

# WOOD DESIGN & BUILDING®

WINTER 2018-19 — NUMBER 81

Six dollars

**Calgary Central Library**  
Wood takes center stage

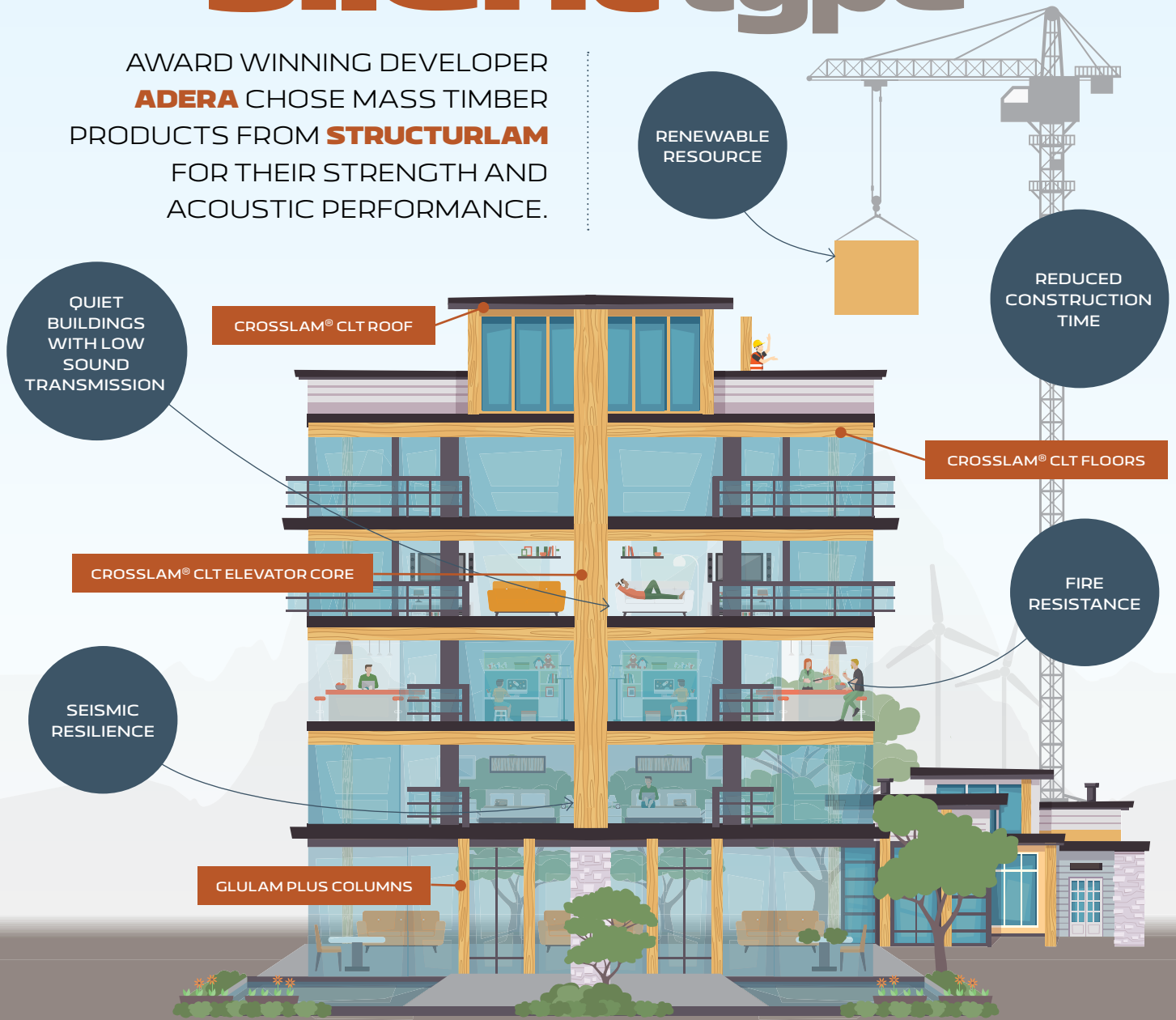
**2018 Wood Design Awards**  
From sublime to dramatic

**111 East Grand**  
North America's first DLT office structure

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# WOOD DESIGN & BUILDING

c o n t e n t s



Above and on the cover: CALGARY CENTRAL LIBRARY, CALGARY, AB  
PHOTO CREDIT: Michael Grimm

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PHOTO CREDIT: ICD/ITKE/IIGS University of Stuttgart

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## An introduction

I can think of no better way to begin my tenure as editor for *Wood Design & Building* than by joining the jurors in Ottawa for an intense day of deliberations, as they considered who should win the Wood Design Awards. Those projects that are not included in this issue (our most expansive awards coverage ever!) should be heartened to know that many of the submissions were passionately discussed and debated, but with a view to represent the highest levels of innovation and artistry, only a few could make the final cut.

The jurors compared buildings from the smallest scale – as you can see with the Special Jury Award for Ephemeral Architecture, a category that was conceived for the two compelling installations by RAW – to the expansive, awe-inspiring volumes of the Calgary Central Library, which was already the “cover star” of this issue before the awards were chosen. Somewhat coincidentally, we also decided to feature North America’s first DLT office building, 111 East Grand (in Des Moines, Iowa), a project by the same firm that designed and built the library’s freeform wood soffit, which embraces the entryway with a dramatic swoop. Not only is the soffit beautiful, but the craftsmanship and engineering is truly mind-boggling: Using computational design, StructureCraft created 170 prefabricated panels with more than 20,000 unique pieces of CNC-profiled wood. And this is only a hint at what you’ll see inside! If Calgary isn’t on your 2019 travel itinerary, you might want to plan a detour.

