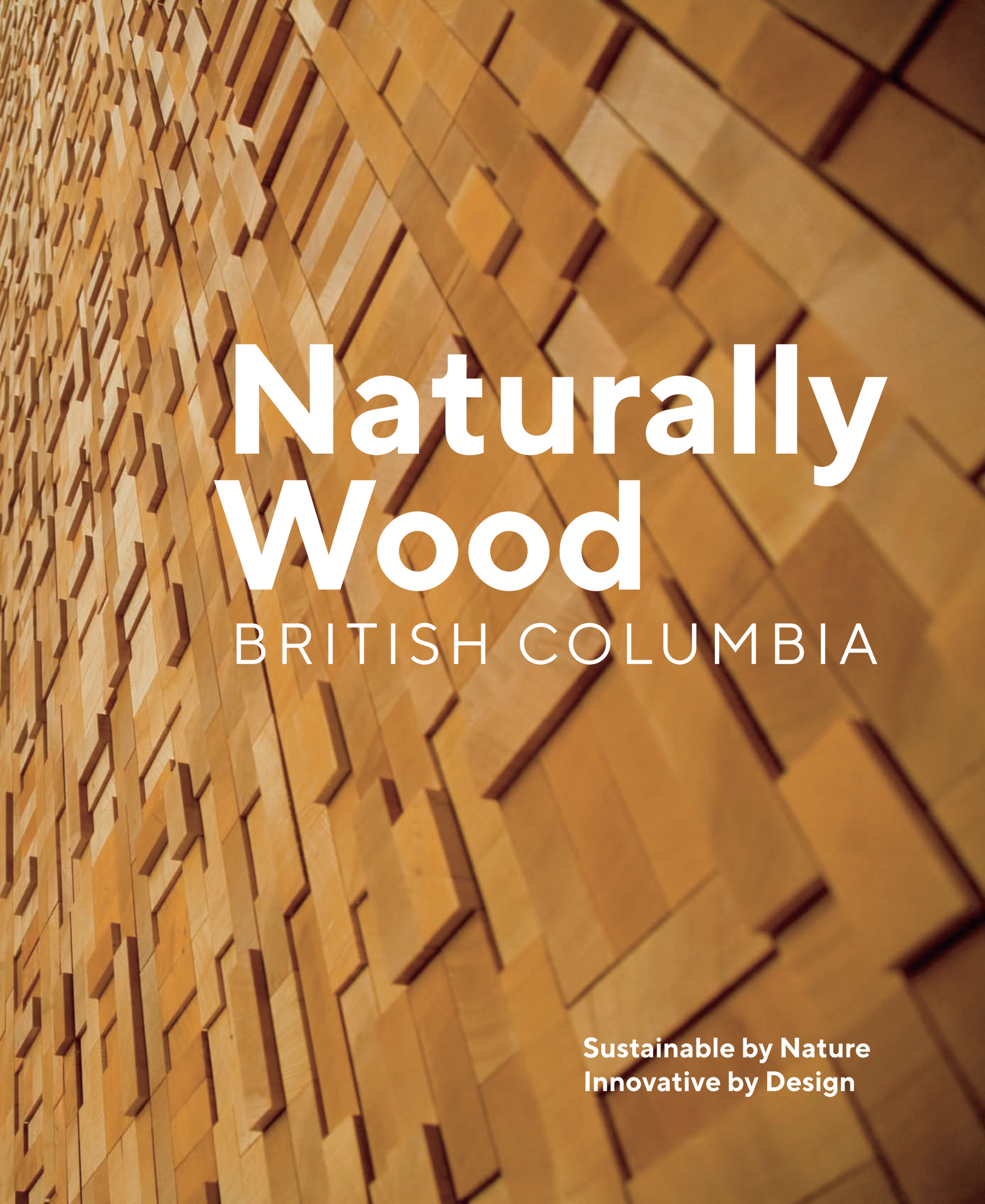

Naturally Wood

BRITISH COLUMBIA

Sustainable by Nature
Innovative by Design

Naturally
Wood

Naturally Wood

BRITISH COLUMBIA

Sustainable by Nature
Innovative by Design

Naturally Wood
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Cataloguing data is available from Library and Archives Canada

ISBN 978-1-9994050-1-4 (PBK.)

naturally:**wood**®

naturally:wood is an information resource about the sustainably managed forests and diverse range of products from the Canadian province of British Columbia, a leading global supplier of softwood forest products.

The content in this publication can also be found on www.naturallywood.com.

Cover photographs: (front) Vancouver Convention Centre, KK Law, (back) Bioenergy Research & Demonstration Facility, Don Erhardt

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Contents

Naturally Wood

British Columbia (B.C.)—the westernmost province of Canada, located between the Pacific Ocean and the Rocky Mountains—is a rugged, biologically diverse, and forested land, spanning 95 million hectares and supporting fourteen distinct ecosystems. Since time immemorial, these forests have provided shelter, clothing, food, and medicines for Indigenous Peoples, and supported their cultural and spiritual values. This far-reaching and densely wooded topography is intrinsic to British Columbians' cultural identity, recreation, and livelihood. The forest sector is directly responsible for 57,000 employees and 7,000 businesses, as well as extensive indirect economic benefits, from the vibrant tourism sector that is supported by a network of vast, protected parklands, to the growing community of internationally recognized experts in wood products, construction, and design.

Covering more than 65 percent of the province, B.C. forests are a natural resource to be nurtured and safeguarded, so much so that B.C. has some of the most stringent forest regulations in the world. To help preserve the region's biodiversity, only native species can be used in the province's tree-planting programs, and significant portions of land remain protected in one of the largest park systems in the world—1,033 provincial parks, recreation areas, conservancies, ecological reserves, and protected areas cover over 14 million hectares. And only a fraction of 1 percent of B.C.'s forests (approximately 200,000 hectares) are harvested annually. All of this natural beauty forms a sense of place that is unique to British Columbians, and is pointedly expressed through the perpetuity of architecture, especially in the increasing number of innovative wood buildings throughout the province.

As early as 1900, buildings in B.C. up to nine storeys tall were built of heavy timber and served as commercial offices and warehouses. A number of these—such as the Leckie Building in Vancouver—still stand today, housing high-tech offices, retail, and live-work lofts and condominiums that are highly sought after for their historic character.

And for more than a century, British Columbians have built their homes with wood and other materials reflective of the surrounding natural landscape, eventually giving rise to the West Coast Modern style. Its telltale traits first appeared in the 1930s in homes in Vancouver, Seattle, and Portland: wood-frame construction, cedar cladding, exposed wood, and open ceilings with post-and-beam construction. The style began to influence the design of schools, community centres, and civic facilities throughout the province, and eventually, decades later, led to the Wood First Act, which recognizes wood's social, environmental, and economic benefits and makes it the material of choice for public buildings in B.C.

Fueled by advancements in technology and mass-timber products, wood is now being used in new and sometimes unexpected ways, to construct everything from tall timber towers—including the world's first eighteen-storey hybrid-timber structure—to community and cultural facilities, such as an Olympic venue boasting one of the world's largest wooden roof spans.

British Columbia is as much about people as it is about place; as much about a thriving community of experts as it is a growing collection of noteworthy architecture. In this book, you will find more than sixty-five examples of wood buildings throughout B.C. Together they tell a story of technological

turning points, design breakthroughs, and industry milestones. Admittedly, there is an ever-growing number of innovative wood buildings throughout the province, too many to mention them all. Organized by building type and selected for their distinct contribution to wood innovation, the projects featured here are merely a representative sample, meant to showcase a diversity of functions, sizes, building types, styles, products, and technologies.

This book aspires to spur British Columbians, our neighbours, and our trade partners to reach out to B.C.'s growing community of forest and timber experts to learn how they can use wood in both structural and finishing applications. You'll find profiles of innovators telling their stories, and their lesser-known secrets, behind their challenges and successes. Visuals and graphics, interspersed throughout the book, offer a glimpse into how some projects were built. A variety of B.C. writers, experts, and community members share their own stories, from an essay inspired by a road trip, winding through some of the province's most breathtaking terrain, to a story of four Coast Salish carvings placed in remote locations throughout the traditional territory of the Squamish Nation, an allegorical reminder to revere what the forest provides.

Wood is a material for our time, a natural choice that can help tackle our biggest challenges in the decades to come. When considered over a building's lifetime, wood can lock in carbon, reduce our environmental footprint, and help fight climate change.

As we confront the fact that buildings are one of our greatest consumers of energy and a potent producer of emissions, there is arguably no more vital question to address, here at home and abroad, than how to ensure the sustainability of our built environment. And if architecture is a conversation between generations over time, in British Columbia, that conversation must begin with wood.

Seeing the Forest for the Trees

Just as innovative wood architecture can inspire awe, so too can the richly diverse forests from which it comes. Trees and forests soothe the soul, cool the air, filter the water, and are home to a vast array of plants and animals. They support industries that stimulate growth in communities large and small, often in remote areas, and anchor local and regional economies. And trees play an integral part in tackling climate change, by removing carbon dioxide from the atmosphere and converting it to carbon, where it is stored first in trees and then in wood products. By managing our forests properly throughout the entire supply chain—starting deep beneath the forest floor through to a building's wood framing, construction, and finishes—we can be confident that innovative wood architecture is sustainable wood architecture.

200 Million Seedlings

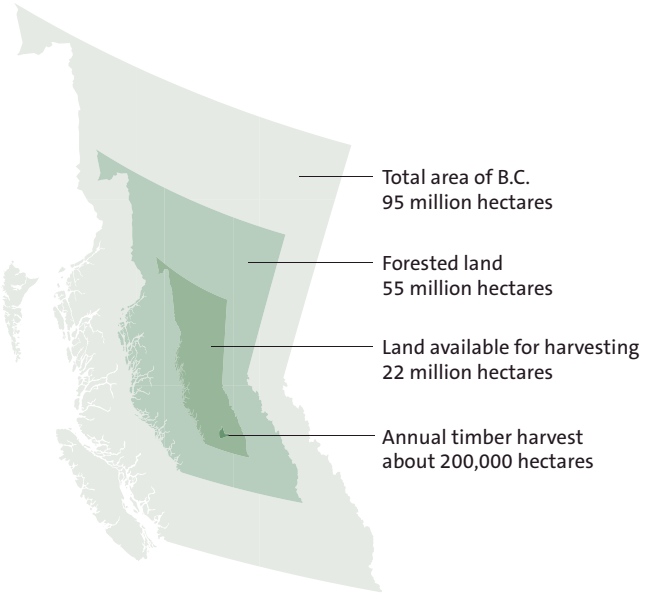
On average, over 200 million tree seedlings are planted annually on public forestland in B.C.

3%

B.C. has roughly the same amount of forested area as it did before European settlement. Only 3% of its land has been permanently converted to other uses, such as farming, ranching, and urban development.

0.2%

A fraction of 1% of B.C.'s forests (approximately 200,000 hectares) are harvested annually. By law, these lands are reforested promptly.



Measures of Sustainability

British Columbia is a global leader in sustainable forest management, and its forest policies continue to evolve to address new issues and reflect the latest science.

Protecting Diverse Forest Values

British Columbia has more than 14 million hectares of protected lands, roughly the size of New York State, where no harvesting is allowed. In addition, a significant amount of land is designated for special management, where values such as wildlife habitat, biodiversity, preservation of old-growth forests, scenic vistas, or recreation take precedence.

Keeping Forests as Forests

A fraction of 1 percent of British Columbia's forests are harvested annually. By law, these lands must be promptly reforested either by planting, natural regeneration, or a combination of both.

Open and Transparent

About 95 percent of B.C.'s forests are publicly owned. Priorities for their use are developed through community-based consultation and strategic planning.

Maintaining Natural Diversity

B.C. has more than forty species of native trees, and resource managers maintain this diversity by planting native species in combination with natural regeneration. They do not allow industrial plantations that introduce exotic species or that fail to meet international standards.

In the Great Bear Rainforest on British Columbia's coast, an unprecedented collaboration among First Nations, the provincial government, environmental groups, and forest products companies resulted in an agreement in 2016 that protects the ecological integrity of the region while ensuring a viable forest sector. The agreement has received international recognition from the World Wildlife Fund (Gift to the Earth award) and the Queen's Commonwealth Canopy.

Reliable Supplier of Legal Products

Forest activities in British Columbia are governed through multi-faceted, sustainable forest management, which includes stringent laws and skilled forest professionals, as well as comprehensive monitoring, compliance, and enforcement. The independent Forest Practices Board serves as a watchdog for forest and range practices in British Columbia, and reports its findings and recommendations directly to the public and the government. In 2017, more than 50 million hectares were certified to internationally recognized certification programs, which provides additional independent assurance that forest products are legally sourced from sustainably managed forests. Customers worldwide trust B.C. as a reliable supplier of forest products from high-quality, legal, and sustainable sources.

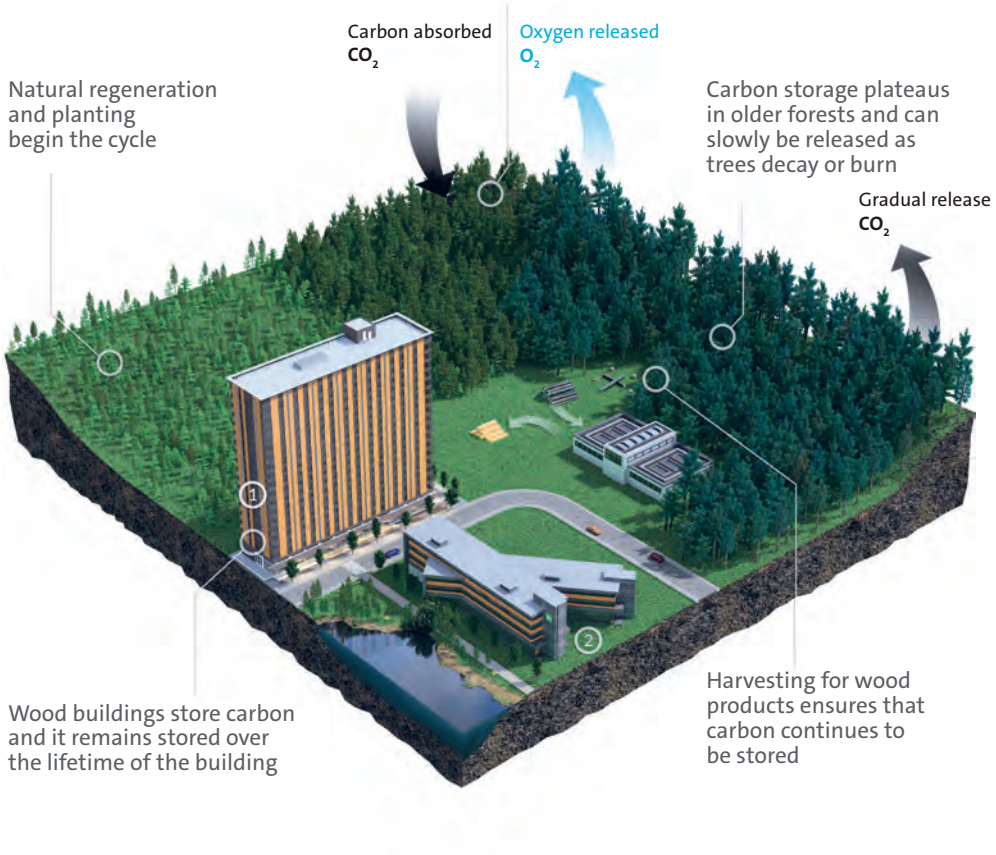
Partnership with First Nations

First Nations Peoples have long been inextricably connected to the forests in B.C., and their involvement in the forest sector today brings invaluable insight and knowledge on sustainable practices. Close to 90 percent of all First Nations in the province have forest tenures or have received offers for licence and harvesting rights, and many have business-to-business relationships with forest companies. First Nations are consulted on activities that may impact their interests or traditional territories.

A Commitment to Sustainable Values

British Columbians treasure their magnificent forests, and the stunning beauty draws visitors from around the world. Forestry is an economic driver, creating tens of thousands of jobs in communities across B.C., and the forests support a wide range of values—from wildlife habitat to clean water to carbon sequestration. Through sustainable forest management, the province, industry, and communities are able to assure British Columbians, and the world, that B.C. wood products meet the highest standards for sustainability and quality.

Growing forests absorb carbon dioxide and release oxygen



① Brock Commons Tallwood House at the University of British Columbia is an 18-storey wood building completed in 2017.
Carbon stored and avoided greenhouse gas emissions: 2,432 metric tons of CO_2. Equivalent to 511 cars off the road for a year.

② Mountain Equipment Co-op Head Office in Vancouver, British Columbia, was completed in 2014.
Carbon stored and avoided greenhouse gas emissions: 2,940 metric tons of CO_2. Equivalent to 618 cars off the road for a year.

Seeing the Trees for the Forest

British Columbia's forests are vast and diverse. The province has more than forty species of native trees, including softwood or coniferous wood, which can be found across the province.

Attributes and Applications of Twelve Native Tree Species

Amabilis fir

REGION Coastal **APPLICATIONS** STRUCTURAL framing, sheathing, subflooring, concrete forms, decking, planking, beams, posts, prefabrication INTERIOR doors, windows, furniture parts, mouldings, panelling **PROPERTIES** High strength-to-weight ratio, dries moderately quickly, easy to work, planes and shapes well, moderate nail- and screw-holding ability, easily treated **COMMERCIAL AVAILABILITY** Commonly sold with western hemlock in structural lumber grades under the name hem–fir

Douglas-fir

REGIONS Coastal, Southern Interior **APPLICATIONS** STRUCTURAL framing, mass timber, plywood, roof trusses INTERIOR millwork, flooring, furniture **PROPERTIES** Excellent strength, dries rapidly, good machining qualities, turns, planes, and shapes well **COMMERCIAL AVAILABILITY** Marketed as Douglas-fir or sometimes Douglas-fir–larch (DFL) in structural lumber grades

Lodgepole pine

REGION Interior **APPLICATIONS** STRUCTURAL framing, trusses, prefabrication INTERIOR joinery for furniture, windows, doors, shutters, millwork **PROPERTIES** High strength-to-weight ratio, dries rapidly, takes a good finish **COMMERCIAL AVAILABILITY** Marketed with white and Engelmann spruce and subalpine fir as spruce–pine–fir (SPF) in structural lumber grades

Ponderosa pine

REGION Southern Interior **APPLICATIONS** INTERIOR furniture, mouldings, windows, trim, panelling, cabinetry **PROPERTIES** Dries rapidly, small dimensional movement with little tendency to check, works easily and smoothly

Sitka spruce

REGION Coastal **APPLICATIONS** INTERIOR sliding screens, panelling, joinery, trim, and specialty products such as musical instruments, trim **PROPERTIES** High strength-to-weight ratio, dries rapidly, easy to work

Subalpine fir

REGION Interior **APPLICATIONS** STRUCTURAL framing, mass timber, trusses, prefabrication INTERIOR millwork **PROPERTIES** Easy to work with, takes stains easily **COMMERCIAL AVAILABILITY** Marketed with white and Engelmann spruce and lodgepole pine as SPF in structural lumber grades

Western hemlock

REGIONS Coastal, Interior **APPLICATIONS** STRUCTURAL framing, roof decking, plywood, beams. INTERIOR mouldings, doors, windows, floors, panelling, ceilings **PROPERTIES** Strong, even density, shapes and planes well **COMMERCIAL AVAILABILITY** Commonly sold with amabilis fir in structural lumber grades under the name hem–fir

Western larch

REGION Southern Interior **APPLICATIONS** STRUCTURAL rough-dimension small timbers, planks, and boards INTERIOR flooring, doors **PROPERTIES** Heavy, hard, strong, dries rapidly, good machining qualities with high bending strength **COMMERCIAL AVAILABILITY** Marketed predominantly as DFL in structural lumber grades

Western red cedar

REGIONS Coastal, Interior **APPLICATIONS** EXTERIOR roof shingles, siding, cladding, decking, portable buildings, fences, outdoor furniture INTERIOR doors, windows, ceilings, wall panelling, millwork, First Nations carvings, ceremonial objects, artistic artifacts **PROPERTIES** Durable, dimensionally stable, lightweight, planes well, naturally resistant to decay and insect damage

Western white pine

REGIONS Coastal, Southern Interior **APPLICATIONS** STRUCTURAL framing INTERIOR windows, doors, millwork **PROPERTIES** Lightweight, easy to work

White and Engelmann spruce

REGIONS Coastal, Interior **APPLICATIONS** STRUCTURAL framing, mass timber, trusses, subflooring, prefabrication, modular housing INTERIOR millwork, finishings **PROPERTIES** High strength-to-weight ratio, dries rapidly, dimensionally stable, superior gluing properties **COMMERCIAL AVAILABILITY** Marketed with subalpine fir and white and Engelmann spruce in lumber grades as SPF

Yellow cedar

REGION Coastal **APPLICATIONS** EXTERIOR shingles, posts, exterior doors, windows, decking, landscaping INTERIOR joinery, panelling, furniture, mouldings, First Nations carvings, ceremonial objects, artistic artifacts **PROPERTIES** Strong, durable, lack of visual grain, easy to manipulate


AMABILIS FIR


WESTERN HEMLOCK


DOUGLAS-FIR


WESTERN LARCH


LODGEPOLE PINE


WESTERN RED CEDAR


PONDEROSA PINE


WESTERN WHITE PINE


SITKA SPRUCE


WHITE AND ENGELMANN SPRUCE


SUBALPINE FIR


YELLOW CEDAR

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.

Adapted from Perkins+Will's *Wood 101 and Mass Timber Pocket Guide*
DIMENSIONS MAY VARY BY MANUFACTURER

CROSS-LAMINATED TIMBER

LAMINATED VENEER LUMBER

DOWEL-LAMINATED TIMBER

MASS PLYWOOD PANEL

GLUE-LAMINATED TIMBER

NAIL-LAMINATED TIMBER

LAMINATED STRAND LUMBER

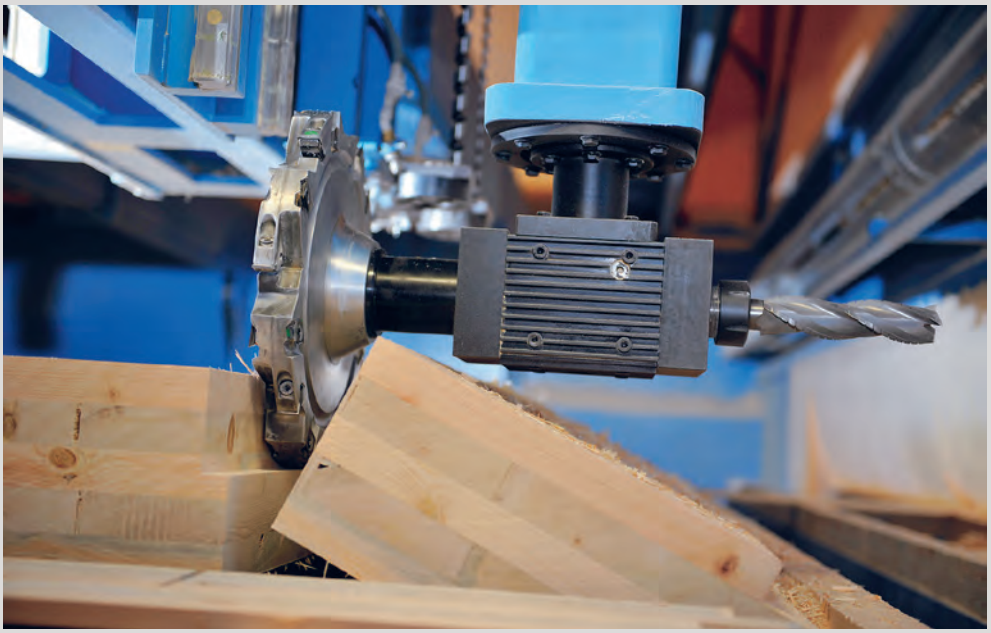
PARALLEL STRAND LUMBER

ESSAY

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 EWPs 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 Saulteau 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.

Growing Strong with Wood

Community, art, and recreation facilities play a vital role in the social, cultural, and physical health of British Columbians. In small towns and remote regions of the province, these facilities may be one of the few public spaces where residents can come together and access important community services. Today's modern community centres, when welcoming and well designed, serve as vital counterpoints to the pervasive digital world, offering tangible, inclusive gathering spaces for diverse populations.

