

# Naturally Wood

BRITISH COLUMBIA

**Sustainable by Nature  
Innovative by Design**

# Mass Timber's Mass Appeal

## What Is Mass Timber?

The term mass timber can refer to a category of wood products, or a form of construction, that uses large, engineered wood products and systems to form the primary structure of a building. Mass-timber products complement light- and heavy-timber framing options and are commonly fabricated as panels, columns, and beams.

## What Are the Benefits of Mass Timber?

Because it comes from forests that are sustainable and renewable, mass timber is an environmentally friendly building material. With its high strength and dimensional stability, it has a growing appeal to building professionals as an alternative to concrete, masonry, or steel in many building types. Hybrid construction pairs the high strength-to-weight ratio of mass timber with concrete and/or steel to create a cost-effective and sustainable building system.

## What Are the Different Types of Mass-Timber Products?

### Cross-laminated timber (CLT)

CLT is an engineered product consisting of layers of dimension lumber (usually three, five, or seven) oriented at right angles to one another and then glued to form structural panels.

### Dowel-laminated timber (DLT)

DLT is a mass-timber panel product created by stacking dimension lumber together on its edge, friction-fit together with hardwood dowels. DLT is the only all-wood mass-timber product with no metal fasteners, nails, or adhesives.

### Glue-laminated timber (glulam)

Glulam is composed of dimension lumber pieces bonded together with durable, moisture-resistant adhesives. The grain of all laminations runs parallel with the length of the member.

### Laminated strand lumber (LSL)

To make LSL, thin strands of wood are aligned parallel to the length of the member, glued under pressure, and then machined to consistent finished sizes.

### Laminated veneer lumber (LVL)

LVL is made of dried softwood veneers, glued together so that the grain of each veneer is parallel to the length.

### Mass plywood panel (MPP)

MPP, sometimes dubbed “super plywood,” consists of several layers of wood veneer glued and pressed together in alternating directions of grain.

### Nail-laminated timber (NLT)

NLT is created by stacking dimension lumber together on its edge and fastening it together with nails or screws. It can be site built or fabricated in panels off-site.

### Parallel strand lumber (PSL)

PSL is manufactured from veneers that are clipped into long strands, laid in a parallel formation, and then bonded together with an adhesive to form the finished structural member.



CROSS-LAMINATED TIMBER



LAMINATED VENEER LUMBER



DOWEL-LAMINATED TIMBER



MASS PLYWOOD PANEL



GLUE-LAMINATED TIMBER



NAIL-LAMINATED TIMBER



LAMINATED STRAND LUMBER

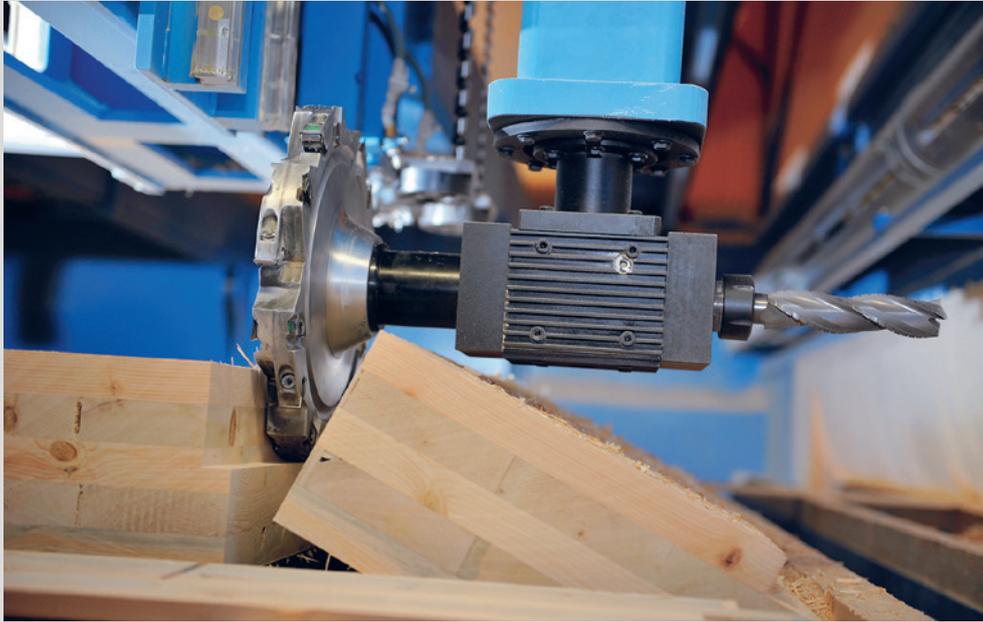


PARALLEL STRAND LUMBER

# Timber Tech

Chronicling the technological advances in British Columbia's wood industry

BY JIM TAGGART



CLT fabricated using CNC technology.



The Wood Innovation Research Lab at the University of Northern British Columbia gives much-needed space to test and research state-of-the-art building systems.

In many countries, wood was the first building material, chosen for its strength, versatility, and workability. In B.C., archaeologists have dated the remains of an Indigenous pit dwelling at Xá:ytem (Hatzic Rock) to at least 5000 BC. The site, eighty kilometres east of Vancouver, was designated in 1992 as a national historic site of Canada for its spiritual value to the Stó:lō Peoples. Pit dwellings employed simple log construction, but over the centuries, more sophisticated forms of wood building were developed and refined. Impressive handcrafted post, beam, and plank longhouses were much in evidence when the first Europeans arrived in the late eighteenth century.

