



Mass Timber and Wood Design

RJC ENGINEERS EXPERIENCE PACKAGE

Creative Thinking
Practical Results





RJC Engineers

RJC Engineers (RJC) has the resources and expertise of a national firm combined with local commitment, knowledge and experience. Our people bring the best of RJC to every project, working collaboratively to deliver on architectural vision while respecting project budgets and schedule.

Specializing in structural engineering, structural restoration, building science, building energy modelling, parking facility design and structural glass engineering, RJC has a well-earned reputation for delivering innovative uses of building materials across Canada. Our structural expertise in wood design is supported by our knowledge and experience in these other practice areas, particularly enclosures, to develop durable, long lasting structures.

For wood, and all our work, we challenge ourselves to be the best at what we do, to push the limits of what is possible in order to bring value to our clients. Respected thought leaders, RJC brings technical expertise, industry knowledge, and experience to turn visions of wood design into reality.

Leaders in Wood Design

A renewable building material with low embodied energy, wood is durable, versatile and can add significantly to the value of a building over the long-term. It is increasingly becoming a primary material of choice, thanks to advancements in codes, products and manufacturing.

RJC is at the forefront of wood design in Canada. Our talented teams deliver wood projects around the globe, from residential to institutional buildings. Engaged by provincial and federal governments, our recognized experts consult on the latest updates to building codes for wood design.

RJC has an integral role in the development of Canadian Codes and Standards for wood-frame and mid-rise wood-frame developments. We participate at a national level on code groups to develop changes for wood, including those that are leading the way to allowing for taller wood buildings.



Mass Timber and Wood as a Feature Element

What defines a mass timber building?

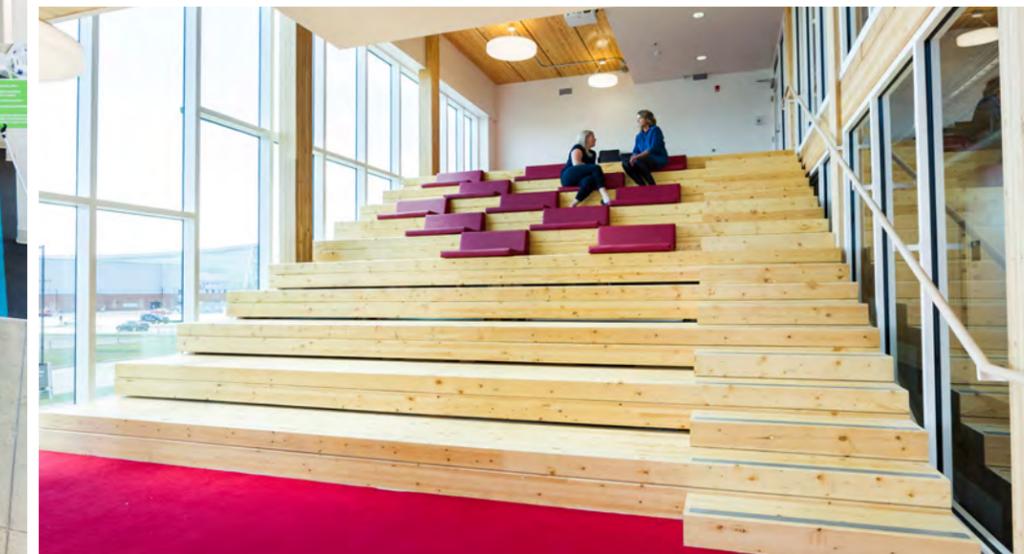
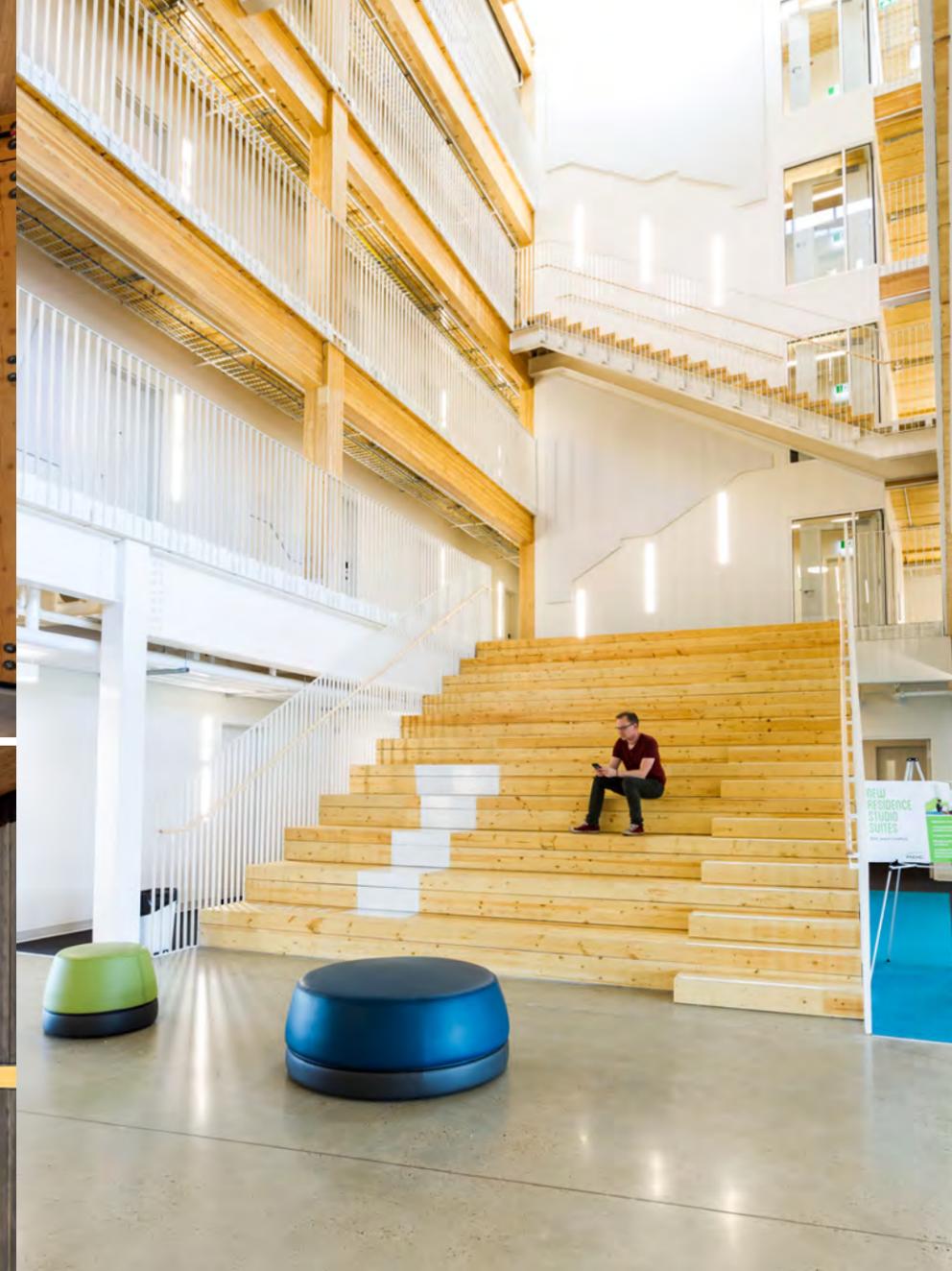
Mass timber construction utilizes wood technology such as solid wood panels, posts, beams and engineered wood products for the primary for wall, floor and roof construction of a building. Hybrid mass timber construction pairs mass timber with concrete and/or steel to create cost-effective and sustainable buildings.

Why use wood as a feature element?

Wood can be used virtually everywhere to create a warm, enduring, welcoming design. It is a natural, cost-effective and sustainable structural option, that can be used in many creative ways. When incorporated thoughtfully and creatively, this material has been key to creating many of the most inspiring spaces in the built environment.

Select Mass Timber Projects

The following projects showcase RJC's experience delivering mass timber projects for a variety of building types and sizes. Projects range from completed, purpose built structures to research projects designed to push the limits of what is possible with mass timber design.