Now that I’ve joined the *Wood Design & Building* family, I look forward to delving deeper into the world of wood – the excitement is palpable, as mass timber revolutionizes our ideas of what can be built with this ancient, renewable material. When you also consider the impact of parametric design and 3D printing, these are exciting days in the architectural world – and seeing that wood is evolving along with the industry is good news, indeed! 🎉

A handwritten signature in cursive script that reads "Popi Bowman". The ink is dark and the signature is fluid and elegant.

**Popi Bowman**  
Managing Editor

*Wood Design & Building* magazine invites you to submit your project for consideration and possible publication. We welcome contributed projects, bylined articles and letters to the editor, as well as comments or suggestions for improving our magazine. Please send your submissions to [pbowman@dvtail.com](mailto:pbowman@dvtail.com).

# inspiration BOARD

WHAT I'VE FALLEN FOR THIS MONTH...

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## BEAUTIFUL LIBRARIES

The brand-new Calgary Central Library is featured in this issue because it is an absolutely stunning example of wood use in a building that can be enjoyed by everyone – and there are many other libraries that use wood to enhance their environments. We found several around the world that we've highlighted in *Against the Grain*, but Canada boasts many examples, some of which are among the recent winners of Wood *WORKS!* awards.



PHOTO CREDIT: Perkins + Will Canada

In Markham, Ontario, the **Aaniin Community Centre and Library** – by Perkins + Will Canada, with CH2M Hill – was the recent winner of the Institutional Wood Design Award (greater than \$15 million).



PHOTO CREDIT: Perkins + Will Canada

Also in Ontario, a Wood *WORKS!* Jury's Choice Award went to the **Albion District Library** – by Perkins + Will Canada, with Blackwell – in Etobicoke.



PHOTO CREDIT: Best Impressions Photography

In B.C., the **Radium Hot Springs Community Hall and Library** – by Urban Arts Architecture, with Equilibrium Consulting – won a Wood *WORKS!* Community Recognition Award; this is one of the first public buildings in B.C. constructed with dowel-laminated timber.



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# International Libraries

Ethan Kwan

In this digital age, the way information is handled changes constantly, so libraries are evolving to meet our modern needs. No longer mere storehouses for books, they have become community hubs that also offer a sanctuary from the busyness of everyday life. In a small village almost two hours outside Beijing, for example, patrons flock to Li Xiaodong's off-grid, predominantly wood Liyuan Library, a building that took home the inaugural Moriyma RAIC International Prize in 2014. The incorporation of wood into these buildings can help remind us of our roots, preserving history and tradition, and above all, providing a serene place to unwind, relax and read a good book – while appreciating the wonders of wood architecture.

The **Public Library of Constitución, Chile** (winner of a 2015 Wood Design Honor Award) by local architect Sebastián Irarrázaval, was part of a public-private initiative to rebuild the town after a devastating 8.8-magnitude earthquake in 2010. Because Constitución is one of the cores of wood production in Chile, both carpenters and locally sourced resources were readily available. The library is made almost entirely of laminated pine, with firewalls of exposed concrete. The wooden beams and pillars that help support the library's three main levels are exposed to define the interior space.

**Rapana** is a street library in Varna, Bulgaria, and the first of its kind in the coastal city. The shape, based off a whelk of the same name, was made by Downtown Studio using parametric design, and was constructed using 240 CNC-milled timber pieces after testing different designs with engineering software. It has a capacity of 1,500 books, and encourages its borrowers to make use of a circular, partly shaded wooden reading bench that anchors the structure.

In 2010, a competition was held in Baiona, Spain, to redesign the interior of the 17th-century Sancti Spiritus Hospital for its new role as the **Baiona Public Library and Historic Archive**. The winner, Murado y Elvira Architects, was tasked with creating an inviting space for the public while preserving the cultural significance of the original building. Their solution was a wooden “dress” – maple encases most of the interior, including floors, walls and ceilings, while leaving the exterior unchanged.

Situated at the center of a field in Zhejiang, China, is Leeko Studio's **Rural Library**. The focus during construction was not to build a structure that stands out, but rather one that fits in harmoniously with the natural landscape around it. From the outside, the library appears humble, displaying a folded-arch roof made of dark boards, but its 40-meter-long interior is bright and warm, featuring raw red cedar from northeastern China that provides a pleasant, natural fragrance. 🌲

1. Public Library of Constitución  
Architect: Sebastián Irarrázaval  
Location: Constitución, Chile  
PHOTO CREDIT: Felipe Díaz Contardo

2. Rapana  
Architect: Downtown Studio  
Location: Varna, Bulgaria  
PHOTO CREDIT: Emanuil Albert

3. Baiona Public Library and  
Historic Archive  
Architect: Murado y Elvira Architects  
Location: Baiona, Spain  
PHOTO CREDIT: Imagen Subliminal

4. Huateng Hog House Rural Library  
Architect: Leeko Studios  
Location: Zhejiang, China  
PHOTO CREDIT: Yong Zhang



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### ► Sidewalk Toronto Announces Mass Timber Multi-Building Development

An unprecedented mass timber project is under development in Toronto, with preliminary plans revealed by Sidewalk Labs in late 2018. Quayside, a 12-acre site east of downtown, will feature a district almost exclusively populated by timber buildings, varying in heights up to 30 storeys. Architect Michael Green worked with engineering firms Equilibrium and Aspect, along with manufacturers and other architectural firms, to develop a kit of parts which will feature exposed wood surfaces inside. Sidewalk Labs is also planning to develop a digital configurator that will simplify mass timber design for any site. Sidewalk's Director of Buildings Innovation Karim Khalifa told *Canadian Architect* that "every piece of the building basically has a serial number, so if there's a problem with some element, you would know where those trees came from and what production line they were in, and could look to see if that impact is on any other piece of the building." Digital power systems, photovoltaic panels and sewer heat recovery – along with wood – will contribute to decreasing the development's greenhouse gas emissions by approximately 75 to 85 percent over standard construction practices. We'll be watching this project carefully in the years to come. [sidewalktoronto.ca](http://sidewalktoronto.ca)

