roof assembly and at key beam connections to track moisture levels during construction.
  - **Envelope reviews during mass timber installation** to ensure membranes, flashings, and barriers are installed in coordination and do not trap moisture..
- **Protection of surfaces intended to remain exposed**, with clear expectations that finishes will be visible. Work closely with contractors to ensure all team members understand that markings such as spray paint, damage, and dunnage impressions must be avoided.
- **A mitigation plan for damage**, including requirements for sanding, repair, and re-coating where necessary.

Refinishing instead of protecting

Instead of over-protecting every surface, some teams prefer to allocate a refinishing allowance at closeout that includes sanding and recoating once construction is complete. This can be a more cost-effective and realistic approach than maintaining protection throughout construction.

wəkʷan̓əs tə syaqʷəm Elementary School | Vancouver, B.C. The CLT structure, erected early in construction, needed to be protected from damage and exposure to moisture. *(HCMA, 2009)*

Stewardship

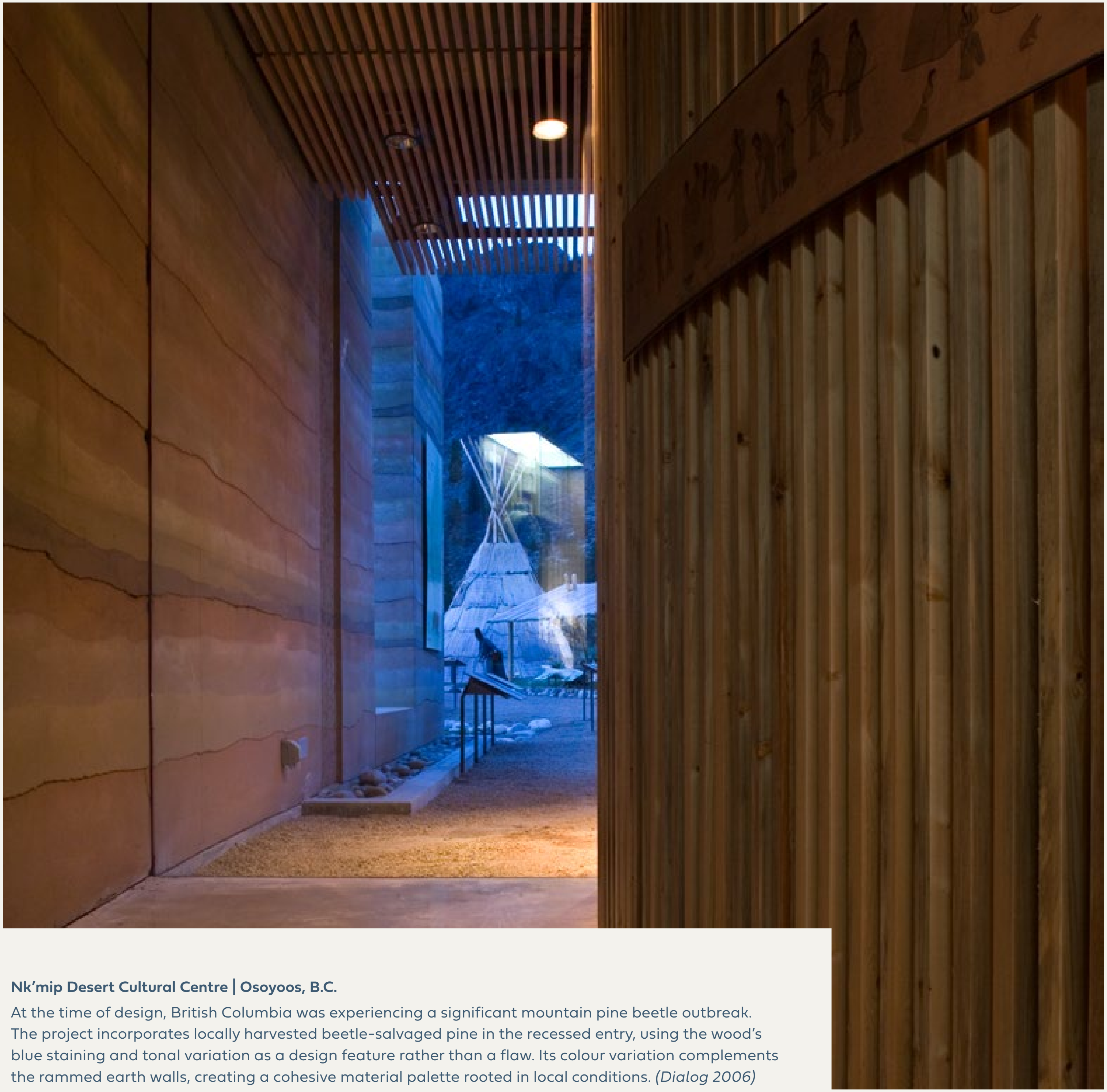
Stewardship of wood as a building material begins with recognizing that it comes from a tree and a forest ecosystem. We value the biophilic benefits of this natural material and use it to help achieve sustainable design goals, including reducing a project's embodied carbon.