The forest sector has long sustained local economies. In fact, 140 communities throughout B.C. rely on the forest as a primary economic resource. Many of these communities founded on forestry are increasingly returning to their roots by constructing landmark buildings with local wood products, using local expertise, labour, and manufacturers. The use of B.C. forest products not only offers environmental benefits, it also connects residents to local craftsmanship and contributes to economic vitality. Whether it's a hockey game, a swim meet, a concert or other cultural event, community members can see first-hand the benefits and beauty of innovative wood construction. From forest to fabrication, each building featured here tells a story of a vibrant B.C. community.

Squamish Lil'wat Cultural Centre

Squamish Lil'Wat Cultural Centre

Whistler

Adjacent to Lost Lake Park in Whistler's upper village, Squamish Lil'wat Cultural Centre combines technology with tradition, in a contemporary interpretation of traditional longhouse and pit house forms used by the Squamish and Lil'wat Peoples. The post-and-beam glue-laminated timber design supports three storeys across a radial plan, the structure itself cutting into the hillside on the north edge of the steeply sloping site, giving it a dramatic, ceremonious stance.

On the exterior, local basalt ledgestone forms a plinth beneath a window wall along the north side, while prefabricated, western red cedar cladding completes the other elevations. The main entrance, with its intricately carved western red cedar doors, leads visitors directly into a light-filled Great Hall. This impressive double-height space features dugout canoes and a massive western red cedar spindle whorl suspended from the ceiling beams. This main exhibition level also contains a theatre and gallery space. A mezzanine provides a second gallery, workshops, and access to a replica longhouse and an istken (a traditional Lil'wat pit house), located on the south side of the site. Stairs down from the Great Hall lead to the gift shop, cafeteria, and curatorial and administrative spaces. Members of Squamish and Lil'wat First Nations co-designed and constructed the cultural centre, and following its completion established an Indigenous trades school.

OWNER Squamish Nation and Lil'wat Nation
ARCHITECTS Formline Architecture and Toby Russell Buckwell & Partners
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2008 **SIZE** 3,350 m²

Nadleh Whut’enne Yah Administration and Cultural Building

Nadleh Whut’en First Nation

Situated near the base of Mount Fraser near the community of Fort Fraser, the Nadleh Whut’enne Yah Administration and Cultural Building serves as a hub for the Nadleh Whut’en First Nation and includes band administration offices, a health clinic, classrooms, recreation and assembly spaces, and a community kitchen.

Nadleh Whut’en First Nation wanted wood to serve not only as the primary building element, but also to be left exposed as much as possible to visually connect the building to its forested landscape. Wood was used almost exclusively throughout the post-and-beam structure, from the glue-laminated timber (glulam) framing and plywood sheathing to the decorative millwork, interior features, and exterior cladding. Cedar, Douglas-fir, and birch planks showcase the durability and beauty of the locally sourced wood.

The lobby and council chamber are dramatic, circular rooms with a vaulted glulam beam roof clad with cedar tongue-and-groove planks, while large Douglas-fir glulam beams span the width of the assembly hall. Overall, the craftsmanship and extensive use of wood makes this multi-purpose facility a warm and welcoming gathering place for this central B.C. community.

OWNER Nadleh Whut’en First Nation
ARCHITECTS Evans Architecture and Joe Y. Wai Architect (joint venture)
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2016 **SIZE** 2,500 m²

Prophet River Multiplex

Prophet River First Nation

Located along the Alaska Highway south of Fort Nelson, B.C., this culturally significant multiplex provides administrative facilities, council chambers, a health centre, an Elders' lounge, and a community centre for the Prophet River First Nation. To showcase its dramatic wood structure, a fully glazed atrium extends the entire length of the building, filling the interior with abundant natural light during the day and giving the exterior an inviting auburn glow at night. Its primary structure, a Douglas-fir glue-laminated timber post-and-beam design, is offset in plan; the connecting roof beams form a rhythmic triangular pattern the entire length of the building. Between the beams, exposed tongue-and-groove Douglas-fir roof decking envelopes the interior with warmth. The "butterfly" form of the roof, with a central low point along its spine, is designed to retain snow, which acts as further insulation and improves the energy performance of the building during the winter. Community members of the Prophet River First Nation were involved in the construction of the facility, strengthening community ties and reinforcing the region's tradition of building with wood.

OWNER Prophet River First Nation
ARCHITECT AND STRUCTURAL ENGINEER
David Nairne + Associates Ltd.
COMPLETION 2012 **SIZE** 1,291 m^2

Audain Art Museum

Whistler

Enveloped by evergreens, the unmistakably modern Audain Art Museum is an understated, yet expressive, counterpoint to the more traditional alpine architecture that surrounds it in the mountain resort town of Whistler. Located on a floodplain, the structure is elevated a full storey above the ground and crowned with a steeply sloped and panelized prefabricated wood roof, which uses laminated strand lumber for sheathing and parallel strand lumber for rafters. Its distinctive "hockey-stick" shape accommodates and never competes with its wooded location, a solution that eliminated the need to remove trees from the site. Visitors enter the museum over a pedestrian bridge and are greeted by an impressive western hemlock–ribbed oculus and an aluminum sculpture by Xwalacktun, a Coast Salish artist. Clad in dark metal and with western hemlock wood casing throughout, the building is designed to handle the winter climate and heavy snow loads of the region. At night, the museum glows like a larger-than-life wood lantern tucked discreetly into its forested surroundings.

The clear vertical grain of the exterior western hemlock casing seamlessly connects to the wood finishings of the interior, where visitors can enjoy the art collection of Vancouver-based home builder and philanthropist Michael Audain. Works from some of British Columbia's most celebrated artists reside here, including Emily Carr, E.J. Hughes, Jeff Wall, and Stan Douglas. A showpiece of the collection is Haida artist James Hart's monumental cedar sculpture *The Dance Screen (The Scream Too)*. Local wood surrounds the art, in the pathways that connect galleries and on the walls that provide picture-frame views of the surrounding forest. Nature and art become one.

OWNER Audain Art Museum
ARCHITECT Patkau Architects
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2016 **SIZE** 5,203 m²

Audain Art Museum

Sacred Cedar

Coast Salish artist Aaron Nelson-Moody shares the story of the *Four Cedar Women*

BY JASON MARTIN

Cedar Woman housepost displayed at the Squamish Lil'wat Cultural Centre.

Long before European settlers set foot on this vast, rugged terrain we now call British Columbia, a society of First Nations women from different corners of the region kept track of the state of their territories and their environmental health—things like the size of salmon runs, animals hunted, and the medicinal plants taking root.

Seated at his kitchen table with me, artist and carver Aaron Nelson-Moody—his Squamish Nation name, Tawx'sin Yexwulla, translates as "Splashing Eagle"—explains how this story became the inspiration for a carving project, a fifteen-year labour of love he calls *Four Cedar Women*. "Some time back, I met several Coast Salish women; we all had dinner and they were telling me that there was a society of women who would help keep track of the state of the traditional Native territories. I initially didn't know about this particular society, although I knew we Coast Salish had storytelling societies, warrior societies, and several sacred societies."

When he asked one of his friends and teachers, Theresa Nahanee, she eventually recalled the story. "At first she didn't remember," Nelson-Moody says, "but when I spoke to Theresa again six months later she was very excited because she had remembered something from when she was quite young, about these women who looked after our land. She told me to carve four of these women, so that people would remember this role our women played and the care we put into our land; she'd get me the money and logs, and she'd tell the story." Unfortunately, Nahanee unexpectedly passed away soon after. "It broke my heart. She was such a good friend, such a good mentor. It took me a year to even come back to it, but I wasn't going to let her down."

An accomplished Coast Salish artist, carver, and jewellery engraver, Nelson-Moody's work includes the doors to the British Columbia pavilion at the 2006 Winter Olympic Games in Torino, and several large works for sites at the 2010 Olympics in Vancouver and Whistler. Over the next decade and a half, he continued to work on the *Four Cedar Women* carvings, telling and retelling their story along the way.

"From what we gather from these stories, there was this society of women with special knowledge who kept track of how the Nations treated the world—not in human time, but in ancestral time. Young women were raised in the history of the land, learning things such as long migration patterns, long weather patterns, and they would get a sense of the world in geological time. They upheld the highest law in all of our Nations—how we treated the world and nature—and maintaining the environmental health of the territories superseded any local politics," he explains.

As the name suggests, the figures are carved of cedar: one of yellow cedar and the remaining three of western red cedar. Both trees hold special, spiritual meaning for Nelson-Moody and the Coast Salish Peoples—and both are an invaluable resource that this society of women helped manage and safeguard.

Found in low to mid elevations along the West Coast, where the climate is cool, mild, and moist, western red cedar is distinct from other trees of B.C. with its strong, unmistakable aroma; its grey, stringy bark that sheds in long strips; and its flat branches that droop in soft, fan-like sprays. Western red cedar produces thujaplicin, a defense mechanism against rot and fungus. This natural fungicide enables even a dead tree to be a valuable part of the forest. If treated properly, western red cedar products will reliably resist rain and salt water.

Yellow cedar has similar characteristics, but is considerably harder than most softwoods, giving it added strength.

Western red cedar is called the "Tree of Life" by many First Nations Peoples in B.C. "As Coastal People, we are often referred to as Cedar People," says Nelson-Moody. "Our People have been here so long we make up the soil. The trees are our relatives, our cousins—even the same family. One story you hear is of a young woman who was so generous to her people that she prayed and prayed and prayed, eventually transforming herself into the first red cedar, so she could provide for her people. The trees became our clothes, shelter, transportation, tools, and became so much a part of our life—it's all pretty intricately linked."

Coast Salish Peoples use cedar in everyday items including longhouses, canoes, baskets, clothing, ropes, cooking utensils, medicines, spiritual ceremonies, carvings, ceremonial masks, hats, and capes. It also plays a role in their contemplative, ancestral approach to passing down craftsmanship and innovation. Nelson-Moody explains that when an expert acquires a new technology in an activity like hunting, canoe carving, or traditional healing, for the first few years others in the community simply observe, study, and learn from their wisdom. "For example," he says, "if a hunter was to come to his People with a new technology such as a rifle, no one else would pick one up for two or three years. We would let the hunter learn about it first and everyone else would have the restraint, the discipline not to just go grab one themselves. In our tradition we would wait to see what you had to say."

Along with this systemic, holistic understanding of nature—brought to life by Nelson-Moody's carving of *Four Cedar Women*—non-Salish societies can benefit from the carefully considered, unhurried approach to technology and innovation that Nelson-Moody describes. "We have a unique culture of innovation. It's a tradition of integrating new technology in a slower, deliberate, thoughtful way. I think this approach to innovation is a fascinating part of our culture."

In 2013, Nelson-Moody completed *Four Cedar Women.* One of the figures is on display at the Squamish Lil'wat Cultural Centre, while the other three have been placed in remote locations throughout the Squamish Nation, demonstrative of their role to watch over the land.

Remarkably, their story was reinforced, he explains, when a forest fire broke out in Upper Squamish. "We were watching the news and they were flying over with the chopper and commenting, with surprise, on a carving they had spotted on the bluff. There on the television was one of my carvings of the *Four Cedar Women* and everything around the carving had burned, but the bluff and the carving remained untouched." And so the *Four Cedar Women* live on, their wisdom shared in the telling and retelling of their story.

Portrait of the *Cedar Woman* on display at the Squamish Lil'wat Cultural Centre.

Upper Skeena Recreation Centre

Hazelton

When its forty-four-year-old ice arena was condemned due to safety concerns, the construction of the Upper Skeena Recreation Centre, built of heavy timber and wood-frame construction, delivered efficiency, innovation, and hope to this remote northern region. Complete with an NHL-sized ice rink with seating for five hundred spectators, a full-sized gymnasium with a fitness room, and areas for cultural programs, the facility's construction was initiated by local residents and is designed to be more than a place to play sports—it provides a safe place to come together and strengthen their sense of community.

The facility's exposed wood roof, supported by glue-laminated timber beams and columns, represents an economical framing solution. Simplified construction methods for the roof and exterior walls, which are made with plywood and dimension lumber, deliver further cost savings. To speed construction, the wood wall and roof panels were prefabricated by local workers and then dropped in place for rapid assembly. This all-wood solution delivers a structural performance and ease of installation that is comparable to steel, with the added benefits of aesthetic warmth, natural insulation, carbon sequestration, and locally sourced materials and labour. The practical yet beautiful wood structure was made possible through grassroots community involvement and gives the region a focal point of pride that will last for decades to come.

OWNER Regional District of Kitimat-Stikine
ARCHITECT Hemsworth Architecture
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2019 **SIZE** 5,050 m^2

P’egp’íg’lha Community Centre

T’ít’q’et First Nation

Located within the Central Interior–Fraser Canyon region of B.C., this all-wood facility, supported by vertical glue-laminated timber (glulam) posts, shallow glulam arches, and cross-laminated timber panels, provides the T’ít’q’et First Nation with a community hall, band offices, and health centre while offering all the First Nations of the St’át’imc People amenities for traditional feasts and ceremonies.

Situated near the town of Lillooet on benchlands high above the Fraser River, the centre’s heavy timber design draws on the principles of traditional Indigenous dwellings, sinking the structure partially into the ground to create a natural earth shelter. This design makes practical use of the rugged landscape and helps fend off the hot summers, harsh winters, and persistent winds that are characteristic of the region.

The community chose wood—locally harvested, processed, manufactured, and constructed partly by T’ít’q’et First Nation members—for its cultural, environmental, economic, and social benefits. Exterior finishes include tongue-and-groove cedar siding and pine soffits. Visitors to the building are greeted by decorative screens of cedar boards interwoven with vertical poles, recalling the exceptional basketwork of the traditional crafts of the T’ít’q’et.

OWNER P’egp’íg’lha of the St’át’imc Nation
ARCHITECT Urban Arts Architecture
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2014 **SIZE** 1,860 m²

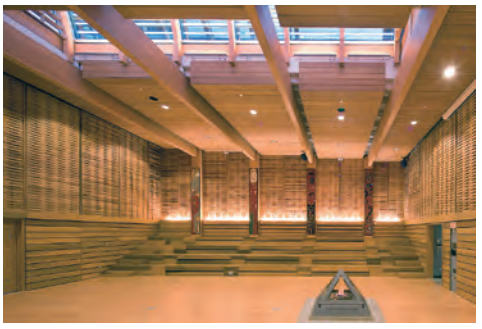
First Peoples House

Victoria

The First Peoples House was designed as a home away from home for Indigenous students at the University of Victoria, the largest university on Vancouver Island. It is a social, cultural, and academic centre and serves as a safe and welcoming place for connection and community building. The facility houses the Office of Indigenous Affairs, student counselling services, classroom space, a student lounge and Elders' lounge, faculty offices, and a ceremonial hall and kitchen. Following the Coast Salish style, the ceremonial hall, with its heavy timber structure, is built according to a traditional longhouse design, while employing modern glue-laminated timber Douglas-fir beams and columns, with inconspicuous tight-fit stainless-steel pin connections.

The exterior is clad with cedar while the lower portion of the structure is flanked by load-bearing insulated rammed-earth walls. This design detail is a reference to the traditional interior Salish pit house structures and it offers a sustainable source of thermal control and a natural tactile aesthetic. Inside, woven-cedar wall panels and cladding envelop the visitor in a palpable, aromatic sense of warmth. The facility showcases two sets of carved cedar houseposts, carved ceremonial doors, and inset panels in the hall, along with other First Nations artwork. The final design reflects input gathered during consultation with First Nations leaders as well as Indigenous faculty, staff, and students. At night, with its abundant use of western red cedar, clerestory windows, and glazing, the building glows orange like a jewel box amid its wooded surroundings.

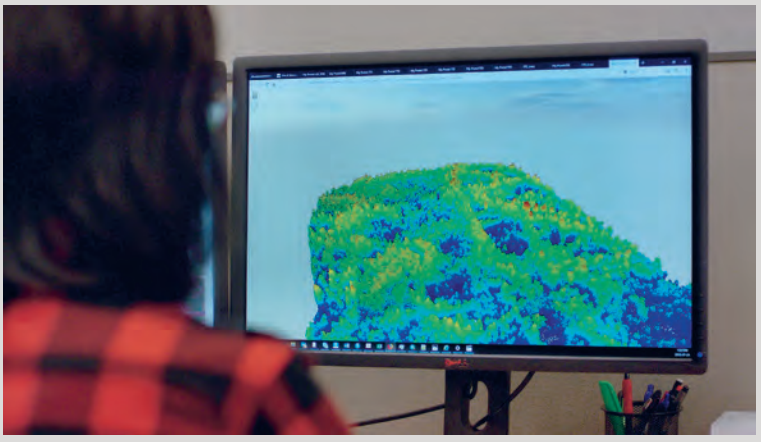
OWNER University of Victoria
ARCHITECT Formline Architecture
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2009 **SIZE** 1,196 m^2



Technology Meets Tradition

A First Nations forester turns to traditional knowledge and new technology for wiser resource management

BY KAREN BRANDT



First Nations forester Matt Wealick is combining traditional knowledge with new technologies, such as light detection and ranging (LiDAR), a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.

As the original inhabitants of the place that today we call British Columbia, First Nations are the holders of thousands of years of traditional knowledge about these lands. Although there is no universally accepted definition of traditional knowledge, the Assembly of First Nations says it is commonly understood as "the collective knowledge of traditions used by Indigenous groups to sustain and adapt themselves to their environment over time." This knowledge is deeply rooted in First Nations history and culture and is passed down through generations.

Today we often talk about sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs," as it has been defined by the United Nations' Report of the World Commission on Environment and Development. Increasingly, we are discovering the linkages between traditional knowledge and the call for more sustainable practices. Yet, to a large extent, the western world has been slow to incorporate this knowledge into natural management approaches. However, with the growing role of First Nations in the forest sector, the acknowledgement of rights and title, and the leadership of First Nations in land use planning, traditional knowledge is beginning to take its rightful place—assuming a larger role in the environmental conversation among industry, academia, and government.

Matt Wealick is a member of the Ts'elxwéyeqw Tribe near Chilliwack in B.C.'s Fraser Valley. Their territory is over 95,000 hectares and is "rich in Ts'elxwéyeqw cultural history, natural beauty, and resources." Their mission is "to achieve strength, unity, and success by managing natural and cultural resources for the well-being of our people and our environment."

Drones and LiDAR technology can be used to create 3-D maps to assist in better forest management.

Wealick's family has a long history rooted in the forestlands of B.C. His father worked in forestry, which led him to northern Vancouver Island, where Wealick grew up—deep in the heart of the forest industry. After spending several years on logging crews and as a professional hockey player, he earned his bachelor of science in forestry, and later a master of arts in environment and management. Today he is a Registered Professional Forester.

But his formal training in traditional knowledge began not in university, but in 2002 when he started working with Lennard Joe, general manager of Stuwix Resources, a joint venture owned and operated by eight First Nations in B.C.'s Southern Interior. "It was an eye-opener for me. Up until that time, I hadn't put a First Nations lens on forest management—it's not something that we learned in university," says Wealick. "Through Lennard and community members, I began to learn about the significance of honouring the forests through conducting ceremonies before logging; protecting fish, water, and plants that sustain our people to this day; and the spiritual and cultural values and history of the area."

In 2004, when the Ts'elxwéyeqw Tribe received its first forest licence, Wealick knew it was time to come home. "Here I was, a professional forester, but I knew I had so much to learn about traditional knowledge and the history of my people," says Wealick. He spent his first three months on the job going through archives, visiting sacred places, and speaking to community leaders, members, and Elders. "To truly achieve the goals of our people I had to develop a forest stewardship plan that went beyond the regulatory requirements and my university education. I needed to incorporate the Tribe's values, like water, plants for food and medicine, wildlife, and important spiritual areas—these are things that aren't legislated but are integral to the survival of our community and all living beings."

He has since developed a database for many of these values, and is using LiDAR—an aircraft-borne laser scanning tool—to capture much of the forest and plant data which will be modelled into future forest plans and shared with other forest companies operating in the territory.

There are a number of people and organizations who believe, like Wealick, that sharing traditional knowledge with non-Indigenous peoples—who make up 95 percent of B.C.'s population—is integral to sustainability. It's also something that is on the mind of John Innes, the dean of the Faculty of Forestry at the University of British Columbia.

The university has launched Indigenous forestry initiatives that provide First Nations students with a specialization in community and Aboriginal forestry, but Innes believes more needs to be done to weave traditional knowledge into the forestry curriculum for all students. "When it comes to traditional knowledge, I don't believe students in North America are getting the knowledge they need," says Innes. "Our goal is to create a centre of excellence in traditional use and management, with at least half of the instructors being of First Nations descent."

Forest companies also know that incorporating traditional knowledge is good for the environment, business, and relationships with First Nations. For example, one B.C. company has signed an agreement with the shíshálh Nation that includes a joint decision-making process to ensure that forestry operations uphold shíshálh laws and values. And Canada's third-party forest certification systems are also embracing the use of and respect for traditional laws—with specific and auditable requirements for forest companies.

Governments are beginning to recognize traditional knowledge in legislation. The Species at Risk Act states that "the traditional knowledge of the aboriginal peoples of Canada should be considered in the assessment of which species may be at risk and in developing and implementing recovery measures."

Managing our forests and ensuring a healthy planet and communities for generations to come is a goal we all share. Wealick believes it can be achieved by combining thousands of years of traditional knowledge with the professional training of land managers and the latest technology. Both Wealick and Innes agree that twenty years from now, First Nations values and traditional knowledge will be a keystone in natural resource management in B.C. "We have work to do, but we are headed in the right direction," says Wealick.

A Natural Choice

Wood is a natural choice and is particularly well suited to the demanding atmospheres of swimming pools and ice rinks. It tolerates high levels of humidity, offers acoustic and thermal benefits, and absorbs and releases water vapour without compromising its structural integrity.

British Columbians are drawn to water, and for good reason: the province is home to abundant temperate rainforests, a rugged Pacific coastline, and numerous lakes and rivers. Nonetheless, our climate calls for indoor swimming for much of the year, and the popularity of aquatic facilities throughout the province is undeniable. Indoor pool design has evolved dramatically over the past decades. Today, B.C.'s aquatic facilities boast an ample use of natural light, unique design features, and a bold, innovative use of wood.

Similarly, arenas and ice rinks are bustling gathering places for communities, whether for hockey, figure skating, performances, or other activities. As a natural insulator with a warm aesthetic, wood is a strong performer for B.C.'s arenas and recreation facilities, big and small.

Trout Lake Rink
OWNER Vancouver Board of Parks and Recreation
ARCHITECT Walter Francl Architecture Inc.
STRUCTURAL ENGINEER Fast + Epp
LOCATION Vancouver

West Vancouver Aquatic Centre

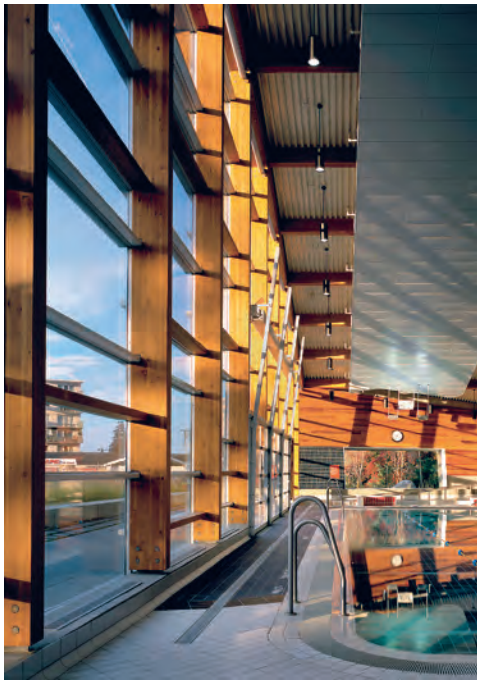
West Vancouver

The West Vancouver Aquatic Centre rejuvenates an aging facility with the addition of a leisure pool, an accessible hot tub, an extra-tall waterslide, family change rooms, a multi-purpose room, fitness areas, and public viewing areas.

The leisure pool, with its custom-designed glue-laminated timber (glulam) mullions, accommodates overhead doors and a series of electrically operated, solar shading devices. A unique fabric roller blind, featuring public art by B.C.-based abstract painter Sylvia Tait, spans the glass wall to provide solar glare control for the pool area. Along with natural lighting, operable glazed overhead doors and mechanically operable vents allow fresh air to flow naturally through the building. These unique features enhance the facility's air quality, while providing users with an outdoor pool–like experience.

The structure features glulam beams, purlins, and columns, a versatile solution that provides long, clear spans over the wishbone-shaped columns. Through careful detailing, connections are virtually invisible and structural lines flow uninterrupted.