European settlers introduced other hand-building techniques, including the squared-log construction popularized by the Hudson's Bay Company. Then, in the late 1800s, things began to change with the mechanization of sawmills and the introduction of mass-produced nails. Light-wood-frame construction became the norm for smaller buildings, while post-and-beam construction, using nail-laminated decking and simple iron- or steel-plate connections, became the standard for larger ones. Historic examples of the latter—precursors to the recent mass-timber movement—can still be found in Vancouver's Gastown.

The industry grew over the next century, driven by an increasing population and rail and road connections to new markets, but little changed technologically. Notable exceptions were the introduction of plywood, first manufactured in B.C. in 1913; and glue-laminated timber (glulam) beams, first manufactured in North America in 1934 but not widely used in B.C. until after World War II. These were the first engineered wood products (EWPs). EWPs offer certain advantages over solid-sawn lumber, eliminating considerations such as shrinkage due to changes in moisture content, size limitations, and variable strength due to knots and splits.

In the 1970s and '80s, new EWPs were developed, beginning a new era in timber engineering and generating an expanded understanding of the potential of wood structures. EWPs are created using veneers, strands or smaller sections of wood glued together and formed into panels or beams—with dimensions limited only by the size of the press and the constraints of road transportation.

The manufacturing process eliminates defects, improves dimensional stability, and enables larger spans.

Most notable of these EWP's is parallel strand lumber, a beam product developed in B.C. that has been used in many large buildings including the University of British Columbia's (UBC) Forest Sciences Centre and Surrey's Central City. Another new EWP was laminated strand lumber, a large-scale panel product used in projects such as Gilmore SkyTrain Station and North Vancouver City Hall.

B.C.'s architects, engineers, and fabricators are keeping pace with international innovations, importing new, highly efficient connectors from Europe. These connectors provide engineers with alternatives to the simple steel plates that were the default solution for decades. European connectors offer a variety of solutions applicable to different load conditions. The advantage is superior performance, which is achieved through more careful attention to the unique properties of wood, including its different strengths parallel and perpendicular to grain and the greater strength achieved by spreading the load across the fibrous structure, rather than concentrating it at a single point. Some of these connectors are variations on bolts, pins, and screws, while others require complex yet highly precise machining of joints.

These latter types are best accommodated using a computer numerical control (CNC) machining process. The introduction of sophisticated CNC machinery, and the 3-D digital models used to instruct them, constitutes a significant technological advancement in contemporary wood building technology. CNC machines can also be used to cut, rout, and drill wood members of all shapes and sizes with unprecedented speed and accuracy.

In 2001, B.C.'s first CNC machine fabricated structural wood products for the Sauteau Community Centre and then the Prince George Airport, both of which feature glulams machined to an elliptical cross-section. Digital fabrication is now used by at least four timber fabricators in British Columbia. All four companies have worked extensively in international markets, designing and prefabricating structures of all types, from custom houses to large commercial projects.

The speed and precision of CNC fabrication can save a great deal of time and expense on

site by bringing multiple operations into the factory. This can include pre-drilling all holes for mechanical and electrical systems, and pre-installing connections. More and more buildings are being created as an entire "kit of parts" so that site assembly becomes similar to children's building blocks—but on a grand scale.

This analogy has become more appropriate since the arrival of cross-laminated timber (CLT) in British Columbia. Constructed much like plywood, with alternating layers of small dimension lumber laid up in panels up to eight feet wide, forty feet long, and twelve inches thick, CLT has the capacity to displace other materials for large-scale commercial projects, given its smaller carbon footprint and environmental advantages. B.C. companies began manufacturing CLT in 2011, initiating a new phase of the revolution in wood building technology.

To maximize the time and cost advantages of building large structures in engineered wood, design and construction professionals engage in an integrated process in which entire buildings are constructed as virtual 3-D models, providing the opportunity to optimize building systems, identify and eliminate conflicts that might otherwise arise in the field, and even follow the construction process in the virtual world before breaking ground on site. This process was employed to great effect in the eighteen-storey Brock Commons Tallwood House at the University of British Columbia.

Prefabrication can be applied to structural members such as posts and beams; to building elements such as roofs and walls; or even to volumetric modules. Some of them, like the roof for the visitor centre of the VanDusen Botanical Garden, are extraordinarily complex. Increasingly, roof and wall panels are being designed to meet the rigorous Passive House energy conservation standard, such as at the Audain Art Museum in Whistler, or the Bella Bella Staff Housing project, which takes advantage of volumetric prefabrication, including fully finished modules. Prefabrication by B.C. companies is increasingly being used to construct highly repeatable buildings, such as residential dormitories and hotels.

Over the past twenty-five years, British Columbia's industry has embraced the emerging technologies of mass-wood design and construction and created a remarkable

series of demonstration projects, including high-rise buildings and long-span structures. The Richmond Olympic Oval has a wood roof that covers a vast area with no interior support, while the Wood Innovation and Design Centre in Prince George is a thirty-metre-high academic and office tower that contains no concrete between the ground-floor slab and the mechanical penthouse.

Over this same time, old technologies like nail-laminated timber have been updated and revived in projects such as public transit stations and modern office buildings, and new products have been introduced, such as dowel-laminated timber, a panel product that uses dowels to join laminations, making it easier and safer to cut and shape. We are seeing a growing list of precedent-setting innovations in the province, such as the world's longest-spanning timber catenary roof crowning Grandview Heights Aquatic Centre, or the first-of-its-kind CLT cantilevered staircase in UBC's Earth Sciences Building.