Meaningful stewardship should prioritize:

- supporting sustainable forest practices,
- using regional materials that strengthen the local economy and industry in British Columbia,
- considering material salvage and reuse, with priority given to keeping materials in their highest and best use, and
- designing with the principles of design for disassembly in mind to support material circularity.

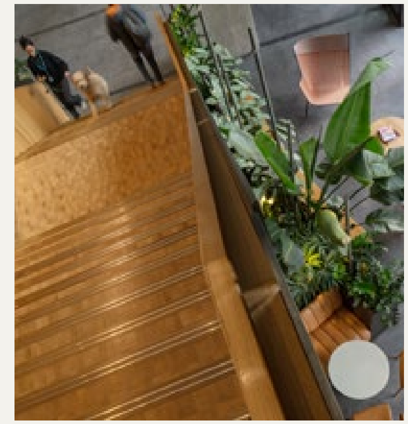
Achieving these goals requires early planning, clear specifications and procurement language and collaboration with local industry partners, including product suppliers, deconstruction contractors and reuse brokers.

This section provides guidance on strategies that design teams and owners can adopt to advance these goals.



Nk'mip Desert Cultural Centre | Osoyoos, B.C.

At the time of design, British Columbia was experiencing a significant mountain pine beetle outbreak. The project incorporates locally harvested beetle-salvaged pine in the recessed entry, using the wood's blue staining and tonal variation as a design feature rather than a flaw. Its colour variation complements the rammed earth walls, creating a cohesive material palette rooted in local conditions. *(Dialog 2006)*



Design with flexibility when incorporating salvaged wood

The available material stock is not always known. This central stair was designed to incorporate beetle-salvaged wood. Utilizing end grain had the dual benefit of allowing smaller pieces to be used without requiring specific lengths while taking advantage of end grain hardness for durability of the stair treads.

(ZGF Architects 2023)

B.C. tree species

British Columbia's forests are vast and diverse. The province has more than forty species of native trees, including softwoods and hardwoods. Nearly three-quarters of B.C.'s forests are certified to one or more international third-party, globally recognized certification standards—more than any other jurisdiction in the world (except Canada as a whole).


Amabilis fir

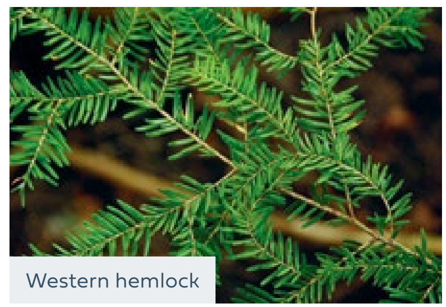

Douglas-fir


Lodgepole pine


Ponderosa pine


Sitka spruce


Subalpine fir


Western hemlock


Western larch


Western red cedar


Western white pine


White & Engelmann spruce


Yellow cedar

Salvage & reuse

Wood makes up a large portion of construction and demolition waste by volume and weight in landfills. To reduce waste, there is often interest in determining whether reclaimed wood can be recycled and reused in new projects.

While reusing wood is possible and permitted by the Building Code, it may not be an easy or economical option to pursue. It requires careful planning, grading, storage and contractual commitment and is currently very difficult logistically and not common practice. Integrating the story of material reuse into design narratives early in the project to connect stakeholders with the vision helps build team commitment.