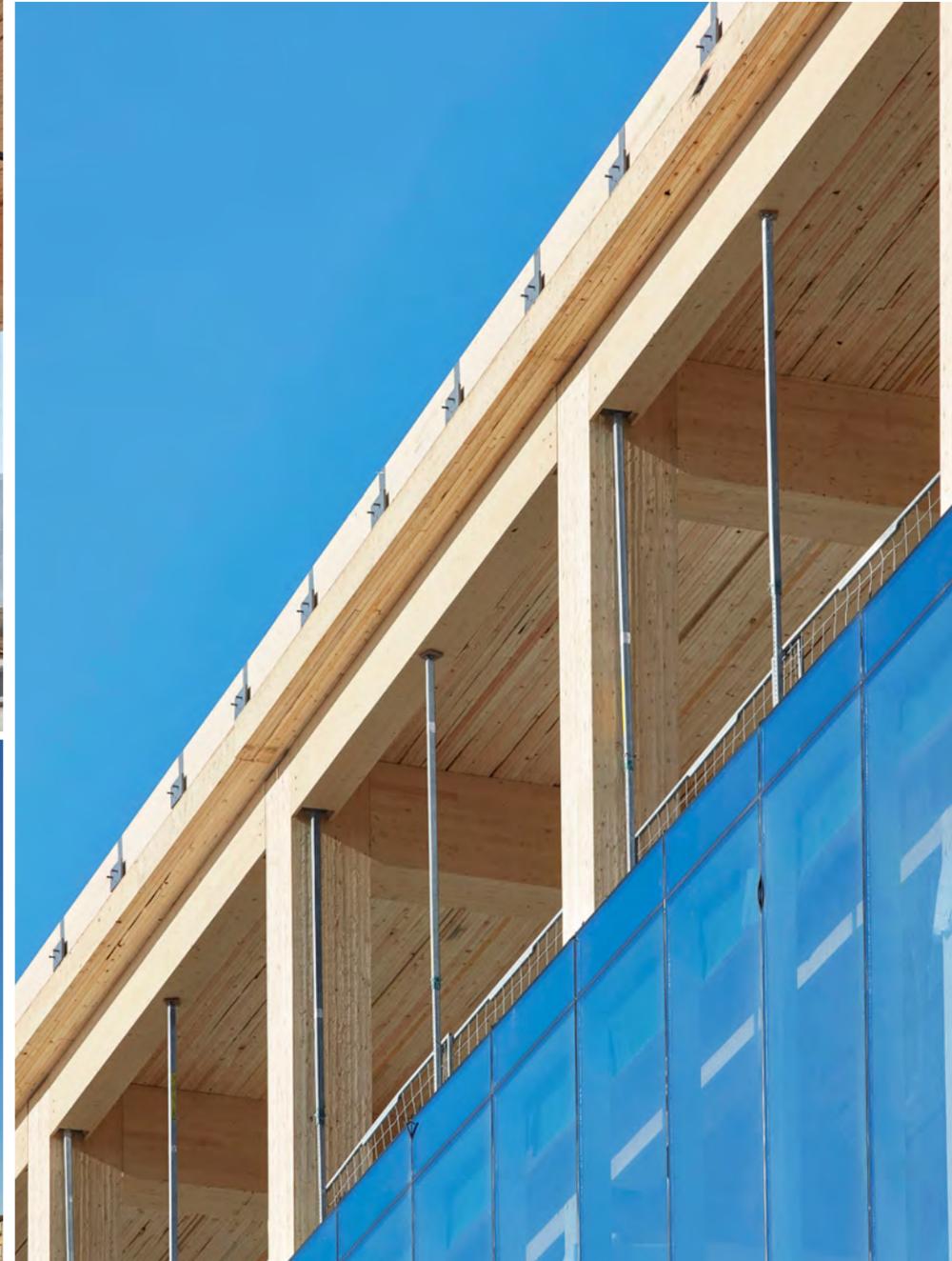
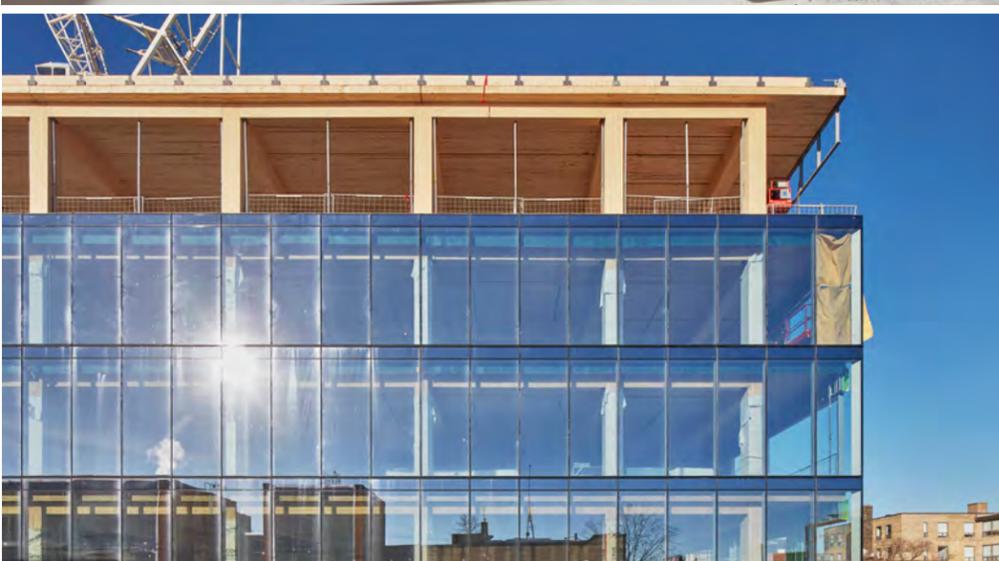


[Innovation Crossing](#) Calgary, AB

Featuring exposed mass timber, this state-of-the-art centre tells the story of Alberta's past exploration and use of natural resources, and how new technologies are currently being used by Albertans to ensure environmental stewardship.

[Red Deer Polytechnic Student Residence](#) Red Deer, AB

This 5-storey student residence incorporates a mix of light frame and mass timber components fully integrated over the height of the superstructure, and several strategies were implemented to reach sustainability goals.



[80 Atlantic Avenue](#) Toronto, ON

80 Atlantic is the first mass timber wood-framed commercial building to be constructed in Toronto in over a century. The building rises five-storeys plus a mechanical penthouse and has a total area of approximately 95,000 sq. ft. Exposed mass timber structural elements throughout the upper floors showcase wood. The building was cost effective and is a unique, and visually appealing commercial space.

[1250 West Hastings - Terrace House](#) Vancouver, BC

A new residential tower proposed for Coal Harbour in downtown Vancouver which will become the world's tallest hybrid timber structure. The top six floors of the building are to be constructed using a composite timber floor system supported by timber columns.