Not far from UBC's gravity-defying CLT staircase is the Centre for Advanced Wood Processing at UBC, a national centre for education, training, and technical assistance for the wood-products manufacturing industry. Home to cutting-edge training and robotic technology, the centre is helping fuel the next generation of professionals and entrepreneurs who will come up with further innovations and breakthroughs. This includes training in product development and wood finishing, as well as company-specific in-plant training. Similarly, the non-profit firm FPInnovations supports innovators through practical research in a variety of areas ranging from forest operations and wood products manufacturing to the performance of advanced wood building systems. This includes real-life seismic testing and validation of products and systems for projects such as the Earth Sciences Building, the Wood Innovation Design Centre, and Brock Commons Tallwood House.

With a combination of enterprise and technology, the B.C. wood industry has developed a depth and breadth of expertise in modern mass-wood construction that firmly positions it as a world leader.

# Wood Is Good for You

For most of human history, a connection to nature was a certainty, with our daily lives intimately tied to the cycles of the sun, the seasons, and the natural world around us. It's only recently that we became able to earn a living, go shopping, enjoy endless entertainment, and even socialize without ever leaving home. While convenient, this self-sequestration from nature may be taking a toll on our health.

More and more, science is confirming common sense: being exposed to nature—and natural, organic materials—not only calms our mind, it may actually help prevent and treat disease. No indoor environment can replace the extraordinary experience of the natural world, but research is showing that incorporating nature into built spaces—whether in the form of sunlight and fresh ventilation, plants and greenery, or organic materials—can improve our health and well-being.

Studies confirm a positive human response to wood itself, and suggest it is a good choice for health-care environments. As a building material it is considered to be hypoallergenic, as its smooth surfaces are easy to clean, which prevents the buildup of particles that is common on softer finishes like carpet. Solid-wood products, particularly flooring, are often specified in environments where the occupants are known to have allergies to dust or other particulates. As a result of these benefits, an increasing number of health-care facilities—acute care, community clinics, and long-term care units—are making use of natural daylight, views of nature, and exposed wood to create a warm, natural aesthetic that supports their healing objectives. B.C.'s health-care environments are embracing the idea that wood is good for you.





# Pacific Autism Family Centre

Richmond



At over 5,500 square metres, the expansive, open-concept design of the Richmond-based Pacific Autism Centre consolidates state-of-the-art services in a hub for autism research, clinical practice, and family support—the first facility of its kind in Canada.

The building's exterior is clad in a combination of metal panels and smooth-faced western red cedar, its unique stained finish giving it a deep red and robust aesthetic. As visitors enter the building, its stately appearance gives way to a bright, spacious, and at times playful interior, punctuated by pops of primary colours and warm, exposed wood. Inside the main lobby, a whimsical mobile of paper airplanes hangs within a transparent central oculus.

Structurally, Douglas-fir glue-laminated timber columns and beams support either prefabricated nail-laminated timber (NLT) or wood I-joist floors, while laminated veneer lumber beams are also used where additional strength is required. The undersides of the NLT panels are left exposed in common areas, and linear wood ceilings and acoustic panels are used throughout the interior.

The building's public spaces and waiting areas are generously sized to prevent feelings of claustrophobia or confinement, and interiors are simply detailed to encourage a calm environment. Transparency is used strategically: exterior views to the surrounding landscape assist with orientation, and interior views between adjacent spaces promote intuitive wayfinding. The facility's overall welcoming design conveys a sense of empathy for its occupants, along with the organization's commitment that no child will be turned away.

OWNER Pacific Autism Family Centre Foundation

ARCHITECT NSDA Architects

STRUCTURAL ENGINEER Fast + Epp

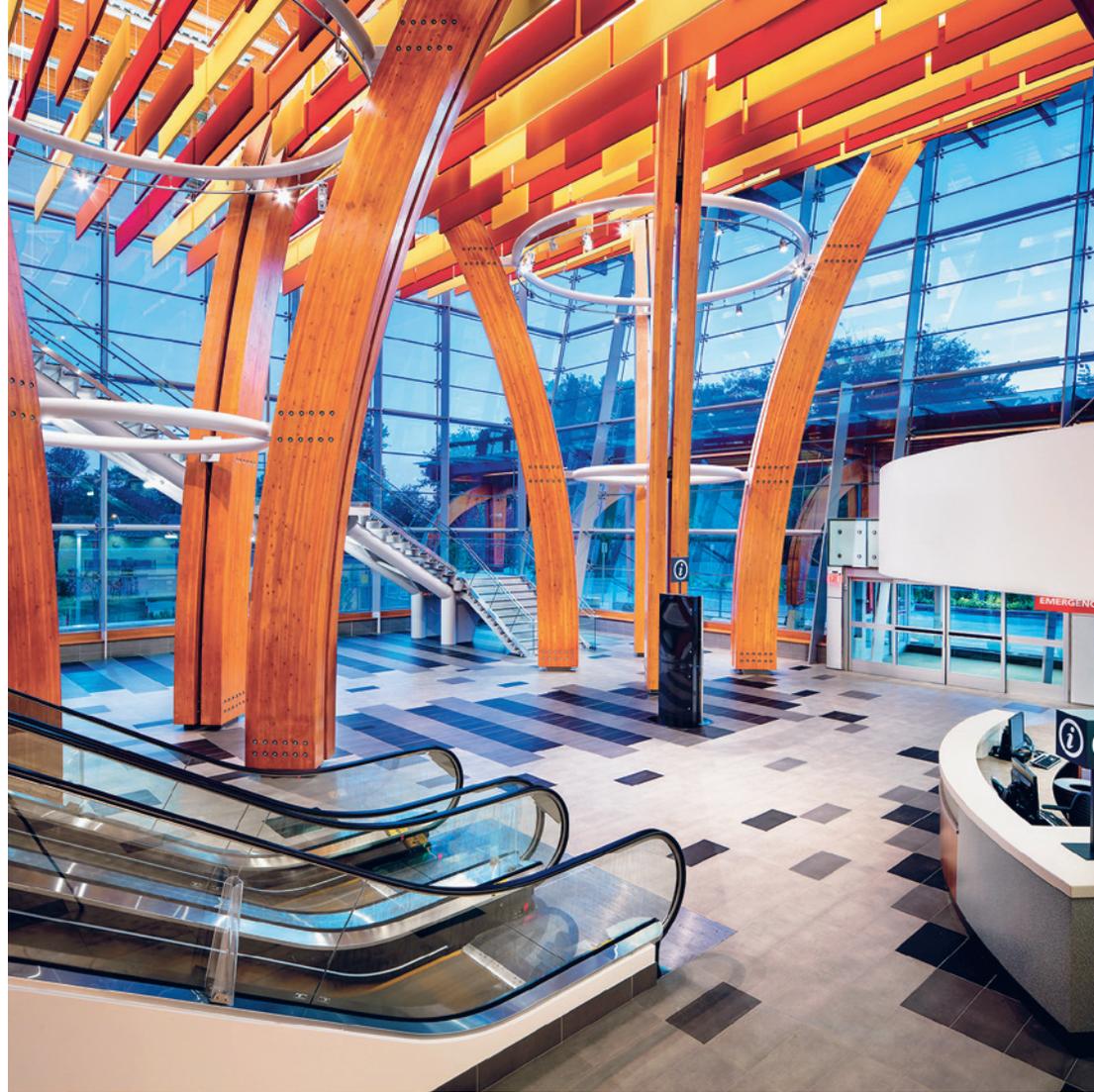
COMPLETION 2016 SIZE 5,600 m<sup>2</sup>