### ► ICC Approves 14 Tall Mass Timber Code Change Proposals

With official results still pending at press time, the International Code Council confirmed that three new types of construction (Types IV-A, IV-B and IV-C) have been approved, which set fire safety requirements and allowable heights, areas and number of storeys for tall mass timber buildings. The new provisions will be included in the 2021 International Building Code (IBC). Type IV-A allows a maximum of 18 storeys, with gypsum wallboard on all mass timber elements; Type IV-B allows a maximum of 12 storeys, with a limited area of exposed mass timber walls and ceilings; and Type IV-C allows a maximum of nine storeys with fully exposed interior timber elements only if they have a two-hour fire resistance. (Heavy timber [Type IV-HT] remains technically unchanged.) The ICC's code development cycle continues through 2019, with final approval expected to occur in late October. [iccsafe.org](http://iccsafe.org)



### ► Call for Expressions of Interest: Timber Bridges

The Green Construction through Wood (GCWood) Program will consider funding timber bridges with spans of 20 metres and more, with applications due March 25 at 17:00 EDT. The maximum amount payable by GCWood will be up to 100 percent of total eligible incremental costs, up to a maximum of \$1.5 million per project. Funds will support a wide range of design development, permitting, materials, construction and post-construction costs, including salaries and professional/technical services. The application form is available at: [www.nrcan.gc.ca/gcwood](http://www.nrcan.gc.ca/gcwood)



### ► Project Watch: Adidas Headquarters

In Portland, Oregon, the team of Lever Architecture, O+A and GGN are undertaking a major expansion of the Adidas Headquarters, due to be completed in 2020. A 460,000-sq.ft. expansion adds two buildings: a hybrid timber structure of pre-cast concrete columns and girders with integrated glulam beams and CLT panels, and a mass timber building featuring glulam columns and beams, also with CLT panels. Lever Architecture won a regional 2018 AIA Merit Award for Albina Yard (also in Portland), a 16,000-sq.ft. office building that is the first in the U.S. to be made from domestically manufactured CLT; it was erected in only four weeks. [leverarchitecture.com](http://leverarchitecture.com)





### ► London Calling: Mizzi Studio Kiosks

The first of nine kiosks marking prominent locations in London's Royal Parks have opened. Designed by Mizzi Studio on behalf of artisan coffee brand Colicci, the kiosks incorporate an organic design, inspired by the nature and space of the parks themselves, and are made of sustainable British oak and various metals. They will continue to open throughout the spring, culminating with a new cafe on the Serpentine Bridge. [www.mizzi.co](http://www.mizzi.co)

### ► Supporting Women in Forestry

The Canadian Institute of Forestry (CIF-IFC) recently announced a three-year, \$467,000 initiative to promote gender equity in the forest sector. Statistics Canada reports that women represent about 17 percent of the natural resources workforce. The initiative will include a committee to advise on the development of a National Action Plan, while the CIF-IFC will work in collaboration with the Centre for Social Intelligence to gradually improve gender equity across the sector. "This initiative will support the recruitment, retention and advancement of women in Canada's diverse and dynamic forest sector," explains Dana Collins, CIF-IFC Executive Director. [cif-ifc.org](http://cif-ifc.org)

### ► Federal Forestry Funding Includes Indigenous Initiatives

The Indigenous Forestry Initiative, part of Canada's \$867-million Softwood Lumber Action Plan, aims to increase Indigenous participation in forestry-related business. In October 2018, the Honourable Amarjeet Sohi, Canada's Minister of Natural Resources, announced more than \$669,000 in funding to support two forestry projects for Kitselas First Nation in B.C. Following this announcement, three more significant investments in Indigenous communities were revealed: In Williams Lake, B.C., a multi-year \$321,500 investment will support an Indigenous-owned milling operation and train community members in forest management, environmental monitoring and business development; in the Yukon, a \$595,000 investment will purchase biomass wood chip boilers; and in New Brunswick, \$295,000 is allocated to establish a forest-based community business and sustainable forestry strategy.

In late November, the Government of Canada also introduced its 2018 Fall Economic Statement, which included a proposal to provide \$100 million to support the forestry sector. [budget.gc.ca/fes-eea/2018/home-accueil-en.html](http://budget.gc.ca/fes-eea/2018/home-accueil-en.html)

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# 2018 Wood Design Awards

*Wood Design & Building* magazine is pleased to announce the recipients of the 2018 Wood Design Awards. With more than 150 entries, including 27 international projects, the judging was a rigorous process of review and debate between the three jurors: Shelley Craig, of Urban Arts Architecture; Andrew Frontini, of Perkins + Will; and Paul Masi, of Bates Masi Architects. More than once a project was tabled, and then revived, as they narrowed in on their final choices.

As the jurors reflected on their selections, and reluctant omissions, there was consensus that their decisions were often as influenced by the story behind a project, as by the execution or design. “Some of the most compelling components were the diagrams, and also the construction photos,” Frontini noted. This point was elaborated by Masi, who explained: “We were hungry to see how the buildings were put together, and when we did see a technical drawing or detail, we were very excited.” Craig agreed and commented that “we all want to hear the story,” and continued to explain: “It’s really great to see the element of whimsy and fun and play – there’s this absolute exuberance and joy in working and building with wood, and that really rang true in many of the projects. It was *very* difficult to make decisions.”

Ultimately, as Masi explained, “the projects that really stood out were more conscious about the story they were telling and how they told it, and what tools – whether it was photos, drawings or text – they used to tell the story.” As they reflected on their final selections, Frontini summarized: “We were very interested in seeing how far you can take wood as a material, both in terms of a system of construction, but also in terms of a set of expressions – it can be playful, it can be very evocative and it can also take on a monumental scale, pushing the boundaries of what you think a wood building can be.”