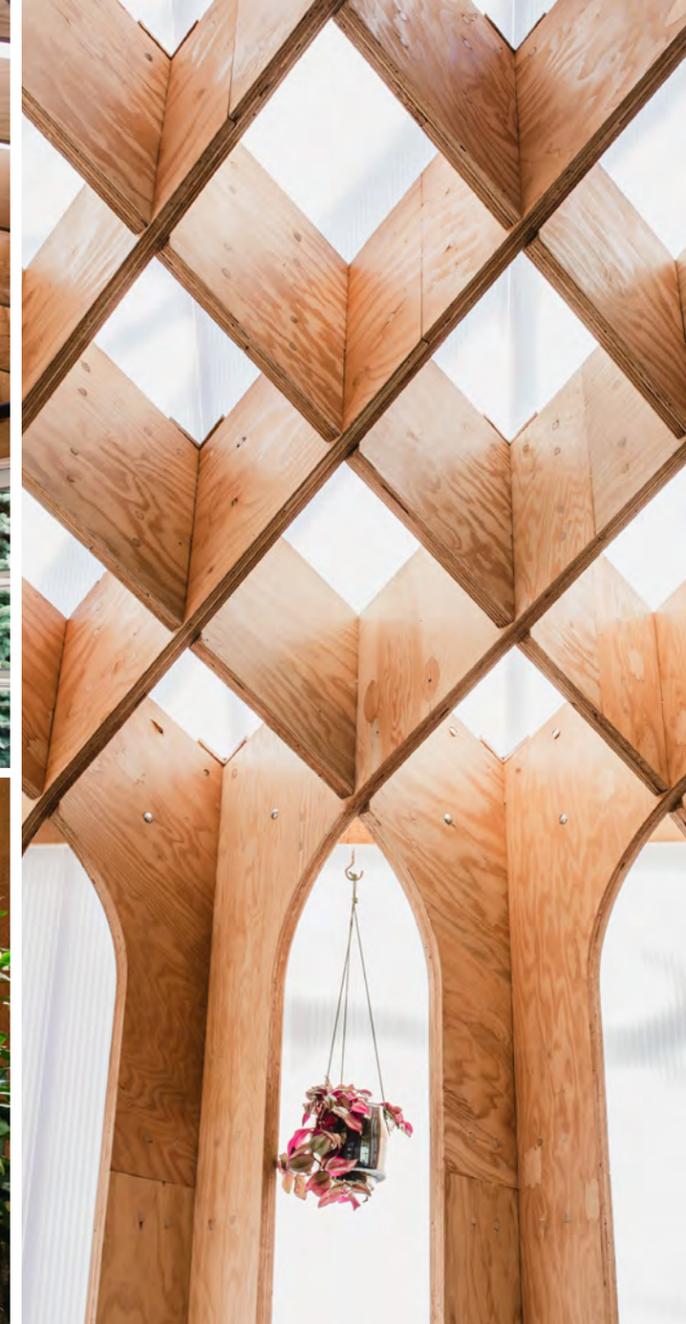
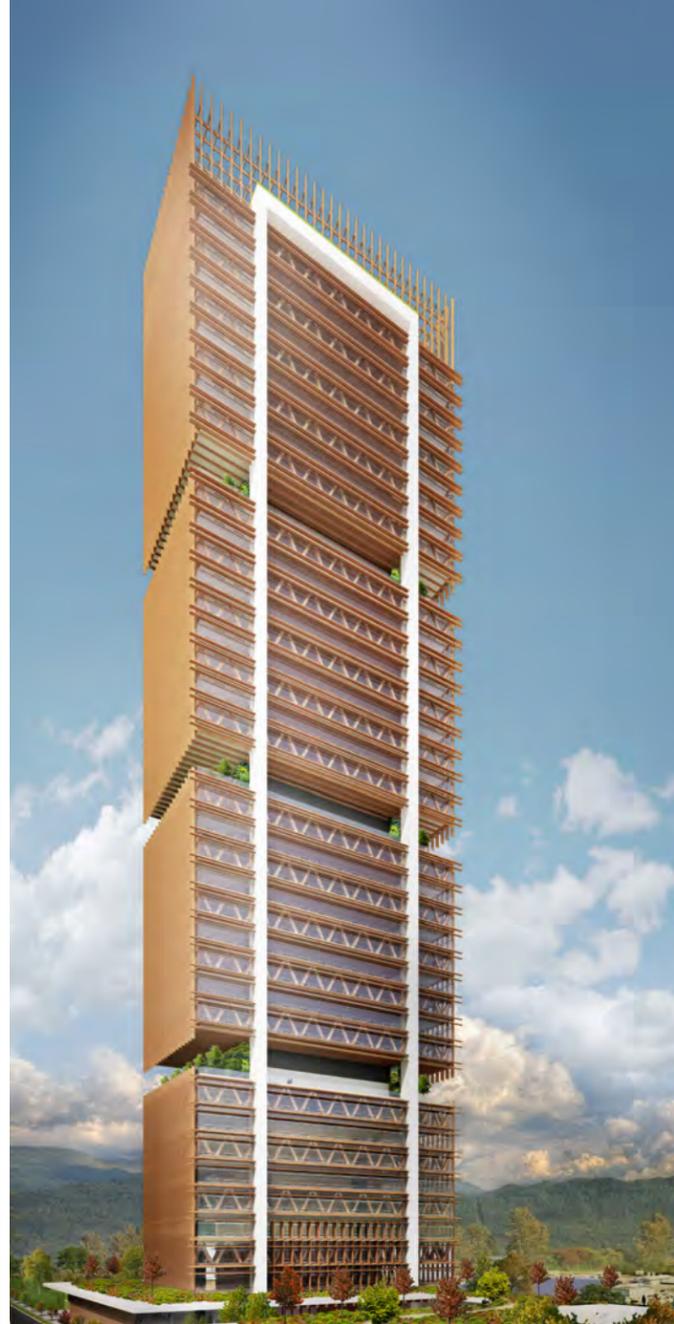
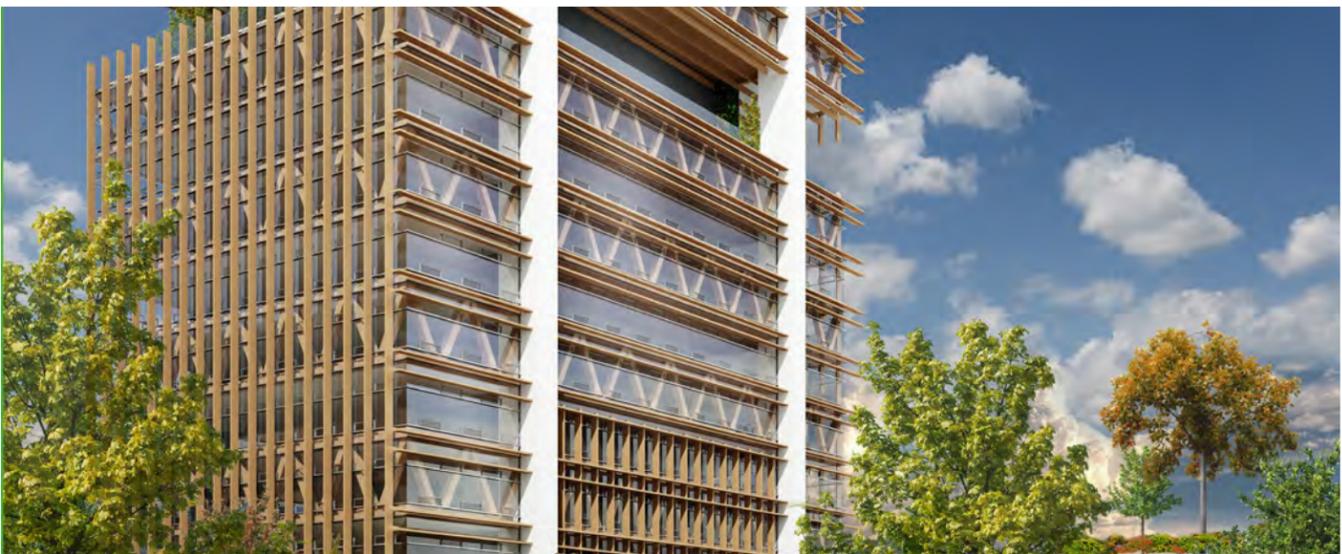


Centennial College A Block Expansion Toronto, ON

This 100,000 sq. ft. four-storey mass timber building is comprised of cross-laminated timber floors and walls, and glulam beams, columns and braces. It is targeting a minimum of LEED v4 BD+C Platinum certification, Net Zero Carbon, Toronto Green Standard v3 and WELL v1 Building Standard certification for new and existing. Mass timber sequesters carbon, supports sustainable forestry, and is a natural material that provides a warmth that will resonate with users.

TRCA Administrative Building Toronto, ON

Given the work of TRCA (Toronto Region Conservation Authority) the organization wants their new building to be a benchmark for sustainable design in a commercial building. Mass timber helps contribute to this goal - it is sustainability harvested, renewable, and embodies carbon.



NAIOP - Office Building of the Future Design Competition

This proposed 40-storey office tower explored the potential for tall wood structures. In collaboration with HDR Inc., the team's design features an attractive working environment while limiting greenhouse gas (GHG) emission. This exercise allowed us to gain experience and test the limits of what is possible with wood, furthering our knowledge and expertise in mass timber.