Reused wood will need to be regraded by an approved agency to be permitted for structural uses. Even when structural reuse is impractical, reclaimed wood has many valuable second lives in interior spaces for non-structural purposes such as in:

- millwork, benches, and furniture
- acoustic panels, slat walls and feature cladding
- decorative millwork and joinery elements
- art installations

Key recommendations:

- **Identify salvage opportunities early in the project,** either through inventory of an existing building that will be demolished, or by partnering with reuse specialists such as deconstruction contractors, reuse brokers, local salvage yards and non-profits that can remove, store, and rehabilitate materials.
- **Keep detailed inventories** of deconstructed materials with photos and dimensions to facilitate reuse decisions.
- **Plan for the variable appearance** of salvaged wood as part of the design aesthetic.
- **Address contamination and treatments.** Screen salvaged material for chemical treatments, adhesives, paint, or mold. Materials with problematic contaminants (e.g., MDF, heavily painted or chemically treated wood) are often unsuitable for reuse.

Salvage efforts typically fail without explicit contractor buy-in and clear responsibilities. Include the following in the scope and bid documents:

- A dedicated budget and schedule for careful removal, sorting, storage, and chain-of-custody documentation.
- A deconstruction plan that defines handling and storage requirements, documentation protocols, and contingency allowances for unusable material.
- Addressing practical challenges, including secure, weather-appropriate storage; coordinating reused materials with construction sequencing; and developing contingency plans for materials that may be lost or damaged during the extended period between demolition and construction.

Barriers to reuse

- Wood needs to be clean and free of chemical contaminants before it can be accepted and processed by reuse facilities.
- Metal fasteners, such as nails and screws, must be removed first as they may damage processing equipment.
- Wood frame construction from the 1970s onward introduced contaminants such as spray-foam insulation and plastic based membranes.
- Engineered wood products, such as medium-density fibreboard (MDF) cannot be recycled or is extremely challenging to recycle due to contamination from resin and adhesives.

Design for disassembly

Designing wood elements for future recovery and reuse extends lifespan and reduces waste. Wood components that are specifically designed for disassembly are easier to recycle and reuse, as they contain little to no engineered or mechanical fastenings or connections, such as nails or glued joints. In designing a new project, materials that can be readily reused include items such as dowel-laminated timber, glue-laminated timber and cross-laminated timber, provided their structural capacities can be verified. DLT in particular is made without face gluing; using only long wood dowels, a DLT panel can be deconstructed by peeling apart the lams or cutting the dowels. Design strategies include the following:

Reversible connections, using mechanical fasteners such as bolts, screws with access plates, steel plates with slotted holes, or removable brackets instead of adhesives or permanent glued joints. Specify fasteners that can be accessed without damaging surrounding materials.

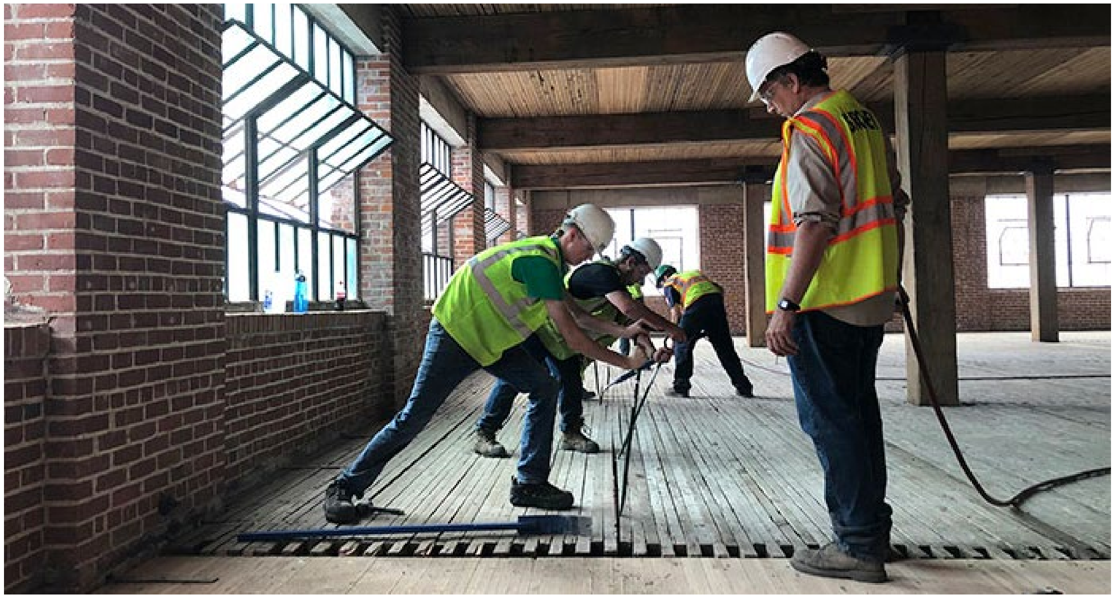
Panelized and standardized components, using modular designs or consistent panel sizes to simplify replacement and reuse.