Special awards also were granted by the Canadian Wood Council and the event sponsors, Western Red Cedar, SFI and Sansin. In partnership with the Canadian Wood Council, *Wood Design & Building* would like to thank everyone who participated in the 2018 Wood Design Awards program, with special thanks to our three esteemed jurors. Congratulations to the winners! 🎉

## JURORS



Shelley Craig  
Principal  
Urban Arts Architecture  
[www.urban-arts.ca](http://www.urban-arts.ca)



Andrew Frontini  
Principal  
Perkins + Will  
[perkinswill.com](http://perkinswill.com)



Paul Masi  
Principal  
Bates Masi Architects  
[batesmasi.com](http://batesmasi.com)

## NORTH AMERICAN

### HONOR

**Calgary Central Library (and Wood Soffit)**  
Calgary, AB  
**Dialog Design with Snøhetta**

**Henry David Thoreau Footbridge**  
Washington Depot, CT  
**Gray Organschi Architecture**

**The Marine Education Center at the Gulf Coast Research Laboratory**  
Ocean Springs, MS  
**Lake | Flato Architects with Associate Architect unabridged Architecture**

### MERIT

**Backyard House**  
Seattle, WA  
**Robert Hutchison Architecture**

**Common Ground High School**  
New Haven, CT  
**Gray Organschi Architecture**

**Voltigeurs de Québec Armoury**  
Quebec City, QC  
**A49/DFS/STGM architects in consortium**

### CITATION

**First Tech Federal Credit Union**  
Hillsboro, OR  
**Hacker**

**High Horse Ranch**  
Willits, CA  
**Kieran Timberlake**

**Indian Residential School History and Dialogue Centre**  
University of British Columbia, Vancouver, BC  
**Formline Architecture**

# Winners

## INTERNATIONAL

### HONOR

**Chile Pavilion Expo Milan 2015 – Second Life**  
Temuco, Chile  
**Undurraga Deves Arquitectos**

**New headquarters FINSA**  
Santiago de Compostela, Spain  
**mrm+ architects**

**Forest Home**  
Helsinki, Finland  
**ORTRAUM architects**

### MERIT

**Collège Simone Veil**  
Lamballe, France  
**Dietrich I Untertrefaller with Colas Durand**

**Shonai Hotel Suiden Terrasse**  
Tsuruoka City, Japan  
**Shigeru Ban Architects**

### CITATION

**Harbour building WVIJburg**  
Amsterdam, the Netherlands  
**Margulis Moormann Architects**

SPECIAL JURY AWARD – EPHEMERAL ARCHITECTURE  
**RAW: almond, The Forks National Historic Site**  
Winnipeg, MB  
**Aux Projects and Wolfrom Engineering joint venture**

**RAW: Gimli, frozen surface of Lake Manitoba**  
near Gimli, MB  
**Aux Projects and Wolfrom Engineering joint venture**

CANADIAN WOOD COUNCIL AWARDS  
**House on Ancaster Creek**  
Ancaster, ON  
**Williamson Williamson Inc.**

**John W. Olver Design Building**  
Amherst, MA  
**Leers Weinzapfel Associates**

**Lake Rosseau Boathouse**  
Muskoka, ON  
**Atelier Kastelic Buffey**

**Shane Homes YMCA at Rocky Ridge**  
Calgary, AB  
**GEC Architecture**

SUSTAINABLE FORESTRY INITIATIVE – SPONSORSHIP AWARD  
**Cowbell Brewing Co.**  
Blyth, ON  
**Allan Avis Architects**

WESTERN RED CEDAR – SPONSORSHIP AWARD  
**Overland Trail Cabin**  
Norden, CA  
**BCV Architecture + Interiors**

SANSIN – SPONSORSHIP AWARD  
**Terrapin Neck**  
West Virginia  
**Richard Williams Architects**



## Calgary Central Library

In a competition that was often difficult to decide, this was one project the jurors didn't hesitate to label a winner. The new library, which opened in late 2018, is located within a complex urban setting, where a fully functional Light Rail Transit line crosses from above to below ground on a curved half-moon path that bisects the site. The building's curved footprint influences the interior through a series of slopes, curves and variable spaces where wood plays a primary role. The design locates the main entry over the encapsulated train line, while gently terraced slopes rise up to the heart of the building. Wood introduces itself in the form of the soffit enveloping the entryway, and its presence is a consistent element throughout the expansive and dramatic structure.

With the interior spaces organized on a spectrum from "fun" to "serious," the library program locates the livelier public activities on the lower floors, gradually transitioning to quieter study areas on the upper levels. At the uppermost level is the Great Reading Room, which is entered through a transitional space with softened light and acoustics. As vast as the 240,000-sq.ft. building may seem, the warmth of wood creates a welcoming ambience. You can read more about this spectacular project in this issue's feature on p.26.



## Henry David Thoreau Footbridge

Gray Organschi Architecture

Named in tribute to the renowned American writer and environmentalist Henry David Thoreau, this cable-stayed, mass timber suspension bridge spans 134 ft. across the Shepaug River in Northwestern Connecticut, rising clear of the 500-year flood level and then sweeping 90 degrees as it gently ramps down a gabion wall plinth on the north bank. Opened to the public in early 2016, the new bridge is a short walk from the main parking lot at the Hidden Valley Preserve, providing access for disabled visitors to explore previously inaccessible trails along the river's northern bank, connecting two sides of the 650-acre preserve. The design was planned with input from wetland soil and wildlife biologists, with a focus on sustainable construction techniques for sensitive ecological areas. Interlocked glulam beams create the bridge deck, suspended from steel backstay and anchored into exposed rock face. The siding consists of handwoven cable net guard (by Nets Unlimited), suspended from weathered steel channel handrail. As the general contractor Seattle Bridge notes, "The design was unusual in several respects. First, it is a suspension bridge with a single tower; the mainlines are anchored directly into a hillside on the far shore. Second, the

mainlines do not run in parallel; they radiate from a single point atop the bridge tower to two anchor points 25 ft. apart at the hillside anchorages. Third, the bridge superstructure – glulam beams pinned together with all thread – was more rigid and resistant to tuning than the dynamic, fixed-pinned stringer bridges that are our usual stock in trade." Quotes from Thoreau's seminal work, *Walden* (including the one on the opposite page), are inscribed by water jet into a bench at the cliff base and along the bridge's steel handrails. The project also received the AIA New England Citation Award in 2016.