Sidwalk Citizen Calgary AB

This 1,000 sq. ft. structure features lattice constructed from $\frac{3}{4}$ " plywood panels and is clad with opaque polycarbonate panels which provides a cozy ambiance for the bakery's new location in Calgary's historically designated Central Memorial Park. The design uses a simple wood element, plywood, which is cost effective yet resulted in a beautiful structure that has become a popular Instagram backdrop.



Saanich Firehall No.2 Redevelopment Saanich, BC

The existing Fire Station #2 will be replaced with a new two-storey building that will provide facilities for two crews. Additional space is provided for apparatus storage, meeting room and training room. The fire hall project was awarded a grant from BC's Mass Timber Program to investigate use of mass timber use in a post disaster facility.

Squamish Oceanfront - Works One Squamish, BC

The Squamish Oceanfront - Works One project consists of a four-storey office building over a large, one-storey parkade. The preferred building methodology utilizes off-site fabricated mass timber and steel components, with a very simple and repeated layout, assembled on site. The lateral system is a hybrid timber-steel system with moderately ductile steel chevron braces. Soil conditions on this Squamish site are challenging and require differential settlement analysis for the raft slab.



Esquimalt Town Square Esquimalt, BC

Esquimalt Town Square is designed to create a space for the community. The development consists of three six-storey wood-frame residential buildings and a five-storey heavy timber office and library building. The heavy timber office and library building is a hybrid system which utilizes concrete, steel, and timber in locations which take advantage of each of the material's unique properties. RJC designed several unique and custom timber to timber connections which were both practical to construct and elegant once complete.

Squamish Oceanfront Discovery Centre Squamish, BC

The building is a mixed use facility which will house a presentation centre, restaurant, brewery, and offices. It is a hybrid structure which takes advantage of elements of both mass timber and light wood-frame construction.



Cowichan Secondary School Replacement Duncan, BC

The new (seismically safe) Cowichan Secondary School will be a three-storey building that will complement the surroundings and honour the unceded Quw'utsun lands on which it is situated. The structure is steel frame with mass timber roofing and canopy and uses an eccentric brace frame lateral system.

UBC Gateway Vancouver BC

UBC Gateway is a six-storey, mass-timber building that will symbolize UBC's commitment to Indigenous relationships, zero-carbon design and the health and well-being of their students and staff. The design team used LCA to explore various design options, such as mass timber, concrete and hybrid frame systems to demonstrate embodied carbon reductions through mass timber design. The LCA was performed in accordance with the requirements of LEED® "Building Life-Cycle Impact Reduction."



760 Vaughan - Phase 3 Kelowna, BC

760 Vaughan is a vibrant area consisting of commercial retail spaces by Faction Projects. Phase 3 of 760 Vaughan consists of a four-storey, mixed-use commercial retail building. The building consists of retail and light industrial on level-one, and office space on levels-two and four. The structure is constructed of mass-timber with an NLT floor and roof, and glulam/lvl posts and beams.

MiKai'sto Red Crow Community College Stand Off, AB

The focal point of the expansion is the atrium which provides a gathering space that showcases many pieces of Indigenous artwork. The space features a unique lattice ceiling and is supported by glulam columns that split towards the ceiling, emulating the branching of a tree.

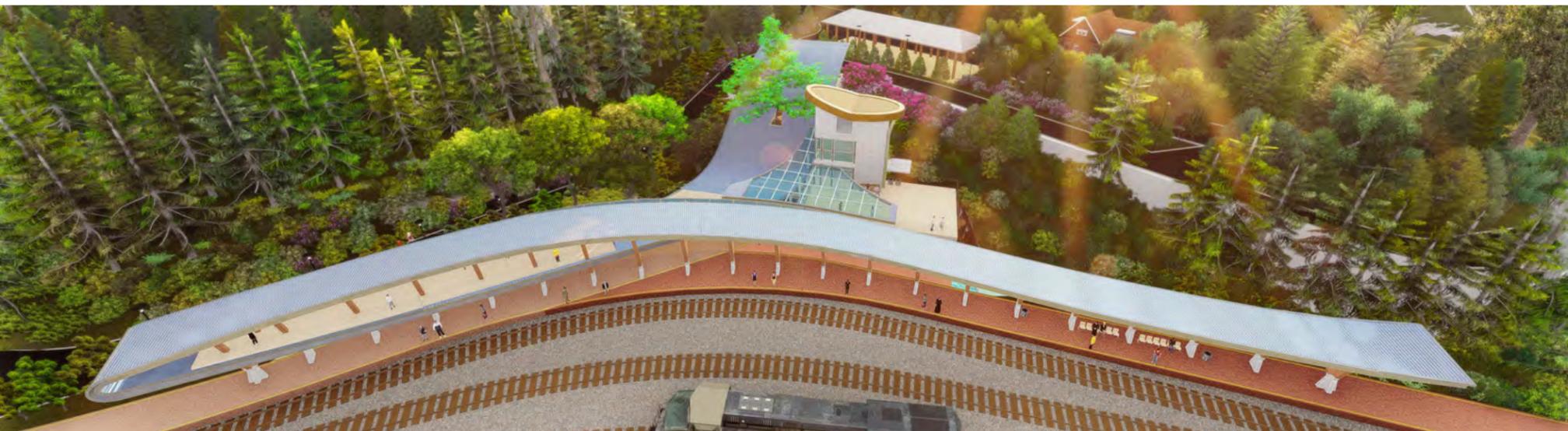


[Ramada Hotel](#) Kelowna, BC

As the tallest mass-timber tower in Kelowna, the Ramada Hotel is an 82 suite, 12-storey mass-timber structure. The tower is constructed with partial encapsulation, exposed cross-laminated timber (CLT) and glulam. The development distinguishes street-level retail amenities, the hotel's main lobby and two penthouse suites with façade articulation and material treatments. The façade's glass projection will showcase the innovative mass-timber design and construction.

[Penticton Lakeside Resort](#) Penticton, BC

The structure features a concrete/wood core in the center, with wood-concrete floor decks, and Cross Laminated Timber (CLT) Panels with insulation and concrete. The building's visual presence contributes to a warm, inspiring and attractive building form that is showcases what can be accomplished from wood.



GNW Pavilion Vancouver, BC
This landmark Japanese inspired pavilion is appropriately located on the Emily Carr University Campus. Facilitated by digital modelling through Spearhead Inc., a unique yet simple hybrid timber-steel structure was developed to support this complex lotus shape.

ZhuShan Station Taiwan
Mass timber construction is featured throughout this remote and aesthetic train station in Taiwan.