Separation of structure and finish, with wood finishes designed to be easily removable from the primary structure. Attach finishes to a replaceable substrate or an independent subframe.

Labeled and documented assemblies, including numbered panels, disassembly drawings, and a digital "timber passport" provided in the operations and maintenance manual. Documentation should include species, grade, treatments, fastener schedules, and reuse recommendations.

Planned access for disassembly, including access points and lifting clearances. Avoid embedding wood behind permanent finishes that prevent removal.

Material selection that supports future reuse, prioritizing wood species and products with clear reuse pathways. Solid sawn lumber, CLT, glulam and DLT are generally more reusable than composite panels with mixed adhesives, such as MDF.



New DLT billets were used for patching 100-year-old NLT floor.

Key takeaways

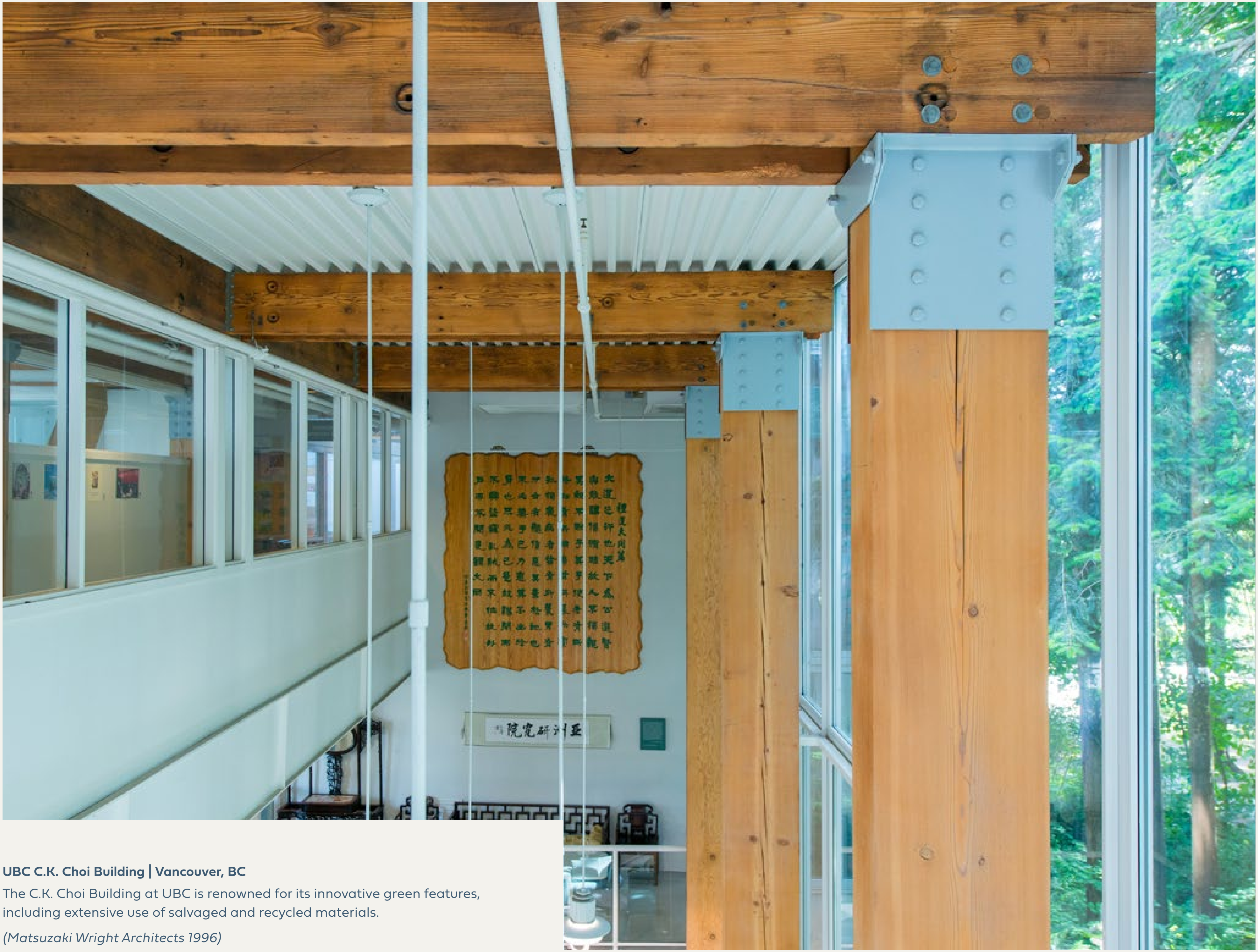
How to work with partnerships, cost, reuse, and supply chains to provide value.