#### STRUCTURAL ENGINEER

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New York, NY

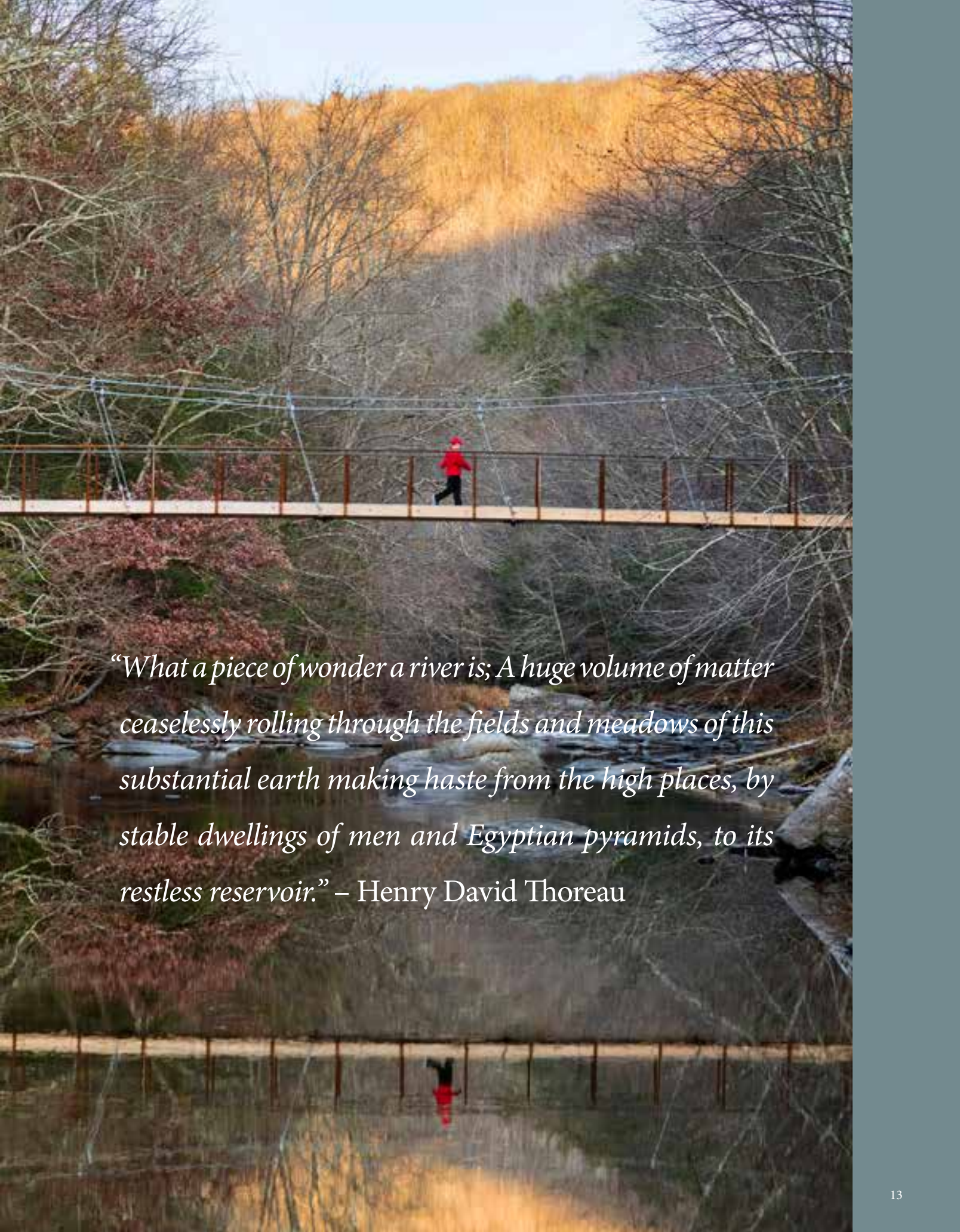
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Seattle, WA

#### PHOTOGRAPHY

David Sundberg/Esto Photographics  
Mamaroneck, NY

A photograph of a person in a red jacket walking across a suspension bridge over a river. The bridge is made of wooden planks and has a metal railing. The river is in the foreground, and the background is a dense forest of trees with bare branches. The lighting is warm, suggesting late afternoon or early morning. The text is overlaid on the lower half of the image.

*“What a piece of wonder a river is; A huge volume of matter ceaselessly rolling through the fields and meadows of this substantial earth making haste from the high places, by stable dwellings of men and Egyptian pyramids, to its restless reservoir.” – Henry David Thoreau*



## The Marine Education Center at the Gulf Coast Laboratory Lake | Flato Architects and unabridged Architecture (associate/LEED)