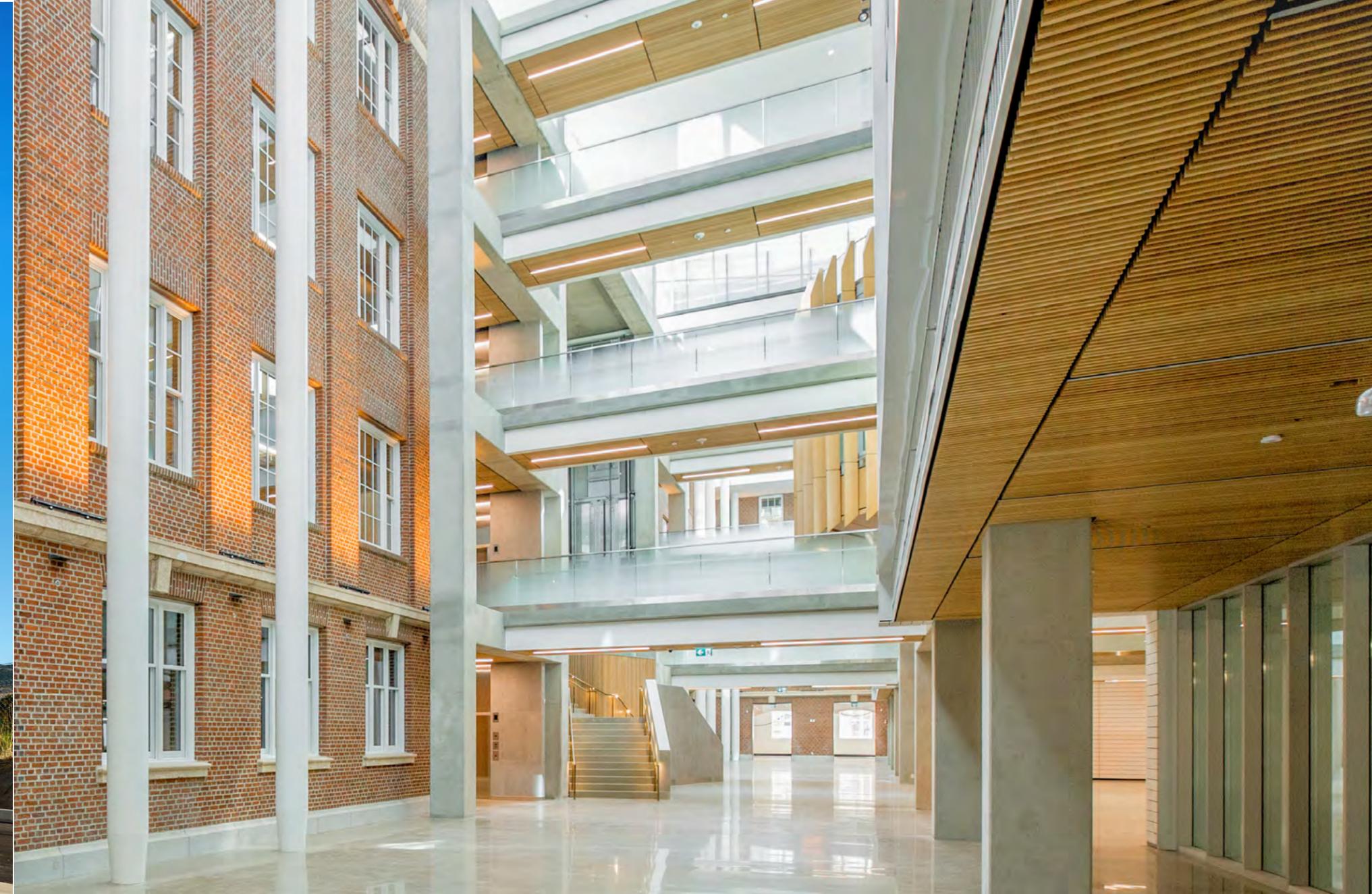


Select Projects with Wood as a Feature Element

The beauty and versatility of wood is evident throughout the following projects. Wood is used as a feature element to create distinct, memorable and graceful structures.

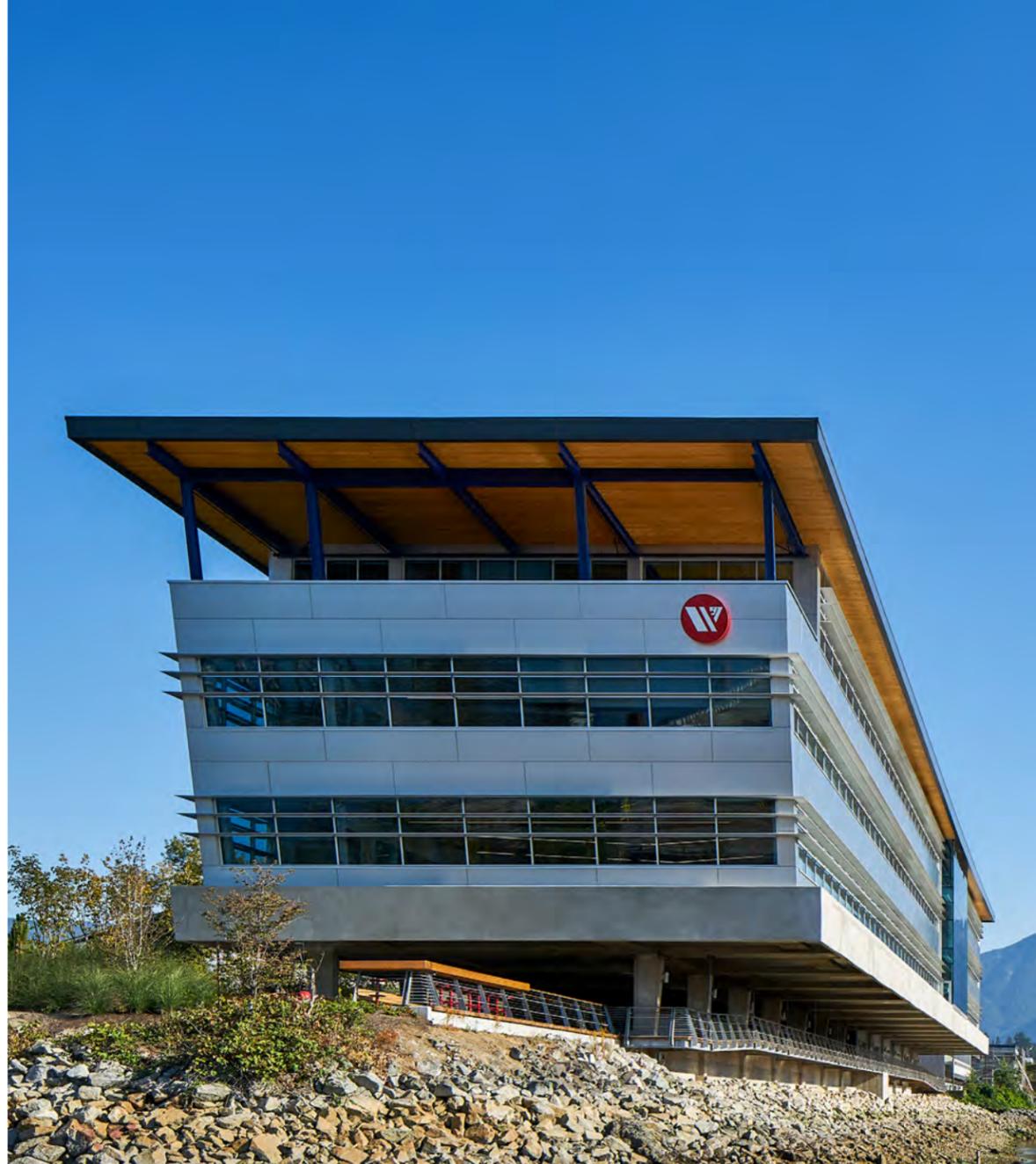
[Craigflower Community and Performing Arts Centre](#) Victoria, BC

Mass timber was used to create the cultural aesthetic of the original Kenneth McKenzie built Craigflower Manor in 1856. While the reciprocating glulam roof frame supported on steel columns utilizes less material than a conventionally framed roof, it also creates a structural reflection of traditional Celtic knots. While striking, the reciprocated glulam beams also emanate warmth and comfort. The natural stone-clad walls create a natural look to the building, while the impressive ceiling peeks through the windows.



[Okanagan College Welding Trades Training Facility](#) Kelowna, BC
This project is a one-storey, pre-engineered steel welding facility with canopies constructed from CLT and structural steel.
The Okanagan College Penticton Welding building is certified LEED Gold.

[University of Alberta University Commons](#) Edmonton, AB
The University Commons is a post-secondary redevelopment project that creates 500,000 sq. ft. of buildable area consisting of new construction and renovation of the historically significant Dentistry-Pharmacy building on the University of Alberta main campus originally constructed in 1922.



Seaspan Corporate Head Office North Vancouver, BC

Located at the end of Pemberton Avenue along the water, this state of the art office has a CLT roof to create a warm and inviting space visible inside and outside the building.

UBC Student Union Building

The Nest features full-height central atrium characterized by exposed heavy-wood structural components including a saw-tooth roof using a hybrid structure of glazed glulam trusses (90 ft. long) and cross-laminated timber (CLT) panels, and 60 ft. tall twin-glulam columns along the glazed west facade. In the Great Hall, our engineers developed a scheme to achieve the architectural vision for boldness with 30 ft. deep exposed structural trusses on three sides with truss spans on the east and west sides exceeding 120 ft.