# Surrey Memorial Hospital Emergency Department and Critical Care Tower

Surrey

Visitors to Surrey Memorial Hospital are greeted by tree-like wood columns, each consisting of four thick glue-laminated timber “branches” that extend from floor to ceiling and support a panelized atrium roof. The addition includes a new emergency department with separate spaces for adult and pediatric care, along with a tower that hosts the Neonatal Centre of Excellence and much-needed patient rooms and beds for critical and intensive-care units. Wood products and finishes used for the millwork, interior walls, and acoustic panelling help to control airborne contaminants, are easy to maintain, and are low-emitting materials, helping to reduce concentrations of chemicals and improve indoor air quality. The bold, striking use of wood throughout the space—uncommon in such health-care settings—softens the hospital’s institutional feel and creates a calm, stress-reducing connection to nature, while standing up to weather, wear and tear, and rigorous maintenance. As the research on biophilic benefits of wood continues to grow, one of B.C.’s busiest hospitals leads the way in offering patients a comforting, supportive, and healing environment.

OWNER B.C. Ministry of Health  
ARCHITECTS HDR | CEI Architecture Associates, Inc.  
and Parkin Architects Ltd. (joint venture)  
STRUCTURAL ENGINEER Bush, Bohlman & Partners  
COMPLETION 2013 SIZE 39,000 m<sup>2</sup>



# Wellness with Wood

Research begins to show the biophilic benefits of wood

BY MATTHEW HARTY



Constructed two decades ago, the still innovative Forest Sciences Centre at the University of British Columbia has long been a favourite study spot with students for its light-filled timber-built design.

Built over twenty years ago, the Forest Sciences Centre at the University of British Columbia—with its soaring, timber-framed atrium and tree-like wood columns supporting a massive skylight—is the closest thing you’ll find to an indoor forest canopy. David Fell, research leader at FPInnovations, sees it as “the ultimate relaxed environment, where people come from all over the campus to study.”

The popularity of the almost entirely wood space, filled with natural light and finished with Douglas-fir and bigleaf maple veneer, inspired Fell to dig a little deeper. In 2010, he launched a study to investigate the health benefits of wood in the built indoor environment. In the last few decades, many studies have shown that exposure to nature can lower blood pressure, heart rate, and stress levels, while cognitive performance, concentration skills, and even creativity are seen to improve. Nonetheless, Canadians spend as little as 6 percent of their time outdoors.

We compensate by bringing plants and greenery into our homes and workplaces. Research reveals that the presence of nature indoors can reduce the human perception of pain, as well as thermal discomfort. For Fell, this measurable influence of natural elements like indoor plants on human well-being suggests that exposed natural wood might also provide the same benefits. “People don’t notice changes in temperature if there are plants in the room,” he says. “If we can prove this for wood in interior applications, it has profound implications for sustainability by reducing the carbon load of the operation of a building.”

To test the effects of wood and natural materials in the built interior environment, 119 students were assigned to one of four staged office environments: three that used

different combinations of natural and synthetic materials and objects, and one non-wood room used as a control. The students completed an audio-based mathematics test after a brief baseline period spent alone in the room. The researchers continuously monitored heart rate and skin conductivity, which both fluctuated in response to stressful thoughts or stimuli. After completing the test, the students were once again left alone for a recovery period.