OWNER District of West Vancouver
ARCHITECT HCMA Architecture + Design
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2004 **SIZE** 3,716 m^2



West Fraser Centre

Quesnel

Wood is the natural choice of building material in this small city, located at the confluence of the Fraser and Quesnel Rivers in B.C.'s Cariboo region, where forestry is key to the community's livelihood and economy. Locally sourced cross-laminated timber (CLT) and other wood products are central to the design of this professional-sized hockey arena, which is used for a wide variety of events. Upon arrival, visitors enter a double-height glass atrium with a roof and interior walls constructed of CLT. Wood is left exposed in the lobby, along with the stairwell and a smaller foyer, giving these spaces natural warmth and insulation. The large roof structure of the main arena space is framed with curved steel girder trusses that are accented by an attractive wood-slatted ceiling assembly. The insulated ceiling serves double duty, concealing mechanical services while absorbing sound and improving acoustics—so much so that it's a suitable venue for anything from hockey games to music concerts, making the centre a recreational and cultural hub for the area.

OWNER City of Quesnel and the Cariboo Regional District
ARCHITECT HDR | CEI Architecture Associates, Inc.
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2017 **SIZE** 5,800 m^2

Cowichan Lake Sports Arena

Lake Cowichan

The central features of this renovation and addition are made of local wood products, drawing on the historic origins of this forestry town west of Duncan on Vancouver Island. This revitalization project adds a dramatic new entrance to the facility, as well as large multi-purpose rooms that are easily subdivided, a new concession, warm viewing areas, an enlarged administration space, and new change rooms tailored to the needs of the local curling and hockey teams.

An inspiring level of community involvement helped source and secure materials, including the equivalent of fifteen truckloads of wood products donated by local logging companies and distributors. The heavy-timber hybrid structure features glue-laminated timber beams with solid-wood decking and exterior tongue-and-groove western red cedar cladding. The interior features birch-plywood millwork and sprung gymnasium floors made of hardwood, a versatile surface for the diverse range of functions the facility hosts, from square dancing to floor hockey.

OWNER Cowichan Valley Regional District
ARCHITECT HDR | CEI Architecture Associates, Inc.
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2010 **SIZE** 3,400 m²

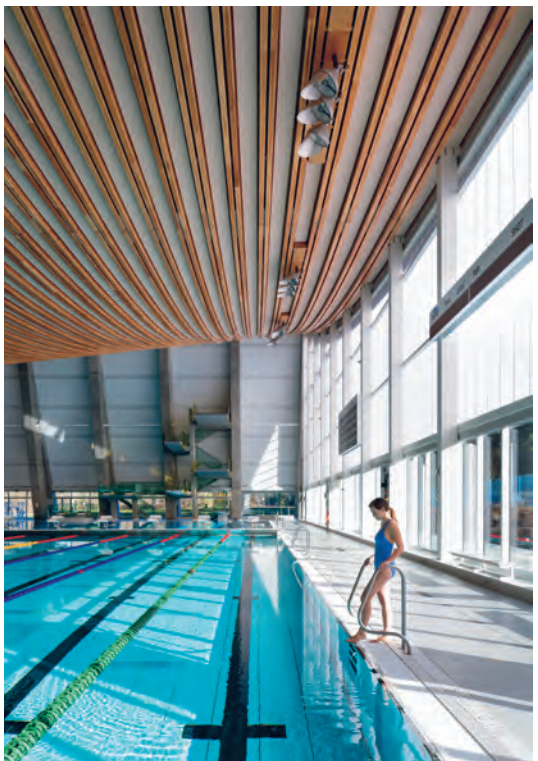
Grandview Heights Aquatic Centre

Surrey

Located in the centre of the province's fastest-growing municipality, Grandview Heights Aquatic Centre is designed to accommodate both international swim meets and a wide variety of water-related community activities. An all-glass natatorium houses a competition-sized lap pool, a leisure pool complemented by two hot tubs, a sauna, a fitness centre, and a poolside café.

This is an aquatic centre that looks ready to take flight, with suspended, undulating glue-laminated timber cables that swoop skyward. Swimmers look up to a soaring sixty-five-metre-long catenary roof, the longest clear span of its kind to date, prefabricated from regionally sourced Douglas-fir beams crane-lifted into place in just eight days. This pioneering structure, only three hundred millimetres thick, reduces the building's volume significantly and in turn boosts energy and capital cost savings. By forgoing the need for conventional steel cabling, which often requires expensive connectors, the nearly all-wood, wave-like design achieves an astonishing structural feat with elegance and economy.

OWNER City of Surrey
ARCHITECT HCMA Architecture + Design
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2016 **SIZE** 8,825 m²



Guildford Aquatic Centre

Surrey

Guildford Aquatic Centre, located in northeast Surrey, shows how wood can be undisputedly modern, luminous, and minimalistic. The prefabricated twenty-nine-metre-long wood trusses conceal pre-installed mechanical ducts, sprinklers, uplighting, and acoustic ceiling insulation. The wood trusses are stained and painted white but display a textured wood pattern, giving a subtle warmth to this Zen-like aquatic centre.

OWNER City of Surrey
ARCHITECT OF RECORD Bing Thom Architects
ASSOCIATE ARCHITECT SHAPE Architecture
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2015 **SIZE** 6,503 m²

Strong Roots

Why wood is the natural choice for HCMA Architecture + Design

INTERVIEW BY JASON MARTIN

Grandview Heights Aquatic Centre

Canada Games Pool & Centennial Community Centre Public Engagement

Whistler Public Library

Darryl Condon and his firm, HCMA Architecture + Design, have embraced and often pioneered the use of wood and mass timber in community, civic, and recreational aquatic facilities throughout British Columbia and Canada. Condon shares why wood is often an integral material in the buildings they design, and how they've pushed the boundaries of what is possible with wood.

Q: Why have you made community centres and recreation facilities a significant focus for your firm?
A: There are many aspects of responsibility that come with the privilege of designing community buildings. These facilities play a vital role in civic life and ultimately in helping to shape strong, just, and cohesive communities. At HCMA, we strive to challenge the traditional boundaries of architectural practice and become catalysts for positive change. Good architecture, I believe, builds community in many ways, but central to this is providing the context for positive social engagement. Whether it be a library, a school, an ice arena, or a swimming pool, they accommodate functions—yet these activities can be seen as a means to a greater end: building community.

Q: What role does wood, as a building material, play in the facilities you design?
A: As a firm we have been exploring the many ways that we can achieve better social outcomes, both through our work and the tools and methodologies we use in the process. For us, the use of wood in community facilities is directly linked to this. The environmental benefits of wood are increasingly well understood, but it is important to recognize the broader social sustainability benefits as well. We are fortunate to have many municipal clients that embrace this mandate and we have enjoyed their support as we have explored the nature and capacity of wood construction. As British Columbians, it makes sense that we are drawn to building with wood and we've really embraced pushing the envelope with what you can do with wood, such as with Grandview Heights Aquatic Centre.

Q: For Grandview, how were you able to achieve such an astonishing structural feat using wood?
A: Grandview Heights Aquatic Centre is the result of a great, forward-thinking client and a passionate architectural design and structural engineering team. We were encouraged by our client, the City of Surrey, to pursue an innovative solution for the project. Here, we tested the limits of wood to be used in long-span buildings by developing a tensile roof structure, using engineered wood cables that use steel only in their connections.

We have long recognized the inherent benefits of utilizing wood in indoor swimming pools; wood is a great solution to the challenges of chlorine and humidity. While analyzing or renovating older swimming pools, we see the wood structures standing up to these rigours very well. It's been a material of choice for all of our recent aquatic facilities. At Grandview, the nature of the wood structural system also provided a visceral expression of fluidity, waves, and water, while being an incredibly efficient design. Here, function and beauty are one—the wood structure is the architecture, and the architecture is the structure.

Q: As an early pioneer with wood in B.C., what is an innovative wood project you are particularly proud of?
A: A notable project for us is the Whistler Public Library, which was completed in 2008. For the Resort Municipality of Whistler, this project had many aspirations including the goal of providing a uniquely civic place in a primarily commercial resort community. The use of wood, while not mandated, was a natural choice to create a new and authentically local language for civic architecture in a mountain community. At the time, a mass-timber approach was not an obvious choice, as more materially efficient structural solutions were the norm. We explored a variety of wood solutions, but ultimately settled on a prefabricated wood panel system utilizing one-hundred by three-hundred–millimetre hemlock members fastened together in an early and innovative form of mass-timber construction. The western hemlock was significant, as we were able to demonstrate the structural potential for an often-overlooked species, one that is abundant near many resource-dependent communities.

Q: Where will you go next when it comes to pushing the boundaries with wood?
A: From the lessons learned from Whistler Public Library, and others, we have been able to integrate a mass-timber approach in a variety of building types, including schools, fire halls, and swimming pools. Every project is unique and offers new possibilities. Who knew we would achieve the world's longest span of a timber catenary roof, as we did with Grandview Heights Aquatic Centre? Wood is a limitless material in so many ways—renewable, and with extraordinary expressive potential. That it fits so well with the role and mandate of community facilities means that we will be continuing to explore and imagine new possibilities in the future.

Wood in the Neighbourhood

As our neighbourhoods grow denser, our work more flexible, and our daily lives more digital, recreation facilities in urban centres only grow in importance—they offer refuge from the bustle of city life, and a safe and welcoming place for connection. For people who share living spaces or work from home, these recreational spaces can even become an extension of their homes—a kind of community living room.

In addition to the standard recreational programming and services, some facilities are beginning to provide workshop spaces for activities such as woodworking, painting, and pottery, along with shared "piazza-like" gathering areas that can double as co-working spaces.

Often becoming a part of people's daily routines, whether for sport, recreation, or just a place to hang out, these facilities are a vital part of a neighbourhood's social fabric. Wood can play an important role in making these buildings warm, inviting, and environmentally sustainable—and, not unlike your home, a place you truly want to be.

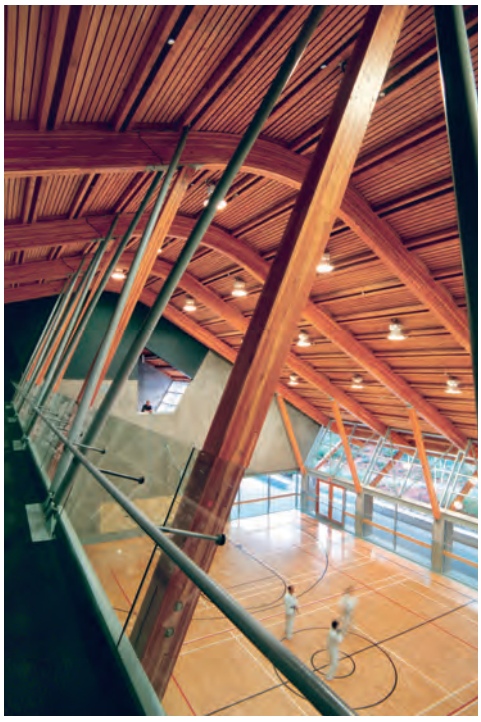
The Hangar Fitness and Wellness Centre
OWNER University of British Columbia
ARCHITECT McFarland Marceau Architects Ltd.
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
LOCATION Kelowna

Gleneagles Community Centre

West Vancouver

Located in West Vancouver's Gleneagles neighbourhood, this community centre incorporates an impressive range of sustainable features. Design, form, and materials serve double duty, offering striking aesthetic beauty as well as environmental benefits. The heavy-timber shed-like roof, composed of prefabricated wood panels and supported by Douglas-fir glue-laminated timber beams, wraps the facility with a generous overhang to provide protection from winter precipitation and summer sun, while collecting and dispensing rainwater back into the natural landscape. Inside, the structure acts as a huge thermal-storage mass, and complements a highly efficient geothermal heating and cooling system. As the defining feature of the building, careful attention was given to the timber roof's detailing to minimize the need for exposed steel plates and preserve the character and elegance of the wood.

OWNER District of West Vancouver
ARCHITECT Patkau Architects
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2003 **SIZE** 2,235 m^2



Wesbrook Community Centre

Vancouver

Glue-laminated timber columns, cross-laminated timber panels (CLT), and steel and concrete form the primary structure of this two-storey community centre that includes fitness facilities, multi-purpose rooms, a teen centre, a dance studio, a child-minding centre, and a café. A central, linear atrium, boldly framed by double-height timber columns and wrapped with floor-to-ceiling exposed CLT, greets visitors and connects them intuitively to the facility's program areas. Located adjacent to Pacific Spirit Regional Park, the forested surroundings and natural palette are reflected in the building's exterior materials of granite, cedar, and aluminum cladding. Inside, an abundance of exposed wood and natural light pulls the outside in, and gives visitors a sense of the nature that surrounds them.

OWNER University of British Columbia
ARCHITECTS Francl Architecture Inc. and PUBLIC: Architecture + Communication
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2015 **SIZE** 2,800 m²

Timber City

How the City of Surrey is winning with wood

BY JASON MARTIN

Artist rendering of Clayton Community Centre.

"Surrey has big aspirations," according to Scott Groves, who oversees the design, construction, and operation of all civic facilities in Surrey. The burgeoning metropolis, located between the Fraser River and the Canada–United States border, is now the province's fastest-growing city.

Once considered a suburb, Surrey is now arguably the region's emerging second downtown: its population of over half a million is growing at twice the rate of Vancouver's, and is set to eclipse it by 2030 to make Surrey the largest city in the province. "Surrey is a diverse city that speaks over a hundred different languages. We want to connect our citizens, share our cultures, and break down barriers," Groves says.

Within the last decade, the City of Surrey has made significant investments in civic and community buildings, many of which not only incorporate wood and mass timber, but represent boundary-pushing, world-class architecture. This is thanks in part to a Wood First Policy that the City adopted in 2010, which recognizes wood's social, environmental, and economic benefits, and makes it the material of choice for public buildings.

It seems fitting and fortuitous that Groves grew up in B.C.'s South Cariboo region in the town of 100 Mile House, the self-proclaimed "handcrafted log home capital of North America." His family's first business was building heavy-timber log houses. "My very first real job was making the pieces of wood that would serve as the balcony rails for log cabin homes. At the age of thirteen, I'd go out and cut down small trees, strip the bark off, and sell the poles to my uncle," Groves recalls.

Between semesters at the University of British Columbia, where he completed a civil engineering degree, Groves worked as a tree

planter, another experience that he believes reinforced his affinity for nature and wood. "My upbringing, and where I grew up, I think it definitely gives me a different perspective and an appreciation for nature and wildlife—a connection that is, perhaps, a little deeper for me. I don't know how many tens of thousands of trees I planted in this province but I'm proud to have been part of that," says Groves.

Before joining the City of Surrey, Groves worked as a civil engineer on the Richmond Olympic Oval and for the Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games. Since then, he's played an important role in Surrey's "If we build it, they will come" strategy, which appears to be working: the city is gradually transforming from a mostly automobile-centric suburb to a metropolitan city with walkable, transit-friendly town centres.

For Groves, it's about connecting the increasingly dense and diverse communities of Surrey, in a day and age when people can feel isolated. "Today, more and more people live in homes or condos where they don't have enough room for a garage, workshop, or studio anymore and, at the same time, we often don't tend to meet or rely on our neighbours as much either. Civic and recreational facilities are becoming an extension of our living space, a kind of community living room in some ways," he says.

And Groves believes making those spaces warm, welcoming, even awe-inspiring, is crucial to their success—and wood, he explains, has a distinct role to play, adding intangible value that goes beyond mere construction costs. "We need to make these facilities places people want to be in, and using wood is a part of that. Pre-engineered manufactured open-web steel-joist construction might be cheaper, in some cases, but on its own it would fail to meet the objectives of most projects. You wouldn't achieve civic pride and it wouldn't create a place where people want to hang out and connect with their community. To be successful, we want it to feel like an extension of your living room." He adds, with a chuckle, "and people don't make their living rooms out of metal."

One particularly successful example is the Grandview Heights Aquatic Centre. Designed by HCMA Architecture + Design, the 8,825-square-metre building boasts a nearly all-wood, sixty-five-metre-long free-hanging curved roof, the longest clear span of its kind to date. "We're very proud of Grandview Aquatic Centre. Visitors almost feel like they're swimming outside and that's an experience that people don't get so much anymore. It's because of a number of factors—it has a spacious, open feel, the ceiling is so high and it has this great wood structure," he explains. "Because it has so many glulams and because they use them as cords, you stand at one end of the lap pool and it creates this interesting optical illusion, making it look even larger, more expansive. It turns out wood works really well in tension. It's a brilliant design."

Equally successful, but distinct in its design, is the Guildford Aquatic Centre by the late architect Bing Thom. The all-white, prefabricated, twenty-nine-metre-long wood trusses (made from laminated strand lumber) show how wood can be unmistakably modern in its aesthetic, while solving a common operational problem. By neatly tucking away pre-installed mechanical ducts, sprinklers, uplighting, and acoustic ceiling insulation into the trusses, maintenance staff can access mechanical services or change a light bulb without having to shut down the pool, a simple cost savings that Groves appreciates.

But the project he seems most excited about is just breaking ground. Designed to be a seven-thousand-square-metre hub for its fast-growing, demographically diverse neighbourhood, Clayton Community Centre challenges conventional civic design principles by combining recreation, library, arts, and parks spaces into a single facility centred on an atrium that could be likened to a modern-day piazza.

Wood will be a primary component of the design, and in fact offers cost savings for the futuristic community centre. When there was pressure to reconsider steel as a structural solution to save money, Groves pushed back. After some number crunching, it turned out the steel option posed more risk, with the potential for significant cost overruns. "Using wood wasn't more, and in fact could save us money in the long run," he remarks.

Beyond cost, Groves explains that retaining the park-like feel of the site and incorporating wood into the structure was important to the community. "They told us they didn't want to lose the park and the trees, so part of the goal of the design is to bring the forest into the building. The atrium will serve as a kind of extension of the canopy of the forest nearby and the glulam and pinwheel design creates a leaf- and branch-like structure. We want to connect the community and connect that community to nature. Using wood in this project was a big piece of that."

And, perhaps more than anything, Clayton Community Centre reflects the civic aspirations and ideals of a richly diverse, spirited, and progressive metropolis—one that is investing in its long-term future and, most importantly, in its citizens.

Central City

Richmond Olympic Oval

Richmond

The Oval is a precedent-setting achievement of wood engineering and construction. It features one of the largest wood roof spans in the world, which was fabricated with hybrid glue-laminated timber–steel arches and 452 WoodWave panels that used wood salvaged from pine beetle–killed forests.

Located on the bank of the Fraser River in Richmond, immediately south of Vancouver, the Oval housed a four-hundred-metre speed skating track with enough room for eight thousand spectators during the Vancouver 2010 Winter Olympic and Paralympic Games. After the Games, it was converted to use for numerous sports— ice, court, and track and field. The building is arranged on three levels: an underground parking garage; a ground-oriented entry, service, and amenity level; and the vaulted sports hall on the top level.

The structure comprises composite wood-steel arches that span one hundred metres, while between those arches are novel prefabricated WoodWave structural panels, made from lumber that's arranged in a geometric wave pattern. By using standard lumber supplied directly from B.C. mills, including lumber affected by the mountain pine beetle infestation, the facility demonstrates what can be achieved using a simple, sustainable, and abundant material. In addition to using lumber obtained from local forests, wood ceilings and panelling were milled from trees felled on the site.

Despite its size of more than six football fields, this is architecture set to soar, with its WoodWave roof resembling wing-like curves with individual "feather tips" extending beyond the massive timber structure—a design inspired by the image of a bird, specifically a heron, ready to take flight. The facility is popular and well used by nearby communities, and is a must-visit destination facility for the surrounding region.

OWNER City of Richmond
ARCHITECT CannonDesign
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2008 **SIZE** 33,750 m²

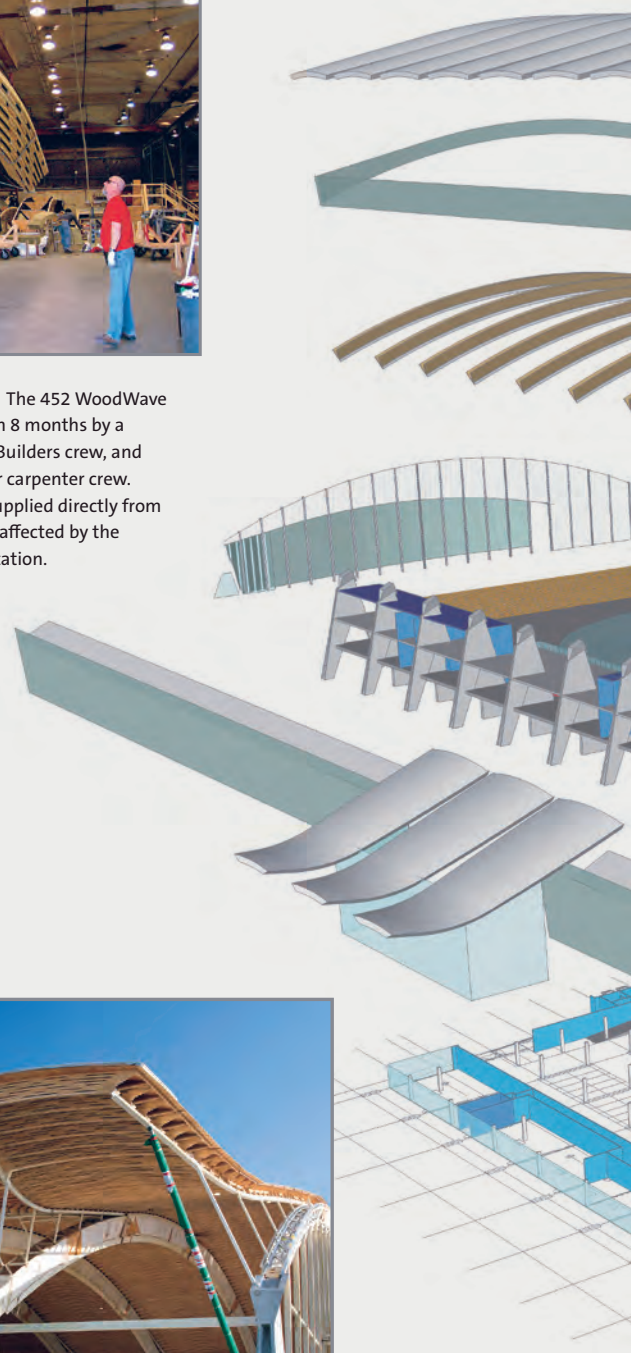
HOW'D THEY DO THAT?

Richmond Olympic Oval

Wood achieves an Olympic-sized feat

The Richmond Olympic Oval, and its poetic evocation of a heron, is an extraordinary testament to the architectural feats made possible by British Columbia's wood products. The facility served as the speed skating venue for the Vancouver 2010 Olympic and Paralympic Winter Games and is now a popular multi-purpose sports facility, well loved by the community.

FABRICATION & INSTALLATION The 452 WoodWave panels were prefabricated in 8 months by a 25-member StructureCraft Builders crew, and erected by their 10-member carpenter crew. The roof's materials were supplied directly from B.C. mills, including lumber affected by the mountain pine beetle infestation.