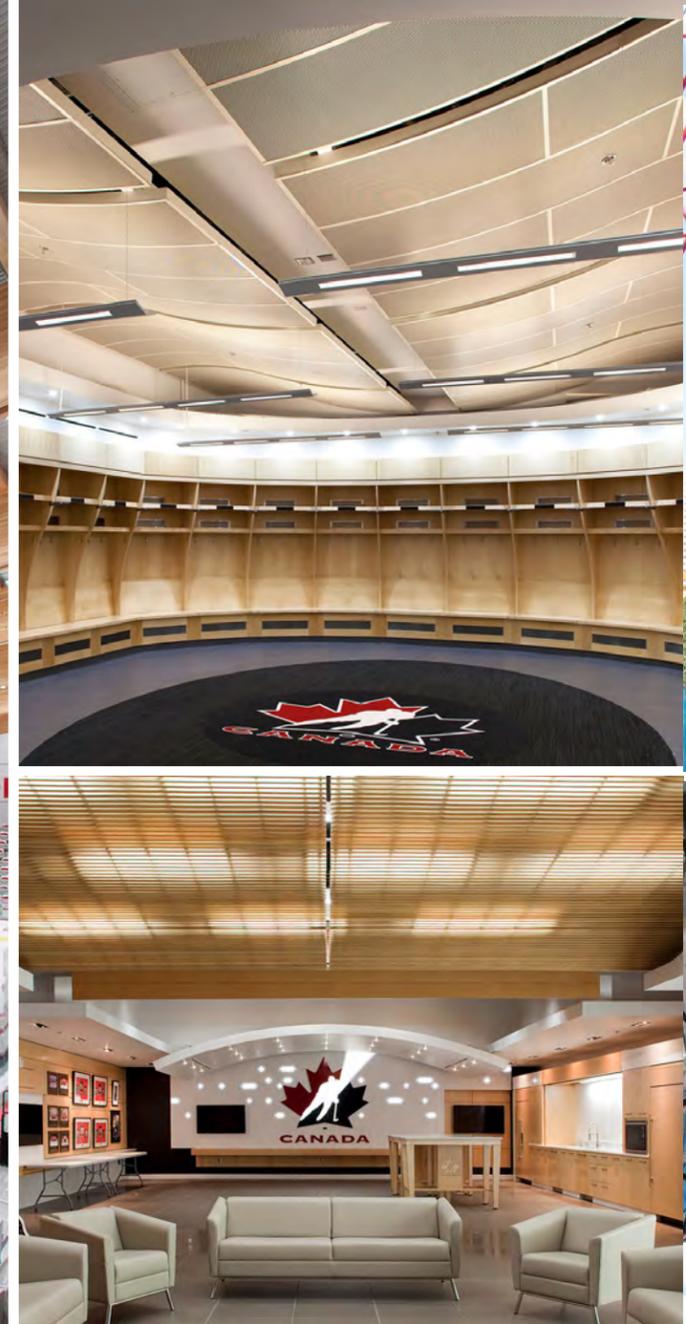


TransLink - Joyce Collingwood Station Vancouver, BC

RJC was brought onto the team for the expansion of the existing SkyTrain station, including an expanded platform and roof which feature Brisco LVL (laminated veneer lumber) roof panels. The use of these unique BC LVL panels integrate the structural roofing system with the station's architectural expression resulting in a strong and natural appearance and a long lasting design that responds well to the future.

Clayton Heights Community Centre Vancouver, BC

The roof structure is a reciprocating frame composed of an assembly of "pinwheel" shaped modules of glulam beams. The two-way wood system allows the wood structure to span to discrete column locations without the need for dropped beams, all the while achieving a unique architectural expression.

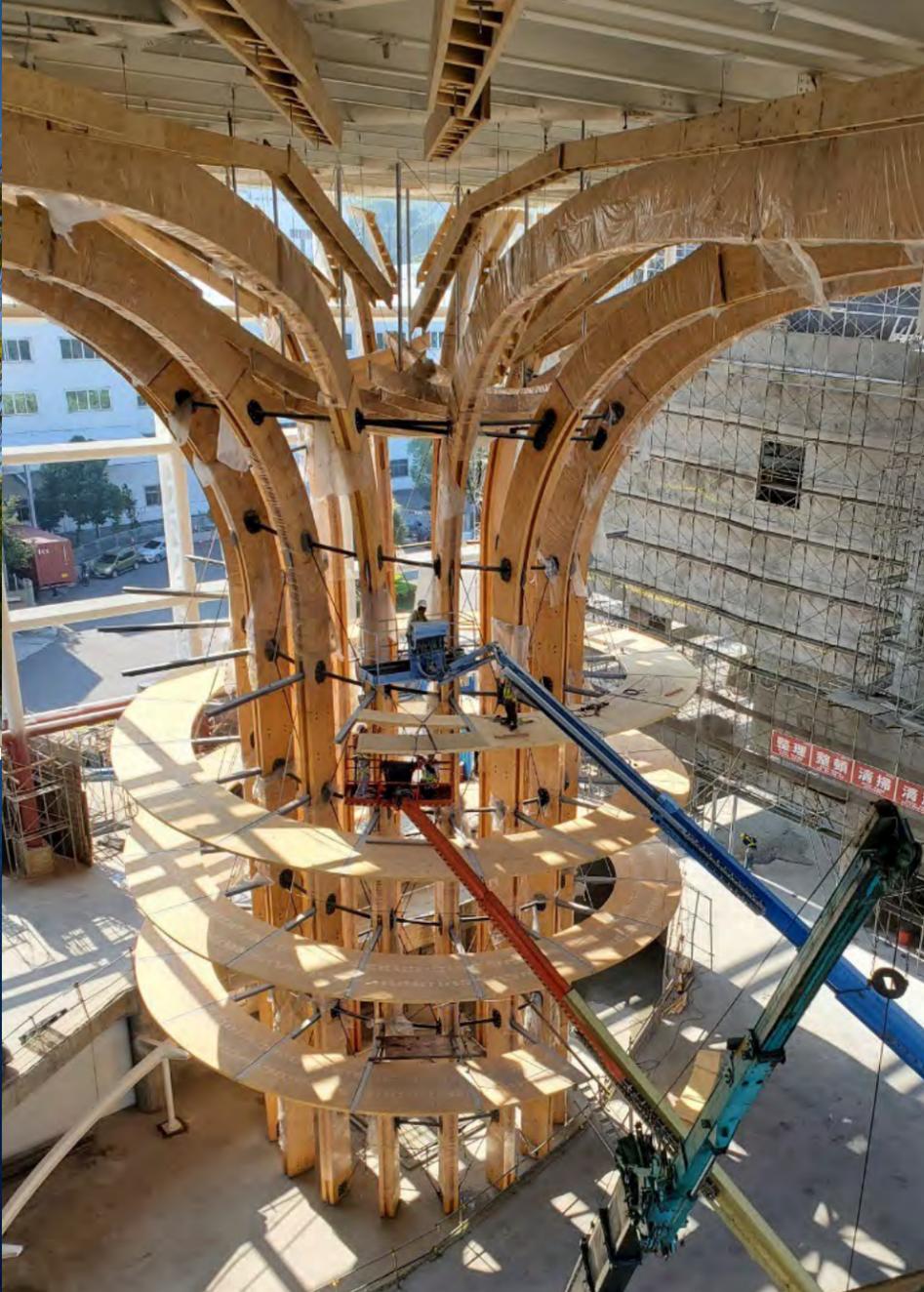


WinSport Canada's Markin MacPhail Centre Calgary, AB

The structural framing used for this world class facility includes glulam beams, exposed precast concrete, and steel framing. The roof over the main rink features gracefully curved glulam beams spanning 48m over the seating bowl. The glulam roof structure was carefully designed to be simple, cost-effective and erected in a minimum amount of time.