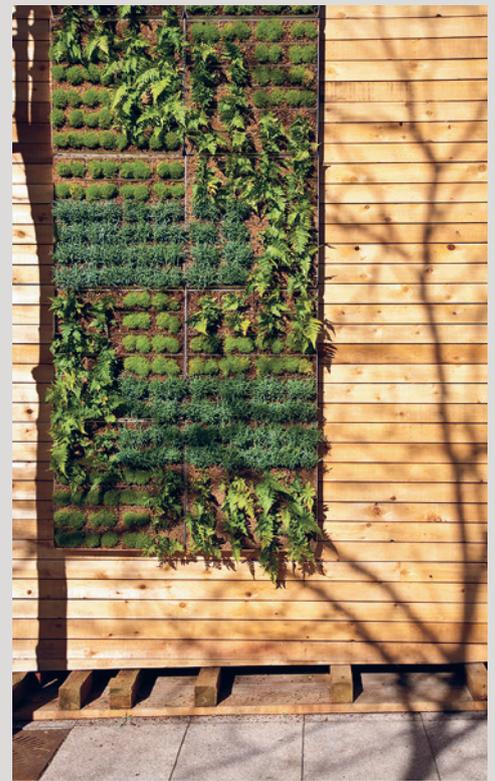
The results: students who spent time in rooms featuring natural wood performed better than the those who did not, establishing a correlation between the sight of wood and the human sympathetic nervous system. During all three periods of the study, stress, as measured by sympathetic nervous system activation, was measurably lower on average in the rooms featuring wood than in the non-wood office.

These early results are promising. We've long used wood in the interiors of our homes for its warm and calming qualities, and for these same reasons we are increasingly seeing wood used in office, health-care, and retail environments. "Wood is an insulator," explains Fell. "It feels warm to the touch. This is a prized relationship."

The precise nature of this relationship is difficult to quantify. "From a psychoevolutionary perspective, there are certain things in nature that gave us an evolutionary advantage," says Fell. "For most of our evolution, humans have had a close relationship to trees and wood, so it's only natural that its visible presence has a positive effect on our well-being. This is not a learned reaction," says Fell, "it is an innate response. We are wired to recognize things in nature that benefit us."

Fell draws attention to the concept of "biophilia," which suggests that humans possess an innate tendency to seek connections with nature. "In the early nineties we focused

on improving a building's environmental performance, but we weren't necessarily always focused on improving the health of its occupants," says Fell. "These days, the conversation has turned to the health of the occupants, and wood has a really great story to tell." And while more research is needed, science is beginning to confirm what folk wisdom has taught us—that wood, and nature, is good for our health. Something we've intuited since time immemorial.



Increasingly, education, health-care, and other public buildings incorporate wood for its biophilic benefits, such as the UniverCity Childcare Centre at Simon Fraser University.

# Ronald McDonald House BC & Yukon

Vancouver

Ronald McDonald House BC and Yukon provides a home away from home for more than seventy out-of-town families whose children are receiving treatment at the B.C. Women's and Children's Hospitals, which are just steps away from the House in central Vancouver.

The project is an advanced application of mass-timber construction, built of a hybrid cross-laminated timber (CLT) wall and high-performance light-wood floor system. Laminated strand lumber floor ledgers support joists, decking, and a concrete topping. The panelized construction enabled off-site prefabrication, with panels factory-cut to a precise size and fit. As the first example globally of a tilt-up CLT and light-wood-frame building system designed for a one-hundred-year service life, the project set a new benchmark for robust, cost-effective, institutional-grade timber construction.

The exterior is designed to feel like a home and not a hotel. With an iron-spot brick facade punctuated by square-box dormers, it's a fresh take on more traditional residential motifs. Cedar cladding and wood window frames offer a warm contrast to the sleek, steel-grey masonry. The facility comprises four "houses" joined together, with common spaces such as dining rooms, games rooms, lounges, and courtyards. Common and private spaces blend seamlessly within its warm, contemporary, yet understated interior, offering moments for both quiet reflection and social connection. A spacious grand living room features an exposed-timber floor and ceiling; a large fireplace clad with the same iron-spot brick as the exterior is its focal point. Children descend into the common spaces by way of a wooden staircase or an enclosed yellow slide. This is architecture with empathy, decidedly non-institutional in its feel, a place where dignity and playfulness live side by side.

OWNER Ronald McDonald House BC & Yukon  
ARCHITECT MGA | Michael Green Architecture (project started at Mcfarlane Green Biggar Architecture + Design)  
STRUCTURAL ENGINEER Equilibrium Consulting Inc.  
COMPLETION 2014 SIZE 6,800 m<sup>2</sup>





# Ambassador of Wood

For Michael Green, good architecture is more than beautiful spaces — it advocates for a better world

BY JASON MARTIN



North Vancouver City Hall

Wood may not be the first thing that comes to mind as a solution to some of the world's biggest problems, but Vancouver-based architect Michael Green thinks it should be.

Homelessness and affordability challenges continue to worsen worldwide. By 2033, three billion people, or 40 percent of the world's population, will need a new home. At the same time, construction and buildings are some of the largest contributors to global warming.

To solve this conundrum we need to find new and more efficient choices than steel and concrete—significant contributors to greenhouse gas emissions—with engineered and prefabricated wood, the only major structural material that is renewable and locks in carbon.

Green is founding principal of MGA | Michael Green Architecture, a Vancouver-based thirty-person firm with a mission to tackle such global problems through all-wood architecture, design, and construction. MGA may be a mid-sized firm, but they have big ambitions and innovative ideas when it comes to using wood in the buildings of tomorrow. “As an architect, wood is the only material, the only big structural material, that I can build with that is grown by the power of the sun. We have an ethic that the Earth grows our food, and we need to move to an ethic, in this century, that the Earth should grow our homes and our buildings,” says Green.