Completed in early 2018, this facility – located within an ecologically critical bayou and marsh wetlands – was designed with a focus on sustainability and resiliency after the original Marine Education Center was destroyed by Hurricane Katrina. A collection of buildings that serve as the educational and outreach center for the University of Southern Mississippi’s Gulf Coast Research Laboratory includes outdoor and floating classrooms, laboratories, administration offices and a linked network of boardwalks and outdoor pavilions. Considering natural disasters and durability, the design focused on using and maintaining the land to serve as the first line of defense. The team sited buildings within

the existing tree canopy, which could serve as a natural wind buffer, while the roofs are sloped to quickly shed rainwater. Low-impact materials were selected for the health of the building’s occupants and to avoid ocean contamination in the event of a natural disaster; traditional building materials including zinc and PVC were red-listed. The primary structure is composed of southern yellow pine dimensional lumber – chosen given its availability and prevalence as a local Mississippi commodity; also, locally sourced wood ensures that any future repairs can be easily accommodated. The buildings of the main campus are designed around a central courtyard, which serves as an outdoor class-



room and informal gathering space. Composite wood slats create a shading device and provide visual interest, while porches are an important design component for sheltered outdoor walkways and teaching spaces. Tongue-and-groove wood decking provides flooring for the screened porch classrooms. A 200-ft.-long cable suspension bridge connects the main campus to the outlying facilities, while protecting an ecologically sensitive forested bayhead. Inside the buildings, gapped wood ceilings are equipped with acoustical insulation. The facility is approximately 29,700 sq.ft., and was built with a budget of \$13 million. It has already won several honors, including a 2018 AIA Local Award.

**STRUCTURAL ENGINEER**  
Datum Engineers  
Dallas, TX

**GENERAL CONTRACTORS**  
Starks Contracting Company  
Biloxi, MS

**PHOTOGRAPHY**  
Casey Dunn  
Austin, TX







## Chile Pavilion Expo Milan 2015 – Second Life

Undurraga Deves Arquitectos

Knowing that the pavilion to represent Chile in Expo 2015 would be temporary, the architect designed a wooden Meccano-like, three-storey structure that easily could be assembled, disassembled, transported and reassembled in its new home, Temuco (capital city of the Araucanía Region in Chile). The glulam structure works like a lattice truss, which is composed of interlocking diagonals pinned to the top and bottom horizontal chords; the lower chords are connected to each other by the floor beams, while the upper ones are connected by a spatial structure composed of pyramids that help give rigidity to the main structure. To simplify assembly and disassembly, the connections are designed to use the least possible amount of metal, while being embedded in the wood for both aesthetic and fire protection purposes. Each glulam element is made of Radiata pine from southern Chile, glued and shaped in Italy, with no pieces longer than 12 metres to allow for easy transportation. The building enclosure is achieved by using wooden insulated panels and strategically located windows, both placed inside the diagonal beams to maintain the structural lines.

The interior spaces were designed to be flexible so they could host different uses and scenarios in the future. Floors are made of Lignum K, an insulating structural panel made of wood (by Albertani), plus a custom-made raised floor to house mechanical and electrical services. “From the very beginning, we thought the pavilion had to be wooden-made,” the firm explains. “There is a beautiful and rich tradition of wood construction in our country. Wood is also one of our most important natural resources; it is a renewable material, Chile being one of the countries with the highest reforestation rates in the world.” The pavilion won a Silver Award during the Expo Milano 2015, along with other accolades.

### STRUCTURAL ENGINEER

F&M Ingegneria Spa  
Venice, IT

### GENERAL CONTRACTOR

Sarapalti – Albertani (Italy)  
Constructora San Ignacio – ASAP (Chile)

### PHOTOGRAPHY

Roland Halbe  
Stuttgart, DE

Carlos Massmann  
Chile



## New Headquarters FINSA

mrm+a architects

Founded in 1931 as a small sawmill, Finsa is now the oldest chipboard and MDF manufacturer in the Iberian Peninsula. Naturally, when planning an extensive renovation and expansion to its headquarters, wood played a central role in the design. The dramatic renovation takes its cues from the new building, dubbed La Conexión, which features ventilated wooden accoya cladding, laminated wood main beams and pillars, along with solid wood flooring, ceiling panelling and roof systems – all produced by Finsa. Accoya slats on the original facility unify the pre-existing structure with its addition, which was completed in late 2017. The new structure features a free-form plan on both floors, arranged only by small patios and glass partitions that link the indoors with its surroundings. The new structure is intentionally transparent to connect the building with its landscape, including the surrounding pine forests that provide Finsa's raw materials. Beams spanning 22 meters maximize the feeling of space and

continuity, while exposed roof beams give a sense of scale, especially in the main lobby and first floor. The interior walls are mainly finished in high-pressure wooden fiber boards, while the suspended ceiling throughout consists of acoustic wooden fiber boards finished in pine or removable ayoux slats. Because the flooring needed to be easy to clean and effective for acoustic isolation, a PVC carpet is used in most areas. The different zones are designed with as few partitions as possible to make connections easier among the 300 workers and many visitors who use the spaces for working, meeting and rest.

### STRUCTURAL ENGINEER

Josep Agustí  
Spain

### PHOTOGRAPHY

Miguel Goñi Aguinaga  
Navarra, ES





# Forest Home

ORTRAUM architects

The only single-family Honor winner in this year's awards program was chosen for its masterful but playful treatment of residential function, featuring a frame and interior that is predominantly CLT, with integrated furniture and stairs assembled of prefabricated CLT elements. The material is an ideal framework for a climbing wall and other attachments, which are secured easily to the wooden walls. A bright, free-flowing plan includes a void that is transformed into a lounge space with the use of trampoline netting. The main floor features a communal kitchen and dining area at one end and a generous living room at the other. In the middle of the plan, a gentle fold in the southern wall provides glimpses of the sea and afternoon sun; the window placements carefully avoid the neighboring homes. Throughout the structure, windows intentionally frame views of the forest, water or sky, allowing large patches of light to travel through the rooms. The upper floor is divided into quadrants that serve as private bedrooms, arranged around a central landing, and each room contains a small loft that connects to the adjacent spaces in a cross plan at the mezzanine level above, which features large skylights.

The wooden surfaces of the CLT floor, wall and ceiling panels are exposed throughout the interior, bestowing a sense of weight and solidity. Components such as trim boards, air vents, lighting fixtures and electrical connections were minimized, hidden or eliminated completely to keep the interior surfaces free from obstructions, so that the clean lines remain sharply defined. The exterior is clad with Siberian larch, which will weather to a silver-grey, emulating the granite rocks that surround the home – while the geometry of the home itself rises boldly like a mountain in the forest. Larch continues inside as a flooring and furnishing material, while dark copper frames the windows to emphasize the contrast between indoors and out. A metal-clad roof tops off the structure's dramatic profile.