Eunoia Junior College Singapore

RJC was engaged as a structural engineering specialist for the commissioning of a 2,680 sq. m Cross Laminated Timber (CLT) façade at Singapore's first "high-rise" Junior College. Constructed using Mass Engineered Timber, CLT was used for the façade of the Junior School project to minimize site work and accelerate construction. The precast façade was converted into sustainable CLT panels clad with aluminium providing an aesthetic and functional façade.

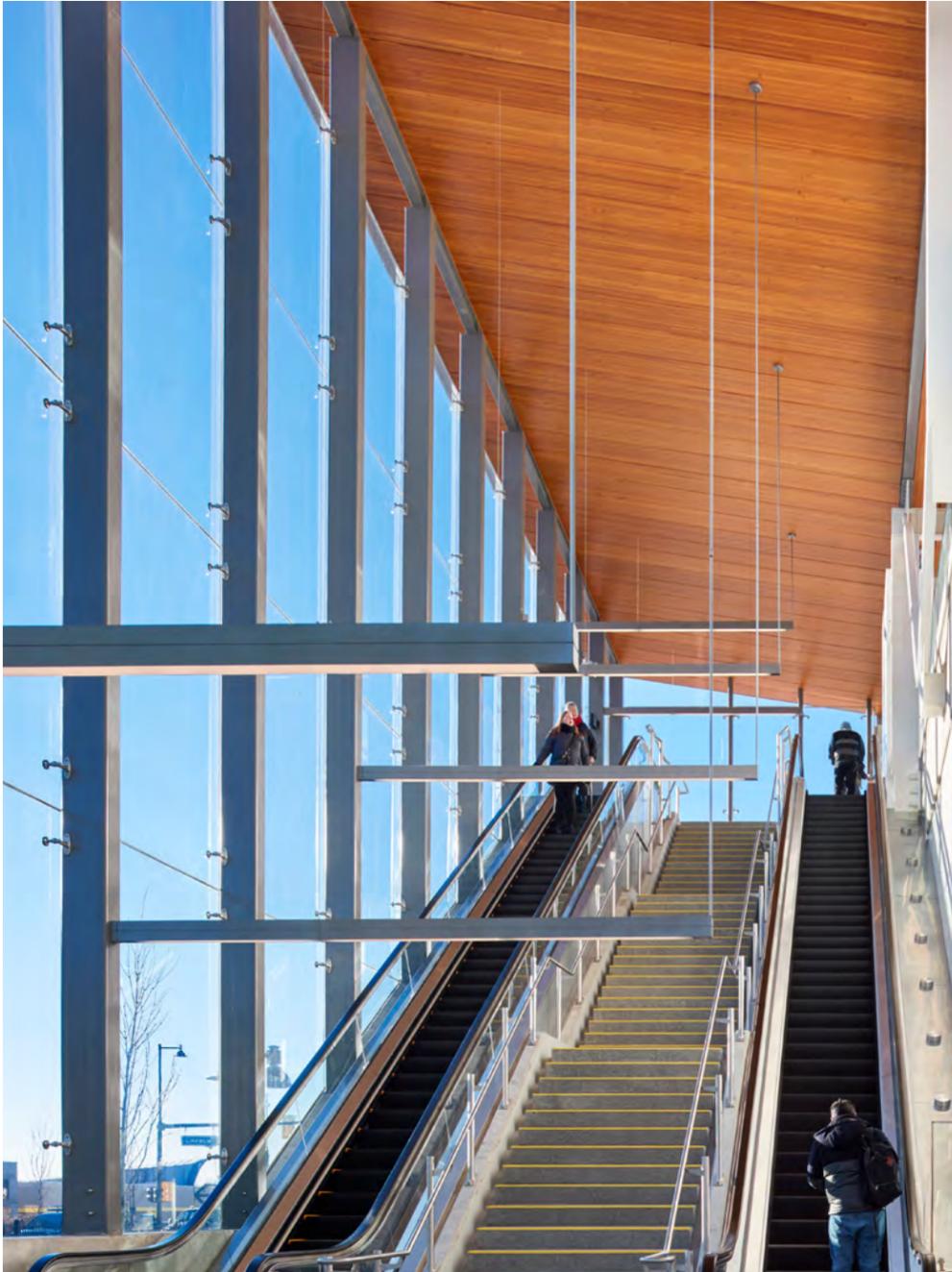


Capella Island Resort Maldives

Located in a remote island in the Maldives, CLT wood and mass timber elements are used to create a unique and appealing arrival hub for the luxury resort's guests. Wood was the best option because it allowed us to take the advantage of the receptiveness of delivering 80 identical units, executing the project in a simple and economic, yet elegant way. Wood also minimized site work by allowing the element structures to be pre-fabricated prior to installation. It was also light and easy to transport and erect on site. The timber structure will remain durable over long periods too, leading to the best potential to meet or exceed the design life of the project.

Shuter Babuza Green Factory Taiwan

At its core, a massive timber structure was placed in the central part of the factory to support this vision of community and growth. Curved glulam beams are used to create the tree "branches" and a 380 meter long helix walkway surrounding the tree branch is made of GLT on flat and connects four different floors.



Hillcrest Centre Vancouver, BC

Timber is featured in the Aquatic Centre Natatorium. The timber structure is proudly expressed by the wood deck on slightly curved glulam roof beams which connect to sloped glulam columns. Wood handles the corrosive pool environment better and requires less maintenance than some other materials. It naturally absorbs and releases moisture without loss of performance, and when properly detailed resists decay. Wood also helps absorb sound.

TransLink Evergreen Line Extension (Lincoln Station) Coquitlam, BC

Taking advantage of the structural continuity, RJC Engineers designed an extremely efficient GLT roof structure, with 175 thick GLT spanning 10 meters, achieving an impressive span to depth ratio, that helps the structure express the open architectural desire.