Quick Facts

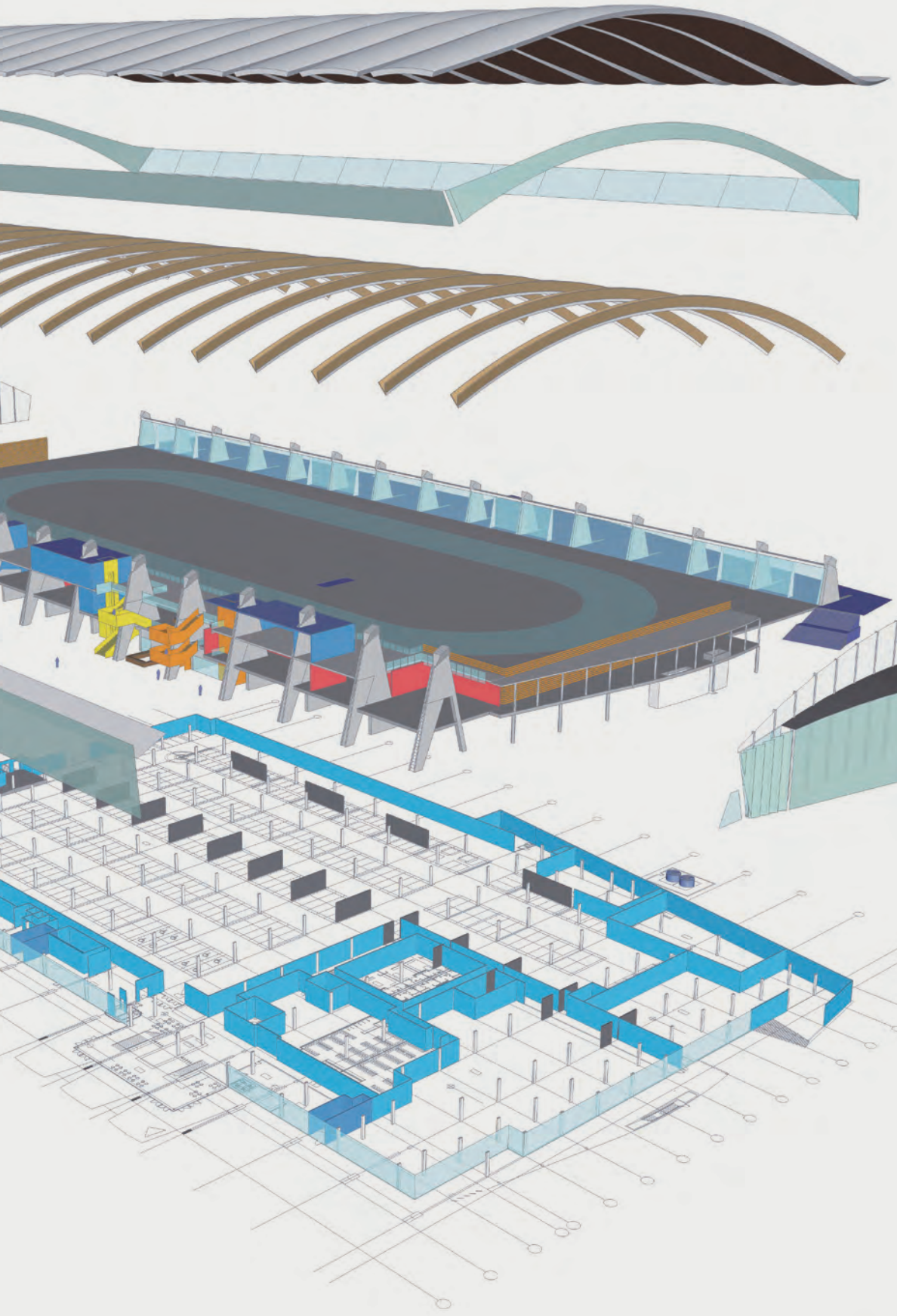
The Richmond Olympic Oval is 33,750 m^2 in size, or more than 6 football fields.

The roof uses standard materials supplied directly from B.C. mills: over 1 million feet of 2×4 spruce–pine–fir lumber, plywood, glue-laminated timber (glulam) beams, and other lumber.

The structure is made of 3,524 m^2 of lumber, plywood, and engineered wood.

Wood is renewable—every 28 minutes, forests in Canada grow enough to build another Oval.

ARCHITECTURAL METAPHOR The facility's design evolved from the image of the heron, a bird native to the area. The WoodWave roof resembles wing-like curves and individual "feather tips" extending beyond its massive main structure.



LONG-SPANNING STRUCTURE The bones of the structure are created by 15 composite glulam-and-steel arches that span the 100 metres across the building, resting on 30 enormous concrete buttresses. Each arch has a hollow, V-shaped cross-section that conceals heating, ventilation, air conditioning, plumbing, electrical, and lighting systems.

PREFABRICATED WOODWAVE PANELS The unprecedented WoodWave panels, cut using custom computer numerically controlled machinery, are made of 3–6 metre pieces of lumber spanning the 12.8 metres between the arches. The naturally straight V-shaped sections were bent into an arch using a custom-built hydraulic press, and tied with a steel rod to keep the curved shape.

Engineering Dreams

How engineer Paul Fast is making the reverie of architects a reality

BY JASON MARTIN

Brentwood Town Centre Station

If an architect can dream it, chances are Paul Fast can engineer it. For more than three decades, the co-founder of Fast + Epp Structural Engineers and his (now sixty-five-person) team have transformed the often complex and intricate reveries of architects into elegant, and even daring, wood and hybrid structures.

Fast cut his teeth at Bogue Babicki Associates, working on projects for Vancouver's Expo 86 World's Fair (including Science World's geodesic dome). Shortly after, he struck out on his own, surviving on fees for calculations and load takedowns for wood-frame construction as he built up his business. When he partnered with Gerald Epp, his classmate at the University of British Columbia's engineering school, the pair quickly built a reputation for their expressive wood-hybrid structures and their collaborative approach with architects.

Fast is an engineer who clearly enjoys the design process. What others might dismiss as an architect's fanciful notions, Fast embraces as an intriguing challenge, seeing himself as a facilitator, and even catalyst, for creative problem-solving. "As structural engineers, we need to be able to understand architects, glean their desires, help draw out their design intentions, and respond with solutions that really enhance the architecture, with elegant yet efficient structures," he says. "We are stone turners, turning over every stone, until all the indicators are pointing in the same direction."

For Fast, the design process is iterative and requires faith that the best solution will emerge. "It's like wine; the best wine is the result of the right aging process and you have to go through that fermentation process first—yes, it means that the architects may change their mind and it may require more patience, but if you work with the architects they'll appreciate

it, and that's when the special relationship can form and you can do really great work."

Fast has enjoyed successful collaborations with architects throughout B.C., most notably with Peter Busby, founder of Busby + Associates and now board member and Vancouver design principal of Perkins+Will. In 2004, when Metro Vancouver's transit authority wanted to build unique stations for its elevated rapid transit, Busby and Fast proposed a mass-timber double-curved roof design, constructed with glue-laminated timber beams and nail-laminated timber (NLT)—the first of its kind in North America. The Brentwood Town Centre Station, with its curvaceous wood, steel, and glass structure that is reminiscent of a classic Canadian icon—the wooden canoe—helped put mass timber on the map for civic architecture.

The station was "a significant turning point for our firm and for the use of mass timber in the province. We wanted to use wood, something that hadn't really been done before, at least in North America, since the old Wild West train stations," says Fast.

But it wasn't easy convincing the pencil-pushers that NLT would be cost effective. "We got pushback, as they weren't familiar with it, and it had never been done before in transit stations. They came back to us, saying 'This is going to cost too much.' And so we went out and did our own costing and showed them it could be done within budget. Alan Hart, the system-wide architect working on behalf of rapid transit, was a real champion. That project led to more mass-timber projects," Fast recalls, with an air of nostalgia in his voice. To be exact, Fast + Epp, working with numerous B.C.-based architects, went on to do thirteen stations in all, each one incorporating wood or mass timber. Nearly eighteen years later, the mass timber in the Brentwood Town Centre Station has stood the test of time, showing little if any significant wear.

Astonishing structural feats that expand the boundaries of what wood can achieve have since become the linchpin of Fast's career. Other projects he's worked on include the intricate organic wood roof on the visitor centre at the VanDusen Botanical Garden, another collaboration with Busby; Brock Commons, the tallest hybrid-timber tower in the world at the time of completion; and Grandview Heights Aquatic Centre, featuring a soaring sixty-five-metre-long catenary curved wood roof, the longest clear span of its kind to date.

He attributes the firm's success, in part, to a fruitful partnership with Epp, who now serves as president and CEO of StructureCraft Builders, an engineer-led construction firm specializing in timber and hybrid-timber structures. The duo started StructureCraft when they found few bidders would take on their bold designs. "We had been tinkering with the idea of being our own fabricators just as we were getting into using more wood. If StructureCraft hadn't been around, many projects probably never would have happened. It really enabled us to do more complex, unusual timber structures, such as Central City in Surrey and the Richmond Olympic Oval," recalls Fast.

The partnership produced an impressive portfolio of projects, with the Richmond Olympic Oval—as the largest wood roof span in the world—being a professional pinnacle for them both. Fast served as the Engineer of Record for the overall project, and Epp developed the unique WoodWave panel design. The idea to use wood salvaged from pine beetle–killed forests in those panels originated in part from a suggestion Fast made during a design charrette for the project. "I brought in a hunk of pine beetle kill wood and put it on the table," he recalls. "I said, 'We might want to look at using this in the structural design in some way.' It wasn't going to solve the infestation, but it was a gesture of what we could do with this wood. And that sort of began to embed itself into the architects' minds."

Out of that came a tenacious, and at times tedious, exploration of how the blue-stained dimension lumber could be transformed into a 2.5-hectare free-spanning wood roof. "Early on, during the interview, the client asked me if you could achieve this span with wood. I said yes—but my heart was fluttering," Fast explains, chuckling as he gently beats his chest with the palm of his hand. "No one had ever done anything quite like this before with wood. But we stuck with it and Gerald eventually found a way.

"The soaring hundred-metre-long composite timber-steel arch was adopted by the design team from the outset. However, the idea of using prefab wood panels between the arches was initially rejected for various reasons. I asked Gerald to revisit the concept. He took the original two-by-four pine-beetle panel design concept and transformed it into the WoodWave design. He got an acoustic opinion, put a price together, a schedule—and they bought it. And that's when the real stress began," Fast says, laughing. "When Gerald puts his mind to something, he makes it happen. In the end everything aligned with that project. What an incredible once-in-a-lifetime project for us to both work on. It's a beautiful building."

In contrast to his humble demeanour, the east wall in Fast's office is covered in awards and honours the firm has won over the years. The accolades are somewhat beside the point, as it's clear he loves his work and takes much joy in helping architects express their design vision, more often than not with some wood included. In fact, it seems it's the pure challenge, the pursuit of innovation, that draws him to wood as a structural material. "I've always had a hankering to push the envelope, from my very first engineering course. I remember, even back then, I wanted to come up with a solution that nobody else was going to think of. I always wanted a challenge, and I never forgot that."

VanDusen Botanical Garden Visitor Centre

Travels in Time and Timber

Whether you're a visitor or a long-standing resident, it's difficult not to be awestruck by the natural beauty of British Columbia's diverse landscape—rocky coastlines, sandy beaches, forests, lakes, mountains, inland deserts, and grassy plains. The allure of this rugged, forested terrain is firmly embedded in the cultural identity of British Columbians, its sheer immensity fueling the imagination. B.C. has the highest percentage of parkland in Canada. It's also a big part of why the province's 1,033 provincial parks attract more than 15 million tourists to the province every year.

Undoubtedly, this connection to geography is reflected in the region's architecture and the abundant use of sustainably harvested wood in B.C.'s arts, tourism, and cultural buildings. The buildings featured here successfully use wood for both structure and storytelling, function, and expression. They articulate, innovatively with wood, an identity that is unique to British Columbia.

VanDusen Botanical Garden Visitor Centre

Vancouver Aquarium | Pacific Canada Pavilion

Vancouver

Completed in 1999, this turning-point project for wood-hybrid design features a geometrically complex 745-square-metre roof that combines parallel strand lumber with stainless steel components. The expressive and remarkably refined structure is made more prominent by the aquarium's luminous footlight setting. The project marked the beginning of a series of specialized custom timber and wood-hybrid structures that would begin to emerge throughout the province.

OWNER Ocean Wise Conservation Association
ARCHITECT Bing Thom Architecture
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 1999 **SIZE** 1,208 m^2

Squamish Adventure Centre

Squamish

Craftsmanship and technology converge in this combined visitor centre, sports museum, and economic development office. Thirty-five different composite steel-and-timber roof trusses, each with a unique geometry, comprise the curved, butterfly-like roofs that perch lightly on a supporting structure of exposed timber columns, brackets, and beams. The elliptical plan and expansive glazing ensures the building is highly visible from B.C.'s Sea-to-Sky Highway. The organic form reflects the local alpine geography, and surely inspires the more than two million visitors who pass by it each year on their way between Vancouver and Whistler. Computer-aided design and manufacturing software technology was critical to the success of the project, with over one thousand uniquely shaped heavy-timber members—few, if any, containing right angles—made from locally grown Douglas-fir harvested from a sustainably managed forest operated by the Squamish Nation.

OWNER District of Squamish
ARCHITECTS Iredale Architecture and Dennis Maguire Architect
STRUCTURAL ENGINEER Iredale Architecture
COMPLETION 2005 **SIZE** 536 m^2

ESSAY

Timber Tales

A writer and poet's encounters in time and wood

BY MICHAEL TURNER

For many of us, our first lessons come not from school books but from informal encounters. Sometimes our school books echo these encounters, other times they anticipate them. A history I grew up with was rooted in a curriculum partial to daring European explorers pushing their way into a vast, underexploited landscape, with little to say about the lives of those living here prior to "contact." The focus of this history was "our natural resources"—forestry, mining, and fishing.

"Here," said the tinsmith who once a month parked his camper at the end of our block and waited for our mothers to bring him our dulled cutlery. "Take this hook, run a line through its eye, and voilà—you're halfway in business."

We shrugged.

"You can't just put a worm on its end and throw it in the water, right?"

We nodded, wishing we knew why.

The tinsmith got up from his stool, walked over to a neighbouring fir, and snapped off a branch. "Need something to keep the hook away from the shore," he said, tying the line to the end of the branch and dropping the hook end in a puddle, where the line curled up, the hook nestled within it.

"You need a sinker," one of us said.

This time it was the tinsmith who nodded. He kicked at the earth and dislodged a jagged piece of rock and tied it above the hook. But instead of tossing the rock in the puddle, he held it high and, as if we were not already hypnotized by his demonstration, swung it back and forth before us. "Hook and line notwithstanding, what you have here is what this province was built on: wood from our forests, minerals from our mines, and . . ." he said, with an eyebrow raised.

"The fish you catch with that hook?" another of us offered, cautiously.

Lessons like this are what I mean by an informal encounter. And since my time growing up, school curricula and industry have come to have a more progressive, socially-conscious relationship with our vast forests and landscape, one of mutuality and sustainability.

My own relationship with the land has me spending more and more time on its roads. Rather than take the quickest route from A to B, I have learned to slow down, savour the journey, count its trees and rocks among my friends. A recent trip had me travelling south from Pemberton via the Lower Mainland to Penticton—all in a single day.

Because of my earlier than expected start, I decided to stop at the Cheakamus Centre in Brackendale, a half hour's drive south of Whistler. I was familiar with the site when it was the North Vancouver Outdoor School (est. 1969), but I had yet to visit it since the construction of the BlueShore Environmental Learning Centre in 2012. Although the Centre's program continues to emphasize learning with and through the land ("Nature is in session"), its new building is designed for all ages—a modern "green" structure situated among living cedars and built in part with reclaimed beams. Here, wood is not simply a convenient material used to keep the heat in and the rain out, it lives on through its thoughtful placement in relation to the forests from which its boards and beams were born.

The lessons of the Cheakamus Creek building remained with me as I drove past the site of the new Vancouver Art Gallery (VAG) at downtown Vancouver's Larwill Park. Back in 2015, the VAG unveiled its Herzog & de Meuron–designed, all-wood building to a buzzing public, many of whom were astonished that a modern building could be made of anything other than concrete, glass, and steel. Never have I heard such a debate over a material, even more so than the structure's ambitious Jenga-like design. Rather than continue along Georgia Street to Highway 1, I decided to visit another ambitious building—the VanDusen Botanical Garden Visitor Centre at Oak Street and 37th Avenue.

Unlike the Cheakamus Centre, which is in a forest, the VanDusen's visitor centre (the second visitor centre in the VanDusen's almost fifty-year history) is in a cultivated garden space. Moreover, whereas the site of the Cheakamus Centre was originally designed for school-age children, the VanDusen's earlier centre, with its compact *Shhh, no running!* layout, had become associated with seniors. This new environmentally-friendly visitor centre, with its rhythmic, undulating wood design and fluid interior spaces, seems aware, if not encouraging, of the energies of children. To see a pair of nine-year-olds swan past in blanket capes and chamomile crowns is to ask, who says children have no patience for gardens? And indeed, who says they can't be inspired by modern architecture? One of them likened the wood rafters of the VanDusen's exterior canopy to the gills of a mushroom.

The quickest route to Penticton from the Lower Mainland is Highway 5 through the Coquihalla Connector, but on this trip I chose river valleys over mountain passes and took Highway 3 instead. A highlight on this route is that Las Vegas of fruit stands known as Keremeos, which, with its hand-painted wooden signs, was in full bloom. Another is the recent west wing addition to the Penticton Lakeside Resort—a six-storey wood-primary hotel whose mass-timber construction includes an atrium that evokes the 1930s forest-as-cathedral paintings of Emily Carr, but also Barnett Newman's equally inspirational *Voice of Fire* (1967), an eighteen-foot-high "elemental" painting commissioned to echo Buckminster Fuller's geodesic dome pavilion at Expo 67, and now on permanent display at the National Gallery of Canada.

How fortunate we are to have moments like this in our province, where nature, art, architecture, and industry come together and, without planes, trains, or automobiles, truly transport us, remind us where and what we are from—in the silence of a hotel lobby. It is encounters like this that we need more of.

VanDusen Botanical Garden Visitor Centre

Vancouver

The petal structure of a native British Columbian orchid is the inspiration for this building's curvaceous, undulating timber roof floating over rammed-earth-and-concrete walls. The complex, nearly all-wood geometry was made possible through advancements in 3-D modelling technology. Located in a fifty-five-acre conservatory in the heart of Vancouver, the building functions as a community-oriented centre for the botanical garden; it has a café, library, volunteer facilities, garden shop, offices, and classroom space for meetings, workshops, lectures, and private functions.

The whimsical, prefabricated wood roof is constructed of more than seventy unique trapezoid-shaped panels that not only include a finished ceiling, but neatly tuck away mechanical and electrical systems. Each panel is composed of double-curved glue-laminated timber edge beams, dimension lumber roof joists, and a Douglas-fir plywood–slat exposed ceiling that gives an organic, ribbed appearance to the underside of the roof. The ceiling's curves are reflected in finishings including the exterior wood walls; interior sliding doors; the front of the reception desk; and, in the lobby, a thirty-metre-long curved bench, made from milled reclaimed timbers, that appears seamless and suspended.

Once inside, the eye is naturally drawn to a glazed oculus that leaves the atrium awash in the warm glow of wood and natural light. This striking design gesture assists with natural ventilation by operating as a solar chimney and aluminum heat sink: it converts sunlight into convection energy, stimulating air movement throughout the space. A green roof is installed atop the building; one of the petals is a rainwater catch basin and another holds a solar hot-water tube array. The dramatic, yet delicate design breathes new life into the nearly forty-five-year-old botanical garden.

OWNER City of Vancouver Board of Parks and Recreation
ARCHITECT Perkins+Will
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2011 **SIZE** 1,810 m²

Kuskanax Creek Footbridge

Nakusp

Modest materials and modern 3-D modelling come together in this wood-and-steel footbridge's simple but daring design, which reaches thirty-six metres across the Kuskanax Creek in the West Kootenay region of the province. Pre-cut off-site manufacturing of the timber components offered cost savings and meant less disturbance to the natural surroundings.

A steel understructure provides load-bearing support to a solid, air-dried Douglas-fir wood deck, posts, railings, and roof structure. The sturdy construction includes a protective overhanging roof to preserve its service life and gives shelter from the elements, and its wide plank design and central viewing platform accommodates horses, strollers, and visitors with impaired mobility. It took a village to build the bridge—much of the materials, labour, and construction expertise was sourced locally in and around Nakusp. The awe-inspiring wood superstructure is a must-see destination for tourists and locals alike.

OWNER Village of Nakusp
STRUCTURAL ENGINEER Omega Engineering
COMPLETION 2013 **SIZE** 36 m span

Cheakamus Centre | BlueShore Environmental Learning Centre

Brackendale

Situated along the bank of the Cheakamus River in a 175-hectare ecological reserve just north of Squamish, this educational building (formerly the North Vancouver Outdoor School) is one of only a few such places in Canada that offer an overnight environmental educational experience. Five thousand children and six thousand adults visit the centre annually. Brackendale is in Squamish Nation Traditional Territory, and the programs offered by the centre draw on Indigenous practices of environmental stewardship. The diverse biological landscape of forests, wild salmon streams, and amphibian ponds serve as its expanded "outdoor classroom."

Primarily constructed of wood, the "treehouse" design—a simple, modernist, rectilinear box—includes a large reception and dining area; multi-purpose classrooms; event and exhibit spaces; and an outdoor amphitheatre. When looking to its north or south elevation, the building appears to float amid the surrounding forest. Its structure is composed of glue-laminated timber post and beams and cross-laminated timber floors, raised above the floodplain of the Cheakamus River on steel columns affixed to concrete raft slab. The ceiling is finished with reclaimed Douglas-fir and its exterior is wrapped with vertical cedar cladding. The building's elevated stance brings the surrounding forest into view for students, whose connection to the landscape is further enhanced by its exterior balcony.

OWNER North Vancouver School District
ARCHITECT McFarland Marceau Architects Ltd.
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2012 **SIZE** 1,000 m^2

Wood's Home Advantage

Through advancements in construction technology, modernized building codes, and a demand for sustainable design, wood is proving to be a viable and effective material for a growing range of residential buildings. Podium wood-frame designs and hybrid mass-timber construction have enabled B.C. industry to take wood buildings to new levels—eighteen levels, in fact, with the construction of Tallwood House at the University of British Columbia's Brock Commons, the tallest hybrid wood structure in the world when it was completed in 2017.

As in many parts of North America, the demand for affordable housing in B.C. is increasing, and wood is the material of choice to add value to homes. Whether light-frame wood, hybrid, or mass-timber construction, all can deliver safe, comfortable, quality buildings. Wood is well suited for economical and timely construction in hard-to-reach remote locations, such as Vancouver Coastal Health's staff housing in Bella Bella and tight urban sites in Metro Vancouver. And modular prefabricated wood technologies can speed up construction schedules and reduce overall construction costs, as was the case when Trinity Western University in B.C.'s Fraser Valley built a wood-frame five-storey student residence in just nine months.

Along with affordability, wood provides several other benefits for multi-family residential and hotel construction: wood-frame and timber buildings can flex, absorbing and dissipating energy when subjected to earthquakes. When equipped with firewalls, automatic sprinklers, and fire detectors, wood-frame is proven to be as fire safe as other forms of construction. At the same time, wood structural systems have a high building-volume-to-surface-area ratio, allowing for generous interiors even with space constraints that require tall, compact designs. As a natural insulator, wood offers thermal advantages over concrete or steel. And finally, of course, there's wood's unique aesthetic beauty and visual warmth that British Columbians are so at home with.

Brock Commons Tallwood House

King Edward Villa

Vancouver

This six-storey mixed-use residential project is located on a major commercial thoroughfare in East Vancouver and offers seventy-seven rental units with easy access to transit and nearby shopping. The building's structure is composed of one level of underground parking, one storey of retail space in concrete construction, and five storeys of rental apartments, prefabricated in light-wood-frame construction.

The site was exceptionally tight, with minimal setbacks on the front and sides, and a small rear yard for storage and staging. Access for construction vehicles was restricted to a single twelve-metre-wide laneway overhung by a large tree. In response to these constraints, wood-frame components, including floor, wall, and roof panels, were prefabricated off-site. Using a 3-D model, each element was given a unique code corresponding to a specific location in the building. Components were delivered on a just-in-time basis, minimizing site storage and road closures. The accuracy of the model meant that wall elements had their stud spacing precisely aligned from one floor to the next. This facilitated the rapid installation of electrical, mechanical, and plumbing services, resulting in a cleaner site and shorter construction time at a competitive cost.

OWNER Richard Wong
ARCHITECT GBL Architects
STRUCTURAL ENGINEER Bryson Markulin Zickmantel
COMPLETION 2017 **SIZE** 5,405 m²

The Heights

Vancouver

As Canada's largest building to earn Passive House certification—a rigorous, ultra-high standard for energy efficiency—The Heights will incur heating and cooling costs that are 80 to 90 percent less than those of a standard building, an attractive benefit for owners who have to cover operating costs over the facility's lifetime. This mixed-use project, with five storeys of light wood-frame on one storey of concrete, was built under the City of Vancouver's Rental 100 Program, an initiative that offers developers increased density in exchange for operating the building as rental apartments for a period of sixty years.

Located in the Hastings–Sunrise neighbourhood of East Vancouver, the building features a highly insulated and airtight envelope, triple-glazed windows, heat-recovery ventilation, and a highly efficient air exchange for a healthy indoor environment. Over the long term, the increased capital costs of providing additional insulation, high-performance windows and doors, as well as other measures, can be offset by the reduced size and cost of mechanical equipment and the savings in operating energy.