You do this by building more efficiently and taller with wood, a topic he delves into in his book, *Tall Wood Buildings: Design, Construction and Performance*. Mass-timber and engineering advances have changed the game, which Green explains using an analogy of a familiar toy. “The way I describe this best, I’ve found, is to say that we’re all used to two-by-four wood construction. Two-by-four construction is sort

of like the eight-dot brick of Lego that we all played with as kids. But do you remember when you were a kid and you sifted through the pile of Lego and you found that big twenty-four-dot brick of Lego and you're like, 'Cool, this is awesome, I can build something really big!' That's the change mass timber represents. Mass-timber panels are those twenty-four-dot bricks."

If mass timber is a game changer, MGA has been at the forefront of that change, working on such wood high-rise projects as T3, a modern, seven-storey, twenty-thousand-square-metre office building in Minneapolis that, by using eight-foot-by-twenty-foot mass-timber panels, harkens back to the hundred-year-old heavy-timber warehouses of yesteryear. Closer to home, the firm oversaw the design and construction of the Wood Innovation and Design Centre in Prince George, a 29.5-metre, six-storey building that helps tell the story of what's possible with mass timber through its expressive wood structure, finely detailed wood-on-wood connections, exposed cross-laminated timber (CLT) stairwells, and alternated panels of naturally aging cedar that was charred using the traditional Japanese technique of *shō sugi ban*.

Undeniably a strong communicator himself, Green sees storytelling as a fundamental part of good design, so much so that he sometimes creates illustrated children's books to accompany his buildings. This was the case with *Alpenglow*, a picture book given to sick kids and their families staying at Ronald McDonald House in Vancouver, a "home away from home" when receiving medical treatment at B.C. Women's and Children's Hospitals. "I created this illustrated book to tell the story of the building, in a metaphorical way, and its deeper purpose for the community it serves," he explains.

The Governor General's Medal-winning building also tells a story about creating architecture for the ages, and the pivotal role mass timber can play. "I believe we need to build institutional buildings with their legacy in mind—buildings that should last hundreds of years," Green says. "The Ronald McDonald House is a great example of wood construction that is built to last. The exterior facade may be

brick, but CLT is the vertical strength and light-wood frame is the horizontal. When we think of construction that is built to last, wood and mass timber can serve that role, as a long-lasting legacy material."

For Green, how his architecture makes you feel, the quality of life it fosters, and its overall environmental impact are as much a test of its legacy as its durability and longevity. But his aspirations are part of a much larger goal: "It's our duty as architects to be advocates for improving quality of life, but I think we need to think beyond the traditional roles. I think there is an even bigger role for architecture and that means participating in the global conversation. That's the realm we've been interested in. As architects we have a global responsibility to help fix world problems, affordability issues, humanitarian issues, and climate issues. And we're striving to do it in a fairly dramatic way."

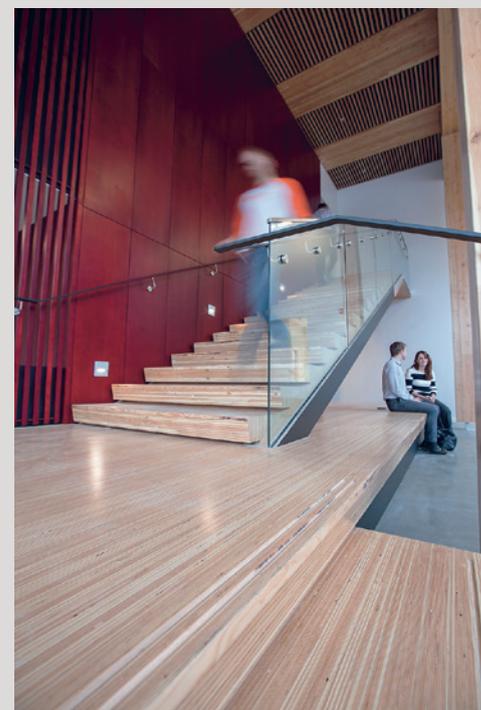
This includes starting his own non-profit research institute, Design Build Research, to get the next generation of designers experimenting with timber construction and thinking about climate, environment, disaster, and global shelter needs, and the role wood can play in finding solutions.

He's also teamed up with Kattera, a Silicon Valley design-build startup focused on streamlining construction end to end, through technology, prefabrication, and mass-timber products. Green sees this partnership as one way to carry out his social responsibilities on a broader, global level. "We want to be an incubator for new ideas, constantly inventing new processes, and this partnership will allow us to do that, make a bigger impact, give good wood architecture to more people than ever before, and help address housing and affordability challenges," he says.

With this newfound collaboration, he hopes to make the leap from specifying wood products to creating new wood products—not the traditional bailiwick of architects. Green talks of inventing new software that enables an architect to design a structure and then, without delay, send the drawing straight to a CLT factory for immediate fabrication. In his view, we will one day be able to work with wood at the cellular level, breaking down and reconstituting fibre into new wood systems and products, using technology similar to 3-D printing.

Even with all this talk of technology, it is the forest itself that Green looks to for inspiration. All these technological advancements are merely a means to an end—to help us emulate what nature already does best. "Nature is incredibly efficient and uses the minimal amount of energy needed to survive and thrive," he explains. "Take a tree branch for instance; it isn't shaped like a rectangle, its structure thickens where it connects to the next branch and tapers along its length, and the fibre inside that branch is aligning to give it the strength it needs—it is a pure, efficient structural shape created by nature."

When asked what's next, Green is optimistic. "As architects, we need to learn from and mimic nature in order to push the boundaries of what we can do with wood. We need to use technology to be in tune, rather than in conflict, with our natural world. We need to understand the story nature is telling us."