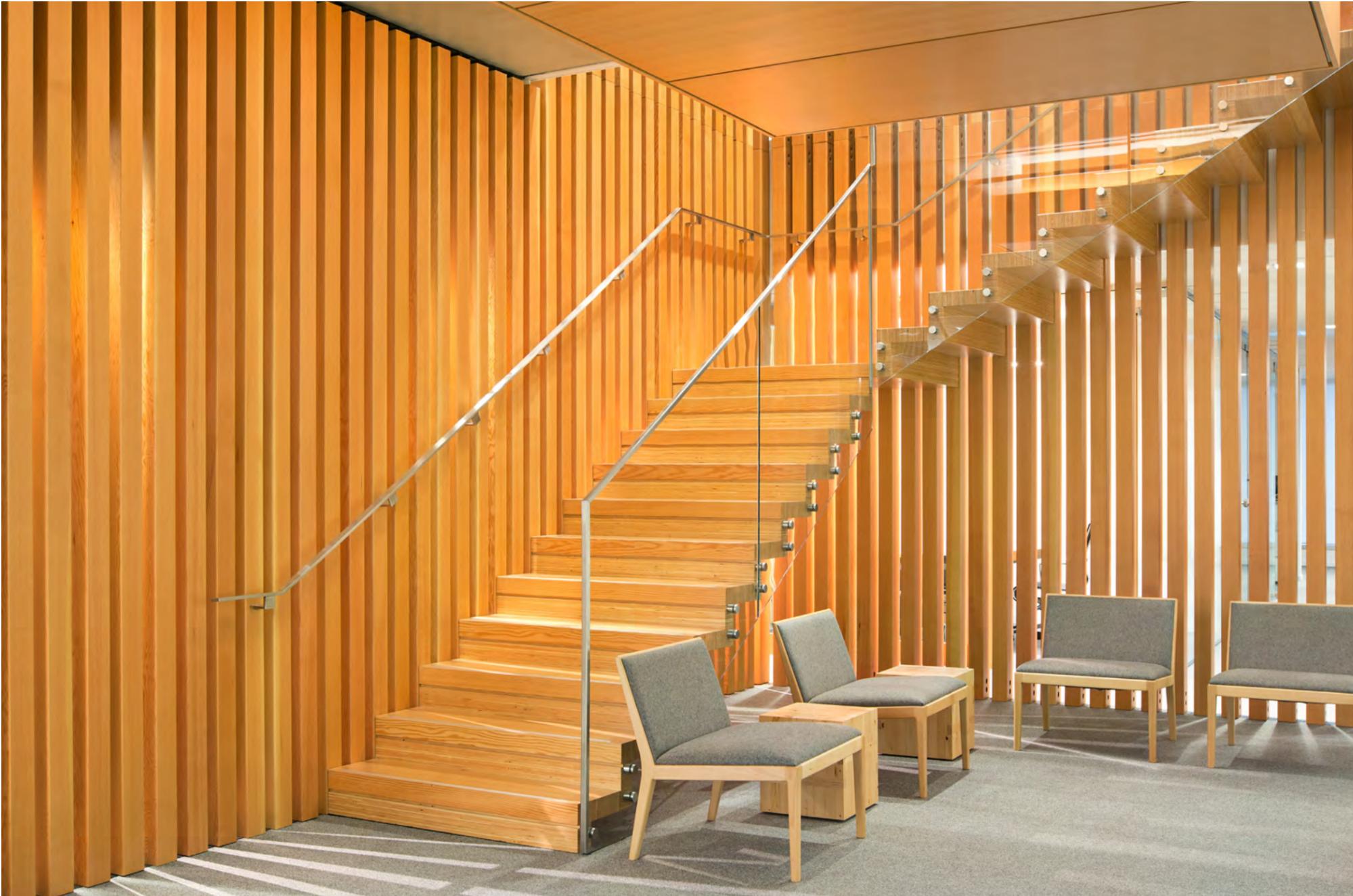


[Shane Homes YMCA at Rocky Ridge](#) Calgary, AB

North America's largest single diaphragm wood roof structure. The 186,000 sq. ft. single diaphragm roof consists of cantilevered continuous glulam beams creating 36m clear span spaces within the facility. The design not only achieved the architectural vision of emulating the foothills rolling landscape, but also resulted in significant cost savings for the City of Calgary.

[Linear House](#) Salt Spring Island, BC

Helping push wood construction technology to a new level, RJC Engineers designed spliced wood panel web beams for site assembly to span a 78-foot glazed opening and a 32-foot end cantilever. These innovative beams not only enabled very large spans but also were key to getting materials to the very remote site.



[Interfor Interconnecting Stair at Metrotower II](#) Burnaby, BC

Interfor, a major player in the North American lumber industry, naturally chose wood as the primary material for their office. A feature is this seamless, interconnecting stair that shows no visible supports. The stairs are made from Brisco LVL material and the posts are made from sawn lumber.

[1515 Douglas Street - Phase 1](#) Victoria, BC

The 20 metre glass rotunda roof is seven-storeys off the ground floor, consisting of six 'boomerang' shaped glulam members supported by tension rod and central compression and tension rings. There was a desire for the structure to have depth to optimize the relationship between the rotunda and its height, and the result is a showcase for the city of Victoria.



Tsawwassen Mills Tsawwassen, BC

The food court features timber that creates warmth and openness, lifting the roof to 52 feet at its highest point. Utilizing an innovative pin connection allowed for the use of four shorter beams instead of one longer beam, the smaller size beams meant simpler transportation to site which led to extensive cost savings.



UBC Bioenergy Research and Demonstration Facility Vancouver, BC

This facility incorporated the first commercial application of Cross Laminated Timber (CLT) in North America. RJC provided Specialty Engineering services for the panels and connections based on tests performed by UBC.





Reliable Controls Headquarters Victoria, BC

A LEED Platinum building and showcase for innovation, Reliable Controls Headquarters features an exposed locally sourced wood structure to create a serene, creative space. 56% of the wood used is Forest Stewart Council certified and 34% of the building material was sourced locally.

Sungod Aquatic Centre Delta, BC

RJC responded to desire to have an open and colorful building by devising an efficient long-span curved glulam structure, adding visual drama to the natatorium by creating an impressive open space filled with natural light. The wood naturally absorbs and releases water vapor without losing structural integrity, and also helps to absorb sound.

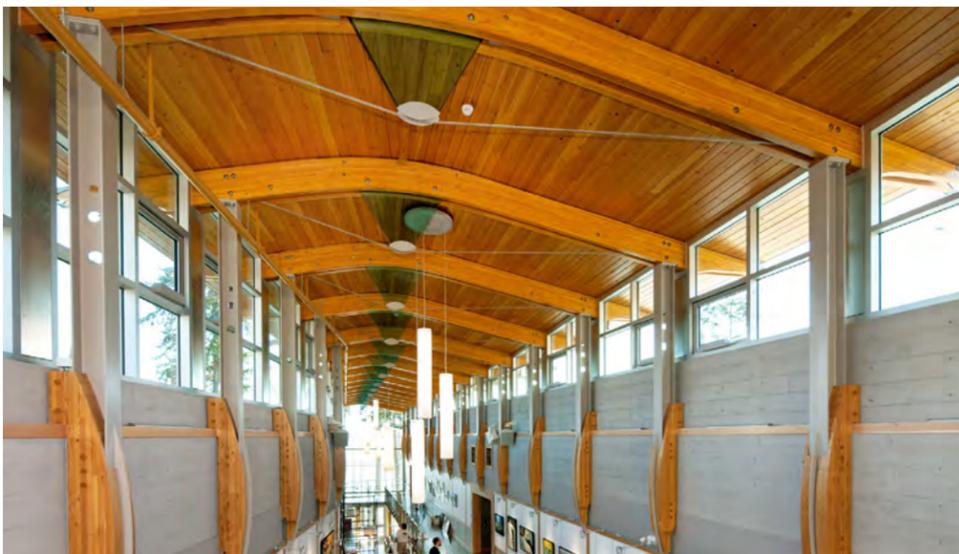


[UBC Marine Residences Amenity Building](#) Vancouver, BC

Detailed glulam beams, some in the form of trusses together with glulam and timber log posts, provide an inviting presence amidst multiple concrete and brick residence buildings.

[Fire Hall No. 14](#) Surrey, BC

Exposed wood deck and glulam beams are employed for the roof structure over the lounge & dining area which give tenants a sense of warmth.



[Brentwood College Visual Arts and Global Studies Centre](#) Mill Bay, BC

Featuring undulating timber roof forms and unique composite atrium roof truss design. The atrium trusses esthetically highlight wood through cleverly hidden connections joining curved double glulam top chords, steel cable bottom chords and laminated structural glass king posts.

[Mountain Equipment Co-op](#) Toronto, ON

The wooden entrance structure and the upper level roof trusses were built using recycled timber salvaged from log booms in the Ottawa River. MEC chose to feature wood for its performance, renew-ability and aesthetic.



Mulgrave Senior School Addition West Vancouver, BC

Exposed timber was a focus throughout the project as a primary and secondary structure in order to transform the school to a more productive and warmer learning environment.

Camosun College Centre for Trades Education & Innovation Victoria, BC

The Centre at the Interurban Campus of Camosun College includes new facilities for a marine and metal trades training program. Spanning 140' over the main entrance atrium, a glulam truss appropriately resembles the form of a ship's hull. Classroom roofs are comprised of nail laminated timber (NLT) and exposed glulam framing. Throughout the design, students are exposed to various visual elements showcasing examples of the trades being taught in the space.



[Chiayi Art Gallery](#) Taiwan

CLT was used to rejuvenate the art gallery, providing a more contemporary and modern look. The CLT panes are behind glass that features a frit. Together, the wood and glass give the appearance of brick to the facade.

[St. Michaels University School](#) Victoria, BC

The roof of the Centre features an expressive wood structural system. Douglas Fir is featured predominately throughout the building, including the structure, doors, window frames and furniture, providing unity in material at both a macro and micro scale.



[Lakeland College WHT Mead Building Modernization](#) Edmonton, AB

The modernization project saw two thirds of the existing building (administrative and confined classrooms) demolished while the last third (three tiered lecture spaces) that couldn't be functionally reconfigured was selectively renovated. The new structure is mass timber with column beams and glulam ceilings, as well as corrugated cladding. A breezeway entry was constructed to ensure the new building connects to the rest of the campus.



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