In addition to being the most economical construction material for this size and type of building, wood is ideal for Passive House construction. Being a natural insulator, it minimizes thermal bridging and contributes positively to the overall performance of the building envelope. The Heights sets a new standard in occupant comfort and energy efficiency for rental buildings in B.C.

OWNER 8th Avenue Development Group
ARCHITECT Cornerstone Architecture
STRUCTURAL ENGINEER Weiler Smith Bowers
COMPLETION 2017 **SIZE** 5,600 m^2

Winning with Wood

How wood is boosting affordability, value, and innovation

BY KERRY GOLD

The Heights
Wood is the most economical construction for this size and type of building. The Heights sets a standard in occupant comfort and energy efficiency for rental buildings in B.C.

Library Square
OWNER Thompson-Nicola Regional District and TriCity Contracting (BC) Ltd.
ARCHITECT JM Architecture Inc.
STRUCTURAL ENGINEER Siefken Engineering Ltd.
LOCATION Kamloops

Project manager Paul Warwick is proud of King Edward Villa, a seventy-seven-unit rental project in East Vancouver that Performance Construction built—it's six storeys high and was built entirely using prefabricated wood-frame construction. It was a pioneering project, launched not long after city building code amendments increased the allowable height of wood-frame residential construction to six storeys. Prior to the 2009 change, only four-storey wood-frame buildings were allowed in B.C.

More multi-family developers are discovering that the innovative use of wood and mass-timber construction doesn't just save money, it can be an advantage that sets you apart in a sea of condos that begin to all look the same. Increasingly, both buyers and renters are placing importance on organic materials, sustainability, and warm, inviting interiors—all areas where wood construction excels. Wood can offer performance and thermal benefits, adding to energy efficiency and occupant comfort, while at the same time offering aesthetic warmth and a visual selling feature.

In the case of King Edward Villa, Warwick and his team introduced double-insulated prefabricated walls and floor trusses to the project. Those techniques boosted energy efficiency significantly and helped the project target LEED Platinum certification, all the while keeping costs down. "We made the case to the owner that if we built a more efficient building with a really efficient envelope, they would have very low operating costs, because a person renting out almost eighty apartments is definitely looking to cut back as much as they can on their energy use," says Warwick. "We now have a year and a half of performance data, and the numbers are really good," he adds. "A small, six-hundred-square-foot apartment

King Edward Villa
Off-site wood prefabrication reduced completion to just two months for these mixed-use rental apartments, resulting in a double-digit cost savings and a tight, more precise structural fit.

costs less than one hundred dollars a year to heat. So it's very impressive." His clients are increasing looking for sustainability and energy efficiency. "These buildings use about 50 to 60 percent less energy than is mandated currently by energy codes."

King Edward Villa was part of the City of Vancouver's Rental 100 program, an initiative to increase the stock of affordable housing in the city. Cost savings and energy efficiency can benefit renters, and are a boon for developers who must keep starting rents below certain thresholds to participate in the program.

Warwick is at work on another mid-rise that follows the exact same wood-frame template, at West 35th Avenue and Quebec Street in Vancouver. It is a five-storey condo building with eighteen units, and their anticipated energy savings is expected to boost their value. "Properly built, wood-frame is a much more efficient building thermally, and also very sound proof," says Warwick.

GBL Architects project manager Greg Ellingson says a significant amount of time was spent up front, planning the template for the manufacturer of the prefabricated components. "It took a bit longer planning wise, but once it went out, it went up fast," he says.

Warwick forecasts that in another decade the majority of buildings will be constructed out of prefabricated wood components, based on cost benefits and efficiency alone. "In six-storey mid-rise construction, I believe a wood-frame structure is the most cost-efficient way to build a building," he says. "Concrete has its merits, but it's very expensive. There is a premium in both cost and time to build a concrete structure as opposed to a podium wood-frame building," says Warwick. A typical forty- or fifty-unit concrete building takes about five thousand metric tons of concrete, and an enormous amount of steel is used to reinforce it, while a five-storey eighteen-unit wood-frame building can take as little as two months to put up. A concrete equivalent would take two or three times as long, says Warwick.

Wood construction has long been a differentiator for Vancouver mid-rise developer Adera Development Corporation, but the company took a bigger leap into mass-timber prefabricated construction with its Virtuoso building at the University of British Columbia's Wesbrook Village. After the success of Virtuoso, in 2018, Adera launched North Vancouver's first mass-timber development, a 179-unit six-storey multi-family project called Crest. Before construction had begun, the developer had already sold 150 units of the mid-market project.

Another way the developer stands out is in their use of cross-laminated timber (CLT) to block sound transference between floors. Adera's patented wood technology—which they call "Quiet Home"—blocks sound that is airborne, such as human voices, as well as sound created by impact, such as furniture dragged across a floor.

Because seeing is believing, their showroom featured a slab of CLT that ten people could jump up and down on, in order to show its strength. Eric Andreasen, vice president of marketing and sales at Adera, says, "we trademarked the Quiet Home system because for the longest while, noise concerns had been top of the list for our customers. We substituted the concrete slab between each floor with a wood slab, and showed it performs better than concrete."

And prefabricated panels mean his company can build far more rapidly than they had with traditional construction. There are greater efficiencies for both the developer, the community, and the consumer. "There are a whole bunch of benefits, to the environment, to the community, and in time savings, that can be captured by building with CLT," says Andreasen. "Those savings make a difference to the consumer at the end of the day."

Another project that saw savings from creative use of mass timber is the Penticton Lakeside Resort, which used glue-laminated timber and CLT to maximum effect in its newly expanded hotel. A major cost-saving measure of mass timber is that it's five to six times lighter than concrete. "So they saved over a million dollars by not having to install piles," says Stephen Tolnai, vice president of sales and marketing at Structurlam Products, whose plant is based in Penticton. "And now they have a better building that is sustainable and beautiful—they exposed all the materials—and not only did they save time, they saved a significant amount of money."

Brannigan Mosses, director of regional sales and marketing at the resort, says the new seventy-room wing is a major draw for guests wanting an "elite experience." The mass-timber design is attracting people who are environmentally conscious and interested in sustainability, including tourists visiting the local wineries, mountain bikers, and even a few dignitaries. "I think it gives us an opportunity to cater to people who are looking for something just a little bit different," says Mosses.

Camas Gardens Supportive Housing

Victoria

This modest, attractively modern, light-wood-frame housing near downtown Victoria proves that publicly funded projects can be cost effective and still deliver on quality and aesthetics.

In partnership with BC Housing to deliver integrated services, Camas Gardens provides a contemporary and comfortable facility along with forty-four modern units for individuals who are homeless or at risk of being homeless.

The project supports an integrated service model and takes full advantage of the benefits of prefabricated wood-frame construction to deliver safe and affordable housing.

The exterior wood-frame walls were assembled off-site to reduce time and construction waste. The well-being of residents was top of mind, with a wood-frame double-wall system providing durable fire protection and improved safety in the event of an earthquake. The palette of natural materials and western red cedar cladding complements the site's landscaping and park-like courtyard, all of which contribute to a calming and supportive environment.

OWNER Pacifica Housing Advisory Association
ARCHITECT Low Hammond Rowe Architects
STRUCTURAL ENGINEER Read Jones Christoffersen
COMPLETION 2011 **SIZE** 3,166 m^2

Bella Bella Staff Housing

Bella Bella

When fire destroyed the existing staff housing for the hospital in Bella Bella, a small, remote community on B.C.'s central coast, the health authority faced a daunting challenge—how to build a replacement facility quickly and economically in a community with a labour shortage, a hard-to-reach site, and a challenging climate.

The answer was to use modular prefabrication. Each module was fitted out and finished to the greatest extent possible before the entire building was shipped to Bella Bella for installation. Site work was limited to overbuilding on the existing foundation, craning the modules, final envelope and weatherproofing, and constructing of the wood decks and stairs. Prefabrication, which took only forty-five days, was carried out by Metric Modular in Agassiz, 125 kilometres east of Vancouver. The modules were trucked to the Fraser River, loaded on a barge, then delivered to the site and lifted into place to create a single building comprising six two-storey, two-bedroom units. Walls and floors were constructed with standard spruce–pine–fir dimension lumber, while structural plywood and oriented strand board were used for the roof, wall sheathing, and subfloor. Cedar was used for the exposed post and beams on the rear decks.

For the first time in Canada, a modular building was constructed to the ultra-low-energy Passive House standard, reducing the energy required for heating and cooling by approximately 90 percent compared to conventional construction. The workers at Metric Modular were trained in the required construction techniques and testing was carried out in the factory before delivery. Local workers were trained in the assembly of the modular structure.

OWNER Vancouver Coastal Health
ARCHITECT Mobius Architecture Inc.
STRUCTURAL ENGINEER Canstruct Engineering Group
COMPLETION 2015 **SIZE** 500 m^2

The Merits of Modular

Cutting-edge construction, limited assembly required

BY DAVID WYLIE

Jacobson Hall, Trinity Western University, under construction.

Metric Modular built the two-storey Burns Lake–based Key-oh Lodge on a compressed timeline by constructing 30 prefabricated wood-framed modules and using wood harvested from the community's own forest.

Key-oh Lodge
OWNER Burns Lake Band
ARCHITECT Boni-Maddison Architects
STRUCTURAL ENGINEER Canstruct Engineering Group
LOCATION Burns Lake

Modular construction is gaining a reputation as an affordable and efficient way to build multi-storey residential and commercial projects. While the type of construction is not entirely new, technological advances are making it a game changer for affordable housing. "Modular construction is at the forefront of innovative off-site construction techniques," says Craig Mitchell, director of innovative solutions at Metric Modular. "Repetition in the projects lends itself well to what we do."

The head office for Metric Modular, in Agassiz, B.C., a short drive east of Vancouver, is itself an example of what can be done with modular construction. The high-quality finishes and oblique roof offer a modern perspective on the formerly underused construction method. The company has a second manufacturing facility in Penticton. The pair of 8,350-square-metre facilities employ about one hundred people each—though when business is on a significant uptick, there can be up to 160 people in each factory.

"We're a wood-first company. We use more wood in our buildings than conventional construction," says Mitchell, explaining that the company "doubles up" on wood. "We're putting box upon box upon box. The floor, the walls, the roof, they all have to be transported down the road. With conventional construction, the roof of the suite is the floor of the suite above. With our method, this leads to a more rigid building and a higher sound attenuation between rooms."

The facilities operate like an assembly line, piecing each module together in about twenty days, from the first wood cut to the final fixtures. The repetitive floor plans of buildings like hotels, condos, and dormitories are a perfect fit for off-site modular construction. The climate-controlled environment in the facilities means consistent quality at all times, explains Mitchell. "We are building at ground level in a well-lit, beautiful working environment," he says. "We're not working five storeys in the air on the side of scaffolding in the pouring rain at four o'clock on December 15th while the wind and rain is driving sideways and you're trying to install a window."

With Metric's manufacturing techniques, most employees don't need specific certifications. Metric president Stephen Branch

says a strong presence in the local community—and local market—is key to the business' success. "You can't go to the world if you don't have a local foundation. If our core is not strong, the export market is irrelevant," he says.

That approach is having a positive impact on communities, both by providing more affordable housing options and through local, stable employment. Metric's workforce is diverse, including about 10 percent First Nations workers. "It's more reflective of being active members of the communities in which we work," says Mitchell, adding the company has had successful training programs with local First Nations communities.

Branch says the company is now focused on finding the right customers, those who understand the benefits and the business reasons to go with wood-frame modular. "It fits great in the right area," he says. "It's all about reducing the pain points. The more you can do here [in the manufacturing facility], the easier it is on-site. The idea is to assemble as much as possible, not construct."

Modular construction does have some convincing to do in the marketplace. Part of the challenge is showing people the quality, says Tim Epp, director of manufacturing at Metric. "It's a very big misconception when people think of modular as cheap or flimsy," says Epp. "Typically, these are engineered heavier than any site-building. We have to meet the same building codes that everybody else has to meet, and we have to be engineering these modules for site transport and craning."

The company has produced numerous examples of cutting-edge design. Metric partnered with BC Housing and the Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games to design and build 320 temporary accommodations used by about six hundred officials in the Whistler Athletes' Village. Those facilities were repurposed into housing as a legacy project. After the Games, Metric stacked and connected the units. "It takes a lot of planning," says Epp. "All of the plumbing and electrical required for this use had to be incorporated and hidden in the walls. Structurally, we had to build for both purposes and meet all of the codes."

Canada's first ever multi-unit modular Passive House, in Bella Bella, is an example of the energy efficient, innovative work that Metric specializes in. The staff housing project had to be built in seven months—the kind of accelerated timeline with which Metric shines. The company managed to complete the project on time, no small feat in a remote location like Bella Bella, where there is only boat and air access. The modules were built in Agassiz and trucked to a barge that transported them to a specially built beachhead.

Planning ahead is one of the main ways Metric creates cost and time efficiencies. All of the drawings are done ahead of time and all of the material is purchased before construction begins. "A lot of time and energy is put into planning how we're going to build it before we even start. That means the timeline is shorter, the amount of trucks, material, and people working on site is a lot less. There is a lot less impact to the area. Especially if you're building in a densely populated area—instead of being there for a year, you're there for five months," says Epp. "The second the site foundation is done, we can start craning finished modules on to the site, and then it's just a matter of interconnections, some of the exterior, and you're away to the races. You can literally take half the time out of the process."

Half an hour from their manufacturing plant in Agassiz, a forty-six-unit modular supportive housing residence is underway in their neighbouring city of Chilliwack. With homelessness rising in urban centres and smaller communities, the speed and efficiency of modular building has proven imperative, helping B.C. cities such as Chilliwack to find effective, long-term solutions for their community residents in need.

Metric Modular has become one of the largest manufacturers of modular wood-frame structures in North America. With over twenty modular housing projects under their belt in B.C., they are proving the case for modular wood buildings as affordable, fast, and high-quality solutions for the future.

Metric Modular assembled 90 prefabricated wood-framed modules, providing Trinity Western University with a five-storey student residence 50% faster than conventional construction.

Jacobson Hall
OWNER Trinity Western University
ARCHITECT BR2 Engineering
STRUCTURAL ENGINEER Canstruct Engineering Group
LOCATION Langley

Brock Commons Tallwood House

Vancouver

This eighteen-storey residential tower became the world's tallest mass-timber hybrid building when it was completed in 2017, and is now home to over four hundred students. While the wood structure makes the building extraordinary, in all other respects the design is deliberately straightforward, demonstrating that timber construction can be a highly efficient, safe, repeatable, and reliable approach to high-rise construction.

The fifty-four-metre-high structure comprises an innovative and efficient system of Douglas-fir glue-laminated timber (glulam) posts that directly support cross-laminated timber floor panels without the need for downstand beams. The entire mass-timber superstructure, including the prefabricated exterior wall panels, with wood-fibre-and-resin cladding, was erected in just over two months.

The seventeen storeys of mass timber sit on a single-storey concrete podium. The mass timber components are encapsulated in drywall for added fire resistance, this being the most expedient approach to ensure quick approvals and address tight schedule constraints. Inside the building, warm wood finishes are used on the ground floor and in the social and study spaces. Glulam columns are left exposed in the upper level amenity lounge, hallways feature wood doors, and elevator lobbies are finished in the same wood-fibre cladding panels used on the exterior.

OWNER University of British Columbia
ARCHITECT Acton Ostry Architects, Inc.
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2017 **SIZE** 15,120 m²

HOW'D THEY DO THAT?

Brock Commons Tallwood House

A closer look at how to build an 18-storey timber high-rise

Towering above the University of British Columbia's (UBC) Point Grey campus, Brock Commons Tallwood House is one of the tallest contemporary mass-timber hybrid structures of its kind in the world. Standing at 18 storeys, the innovative wood-hybrid building is home to more than 400 university students. Brock Commons showcases mass timber as a practical building material for high-rise construction.

Building Innovation

Tallwood House is one of over 20 UBC buildings and structures with mass-timber elements. It has a hybrid structure composed of mass timber, concrete, and steel.

Safety First

Structural components of Tallwood House are encapsulated with 3 or 4 layers of fire-rated drywall. Encapsulation enhances mass timber's natural fire performance, as it chars on the outside without impacting strength for a prolonged period of time. Concrete and mass timber work together to resist seismic forces.

Mass Timber

Large, engineered wood elements manufactured off-site for quick on-site installation

CLT

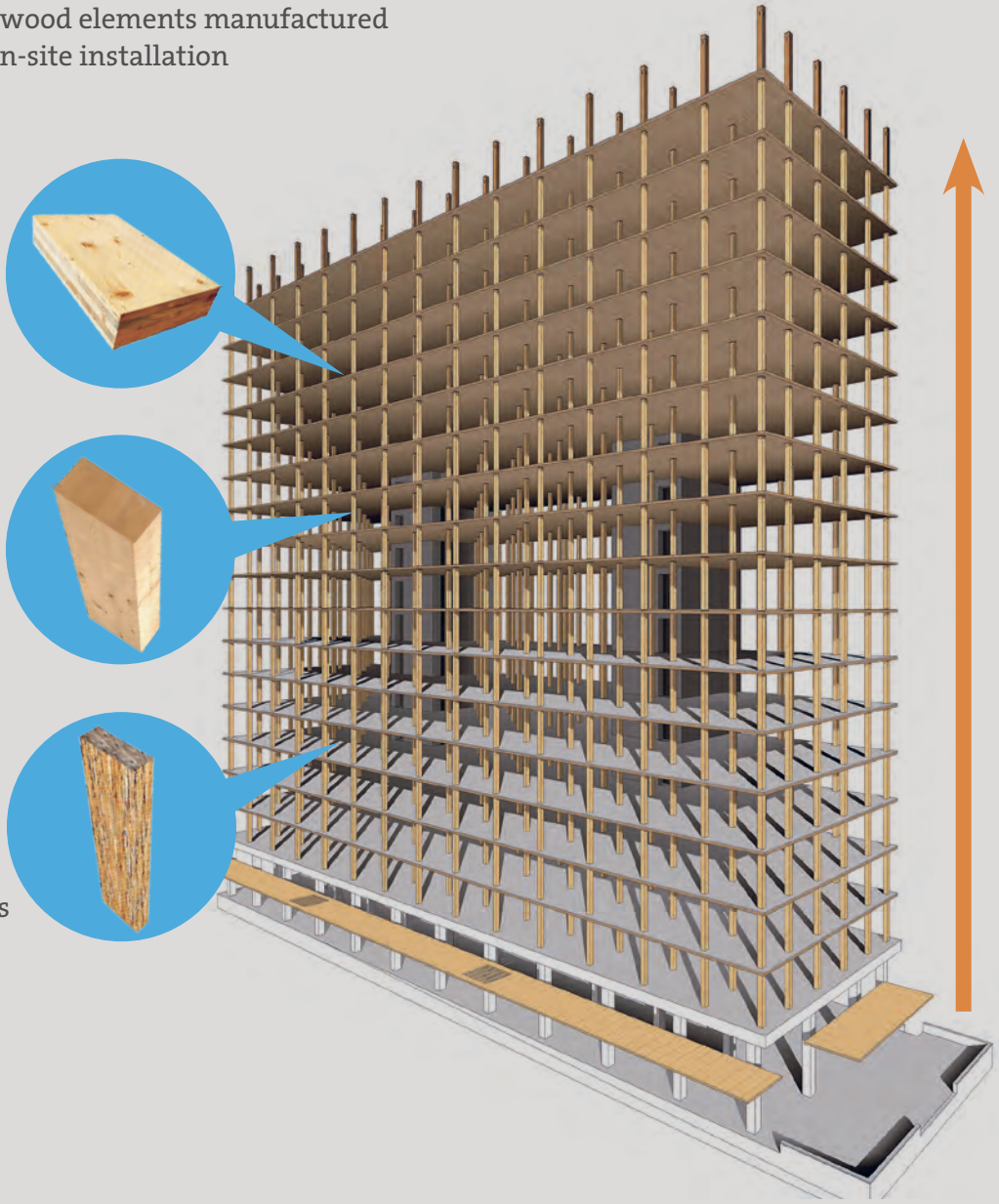
Cross-laminated timber used for levels 3–18 floor slabs

Glulam

Glue-laminated timber used for majority of levels 2–18 structural columns

PSL

Parallel strand lumber used for levels 2–5 central structural columns



Reaching Tall Heights Faster

MASS-TIMBER HYBRID STRUCTURE: 17 STOREYS PLUS CONCRETE PODIUM

CREW: ~9

TIME: 2 MONTHS FASTER THAN A COMPARABLE CONCRETE PROJECT

REDUCED: NOISE AND WASTE ON-SITE

Environmental Impact of Wood Use

Mitigated greenhouse gas emissions are equivalent to:

511 CARS OFF THE ROAD FOR A YEAR

ENERGY TO OPERATE A HOME FOR 222 YEARS

CANADIAN FORESTS GROW VOLUME OF WOOD USED IN 18 MINUTES

The Shore

North Vancouver

These five- and six-storey 359-unit residential condominiums, located on the north shore of Burrard Inlet, are all constructed in light wood-frame over a single-storey concrete parking garage. Many units have large balconies or terraces with views to the Burrard Inlet or North Shore Mountains.

The four buildings, which also include shared amenities such as a fitness room, hot tub, and yoga studio, are arranged around a generous courtyard that includes a fountain, a central plaza with table seating, and four sculptures by local artists.

Adera, the developer and construction manager for the project, took advantage of the multi-phase format to explore different methods of wood construction, optimizing the efficiency and performance of its residential buildings. The test-and-trial approach to the project advances wood-frame and mass-timber construction technologies for the region and demonstrates wood's advantages when it comes to prefabrication, moisture control, nail-laminated timber elevator shafts, and acoustic performance.

OWNER Adera Development Corporation
ARCHITECT Integra Architecture
STRUCTURAL ENGINEER London Mah & Associates Ltd.
COMPLETION 2017 **SIZE** 28,000 m^2

MONAD

Vancouver

Designed to increase the appeal of compact urban living, this innovative, systematized approach to infill development results in dwellings that are more like "sky houses" than traditional condominiums. Low-carbon construction, a high-performance building envelope, and on-site renewable energy enhance the sustainability of the project.

The four-storey mixed-use building, located in the Kitsilano neighbourhood, includes a ground-floor commercial unit of concrete construction below three floors of residential accommodation in factory–prefabricated wood-frame construction. The residential units are arranged around a vertical courtyard, giving each direct access from the outside. The courtyard also gives the units a double orientation, with exterior balconies, daylight, natural ventilation, and views in two directions. A compact car elevator frees up storage space on the basement level.

Off-site prefabrication of the building modules helped to control costs, accelerated on-site assembly, and minimized noise and disruption to neighbours during construction. The MONAD system uses open-sided modules that, with the addition of bridging panels of different lengths, can be adapted to infill lots of varying width. This also permits owners to configure their interior space to suit their individual needs, and offers the option of open-plan layouts.

OWNER Intelligent City
ARCHITECT Lang Wilson Practice in Architecture Culture
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2011 **SIZE** 1,171 m^2

Penticton Lakeside Resort | West Wing

Penticton

Speed of construction, reduced building weight, and the cachet of a timber design convinced the owners of Penticton Lakeside Resort to use wood instead of concrete when expanding their waterfront resort. Situated on the south end of Okanagan Lake, an area popular with tourists and locals alike for its recreational activities, wineries, and fruit orchards; this six-storey, seventy-unit hotel sets a new standard for the use of mass timber in commercial and hospitality projects. The compromised soil conditions of the floodplain site meant that the reduced weight of mass timber compared to concrete lowered the construction costs significantly. Each floor consists of seventy locally produced cross-laminated timber (CLT) panels, making this the largest mass-timber project in the region.

The exposed timber structure—made of a Douglas-fir glue-laminated timber (glulam) post-and-beam frame with CLT floors, roof, shear walls, stairwells, and stairs—envelops visitors with a sense of warmth and modern rusticity. Glulam was also used to build a dramatic nine-metre-high wall using a double lattice of beams to frame the windows. The floor panels were loaded on the truck at the factory not far from the site and lifted by crane and lowered into place in a single movement. Each floor took an average of one week to install and the entire building was completed in just under a year, in time for the resort's busy summer season.