Value

- Wood's light weight and adaptability can accelerate construction and reduce costs, especially when elements are designed to serve multiple functions—such as structure, finish, acoustics, and environmental modulation—within a single board or panel.
- Working with standard product sizes, supplier constraints, and repeatable connection details early in design minimizes waste, simplifies construction, and reduces overall cost.
- Prefabricated and panelized wood systems improve speed, quality control, and material efficiency, while modular designs enable easier replacement of damaged components without removing full assemblies.
- Maintaining flexibility in species and product selection reduces procurement costs and allows suppliers to use locally available, standard materials that can even shape the overall design concept.
- Choosing simple, readily available wood products—such as standard dimensional lumber—lowers initial costs and ensures future repairs or replacements remain practical and affordable.
- Early collaboration with experienced wood associations, fabricators, contractors, and trades increases constructibility, reduces risk, and improves cost and schedule certainty, especially for prefabricated mass timber or complex geometries.
- Successful exposed mass timber projects rely on early, transparent coordination among designers, contractors, and fabricators, with adequate design fees and early coordination to avoid redesign and cost overruns.

Stewardship

- Responsible wood stewardship involves supporting sustainable forestry, prioritizing local materials, enabling salvage and reuse, and designing for disassembly to keep wood in continuous, high value circulation.
- Reusing wood requires early planning, grading, storage, and team commitment, and while structural reuse can be difficult, reclaimed wood remains highly valuable for non structural interior applications.
- Identify salvage sources early—through building inventories or reuse partners—maintain detailed material records, plan for the aesthetic variability of reclaimed wood, and screen materials for contaminants to ensure suitability.
- Successful salvage and reuse strategies depend on explicit contractor commitment, clear responsibilities, and a shared understanding of reuse goals.
- Designing wood components for disassembly—avoiding restrictive fasteners or glues—supports future recovery and reuse, with products like DLT, GLT, and CLT offering potential for deconstruction and material recapture when their structural capacities can be verified.



UBC C.K. Choi Building | Vancouver, BC

The C.K. Choi Building at UBC is renowned for its innovative green features, including extensive use of salvaged and recycled materials.

(Matsuzaki Wright Architects 1996)

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p73 *Amazon / JBG Smith, HQ2 at Met Park: Magda Biernat Photography*

p74 *Amabilis fir: Kristin Charleton, Sundew Media*
Douglas-fir: Kristin Charleton, Sundew Media
Lodgepole pine: Barbara Zimonick
Ponderosa pine: Barbara Zimonick
Sitka spruce: Jonathan Clark, Nuance
Subalpine fir: Jonathan Clark, Nuance
Western hemlock: Kristin Charleton, Sundew Media
Western larch: Jonathan Clark, Nuance
Western red cedar: Kristin Charleton, Sundew Media
Western white pine: Barbara Zimonick
White & Engelmann spruce: Barbara Zimonic
Yellow cedar: Jonathan Taggart

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