#### STRUCTURAL ENGINEER

Asko Keronen  
Finland

#### PHOTOGRAPHY

Marc Goodwin/Archmospheres  
UK/Europe



# 80 Atlantic

## Ontario Wood *WORKS!*

Welcome back to our serial profile of 80 Atlantic. For those who read the last issue, you'll know that we're on the second installment of a four-part series showcasing 80 Atlantic during the course of its construction. If you missed the first article and would like to catch up, you can find it online: [www.wooddesignandbuilding.com/80-atlantic/](http://www.wooddesignandbuilding.com/80-atlantic/)

80 Atlantic is four storeys of heavy timber construction above a one-storey concrete podium. The exposed wood structure of this striking, hybrid commercial building is comprised of glulam columns and beams with nail-laminated timber (NLT) panels. Although the city boasts many historic “brick and beam” buildings, 80 Atlantic is one of the first commercial wood buildings of this height constructed in Toronto in nearly a century; however, there are many other wood projects in the design and development phase. The renewed enthusiasm for wood construction is driven by several factors including cost, aesthetics, a rapid and quiet construction cycle with minimal staging requirements (benefits realized through off-site prefabrication), and wood's inherent environmental advantages. As compelling as these reasons are, the real catalyst for change was the 2015 update to the Ontario Building Code that increased the allowable height for wood-frame construction from four to six storeys, a move that created an entirely new development opportunity.

Assembly of the wood structure has progressed quickly and on schedule, taking just 16 weeks for all four floors to be installed. The project has a “raising crew” of six to 10 people, depending on the day – including a foreman, a crane operator, a lead hand to direct the crane and ensure hoisting apparatus is rigged correctly, and several skilled carpenters.



Architects' Rendering: View looking North West from Atlantic Avenue and Liberty Street.  
PHOTO CREDITS: Quadrangle



Bird's-eye view of 80 Atlantic during the installation of the timber columns and beams for the third floor.



Carpenter uses 600mm screws to stitch together two pieces of glulam to complete the assembly of a beam prior to its installation.

Once the concrete foundation was complete, construction sequencing for the wood structure began with the installation of the first floor's column bases, followed by the columns, beam hangers, beams and then the NLT floor plate. The NLT panels have a plywood diaphragm and were connected to one another using spline connections. The hold-down screws for the panels were 400mm in length, with some 600mm-length screws as required.

A soundproofing membrane with water-wicking properties was added on top of the NLT panels once the level above was installed. Since the membrane is not robust enough to withstand equipment like the scissor lift, installing the membrane after the next level was up maintained the integrity of the material, so it was not accidentally ripped or torn by equipment. A two-inch layer of concrete topping will be applied over the membrane to increase the acoustic performance of the system.


The large glulam beams for this project were actually manufactured in two parts and "stitched" together on-site with screws (see photo). This strategy makes sense from an economic standpoint and facilitates transportation of the beams; it also addresses the manufacturing challenge of creating very large beams.



Raising Crew lifts NLT panel into place.

For aesthetic reasons, the client for this project required that the steel connections be concealed, so Timmerman Timberworks, the NLT fabricator and erector, designed custom column-to-beam and beam-to-panel concealed connections in-house, and had the connections made at a specialized metal fabrication shop.

Beyond the aesthetic appeal of invisible connections, concealed steel elements actually perform better in a fire event than their exposed counterparts. The heavy timber surrounding the steel connection burns first, resulting in a char layer on the outside of the beam that serves to insulate the rest of the beam, maintaining the structural capacity of the wood member and protecting the concealed connection at the same time.

Nail-laminated timber is an excellent choice for many projects, but people who have projects with a short construction schedule will find the speed of installation especially valuable. For this project, 6,000-sq.ft. of NLT panels, and sometimes more, could be installed in a single day, including the time required to offload the NLT from the two tractor trailers that brought the panels to the site. 

ARCHITECT  
Quadrangle Architects Ltd.

DEVELOPER  
Hullmark Developments Ltd.

ENGINEER  
RJC Engineers

CONSTRUCTION MANAGER  
Eastern Construction Co. Ltd.

NLT FABRICATOR  
Timmerman Timberworks Inc.

GLULAM FABRICATOR  
Nordic Structures

## PROJECT FACTS

**Location**  
80 Atlantic Avenue (Liberty Village),  
Toronto, ON

**Type**  
Office/Retail

**Office Space**  
79,758 sq.ft.

**Retail Space**  
7,719 sq.ft.

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**woodWORKS!**  
Program of the Canadian Wood Council





# Calgary Central Library

Wood takes center stage in this dramatic new monument for books

**Calgary, AB**



One of *Architectural Digest*'s 12 most anticipated buildings of 2018, the Snøhetta-designed Calgary Central Library is a showcase for wood, featuring western red cedar, western hemlock and white oak in a variety of interior and exterior applications. Although the exterior cladding is a geometric interplay between glass and aluminum, as visitors approach the entryway they are greeted by a sweeping roof of unfinished, fire-treated cedar slats; about 170 panels that range in weight from 227 to 907 kilograms comprise one of the largest freeform timber soffit structures in the world, using 21,850-sq.ft. of wood. The fabricator, StructureCraft, created a double-curved surface using only two-dimensional CNC-milled wood framing elements, developing custom algorithms to create a pattern of geodesic ribs that support the curved surfaces. The cedar planks were then installed and interlocked with site-cut segments to form the continuous

surface. Approximately 30 people were involved in the fabrication and installation.