OWNER RPB Hotels & Resorts
ARCHITECT HDR | CEI Architecture Associates, Inc.
STRUCTURAL ENGINEER Read Jones Christoffersen
COMPLETION 2017 **SIZE** 4,665 m²

Timber Gets Top Marks

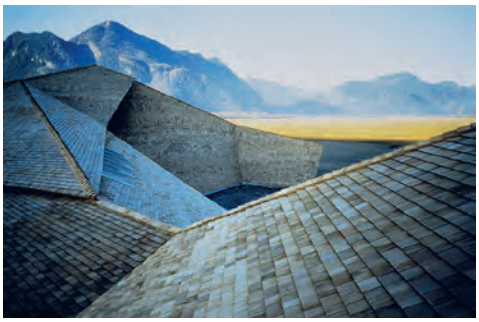
People spend as much as 90 percent of their time inside buildings, and for children, adolescents, and young adults, much of this time is spent in school and educational environments. It is clear that the design of our schools is of critical importance to the health of future generations—an intuitive conclusion now increasingly supported by scientific evidence. In fact, the presence of visible wood is correlated with lower sympathetic nervous system activation—the body's response to stress—and improvements in concentration and test performance.

Along with health and wellness, there is a growing list of compelling reasons to use wood in the construction of our schools. In the past, concrete or other types of materials were favoured for fast construction, but today, prefabricated wood construction is often faster, a boon for school districts looking to reduce construction time and accommodate busy school schedules. B.C. schools place a high value on natural materials, environmental performance, sunlit spaces, and more flexible, open layouts—all the features that wood is best at. Wood also has acoustical properties that can be used to control sound, and thermal properties that help ensure comfort while remaining energy efficient. And with wood's prefabrication advantage, schools can be built with better quality in less time. All these benefits are making timber a top choice for B.C. schools, whether early-childhood, elementary, secondary, or post-secondary.

Begbie View Elementary School
OWNER B.C. Ministry of Education
ARCHITECT DIALOG
STRUCTURAL ENGINEER Read Jones Christoffersen
LOCATION Revelstoke

Lalme’ Iwesawtexw (Seabird Island Community School)

Agassiz



While often described as resembling a bird preparing for flight, the enigmatic-yet-elegant, all-wood form of this school suggests different creatures to different observers. The design draws inspiration from traditional First Nations longhouses, with a parallel-frame post-and-beam structure wrapped almost entirely in cedar-shingle cladding, its silvery, sloping trapezoidal shapes echoing the mountainous landscape of its Fraser Valley setting. Working side by side with the owners, the local Seabird Island Band, the architects designed a building with the potential to take on a life of its own.

Completed in 1988, before computer modelling was common, the design was conceived entirely through hand drawings and physical modelling. The school was built by members of the Seabird Island Band, which is a member of the Stó:lō Tribal Council. With no digital tools available at the time, the physical model became a critical tool for the construction team, illustrating how the framing was to be put together and helping to confirm the wood’s dimensions and measurements on-site. The project is celebrated for its collaborative, community-based approach, which provided training for members who worked on the project and drew on principles of co-design—a model that calls for architects working with Indigenous communities to listen extensively to community members and meaningfully incorporate their design ideas.

OWNER Seabird Island Band
ARCHITECT Patkau Architects
STRUCTURAL ENGINEER C.Y. Loh Associates Ltd.
COMPLETION 1988 **SIZE** 2,190m^2

Southern Okanagan Secondary School

Oliver

In 2011, a fire destroyed the much-beloved art deco–style Frank Venables Theatre and the attached Southern Okanagan Secondary School, which was originally constructed in 1949 and was undergoing a major renovation at the time. School District No. 53—which serves the southern Okanagan and Similkameen regions of the province—joined forces with the broader school community to rebuild the facility, which was unveiled three years later.

The classroom block and library were reconstructed, a new theatre built, and a neighbourhood learning centre added. The plan is centred on an open-ended, south-facing courtyard, and is anchored at one end by the theatre and at the other by the neighbourhood learning centre. A multi-purpose room, located in the middle of the central wing, is the physical and social heart of the school. The building's circular rotunda sits ceremoniously on a gentle grassy hill, conveying a proud vernacular in the face of the disaster overcome by the community.

Wood is used throughout the building, most impressively in the double-height multi-purpose room. Here, an elegant glue-laminated timber structure—comprising turned posts, diagonal branches, and a hexagonal arrangement of roof beams—is the commanding focal point of the space. Along the corridors, and in some high-impact spaces such as the science labs and gymnasium, birch plywood panelling is used on the walls as a hard-wearing yet aesthetically pleasing finish.

OWNER B.C. Ministry of Education
ARCHITECTS KMBR Architects Planners Inc. and HDR | CEI Architecture Associates, Inc.
STRUCTURAL ENGINEER CWMM Consulting Engineers Ltd.
COMPLETION 2014 **SIZE** 11,100 m²

École au-cœur-de-l'île

Comox

This flexible and versatile structure on the east coast of central Vancouver Island is a thoroughly modern school by day and a hub for the local francophone community by night. The facility is organized around four distinct pods, each containing a mix of learning spaces, meeting and multi-purpose rooms, student tech areas, teacher workstations, and learning commons. A multi-purpose gymnasium can accommodate a variety of sport, recreation, and cultural events.

Wood is used extensively throughout the building, including a large-scale 2,960-square-metre timber roof structure. Interior spaces make innovative use of exposed glue-laminated timber beams and mass-timber panels to form unique reading alcoves and multi-purpose spaces. Flooded with sunlight, these smaller spaces within the superstructure look out to a grove of nearby coniferous trees, providing an inviting sense of comfort and scale while connecting occupants to nearby nature. These solid wood elements create a durable and warm interior surface that matches the finish of the roof's expansive wood structure.

Reclaimed Douglas-fir was recovered from the site's previous building to enhance the new structure. A dramatic 7.5-metre glazing wall features the reclaimed timber as mullions, supporting wind loads. The remaining salvaged wood is used as benches and display cabinets. Additional millwork is constructed of veneer-core birch plywood with exposed edges. Custom perforated plywood panels serve as balustrades and acoustic wall panelling. Natural ventilation, geoexchange energy, and rainwater harvesting complement this building's extensive use of sustainably harvested wood, both old and new.

OWNER B.C. Ministry of Education
ARCHITECT McFarland Marceau Architects Ltd.
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2011 **SIZE** 4,500 m²

Cordova Bay Elementary School

Saanich

Located on south Vancouver Island, just north of the provincial capital, Cordova Bay Elementary School demonstrates the abundant benefits of building schools with wood.

The speed, versatility, adaptability, and reduced noise of mass-timber and prefabricated, panelized wood building systems was a boon for this multi-phase demolition and reconstruction that took place during the school year.

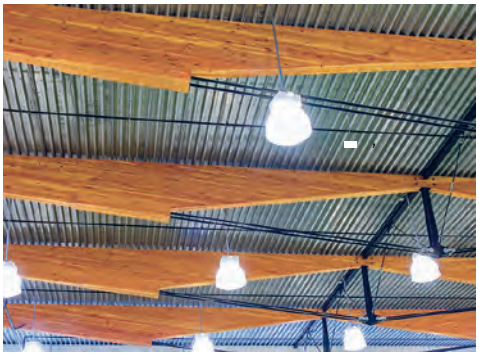
A strategic mix of cross-laminated timber (CLT) and nail-laminated timber (NLT) helped cut costs and maximize value while delivering exceptional stability, structural efficiency, and seismic performance, which is critical in this region. The robust structure is composed of NLT roof panels atop a glue-laminated timber post-and-beam structure framed with CLT walls. It accommodates a four-classroom wing, library commons and computer lab, seminar rooms, and multi-purpose spaces. Sliding partitions provide flexible classroom sizes, and a new corridor extends to an outdoor courtyard that doubles as a practical teaching space.

Expansive airtight glazing provides students and teachers with ample natural daylight, and is complemented by the warmth of exposed wood throughout. Beyond aesthetics, the generous use of visible wood delivers added thermal and acoustic benefits. Overall, the project showcases how schools can take full advantage of wood to construct beautiful, affordable, and safe learning environments that can serve their communities for decades to come.

OWNER B.C. Ministry of Education
ARCHITECT Iredale Architecture
STRUCTURAL ENGINEER Herold Engineering Ltd.
COMPLETION 2016 **SIZE** 1,533 m^2

Sk’elep School of Excellence

Kamloops



As one of the largest First Nations elementary schools in the province, the Sk’elep School of Excellence plays a vital role in teaching and preserving the culture and language of the Tk’emlúps te Secwépemc.

The school’s geometric design rises boldly from the benchlands above the North Thompson River. Its exterior palette of corrugated metal cladding, stucco, cedar, and cultured stone blends fittingly with the dry, desert-like terrain. The structure features an innovative timber two-way lattice made of sawn hem–fir timber elements. The grids effectively form the wood version of a concrete waffle slab. The gymnasium’s roof trusses consist of an elegant hybrid between glue-laminated timber (glulam) beams and a king-post truss. To achieve this, a pair of glulam beams, symmetrical to the centre line, connect together into a king-post truss with double steel-rod bottom chords. This unique timber structure is one of the first of its kind in Canada.

OWNER Tk'emlúps te Secwépemc Indian Band
ARCHITECT Iredale Architecture
TRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2009 **SIZE** 1,719 m^2

Samuel Brighouse Elementary School

Richmond

Built primarily of locally sourced wood and mass timber, this school provides educators, support staff, and more than five hundred students from kindergarten to grade 7 with modern classrooms, offices, special education facilities, a computer lab, a library, and a gymnasium. It also contains an adult literacy centre that serves the wider community in Richmond, the city immediately south of Vancouver.

The school's sustainable design and community garden reinforce a curriculum focused on environmental stewardship. The two-storey atrium offers students a dramatic and inviting entry to the school, its double-height glazing flooding the common space in warm, natural light. The facility's abundant use of wood includes a post-and-beam structure, wall framing, roof decking, millwork as interior doors, and protective wall panels. The school's signature undulating nail-laminated timber roof, made with two-by-fours and steel V-shaped king-posts, demonstrates the beauty and structural capacity of dimension lumber. Its prefabricated panels—much of the wood coming from forests affected by the mountain pine beetle—were built off-site, expediting construction and cutting the installation time by half. The roof offers the added benefit of passive ventilation, through windows at the peaks of each wave.

OWNER B.C. Ministry of Education
ARCHITECT Perkins+Will
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2011 **SIZE** 4,777 m²

Samuel Brighouse Elementary School

Timber Is Top of the Class

School principal Rob Comeau talks about why wood is good for schools

INTERVIEW BY DAVID WYLIE

Abbotsford Senior Secondary School, rotunda.

Located seventy kilometres east of Vancouver in the Fraser Valley, Abbotsford Senior Secondary School features wood as part of a major rehabilitation and replacement project. Central to its design, and crowning the school's three-storey structure, is an intricate and impressive timber rotunda roof built of exposed glue-laminated timber and wood decking. School principal and educator Rob Comeau shares how wood is making the school a place where students feel at home, whether they're enjoying a piano concert in the rotunda or getting hands-on experience building a tiny wood house as part of their green technology program.

Q: Why did you pursue a career in education?
A: I was born and raised in Alberta on a farm. I did my undergrad in agriculture and came out at the wrong time to be a farmer and rancher in the early 1980s. I went to my second love, which was teaching.

Q: Describe your connection to wood as a building material.
A: When working on the farm, wood was a tool. It was a fence post, it was a crossbeam, it was the outside of a grain bin. It was simply functional. On the farm, it wasn't meant to create an emotion, but here in B.C. you see the craftsmanship that people can put into the design of a building and how beautiful wood can look.

Q: What makes a school well designed?
A: Open spaces and light are some of the best design qualities in a school. If you're in a dark, dingy cubicle, you're not feeling very good about where you are. When you can see light and the natural craftsmanship of wood that exists here, those are good design features. That's B.C. architecture—light, wood, and space.

Q: Abbotsford Senior Secondary School underwent a major rehabilitation and replacement project. Can you elaborate on how wood was used in the structural and finishing components?
A: It's a blend of old meets new and it's done in a classy way. When you walk in, you're immediately drawn to the grandeur of the rotunda. There are some very interesting design pieces that catch your eye when you come in. Aesthetically, wood is beautiful, and it speaks to who we are as British Columbians.

Q: How did the new design of the school reuse some of the existing wood from the original structure?
A: When they took the ceiling out, they found beautiful rafters. They looked at them and they said, "We can't destroy this." We've exposed those rafters, stained them, and it is the most gorgeous, inviting gym that you'd ever want to walk into. And some of the older parents still recognize the wood from beams we've repurposed as seats in our rotunda. It's a conversation starter of their memories and time in the school. Now our international baccalaureate business class is going to open up a coffee shop and we're going to take those remaining reclaimed beams and make them into the countertops and high-top tables—refashioning that wood one more time to create another wonderful part of the building. Wood has a way of speaking to you, years, even decades later.

Q: Research is demonstrating that the visual presence of wood indoors can significantly reduce stress levels. Do you experience this in your school?
A: I think you definitely feel better once you've been in a space that incorporates wood. It clears your head. We often have students that just come to the rotunda to be there, enjoy the space, and hang out. It's open and the wood beams are beautiful and inviting. I think it helps with anxiety.

Q: What other benefits do you think the wood and architecture provide?
A: The acoustics in the rotunda are pretty amazing. We recently had an assembly with a baby grand piano in the middle of the rotunda and it was a rich, concert-hall kind of sound in there. I don't think it was necessarily designed to be an acoustic hall but it's certainly a richer sound than you would ever get in a gymnasium. Also, any time you can get quality product right in your backyard, why not use it? It creates jobs in B.C. all throughout the forest industry.

Q: How is wood contributing to sustainability and environmental stewardship at your school?
A: Each of us needs to adjust our carbon footprint and as a naturally renewable material, wood has a role to play. We also have a green technology program for students, along with our own wood program, and this year we're going to be building a tiny house, constructed of local wood.

Q: How is wood part of our cultural identity as British Columbians?
A: There's nothing more majestic than a cedar tree and witnessing what an artist can make out of that. We have First Nations carvers come in every couple of years and do a piece for us. The carvers speak about the cultural aspects of the piece they're working on and what it means. The students get an opportunity to watch them carve and also be able to learn how to carve. We have a totem pole right at the front of the heritage room and a few other commissioned pieces. They all tell a story, and I believe there is great value in sharing that with students, passing it on from generation to generation.

Abbotsford Senior Secondary School

UniverCity Childcare Centre

Burnaby

Nestled in the dense heart of the Simon Fraser University campus, surrounded by trees and a park-like setting, this daycare centre provides early childhood education for fifty preschoolers, using a unique educational programming model that embraces environmental sustainability. It is one of the first childcare facilities in the world to register for the Living Building Challenge—architecture's most rigorous performance standard, which requires sustainable design strategies including exemplary indoor air quality, locally and responsibly sourced wood and other materials, and net-zero energy and water usage.

The L-shaped building includes activity areas for two classes of twenty-five children, connected by a shared lobby, kitchen, washrooms, and reading loft. An exposed steel frame supports a solid-wood roof and exterior wall structures constructed of nail-laminated timber (NLT) panels, which serve as both secondary structure and interior finish. NLT panels, made from salvaged wood affected by the mountain pine beetle infestation, create a corrugated surface that adds visual interest and improves the acoustics of the busy activity spaces. The exterior is clad with western red cedar and the door and window surrounds are milled from reclaimed wood. This exceptionally high-performing building provides children and staff with a warm, welcoming, and healthy environment that is conducive to both learning and play.

OWNER SFU Community Trust
ARCHITECT HCMA Architecture + Design
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2012 **SIZE** 530 m²

Nicola Valley Institute of Technology

Merritt

Modern and traditional, high- and low-tech: contrasting design features are united in one of Canada's first facilities dedicated to providing a uniquely Indigenous perspective to post-secondary students. The building's design reflects the cultural characteristics of the Indigenous Peoples of the region while providing up-to-date learning spaces, classrooms, faculty offices, social spaces, labs, a bookstore, a cafeteria, and a library.

While state of the art in its function, the facility's design is faithful to Indigenous building traditions and includes the substantial use of wood and natural materials. To reflect the pit houses that are the most common traditional Indigenous structures in the Southern Interior region of B.C., the building is a combination of wood and concrete with a structural glue-laminated timber column system. The facility's primary structure is Douglas-fir columns, designed and cut using computer numerical control technology.

The exterior is clad in a yellow cedar rainscreen wall. Windows are shaded with sliding cedar louvres to mitigate solar gain.

A glazed ventilation atrium with operable windows, inspired by the extended tipi used in the historic past by the Lower Nicola People, adds to this design motif, while serving as a functional element of its sustainable design.

OWNER Nicola Valley Institute of Technology
ARCHITECT Busby + Associates
DESIGN ARCHITECT Alfred Waugh
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2001 **SIZE** 4,518 m^2

Forest Sciences Centre

Vancouver

The University of British Columbia's Vancouver-based Forest Sciences Centre is, as its name suggests, an academic and research hub for the science and study of forestry, forest ecology, wood products technology, and innovative wood construction. Designed to showcase what is possible using B.C. forest products, the facility pushed the limits of wood construction at a time when building codes were still catching up to advances in wood technology and construction. Keen to use as much wood as possible, the design team found a solution that was at once practical and innovative—dividing the program into different uses to meet existing building codes.

The plan is bisected by a glazed atrium, with an L-shaped administration building of light-frame wood construction to the south and west and a rectangular laboratory building of concrete construction to the northeast. The laboratory, dubbed the Centre for Advanced Wood Processing, is home to North America's first robotic CNC timber processor. The atrium takes the form of a five-storey galleria, its glass roof supported on thirteen-metre parallel strand lumber "tree" columns, which re-create the feel of a forest canopy. The combination of sprinklers and automated smoke vents, together with tempered glass in the windows and skylights, provides a level of fire separation between the buildings equivalent to that of an unenclosed street.

Two decades after its completion, the facility continues to impress visitors with its innovations in wood construction, and its atrium that is coveted campus-wide by students looking for an inspiring place to study.

OWNER University of British Columbia
ARCHITECT DGBK Architects
STRUCTURAL ENGINEER CWMM Consulting Engineers Ltd.
COMPLETION 1998 **SIZE** 21,500 m²

Centre for Interactive Research on Sustainability

Vancouver

This interdisciplinary academic centre is home to multiple research groups, and the building itself is the subject of ongoing studies on the long-term effects of sustainable design, construction, and operation.

The Centre for Interactive Research on Sustainability (CIRS) demonstrates a different approach to building design: one that is not simply sustainable, but strives to be regenerative, delivering net-positive results for both environmental performance and human well-being. To that end, CIRS integrates passive design strategies, renewable resources, and occupant engagement in the operation of the building.

The structure of CIRS is a hybrid system, with a basement and ground-level auditorium of cast-in-place concrete, and a roof of curved glue-laminated timber (glulam) beams supporting a solid-wood roof over the auditorium. The upper floors are framed of glulam beams and columns that support a solid-wood floor composed of lumber and plywood decking.

The decision to use wood was in keeping with the regenerative concept of CIRS, given it's a naturally renewable building material that locks in carbon. The spruce–pine–fir lumber in the building comes from B.C. forests that have been impacted by the mountain pine beetle infestation; use of the wood offers the same structural quality as other lumber, and helps to eliminate greenhouse gas emissions from decaying trees and foster new growth.

OWNER University of British Columbia
ARCHITECT Perkins+Will
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2011 **SIZE** 5,759 m²

Thompson Rivers University | Old Main Revitalization

Kamloops

Located amid rolling grasslands above the confluence of the North and South Thompson Rivers in the south-central region of the province, this two-storey addition was built on top of the university's "Old Main" building to house Thompson Rivers University's law school. The eye-catching undulating timber roof echoes the surrounding landscape, and provides ample open-air space for the functional elements inside. To meet a tight summer schedule, the panelized roof structure was prefabricated off-site from glue-laminated timber beams, wood joists and plywood sheathing, and installed in only seven weeks, with the panels locking into place like puzzle pieces. Exterior soffits are finished in a smooth cedar cladding, making the sweeping serpentine roof appear like a floating ribbon of wood above the south-facing glass curtain wall.

Its lighter wood hybrid design has the added benefit of minimizing the additional load on the original 1960s structure, transforming an otherwise forgettable low-rise building into a campus focal point. A south wing comprises teaching spaces and lecture halls, while the north wing houses the law library and faculty offices. Expansive interior glazing of the double-height atrium creates transparency and sightlines between the lobby and the library reading room.

A sculptural spiral staircase complements the design—its top-floor landing accommodates a wraparound study counter with mountain views, and doubles as a panoramic venue for informal gatherings. As an altogether modern, flexible design that can shift with programming and student population changes, this is a law school ready for the future.

OWNER Thompson Rivers University
ARCHITECTS Diamond Schmitt Architects Inc. and Stantec
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2013 **SIZE** 4,180 m²

Mass Timber Is Going Mainstream

For architect and timber expert Jana Foit, you can't stop an idea whose time has come

BY KERRY GOLD

Ironically, Jana Foit, an innovator in her field, wants to retire the word "innovation" when it comes to engineered wood. The architect recalls working with a forward-thinking engineer who said it was high time that mass timber entered the mainstream. In other words, we need to remove the mystery around it because it's as practical in application as concrete or steel.

Foit, lead architect on the University of British Columbia's Earth Sciences Building—a project that led the way in building with engineered wood panels—couldn't agree more. "We have to stop talking about it as an innovation and start using it as just another material," she says, seated in the boardroom at Perkins+Will, where for fourteen years she's specialized in the construction of higher-education buildings.

Foit came to wood as a building material by accident, having landed her first job out of university at a small firm that built luxury recreational properties entirely out of custom wood. When she got to Perkins+Will, wood was already very much in the firm's tool box. There was tremendous enthusiasm to do the Earth Sciences Building out of wood-panel construction, even though cross-laminated timber (CLT) wasn't really a part of the conversation at the time. She recalls concerns around cost, and difficulty finding a contractor who could work with engineered wood construction. Eventually everybody bought in, and over time the project proved itself. "I know, because I was on-site for two years," she says. "When I talked to the contractor at the end of it, he said the cost of panelized timber turned out the same as traditional cast-in-place concrete."

At the time, the Earth Sciences Building was the largest panelized wood building in North America. It was made mostly from laminated strand lumber, with only a small amount of CLT, says Foit. Without a North American CLT manufacturer available at the time, they had to get inventive. But that was then and this is now. Wood technology has moved at warp speed.

"It's not really innovation anymore," says Foit. "B.C. has a culture of wood, and it's our province's vernacular, because we are heavily forested and there is a huge wood industry here. So it was natural that we were the first province to do something different."

As mass timber becomes mainstream, new opportunities emerge for Foit's firm. Two of the most exciting are a proposed eighty-storey-tall timber tower to be built along the Chicago River, and recent experiments to create carbon-negative composite fibres from carbon, aramid, and wood. Innovation never sleeps.

Opposite: The Earth Sciences Building's daring cantilevered stair design makes a bold statement of what is possible with engineered wood.

Earth Sciences Building
OWNER University of British Columbia
ARCHITECT Perkins + Will
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
LOCATION Vancouver


GOLDCORP

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.

Ronald McDonald House BC & Yukon

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 m²

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 m²

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, former 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, 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 could have 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 either wood or non-wood rooms.

The researchers continuously monitored heart rate and skin conductivity, which both fluctuated in response to stressful thoughts or stimuli. The study had three distinct time periods. In the first period students were left alone in the room to measure anxiety or anticipation-type stress reactions. In the second period students completed a stress-inducing mathematical task to measure their reaction to a direct stressor. Finally, students spent a third time period in the room alone to observe their stress recovery.

The results: students who spent time in rooms featuring natural wood exhibited lower stress reactivity. 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 m²

INNOVATOR

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 Katerra, 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.

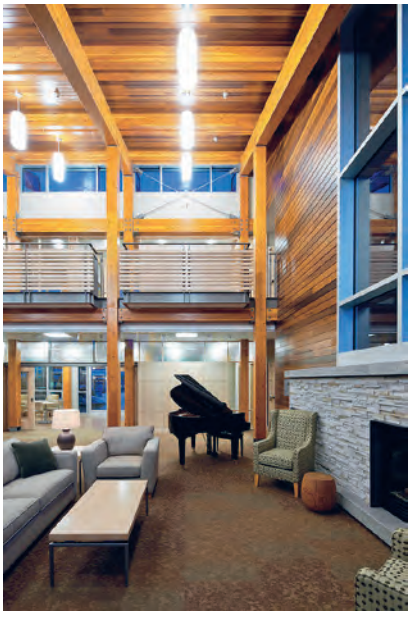
OWNER Kitsumkalum First Nation and Health Canada
ARCHITECT Lubor Trubka Associates Architects
STRUCTURAL ENGINEER CWMM Consulting Engineers Ltd.
COMPLETION 2013 **SIZE** 411 m²

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^2



ESSAY

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.