Wood Innovation and Design Centre

# Kitsumkalum Health Centre

Kitsumkalum First Nation



The Kitsumkalum are one of the fourteen First Nations that make up the Tsimshian Nation. The Kitsumkalum built impressive longhouse structures along B.C.'s northern coastline, an architectural tradition that inspired the design of the Kitsumkalum Health Centre, a combination of light-wood-frame and heavy-timber post-and-beam construction.

Located in the heart of their traditional territory at the juncture of the Skeena and Kalum Rivers, its sleek and chiseled all-wood form houses health services including community health workers, home care nurses, dental services, and nurse practitioners.

In this region of heavy snowfall, the wood structure is raised on a six-hundred-millimetre foundation wall. The dramatic roof form is achieved using conventional prefabricated

triangular roof trusses installed upside down. The substantial overhang discourages snow accumulation close to the building, and maximizes the penetration of daylight into the interior. The sloping soffits are finished in square-edged Douglas-fir tongue-and-groove boards, which are repeated on the interior ceilings. The exterior wall cladding is of large Douglas-fir boards, milled with a shiplap joint that mimics the appearance of traditional plank siding.

OWNER Kitsumkalum First Nation and Health Canada  
ARCHITECT Lubor Trubka Associates Architects  
STRUCTURAL ENGINEER CWMM Consulting Engineers Ltd.  
COMPLETION 2013 SIZE 411 m<sup>2</sup>

# Canadian Cancer Society Kordyban Lodge

Prince George



In the province's largest northern city, a distinctively non-institutional timber-framed lodge gives respite and warmth to up to thirty-six out-of-town residents receiving medical treatment at the nearby B.C. Cancer-Prince George facility. The hybrid-timber structure is framed with engineered Douglas-fir, light-wood-frame prefabricated wall panels, and engineered roof trusses. Visitors are greeted by a robust entrance canopy constructed of glue-laminated timber (glulam) columns and beams, paired purlins, and exposed wood decking, providing shelter from the inclement weather not uncommon to the region. At the north side, a covered walkway entrance to administrative offices is defined by the rhythm of glulam columns that support a large overhang. Inside, the common spaces are double height,

showcasing the long spans of Douglas-fir, and enveloping occupants with western red cedar panelling in combination with solid maple finishing. A fireplace adds to the residential feel of this all-wood design, which offers cancer patients a comfortable, anxiety-reducing home away from home.

OWNER Canadian Cancer Society, BC and Yukon  
ARCHITECT NSDA Architects  
STRUCTURAL ENGINEER Krahn Engineering Ltd.  
COMPLETION 2013 SIZE 2,323 m<sup>2</sup>



# Wood Wisdom

A young, emerging architect explores the idea of co-design with Indigenous communities

BY MATTHEW HARTY



Portrait of the *Cedar Woman* on display at the Squamish Lil'wat Cultural Centre by Coast Salish artist and carver Aaron Nelson-Moody (Squamish Nation name, Tawx'sin Yexwulla, translates as "Splashing Eagle").



First Peoples House at the University of Victoria.

If, as Vincent Scully said, architecture is “a conversation between the generations, carried out across time,” then it’s an architect’s responsibility to understand that conversation, and to learn from the wisdom of those who came before us.

As a young, emerging architect in British Columbia, I have much to learn about my profession, and a spectrum of materials, knowledge, and traditions from which I can draw inspiration. Indigenous Peoples of B.C. are an especially rich source of wisdom given their unique relationship to wood, a material with deep connections to their culture. In this spirit, I set out on a journey to learn more from the growing number of architects in the province who are collaborating with Indigenous communities, and embracing their unique reverence for wood.

Alfred Waugh (Fond Du Lac Denesuline First Nation, Northern Saskatchewan), founder and principal of Formline Architecture in West Vancouver, explains to me that the Coast Salish peoples have historically used cedar for everything from furniture, textiles, and basket weaving, to larger, structural applications. He describes cedar to me as “the Blood of the Salish People.”

Among contemporary Canadian architects, Waugh identifies himself as a modernist, drawing from an architectural tradition that privileges space and planes over imagery and icons. Earlier in his career, while working for Busby + Associates (now Perkins+Will), he oversaw the design and construction of

the Nicola Valley Institute of Technology. Since forming his own firm, he’s completed such projects as the Indian Residential School History and Dialogue Centre at the University of British Columbia (UBC) and the Squamish Lil’wat Cultural Centre.

Hereditary Chief Gibby Jacob of the Squamish Nation describes Waugh as a very good architect when speaking of his work on the Squamish Lil’wat Cultural Centre. It’s a collective hub and exhibition space for the two Nations to share their art, culture, and history with local residents and the many international travellers visiting the area. He explains, “His designs are well thought out and his approach methodical. He is also a good listener. It is part of his make-up as a First Nations person where knowledge is passed on through listening to your grandparents.”

His design for the Indian Residential School History and Dialogue Centre deploys wood in several capacities, from its primary structural duties to its more ornamental applications, such as the basket weave wall in its entrance atrium. Its layers of transparency and use of wood create visual and spiritual connections to the surrounding landscape, connections that offer relief from the emotional content inside. Waugh says that “when working with First Nations clients, I prefer to design buildings that avoid superficial references to Indigenous imagery, and instead try to deliver buildings that represent First Nations in the modern world.”

A few hours’ drive east of the UBC sits one of B.C.’s earliest examples of co-design with a

First Nations community: the Seabird Island Community School, built in Agassiz in 1988 and designed in collaboration with Patkau Architects and the Seabird Island Band. The school was built by members of the local Seabird Island Band, and included job training opportunities for anyone new to the trade.

In listening to the community, there was a “sincere desire to design a building with a life of its own, the way nature is alive,” says John Patkau, one half of the namesake firm he shares with his partner, Patricia. The building’s ambiguous form, clad in silvery cedar shingles, suggests different creatures to different individuals, such as a salmon, or a bird preparing for flight. The school is in many ways amorphous; it avoids the orthogonal organization typical of educational facilities of decades past, with an organic form that belies its simple parallel-frame post-and-beam structure, a reference to traditional Coast Salish longhouses.

The Seabird Island School is among a collection of ten schools designed by various architects in the 1980s and early ’90s that are the result of an initiative set up by Marie-Odile Marceau, now one half of the practice McFarland Marceau Architects. She founded the initiative on the idea that First Nations communities would find inspiration and empowerment in architecture that is co-designed and informed by their own culture and input. “You could see that people were visibly happy when visiting these schools,” recalls John.

Like the Patkaus, Marie-Odile Marceau and her partner, Larry McFarland, are champions of wood construction in B.C. and have designed a number of projects in collaboration with First Nations clients. In the design for the First Nations House of Learning at UBC, a short walk from Waugh’s Dialogue Centre, wood was used not only for its structural prowess, but for its cultural and spiritual value. In it there are cedar houseposts, a metre in diameter, carved by First Nations artists. This building is what introduced McFarland to the idea that there is a spiritual value in wood.

The spiritual component of wood is a thread common to all of my conversations, and is intimately related to its impact on health and wellness, a primary focus of the design practice of Lubor Trubka Associates Architects. The

firm’s principal, Lubor Trubka, has witnessed “an inherent affinity and feeling towards wood” within Indigenous communities, and an understanding of the material’s “cells and structure, where the hard and soft spots are, and even when untrained community members perform as experienced carpenters, knowing how to cut wood this way versus that.” Trubka recalls a conversation during the design process for Acwsalcta School (Place of Learning), a school in the Nuxalk Nation in B.C.’s Great Bear Rainforest. A young student suggested that the new classrooms should have direct access to the forest. “At the ribbon cutting, the student says to me, ‘I’m glad you listened.’” Architecture is, above all, a handing down of knowledge from generation to generation, and it is difficult to argue that there are any cultures that embody

this sentiment more than the Indigenous Peoples in B.C. The architects I spoke with are embracing this, along with principles of co-design. They’re working in true collaboration with their clients, with central design ideas coming from the communities themselves.

Many Indigenous Peoples have treasured this innately human connection to wood and nature for millennia, and this ancient wisdom is now increasingly informing modern architecture. And, after all my conversations, it’s clear that there is something special about wood—and I’ve only started to scratch the surface. Unlike any other material, wood offers a natural warmth and engages our senses of sight, touch, smell, and hearing (even taste, if one is so inclined). Wood fulfills our need to connect to something greater than ourselves.



Designed in collaboration with and built by members of the Seabird Island Band, this community school, completed in 1988, references the architecture of traditional Coast Salish longhouses.

# Tseshahat Tribal Multiplex and Health Centre

Tseshahat First Nation



To preserve its natural setting, located just outside Port Alberni on Vancouver Island, the Tseshahat Tribal Multiplex and Health Centre's design elevates its heavy-timber structure and follows the contours and outlines of the rocky bluff below. Cantilevering the wood structure over the Somass River's edge doesn't just make it appear to float, it allows for the concealment of the large services and equipment underneath the floor. All of the small service distribution networks are incorporated within the roof assembly between the exposed ceilings and the surface of the roof. The facility fulfills community, health, cultural, commercial, and social functions.

The extensive use of wood was chosen for its cultural significance to the Tseshahat First Nation. As the sun travels its daily path, light floods into the carefully sited facility, bathing the many

wood surfaces to create a warm and luminous ambiance. The structure is a combination of open-framed post and beam in-filled with glazing and a limited number of strategically placed sheer walls. It uses a multitude of engineered wood products and lumber products milled by the Tseshahat from wood harvested from their traditional lands. The design deliberately exposes every element of the wood structure as an architectural feature, requiring precision pre-manufacturing of each element, which was done on-site prior to assembly. Much of the on-site construction was carried out by Tseshahat craftsmen.

OWNER Tseshahat First Nation  
ARCHITECT Lubor Trubka Associates Architects  
STRUCTURAL ENGINEER CWMM Consulting Engineers Ltd.  
COMPLETION 2007 SIZE 1,521 m<sup>2</sup>



# Yunesit'in Health Centre

Yunesit'in First Nation



Located near Hanceville, ninety kilometres west of Williams Lake in the Chilcotin District of the Central Interior of British Columbia, this remote health centre is a contemporary interpretation of the traditional nomadic Yunesit'in dwelling, which typically features a central gathering space framed in Douglas-fir, and flanked by protecting walls made from closely spaced poles in the form of a palisade.

The structure is a dynamic combination of projecting roofs and angled glue-laminated timber (glulam) colonnades that create sheltered outdoor space and framed views of the surrounding landscape. The offices in the health centre are placed on the south side of the building to maximize daylight; an exterior covered area provides shade and protection during hot summer days. The clinical wing of the building is wood-frame construction

and the roof uses prefabricated wood trusses. Inside, the exposed glulam structure and Douglas-fir ceilings, combined with edge-grain Douglas-fir doors and millwork, create a warm and welcoming atmosphere.

The health centre includes a traditional room for First Nations medicine and provides the community with access to a physician, nurse practitioner, health director, community health nurse, home care nurse, and mental health clinicians.

OWNER Yunesit'in First Nation  
ARCHITECT David Nairne + Associates Ltd.  
STRUCTURAL ENGINEER David Nairne + Associates Ltd.  
COMPLETION 2011 SIZE 423 m<sup>2</sup>