Tseshaht Tribal Multiplex and Health Centre

Tseshaht First Nation

To preserve its natural setting, located just outside Port Alberni on Vancouver Island, the Tseshaht 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 Tseshaht 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 Tseshaht 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 Tseshaht craftsmen.

OWNER Tseshaht First Nation
ARCHITECT Lubor Trubka Associates Architects
STRUCTURAL ENGINEER CWMM Consulting Engineers Ltd.
COMPLETION 2007 **SIZE** 1,521 m^2

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^2

Constructing Civic Pride

Good public and institutional architecture is a reflection of a municipality's civic values. In British Columbia, governments at all levels are demonstrating the importance of sustainable building, showcasing what is possible with wood construction and investing in architecture that not only serves its citizens, but fosters civic dialogue and engagement.

When B.C. municipalities build with sustainably harvested wood products, they help to address climate change with a lower carbon footprint; they stimulate a healthy economy by creating local jobs and using local products; and they build civic infrastructure that inspires and endures. It is for these reasons that the Province of British Columbia established the Wood First Act, which is designed to encourage public institutions to consider using wood wherever it is appropriate, a concept also implemented by governments in France, Finland, the Netherlands, and Quebec. Since the act was introduced in 2009, over fifty B.C. municipalities have adopted wood first resolutions, polices, or bylaws. Throughout the province, wood serves as the predominant structural and finishing material for municipal buildings, libraries, fire halls, police stations, and a wide range of transit infrastructure.

With buildings being among the highest consumers of energy and most potent producers of emissions, governments have a responsibility to lead by example, and find solutions—such as the use of sustainable wood products and environmentally sensitive design—to help abate the negative impacts of greenhouse gas emissions from the built environment. A growing number of B.C. municipalities are doing just that, promoting locally sourced timber construction as one way they can take action on climate change—and safeguard a better future for British Columbians.

North Vancouver City Hall

Richmond City Hall

Richmond

Built in 2000, this precedent-setting design was one of the first major civic buildings in the province to prominently feature a wood and heavy-timber structure as its defining architectural statement. As the civic hub for the City of Richmond—the municipality immediately south of Vancouver, in the Fraser River delta—the building comprises a nine-storey office tower and a two-storey "meeting house" and is flanked by a landscaped plaza and gardens. The design embodies the city's desire to reinforce its identity as a major urban centre, while reflecting the architectural character of the West Coast. The base of the tower includes counters for all the departments commonly accessed by the public, and a soaring galleria that extends out to greet visitors arriving from No. 3 Road. The galleria structure is a series of Douglas-fir glue-laminated timber portal frames with heavy-timber decking. Expansive north-facing glazing floods the double height space with glare-free natural light, enhancing the warm tones of the wood.

OWNER City of Richmond
ARCHITECT OF RECORD DIALOG
ASSOCIATE ARCHITECT KPMB Architects
STRUCTURAL ENGINEER Bush, Bohlman & Partners
COMPLETION 2000 **SIZE** 11,148 m^2

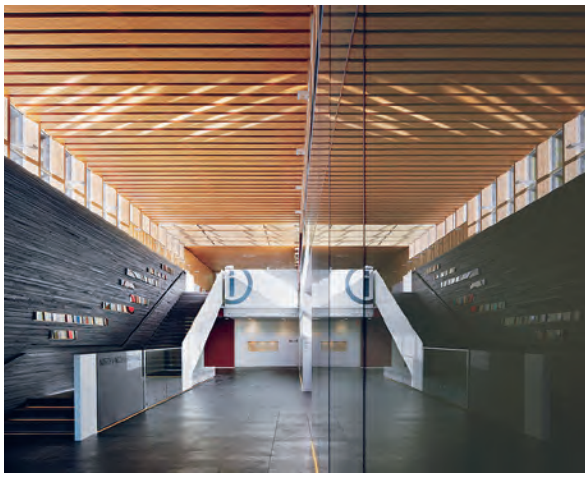
North Vancouver City Hall

North Vancouver

This adaptive rejuvenation of the 1970s municipal hall and library makes inventive use of laminated strand lumber, a highly sustainable, locally sourced material made of fast-growing aspen or poplar. The large-scale panelized mass-timber structure forms a civic gathering space centred on a light-filled, sixty-seven-metre-long atrium, which provides public service counters for the various municipal departments. The renovation also included a conversion of the existing library into staff offices and meeting space.

The long panels are fabricated into box beams, within which electrical and other services are hidden from view. The material is often concealed by drywall, but here is left exposed and given a clear finish. At sundown, the atrium's rectilinear volume glows warmly, showcasing its wood structure as it floats out over the facility's main entrance while symbolizing a commitment to civic engagement.

OWNER City of North Vancouver
LEAD DESIGN ARCHITECT Michael Green, FRAIC, formerly of McFarlane Green Biggar Architecture + Design, now of MGA | Michael Green Architecture
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2011 **SIZE** 3,530 m^2



Qualicum Beach Fire Hall

Qualicum Beach

The Town of Qualicum Beach's extensive use of wood-frame construction in this fire hall makes a definitive statement that wood is not only safe against fire, but is resilient, cost effective, and, as a natural insulator, a source of notable energy savings. Such benefits were important considerations for this municipality, located on Vancouver Island's east coast, which owns and operates the fire hall. The simple but elegantly designed wood-clad facility includes four tandem drive-through bays with apparatus storage, a decontamination area, a hose tower, a workshop, and locker and change facilities. The remainder of the hall includes a reception area, meeting room, offices, fitness room, lounge, and kitchen facilities. The building's wood frame uses laminated veneer lumber (LVL) panels for its upper floor and roof systems. By reducing the time required for shop drawings by the contractor, it is estimated that the use of LVL on this project reduced the overall construction time by more than half, compared to a conventional steel or concrete system. The vast majority of the wood required for the facility was locally sourced, offering employment and other economic and social benefits to the community.

OWNER Town of Qualicum Beach
ARCHITECT Johnston Davidson Architecture + Planning Inc.
STRUCTURAL ENGINEER Herold Engineering Ltd.
COMPLETION 2015 **SIZE** 1,674 m^2

Summerland RCMP Detachment

Summerland

Using traditional wood-frame construction with exposed solid-sawn lumber as both a structural and finishing material, this building's design provides the small, idyllic town of Summerland, located on the west side of Okanagan Lake, with a contemporary facility for the Royal Canadian Mounted Police. A glue-laminated timber post-and-beam structure, with exterior and interior infill walls of light-wood-frame construction, form a rectangular plan that is elongated on the east-west axis to maximize solar exposure. An entrance canopy built of nail-laminated timber gives the building a public presence, and on hot summer days the exposed pine decking glows in sunlight reflected off the aluminum shading fins. The building is designed according to passive design principles to maximize the use of passive heating, cooling, ventilation, and solar control. Offices and workstations are bathed in natural light, and a composite wood-slat ceiling offers acoustic benefits while adding further warmth to the interior spaces.

OWNER District of Summerland
ARCHITECT OF RECORD KMBR Architects Planners Inc.
ASSOCIATE ARCHITECT Allen + Maurer Architects Ltd.
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2012 **SIZE** 1,496 m²

Safe and Sound with Wood

City of Surrey Fire Chief Len Garis talks about the proven safety record of wood construction

BY DAVID WYLIE

British Columbians can have confidence in the safety record of modern wood-frame construction.

Quattro 3 Condominiums
OWNER Tien Sier Group of Companies
ARCHITECT Patrick Cotter Architect Inc.
STRUCTURAL ENGINEER Thomas Leung Structural Engineering (TLSE)
LOCATION Surrey

"You can build your building out of whatever you want—a wood building, a steel building, a concrete building—they're all similar when it comes to fire safety. Wood is just like any other product," says Len Garis, fire chief for the City of Surrey. These are not the words some might expect to hear from someone who makes a living fighting fires. In fact, Garis goes further to say he wants people to see the benefits and beauty of wood, and understand that it's a safe, durable material that we can use with confidence. "Wood has gotten a bad rap" going back centuries, he says, adding there are a lot of myths out there—something he wants to change.

Garis has been thinking about how to keep people safe from structure fires for decades. He's motivated by his passion for firefighting: "There's an attraction to the exhilaration and the stress associated with putting yourself in harm's way trying to help other people," he says. "It's a noble calling." That calling extends beyond the fire station—Garis is also an adjunct professor in the School of Criminology and Criminal Justice at the University of the Fraser Valley. Academically, he focuses on addressing public safety challenges through evidence-based decision making. The issues he's faced over his career have been at the forefront of innovation, from electrical smart meters to evaluating the fire safety of wood.

When British Columbia changed provincial building codes in 2009 to allow wooden structures to increase from four to six storeys, some firefighters were unsure about the change. Garis was president of the Fire Chiefs' Association of British Columbia around that time and was asked to research the safety of taller wood structures. To dispel uncertainty about wood safety, Garis delved into data, including a retrospective analysis that aggregated ten years of fire information across six provinces.

The research points to an important conclusion: wood is just as safe as steel and concrete when proper safety measures are implemented. "The safety systems that are designed for wood-frame buildings, they work really well and there's no more risk in a wood building than anything else," says Garis. Overall, researchers found fire safety has little to do with combustibility of construction materials and much more to do with the contents of the building and the behaviour of occupants, including smoking and cooking, which pose the biggest danger.

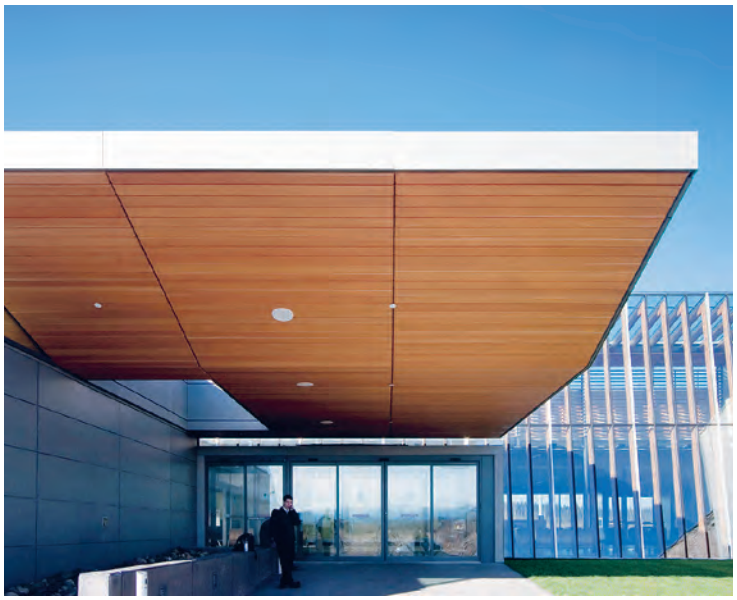
Wood-frame buildings have a proven safety record. They can easily, and economically, be made even safer by using protective finishes, such as gypsum board, that can resist fire up to two hours if the right materials and construction methods are used. Evolving building codes have addressed all concerns about wood construction, for example by mandating sprinklers in attics and on balconies in multi-family structures.

As for mass timber, some may not realize that when it's exposed to fire, the outer layer burns and creates a protective charring that acts as insulation and delays the onset of fire. This process of charring allows timber elements to achieve a level of inherent fire resistance. As knowledge of wood's safety spreads, wood is making a resurgence in popularity. It's gaining momentum throughout B.C. as an efficient, sustainable, and beautiful way to build taller structures such as dormitories, hotels, and urban housing.

The province has deep roots in forestry. In many ways, mass-timber and wood-frame architecture have become part of B.C.'s cultural identity. Garis feels a strong connection to the building material himself, having lived in a wood-frame house most of his life. "Green is everywhere," says the avid hiker. "I've had a long connection with the forest. Living in British Columbia and understanding our connection both economically and socially around wood is really important. It's everywhere and it's a large part of who we are."

Prince George Airport Expansion

Prince George



With its wide-ranging use of different wood species, the Prince George Airport demonstrates how a high-traffic building can benefit from the resilience, versatility, durability, and thermal characteristics of wood. These were important considerations for this northern city, situated at the confluence of the Fraser and Nechako Rivers, which is prone to cold, harsh winters.

The airport's primary structure combines tight-fit stainless-steel connections with elliptically shaped Douglas-fir glue-laminated timber columns, while repeating Douglas-fir ceiling planks provide warmth, and a serene sense of rhythm, throughout the building interior.

Inside, panelized maple plywood, "birch box" seating, and maple benches offer moments of calm for passengers in the departure lounge. An abundant use of natural light, unusual for a building of this type, enhances the wood's warmth. Against the backdrop of ample glazing, careful detailing neatly tucks away wood-to-metal column connections to accommodate expansive views out to the runways and natural landscape. Overall, the use of exposed wood and earth tones offers a contemporary, tranquil aesthetic for busy travellers.

OWNER Prince George Airport Authority
ARCHITECT Michael Green, Project Principal; Steve McFarlane, Co-principal; project by Mcfarlane Green Biggar Architecture + Design
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2005 **SIZE** 1,542 m^2

Prince George RCMP Detachment

Prince George

Timber and wood finishes offer a welcoming presence to visitors of this police facility located on the edge of the downtown core in the northern city of Prince George. On the exterior, a series of heavy timber pillars and trusses span the building's expansive glazing, giving the building civic prominence. Inside, a double-height atrium corridor is lined with wooden columns that resemble an avenue of trees along a forest path. Light filters through the clerestory windows, casting shadows that enhance this illusion. Glue-laminated timber (glulam) columns and purlins, as well as a heavy timber roof deck, much of it sourced locally, offer added warmth to key public areas.

The design also incorporates salvaged wood from the demolished building that originally occupied the site. This recycled material was used to create decorative wood panels in the entrance foyer. The facility is connected to the city's carbon-neutral downtown renewable energy system, which distributes heat from a nearby sawmill to nearly a dozen downtown buildings. Through and through, this is a facility designed to serve and protect both citizens and the environment.

OWNER City of Prince George
ARCHITECT IBI Group
STRUCTURAL ENGINEER Bush, Bohlman & Partners
COMPLETION 2014 **SIZE** 6,900 m²

Whistler Public Library

Whistler

Whistler's library offers a contemporary interpretation of the resort municipality's design guidelines, creating a fresh and modern expression of what it means to build in a West Coast mountain environment dominated by an alpine aesthetic. The L-shaped form of the timber building makes good use of its site's orientation to the sun, mediating between the urban edge of Whistler's Village Stroll and the dramatic natural setting of the mountains beyond. The library features a solid-wood roof system composed of prefabricated panels made of solid hemlock members that span distances up to an impressive fourteen metres. The innovative use of hemlock, an abundant but underused species in British Columbia's coastal forests, demonstrates its commercial viability. The building exterior is clad in stone, western red cedar siding, and composite panels, while reclaimed Douglas-fir millwork enhances the warm feeling of the interior. After using the circulation desk, book stacks, reading areas, computer stations, or multi-purpose spaces, visitors can warm up next to a central stone fireplace or enjoy an outdoor reading terrace on summer days.

OWNER Resort Municipality of Whistler
ARCHITECT HCMA Architecture + Design
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2008 **SIZE** 1,400 m^2

Brentwood Town Centre Station

Burnaby

The first in a series of innovative transit station designs to incorporate wood, Brentwood Town Centre Station is an iconic structure on Metro Vancouver's Millennium Line, with its double-curved futuristic form levitating above Lougheed Highway. Its sleek, canoe-like design foreshadowed the thoroughly modern, state-of-the-art town centre currently under construction in Burnaby, the city immediately to the east of Vancouver. The structure's hybrid-timber design is the result of digital technology applied to tried-and-true traditional materials. The two curved nail-laminated timber canopies, supported by glue-laminated timber ribs, are connected via a structural gutter to steel cross-bracing and V-shaped steel struts to form the primary structure to which the glazing is fastened. More station designs followed this precedent-setting project, incorporating mass timber or other wood products in various architecturally expressive shapes and forms.

OWNER TransLink
ARCHITECT Perkins+Will
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2002 **SIZE** 2,045 m^2

Queensway Transit Exchange

Kelowna

The Queensway Transit Exchange is a gateway to this Southern Interior city's downtown core. The structure builds upon an architectural language of transportation established by the Canada Line and Millennium Line stations in the Lower Mainland, with an impressive sixty-metre-long curvilinear roof span achieved through the use of two engineered glue-laminated timber timber beams supporting nine-metre-wide decking panels. Four inline steel Y-columns, symbolic of the orchards characteristic of the Kelowna area, delicately support the two main beams. The canopy's long curvilinear arc echoes the shape of nearby rolling hills, and waves on the adjacent Okanagan Lake.

OWNER City of Kelowna and BC Transit
ARCHITECT VIA Architecture
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2015 **SIZE** 504 m²

Canada Line Stations

Vancouver and Richmond

The Aberdeen, Lansdowne, Marine Drive, and Richmond Brighouse stations on the Canada Line are united by similarities in structure, glazing, and roof elements. The distinctive canopies provide protection from the Lower Mainland's inclement weather along the length of each platform, and establish a clear identity for the southern portion of the Canada Line.

The prefabricated modular roof panels, constructed from Douglas-fir, rapidly expedited installation. Each of the three station roofs required only a week and a half to install, and contributed to the Canada Line opening three and a half months ahead of schedule. The roof-deck portion is made up of dimension lumber solidly packed together on edge, thin enough to achieve its curvilinear form.

OWNER TransLink
ARCHITECTS Perkins+Will (Richmond Brighouse, Aberdeen, and Lansdowne stations);
VIA Architecture (Marine Drive station);
Francl Architecture Inc. (Templeton and Sea Island Centre)
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2009 **SIZE** Various

Timber Trailblazer

For architect and timber advocate Peter Busby, wood is one of nature's greatest innovations

BY KERRY GOLD

Brentwood Town Centre Station platform

Peter Busby sits inside his summer home on the Sunshine Coast, gazing at the many kinds of wood he used when he built the house—every square inch of it—himself. There is the dried driftwood he used vertically, and the six-by-eight Douglas-fir beams that run horizontally, and the one-by-four tongue-and-groove boards that traverse the ceiling, which make him feel like he's tucked inside a boat's upturned hull.

"It's a very beautiful kind of seventies detail," says Busby. "I love wood. I love the warmth and humanity of it. I love working with wood: the cutting, the shaping, and the joining. It's a very pleasurable material to work with. I came to architecture through construction. I'm a carpenter—and my recreation is to build in wood."

We are chatting by phone, but he conveys a poetic image seated inside his getaway. While studying for a degree in philosophy, he paid the bills with his carpentry work. At the University of British Columbia's architecture school, he met Ray Cole, a professor who impressed upon him the idea that design doesn't operate in isolation, but among people and the environment: "He infused me with the will to work in sustainable architecture for my entire career." For forty years now, Busby has based his career on being kind to the environment, on getting it right.

One of Busby's earliest jobs was designing a lab for MacMillan Bloedel in 1984. The forestry company had created parallel strand lumber, a strong, pressed-wood product that they sold under the brand name Parallam. The client understandably wanted to make their new innovation a key feature of the lab, so Busby designed a four-storey staircase made out of Parallam. From that job onward, he continued to incorporate wood into his designs. "It was the beginning of my career, and obviously, when you

return to British Columbia, you start thinking about local resources and wood becomes a natural option here. So we tried to put it into every project ever since," he says.

If anyone doubts the durability of wood technology, he points that person towards Brentwood Town Centre Station, which might be the most stylish transit station in North America. Busby's firm, Busby + Associates, now known as Perkins+Will, received a Governor General's Medal in Architecture for the tube-like wood and steel structure, with its curved glass walls that allow SkyTrain commuters to be seen from the Lougheed Highway below. "It's now seventeen years old, and the glulam and nail-laminated wood ceiling is in perfect condition. The steel has been repainted three times," he says. "So, when somebody says wood won't last, we take them out there and say, 'Well, it lasts a lot longer than painted steel. You might want to think about that.' "

He's worked with all manner of wood over the years, in different forms and contexts. During that time, he grew his practice and expanded his influence, eventually merging his Vancouver-based firm with Perkins+Will in 2004. Since then, his Vancouver office has helped establish the global giant as an international harbinger of advancements in mass-timber design.

Busby is now taking his passion for wood to another level—thirty-three levels, to be exact. He has designed a thirty-three-storey residential tower that is awaiting the City of Vancouver's rezoning approval. If all goes according to plan, it would be the tallest wood building in the world. The living, dining, and den areas in the units would have exposed vertical wood elements and cross-laminated timber ceilings.

More wood towers will follow as the structural use of wood broadens, he says. Wood is about the same cost as concrete, and just as fire resistant, but offers a smaller carbon footprint. The industry's understanding of wood's importance has been an evolution, he says, and that long learning curve started in B.C. The province's forests generate about 1 percent of their mass per year in new growth—more than enough new growth every year to build everything we need, says Busby.

"Using wood is one of the early discussions we have with our clients, for every single project," he says. "The environment is being seriously damaged by us emitting carbon into it, and if we can build in wood then we reverse that process. We sequester carbon and build up a positive balance. So we are always looking at wood first—always."

Busby is optimistic that there is more trailblazing to come. "I believe that most younger practitioners today are also interested in pursuing mass timber or other wood products solutions. I believe developers are coming around to that. We don't have a mass-timber residential high-rise rental or condo building yet in Vancouver. But we will in five years, and we will have a number of them."

Brentwood Town Centre Station exterior.

Putting Wood to Work

When it comes to commercial and industrial buildings that need to stand the test of time, wood is proving it has the necessary resilience and strength, while offering unique advantages over steel and concrete. When it comes to retail and office spaces, wood not only offers remarkable durability, but introduces a much-desired aesthetic warmth once absent from such environments.

Introducing mass timber into these spaces is a kind of modern-day revival of the century-old timber post-and-beam buildings of the past. What's old becomes new again, but with all the state-of-the-art technologies and sustainable features expected in today's commercial buildings.

With the newly developed technologies that are available today, and the application of prefabrication, timber can compete when it comes to the construction of industrial facilities.

Today, modern timber buildings arrive on site with all timber pieces pre-cut and assembled. In fact, in comparison to steel, the construction of a timber industrial building often takes less time and the work of other trades is made easier. And mass timber, such as cross-laminated timber and dowel-laminated timber, is sustainable.

Historically the domain of steel and concrete, commercial and industrial buildings are increasingly incorporating prefabricated mass-timber construction, proving that wood—the only naturally renewable building material—can deliver both beauty and brawn.

Campus Energy Centre


MAXIMUM LOAD=2500 KG

Central City

Surrey

Timber steals the show in this 2003 turning-point project in the province's fastest growing city. Three distinct timber structural systems are used for the atrium, galleria, and facade of this combined shopping centre, commercial office space, and university, giving warmth and expression to an otherwise concrete, steel, and glass building.

The atrium roof features a geometric wood space frame constructed from 3,700 Douglas-fir peeler cores—making full use of a by-product of the plywood industry. Varying clusters of Douglas-fir logs, turned and tapered, branch from reinforced concrete columns. Upon entering the building, visitors' eyes are immediately drawn to the atrium's expressive web of 3-D timber, reminiscent of a child's Tinkertoy construction set. Large parallel strand lumber mullion columns support the atrium's lower glazing as well as the concrete canopy above it, something unique in a facade so large and complex. The 2,200-square-metre galleria roof—a free-form skeletal structure consisting of twenty individual 3-D composite timber-and-steel cable trusses—covers a serpentine-shaped, five-storey-high vaulted space.

All in all, the atrium, galleria, and facade designs not only push the boundaries of what's possible with wood, but serve as a civic statement, emblematic of the City of Surrey's official motto: the future lives here.

OWNER ICBC Properties
ARCHITECT Bing Thom Architects
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2003 **SIZE** 7,896 m²

Making of a Modern Master Builder

Engineer Gerald Epp looks to the master builders of centuries past for his inspiration on what it means to be innovative

BY JASON MARTIN

Central City's space trusses make innovative use of a by-product of the plywood industry.

"We hung out our shingle pretty early in our career and we didn't have a lot of contacts, but we were dreaming big and thought maybe one day we could do something on an international scale," recalls Gerald Epp, president of StructureCraft and former partner of structural engineering firm Fast + Epp.

As we sit down at a wooden table in a modest meeting room at his company's Abbotsford offices, he explains the construction of his company's new facility. The prefabricated 3,700-square-metre manufacturing plant was erected in just five days, built from a simple kit of parts comprising glue-laminated timber columns and beams, tall wooden walls, and wood roof panels. Its success proposes a new cost-effective and attractive way to construct an industrial building. The all-wood facility stands out among its neighbouring industrial buildings and, given its attractive aesthetic, could almost be mistaken for a community centre. Inside the adjoining office building, the exposed-wood structure houses open-concept offices where designers, engineers, estimators, and fabricators work collaboratively on custom mass-timber structures from concept and modelling to fabrication and installation. This state-of-the-art facility is producing dowel-laminated timber, opening new market opportunities for the firm.

Epp is quick to explain how his career started with humble beginnings and an earnest pursuit to understand the foundational principles of structural engineering and construction on a deeper level. In 1994, this pursuit took him and his then business partner, Paul Fast, to Europe on a professional pilgrimage of sorts to learn from some of the leading designers and firms of the time, including Arup, Renzo Piano, Norman Foster, Richard Rogers, and Nicholas Grimshaw.

Epp credits that trip as the beginning of a lifelong quest to become a modern and skilled master builder of wood and hybrid structures. "The early engineers, like Brunel and Eiffel, were really master builders that understood first principles and could truly collaborate with architects to create and fabricate bold, daring structures. I mean you can even go back to Michelangelo, he was a master builder, he was an artist, an engineer, an architect, a site supervisor, he played every role," Epp explains.

What Epp admires most in these early master builders is a revolutionary spirit, and he sees wood as the perfect material for such ambitions. "We were pioneers in North America, to some extent, drawing on inspiration from Europe," he says. "We chose to work with wood because it was the avenue to really try new things. Exposing the structure

with wood, you can really make it beautiful. With wood-hybrid structures you need to be detailed and precise."

Epp's trailblazing, and the founding of StructureCraft, can be traced back to 1998 when, working with architect Bing Thom, he helped design and fabricate a complex parallel strand lumber and stainless-steel–truss roof for the Pacific Canada Pavilion at the Vancouver Aquarium. "We wanted to create an elegant wood-hybrid structure and there were really no fabricators willing to build it." Epp and Thom presented their design to the owner and StructureCraft was born.

Ignited by the pavilion project, it is clear Epp's relationship with Thom was a special one. "Bing Thom was a master, one of the truly great architects who understood collaboration," Epp recalls. "When Bing entered a room he drew everyone into the pursuit. He wanted everyone's expertise, that's how he got to the best solution."

The new venture proved successful and StructureCraft would go on to produce a number of Thom's signature wood-hybrid structures over the next three decades, including Surrey's Central City. While experienced with all types of building materials, wood has become Epp's material of choice over his three-decade career, often incorporated in complex hybrid structures, and enabling a long list of architects to create bold, expressive, and metaphorical designs.

When asked why he is drawn to wood, he cites its aesthetic characteristics and sustainable benefits: "It gives you a warmth you just can't get with steel and concrete. Wood is your friend. In a workplace it feels at home, in an office you can pin things into it, it curves easily, it's inherently natural, it's a familiar material to us."

As much as he enjoys the benefits, he relishes the challenge and innovation that wood can offer. "Wood is less understood and has distinct properties you have to get to know and work with. It's malleable and you can always try something new. While wood performs differently than concrete or steel, it's extremely versatile. It brings with it unique challenges, but with those challenges comes opportunity."

The Vancouver 2010 Olympic and Paralympic Winter Games offered him one of the greatest opportunities and challenges of his career. When the design team for the Richmond Olympic Oval decided to use pine beetle kill wood as a primary structural material, they turned to Epp and StructureCraft. Never one to shy away from a challenge, Epp asked, "What if we could use the two-by-four, the smallest possible unit of lumber, to solve both the structural and acoustic requirements?"

The design of what became the WoodWave panel did not come easy; with all the testing and research it was a year in the making. "This had never been done before and I'll tell you, it was touch-and-go there in the early days of the WoodWave. But you believe in the concept and you find a way." After fourteen different load tests, they came up with the right solution. "The testing pointed us to the right screw to link the light lattice of two-by-fours to solve a snap-through buckling problem we were having."

Fixing that small variance made all the difference. The result was an entirely new way to use beetle–killed dimensional pine lumber. By using over 450 WoodWave panels, Epp and his team covered one of the largest wood roof spans in the world.

As Epp is telling this story, his sons Lucas and Gerald Jr. join the conversation. They are as well versed in its development as their father, and begin finishing each other's sentences. At one point in the discussion, Gerald Jr. recalls vacations when his father would pull the family van off a busy freeway to sneak a peek at some recent project he had worked on. Later in the conversation, they debate who of the three is better at math. As the conversation comes to a close, it becomes clear that Lucas and Gerald Jr. have inherited their father's attention to detail and his innovative spirit—you could say they're master builders in the making.

Thanks to Lucas's lifelong exposure to timber and his experience on the shop floor from a young age, he is now a structural engineer with more than a decade's experience in managing StructureCraft's engineering and 3-D modelling department. Gerald Jr., a structural engineer in training, spearheads business development for the firm.

Before parting ways, Epp looks to his sons and, in an almost hushed tone, says, "It hit me again the other day that we always need to be pioneering if we want to stay ahead of the pack, if we want to be master builders. It's really just part of us—it's who we are."

Richmond Olympic Oval's one-of-a-kind roof structure is composed of prefabricated WoodWave panels.

Mountain Equipment Co-op Head Office

Vancouver

When Canada's leading retailer of outdoor gear set out to construct a new head office, they chose wood as the primary building material for its performance, renewability, and aesthetic qualities. The four-storey headquarters, situated in Vancouver's burgeoning high-tech hub of False Creek Flats, is constructed using nail-laminated timber (NLT), a simple yet economical construction technology that's been used in commercial buildings for over 150 years. The building's floor assemblies are made of modular, prefabricated NLT panels, a cost-effective way to incorporate an abundance of wood into the office's design.

The use of glass and an open space plan makes wood visible from any vantage point, emphasizing the warmth and beauty of the timber construction. Interior Douglas-fir millwork screens offer an inviting alternative to traditional office cubicles. On sunny days, employees can enjoy a rooftop terrace with views to the downtown and the North Shore mountains.

OWNER Mountain Equipment Co-op
ARCHITECT Proscenium Architecture + Interiors Inc.
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2014 **SIZE** 10,219 m²

Energy House

Dawson Creek

This facility at Northern Lights College (NLC) is architecture that eagerly demonstrates its purpose. NLC provides certification and trades skills for the renewable energy sector, and Energy House, as a designated Clean Energy Technology Centre of Excellence, shows students first-hand how to deliver all your electricity and heating needs through sustainable means, such as wind turbine, solar, biomass, and geoexchange systems. An adjacent facility contains a wood pellet–fed biomass boiler, which serve as the main heat source for the existing Campus Centre Building. NLC also offers a wind turbine maintenance technician program at Energy House, where students learn the theory supporting wind turbines and the practical maintenance procedures required to maintain turbine output.

The nearly all-wood structure houses classrooms, meeting facilities, and visual displays of technologies that save energy, conserve water, and use renewable heat. All elements, except the concrete shear walls (for seismic loads) and a few steel columns and connectors, are constructed using locally sourced wood. All walls, both interior and exterior, contain wood-stud construction between the shear walls, incorporated into a glue-laminated timber post-and-beam structure.

OWNER Northern Lights College
ARCHITECT McFarland Marceau Architects
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2011 **SIZE** 802 m²

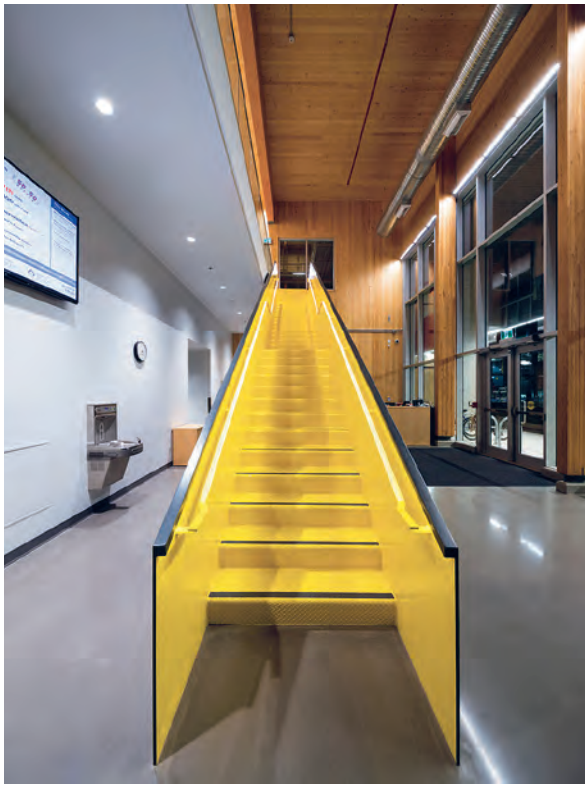
Campus Energy Centre

Vancouver

Set in the heart of the University of British Columbia's (UBC) Vancouver campus, the Campus Energy Centre is a state-of-the-art hot-water boiler facility capable of meeting all of the institution's heating requirements. The primary structure is constructed of locally sourced cross-laminated timber panels supported by glue-laminated timber columns and twenty-metre clear-span beams. Perforated zinc cladding wraps the exterior, and in some cases is peeled back to provide transparency.

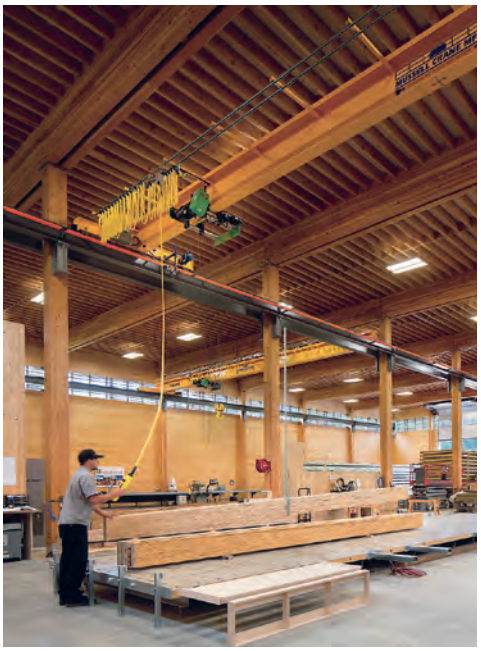
The facility's central location allows it to serve an educational as well as functional role. On the west facade, the metal shroud is cut away to reveal the glazed skin of the boiler house, giving passersby views into the timber-framed building. Interpretive signage educates the UBC community about the daily energy production on campus. Interior spaces are filled with natural light and ventilation, while waste heat provides additional space conditioning. The aesthetic warmth of the mass timber, unique to a building of this kind, gives a striking visual contrast to the enormous process equipment inside.

OWNER University of British Columbia
ARCHITECT DIALOG
STRUCTURAL ENGINEER Fast + Epp
COMPLETION 2016 **SIZE** 2,000 m^2



BC Passive House Factory

Pemberton



BC Passive House (BCPH) Factory began prefabricating its own high-performance building components after successfully assembling Canada's first Passive House–certified structure, the Lost Lake PassivHaus, which was shipped as a kit of parts from Austria to serve as that country's hospitality house for the Vancouver 2010 Olympic and Paralympic Winter Games. As demand increased, BCPH began planning a larger factory, one that would provide employees with as high-quality a work environment as they were producing for others. The new factory is in the Pemberton Valley, north of Whistler, encircled by the peaks of the Coast Mountains.

The facility includes offices, a showroom, and a high-bay workshop, all contained within a simple rectangular volume. Douglas-fir post-and-beam frames, at six-metre intervals, span from the sides to a central line of columns, forming the main structure. Continuous ledgers on either side of the beams support prefabricated wood-frame roof panels. Exterior twelve-metre cross-laminated timber panels are laid horizontally in a staggered pattern for the walls, and are topped with continuous clerestory windows to provide daylight and views in all directions. The showroom and office walls are framed with wood I-joists, super insulated, and certified to Passive House standards. The exterior cladding is of prefabricated panels of horizontal Douglas-fir, and dense, durable larch boards.

OWNER BC Passive House
ARCHITECT Hemsworth Architecture
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2014 **SIZE** 1,500 m^2

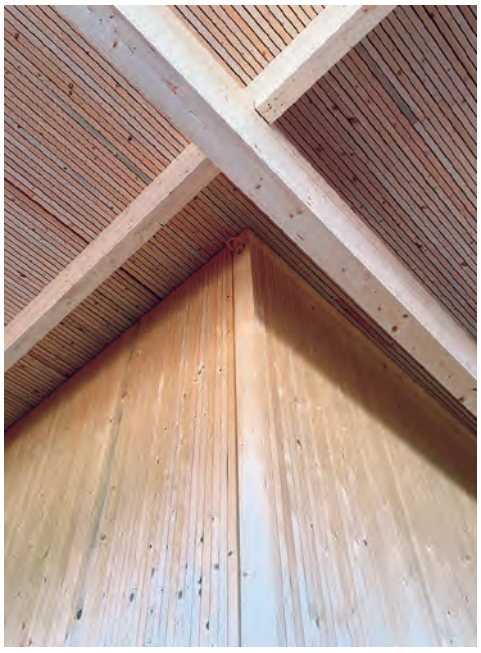
StructureCraft Facility

Abbotsford

StructureCraft, an engineer-led fabricator of innovative timber structures, reinvents the industrial building typology with their facility in Abbotsford, east of Vancouver. The prefabricated facility, built from a simple kit of parts composed of glue-laminated timber (glulam) columns and beams, tall wood walls, and wood roof panels, was erected in just five days, demonstrating a cost-effective method of constructing an attractive industrial building. The facility includes a manufacturing plant for dowel-laminated timber (DLT), and open-concept offices where designers, engineers, estimators, and fabricators work collaboratively on custom mass-timber structures, from concept and modelling to fabrication and installation.

As a sustainable alternative to concrete tilt-up construction, its prefabricated wall and roof panels showcase the variety of cutting-edge mass-timber and engineered wood products that the facility itself designs and assembles for projects around the world. In addition to DLT, these include laminated strand lumber, nail-laminated timber, and glulam.

OWNER StructureCraft Builders Inc.
ARCHITECT Keystone Architecture
STRUCTURAL ENGINEER StructureCraft Builders Inc.
COMPLETION 2017 **SIZE** 4,645 m²



INNOVATOR

Timber for Two

Cutting-edge duo Robert Malczyk and Eric Karsh want to transform the way we think of timber

BY KERRY GOLD

Earth Sciences Building under construction

BC Passive House Factory

Equilibrium Consulting principal Robert Malczyk may be the Engineer of Record on Shigeru Ban's tall downtown Vancouver timber project, but he's more interested in the humble mid-rise. The mid-rise, not the attention-seeking wood skyscraper, he argues, will ultimately transform the way we see wood-frame and mass-timber construction. "Combining energy efficiency and mass timber is my personal passion," says Malczyk. "Of course, it's nice to be involved in these [tall] buildings, but I think the biggest change we can influence is in mid-rises."

Shigeru Ban's Terrace House in Coal Harbour is one of a number of wood skyscrapers underway in the global race to the top. The first twelve stories will be constructed with traditional concrete and steel, while the remaining seven will feature exterior wood elements and floor plates cut from timber. The plan is for all of the wood to be sourced locally.

According to Malczyk, mid-rise buildings—anywhere between five and twelve storeys—built from readily available B.C. wood products are incredibly energy efficient, and will put taller wood construction firmly within the mainstream. North American developers are realizing this, and in many cases, the combined use of light-wood-frame and mass-timber construction can offer economic advantages over traditional steel and concrete.

It's not only cheaper, but prefabricated mass timber means less debris and noise, which makes it less likely to disturb nearby residents. In North America, we already have the technology to build a mid-rise in the space of a week, says Malczyk. "Developers are doing it now for very economical buildings, not the high end," he says. "It's more of a base market with mass timber, which is huge progress."

His founding partner at Equilibrium, Eric Karsh, concurs. For the last couple of years,

the push for residential and office mid-rises has gained momentum, with dozens of B.C. buildings in the design, permitting, and building stages—largely because the development industry is on board, says Karsh. "A few years ago, we were only doing demonstration projects. Now we are doing developer-driven projects. They didn't want to be the first to do it, because issues needed to be resolved. I think we've crossed that barrier."

Beyond mid-rise and tall timber towers, the award-winning firm takes on projects around the world—everything from creative small-budget renovations to public institutions and internationally recognized landmarks. This includes B.C.-based projects such as the Wood Innovation and Design Centre in Prince George, the University of British Columbia's (UBC) Earth Sciences Building, and Whistler's Audain Art Museum, as well as international projects such as the University of Massachusetts Design Building and the WoodTek headquarters in Taiwan, which is that country's first cross-laminated timber building.

Malczyk and Karsh head up their own distinct projects, but regularly collaborate and consult with each other. Malczyk is working on several developments with Boston-based architect Tom Chung, principal at Leers Weinzapfel Associates. And Karsh often works with Vancouver-based architect Michael Green, who shares his ardour for timber construction and design. Karsh and Green collaborated on a book, *The Case for Tall Wood Buildings,* in which they present a new way of designing and building timber panel and glue-laminated timber towers up to thirty storeys high.

Karsh says that when writing the book, they had planned the case for twelve storeys, but after Green saw an ancient temple in Japan at that height he came back and said they should aim for twenty storeys. They came up with a model, and found it worked so well that Karsh suggested they go even higher. Green mentioned the potential for a thirty-storey wood building at a public talk, which, to their surprise, got covered by the press. Suddenly, they were committed to a thirty-storey case study.

"That was a challenge technically and psychologically. It was not something I could wrap my head around easily. Once we got into it, it became evident that it could work, and now, twelve storeys doesn't seem so high anymore," says Karsh. "There is a psychological barrier" when talking about building height, he says. "When they first built concrete high-rise buildings in Chicago, people were crossing the street to get away—they thought those buildings would collapse."

The busting of psychological barriers is one reason for the race to build higher with wood, as well as the publicity and marketing value that it gives the designer and developer, says Karsh. But those barriers are vanishing, with the groundswell of other design and engineer firms working in wood.

It can take decades to change the standard way that the construction industry works, but it is slowly changing, says Malczyk. He cites his own Kitsilano home as an example: when it was built several years ago it was a challenge, because its Passive House construction didn't fit with the conventional building standards at the time.

Malczyk is passionate about Passive House, which is well suited to mass-timber and wood-frame construction. Many consider the Passive House standard to be the most rigorous voluntary energy-based certification in the design and construction industry. His firm collaborated with Hemsworth Architecture on the BC Passive House Factory in Pemberton, just north of Whistler. Another Passive House project nearby, and one of more personal pride, is his own Rainbow Prefab Duplex constructed in Whistler in 2011. It is the first home in B.C. to be certified by the Passivhaus Institut in Darmstadt, Germany. It took four days to build and it's so energy efficient, Malczyk says he doesn't have to turn on the heat until mid-December. That's a way of living that any homeowner would get behind.

For both Malczyk and Karsh, mass timber is no longer perceived as the exception but is on its way to becoming the rule. There is already a growing awareness among developers of multi-family residential buildings who see the economic advantage. Karsh says although it may look like slow going, in the grand scheme of engineering history, the transformation has been faster than we think. Considering the formidable task of training and spreading awareness among industry professionals, fulfilling peer-reviewed site-specific safety requirements, and sourcing supplies, it's coming together relatively quickly. "I do think it is happening quite fast, when you consider what is involved in a transition of this kind," he says. "People get impatient and ask, 'Why is this not becoming popular faster?' I think it is already there."

Earth Sciences Building

Wood Innovation Research Lab

Prince George

This single-storey glue-laminated timber post-and-beam state-of-the-art facility is the first industrial building in North America to be designed to the Passive House standard, a remarkable achievement given the large, exposed surface areas of the building and the region's cold winters. The University of Northern British Columbia's research facility for students and faculty in the Master of Engineering in Integrated Wood Design program includes labs, classrooms, and a mezzanine with additional office space.

Rather than using conventional studs for the walls, the five hundred millimetres of mineral wool insulation required to meet the Passive House standard is fitted between vertical light-wood trusses that were custom built in a local factory. Interior sheathing materials for floor, wall, and roof assemblies are left exposed. A life-cycle analysis determined that, with its low energy demands, biofuel heating source, and the carbon stored in its wood structure, the building generates 70 percent less greenhouse gas than a similarly constructed industrial building designed to current code standards.

OWNER University of Northern British Columbia
ARCHITECT Stantec
STRUCTURAL ENGINEER Aspect Structural Engineers
COMPLETION 2018 **SIZE** 1,070 m^2

Wood Innovation and Design Centre

Prince George

When completed in 2014, the Wood Innovation and Design Centre (WIDC) was one of the tallest modern timber buildings in North America, with eight levels (officially, six storeys with an added mezzanine plus penthouse). Built in part to house a new Master of Engineering in Integrated Wood Design program at the University of Northern British Columbia, the building features an open atrium and demonstration space, a lecture theatre, a workshop and laboratory, and spaces for faculty offices and classrooms.

As a demonstration project, WIDC not only showcases a wide range of locally sourced products and species, but serves as a repeatable and expandable template for constructing future tall wood buildings of different sizes and functions. The shape of the building—a clean, modern box—is intentionally restrained. Its simplicity lends itself to the practical and essential goal of repeatability, and gives centre stage to the beauty of the various woods and all their details.

WIDC's structural concept is that of "dry construction"—using custom, prefabricated structural wood components—which virtually eliminates the use of concrete above the foundation, with the exception of the floor in the mechanical penthouse. This concept also allows for the wood to be elegantly and purposefully exposed as the finish throughout the building. The primary structure consists of an innovative combination of post-and-beam construction and built-up cross-laminated timber (CLT) floor panels. Glue-laminated timber (glulam) beams frame into glulam columns, both of which were chosen for their exceptional structural performance.

Several wood species were used in the construction—including Douglas-fir, western red cedar, hemlock, pine, and spruce—and were all sustainably harvested from B.C. forests. While traditional wood products like dimension lumber and plywood panels were employed in various ways, the structural design and building envelope focused on engineered wood products—glulam, CLT, parallel strand lumber, and laminated veneer lumber, all of which were produced in British Columbia.

Much of the building's exterior features a unique and striking type of cladding—a combination of naturally weathered and charred western red cedar siding. Its lustrous black finish is durable and low maintenance, as the charring process makes it more resistant to flame and pests.

The building envelope design, with its varied glazing pattern, is a metaphor for the natural outer layer of a northern tree, which has thick bark and moss on the north side to protect from the elements, but is thinner on the opposite side for greater exposure to the sun.

OWNER Province of British Columbia
ARCHITECT MGA | Michael Green Architecture
STRUCTURAL ENGINEER Equilibrium Consulting Inc.
COMPLETION 2014 **SIZE** 4,820 m²

CONCLUSION

The Future Is Wood

British Columbians have witnessed an impressive rise of innovative wood architecture throughout the province, from awe-inspiring superstructures that have garnered worldwide acclaim, to heartening smaller-scale designs that serve a diverse range of rural and urban communities.

Many of these examples of ingenuity are featured in this book. Big or small, each of them could only be achieved through the collaboration of a diverse network of designers and building professionals, clients and specialists, foresters and fabricators, and producers and manufacturers throughout B.C. More than ever before, this network of experts is embracing innovations, from cutting-edge structures built with mass timber to high-tech sustainable forest practices.

With its many distinct properties and advantages, wood's versatility is vast. Recognized for its durability, strength, and environmental benefits, it is becoming the material of choice in a wide range of applications and building types. As North America's largest supplier of softwood forest products, B.C. is showcasing technologically advanced—and sometimes unexpected—capabilities of wood. And innovative products like mass timber are allowing for new, unprecedented possibilities in what wood can achieve, from impressively long spanning structures to strong, safe skyscrapers.

As communities grapple with an ever-growing need for affordable housing, wood is playing an important role by improving access to economical, comfortable, and cost-effective solutions. Whether it's in hard-to-reach rural locations or high-density urban centres, builders are choosing modular prefabricated wood and mass-timber construction to save money and time, while boosting overall quality and performance.

Beyond buildings, wood is helping to address the social, economic, and environmental needs of current and future generations. Forest products and wood buildings continue to store carbon after being harvested, helping to address climate change in B.C. and around the world. Wood products from B.C.'s sustainably managed forests are a home-grown solution that contributes to livable communities and local jobs.

Wood is a material for our time, and for our future. For centuries, British Columbians have built with wood, continually evolving and advancing its potential. We can only imagine the new advancements made by B.C.'s next generation of innovators. One thing is certain: an unwavering commitment to sustainable forestry and wood innovation is positioning the province as a global leader in the century to come.

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ISBN 978-1-9994050-1-4