"Visually, wood provides a sense of intimacy and familiarity that allows the library to embody its mission to provide an interesting space for the public and people of Calgary," Snøhetta explains. "The warmth and organic texture of wood strikes a strong contrast to the crystalline facade. At the entry, wooden planks help to visually bring the expansive size of the building down to a tactile, relatable, human scale."

Inside the structure, western hemlock is predominant as the material used for wood slat walls and ceilings. Its visual similarity to the entryway's cedar is complemented by the hemlock's higher density, stability and more consistent grain, which makes it a more suitable choice for a slat system. Zones of slats were panelized into units averaging 2-ft. wide and 8-ft. long, custom manufactured with a slight splay to

respond to the building's curvature. These panels were installed in an interlocking pattern with site-cuts and additions as required for unique conditions. This strategy also allowed for ease of access for maintenance of HVAC, devices, sprinklers and other systems, both during construction and in the future.

More than 49,000-sq.ft. of hemlock panels were used in the creation of the lobby, atrium, theatre and great reading room spaces; in total, there are over 460,000 linear feet of west coast hemlock in the library. The ceiling alone utilizes about 285,000 linear feet. In the theatre, the wood slat walls were panelized with a semi-randomized depth, but each panel follows a regular increment so only minor site adjustments were required. The millwork has a high degree of variability, responding to both programmatic needs and location within the building, so each of those elements were custom designed.




⊕ SITE PLAN

White oak was selected for the floors, walls and millwork – any surface that would be touched or walked upon frequently – as it is a highly durable wood type with interesting visual and tactile charac-

teristics. Approximately 30,000 sq.ft. of engineered wood flooring manufactured by Nydree were used in the atrium and Children’s Library spaces, site-installed over a raised floor.

During peak periods of construction, 18 to 20 installers and cabinetmakers worked onsite with 12 to 14 people responsible for prefabricating components. Local firm Executive Millwork manufactured the wood slat ceilings and walls, while local firm Mobius Objects designed and built 25 solid white oak tables for the Great Reading Room; the matching chairs were produced by Geiger. Overall, the library features 17 different types of chairs, and more than 2,000 public seats in total. “The warmth and comfort of the wood chairs and tables in this space will help make this place a pleasant one,” noted the architects. “The furniture is of very high quality and durability, allowing these elements to be part of the Great Reading Room for many years to come.”



This innovative structure is built over a pre-existing LRT line, bridging two neighborhoods while creating a world-class platform for literacy and community enrichment – including 30 free bookable meeting rooms for members, and an Elders’ Guidance Circle to feature Indigenous programming. The Calgary library system is currently the second largest in Canada, and the sixth largest municipal library system in North America. It now boasts a 240,000-sq.ft. home worthy of this legacy. 

**ARCHITECTS**  
 Snøhetta (design)  
 Oslo, NO  
 Dialog (architect of record)  
 Calgary, AB

**STRUCTURAL ENGINEERS**  
 StructureCraft Builders (cladding)  
 Abbotsford, BC

Entuitive (base building)  
 Toronto, ON

**CONTRACTOR**  
 Stuart Olson  
 Calgary, AB

**PHOTOGRAPHY**  
 Michael Grimm  
 New York, NY

## PROJECT FACTS

**Area**  
 240,000 sq. ft.

**Budget**  
 \$245 million

**Opened**  
 November 1, 2018

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# The Heights

Canada's largest Passive House building sets a new standard for multi-family construction

**Vancouver, BC**



Last year's winner of a Wood *WORKS!* Environmental Performance Award, The Heights is a mixed-use, six-storey residential building with a concrete parking garage and ground level commercial space, topped by five wood-frame storeys containing 85 apartments of up to two bedrooms each. The architect proposed a Passive House structure to illustrate the

energy-saving method's practicality on a larger scale, incorporating a wood frame for its insulating qualities and cost efficiency. Throughout the structure, plywood and 2x4, 2x6 and 2x10 wood studs are used for subfloors and walls. Above ground level, the elevator shaft is constructed of nail-laminated timber (NLT). Overall, the project uses 594 cubic meters of wood

– roughly equivalent to preventing 1,096 metric tons of CO<sub>2</sub> emissions, which is enough energy to operate 170 homes for a year.

To accomplish a Passive House rating (using 80 to 90 percent less energy for heating and cooling than conventional buildings), the building envelope incorporates high insulation values with minimal thermal bridging, resulting in an efficient, boxlike design. A second service wall parallels the exterior wall with a two-inch gap between the two so that insulation can be optimized, while sunscreens, balustrades, masonry veneer and other exterior elements are attached without compromising air barrier performance. Heat recovery systems, increased insulation and airtight windows maximize efficiency, while strategic window placements optimize passive solar heating. Air barriers and a continuous layer of polystyrene insulation minimize thermal bridges. Construction time was reduced by implementing off-site prefabricated panels that were craned into place.

The successful combination of modern construction methods with Passive House principles, along with the predominant use of wood, has attracted international attention and acclaim. The Heights was among this year's Wood Design Award entrants, and although it did not find a place on the list of winners, the jurors spent considerable time discussing its merits as a "pure and simple" example of stick frame construction, while showcasing the benefits of Passive House design on a much larger scale than is usually seen in Canada. 🏡

ARCHITECT  
Cornerstone Architecture  
Vancouver, BC

STRUCTURAL ENGINEER  
Weiler Smith Bowers Consulting  
Burnaby, BC

GENERAL CONTRACTOR  
Peak Construction Group  
Surrey, BC

PHOTOGRAPHY  
Gordon Dumka  
Vancouver, BC



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# 111 East Grand

Modern mass timber makes its debut in Iowa



The modest Midwestern city of Des Moines, Iowa (the state's capital), sits nestled among cornfields that are the agricultural engine for much of the country. Opposite the business district, separated by the Des Moines River, is an area known as the East Village, where factories and warehouses that once thrived are being repurposed into restaurants, businesses and housing, after an era of decline due to suburban migration. Here, a one-minute walk from the city's historic City Hall, the first modern mass timber building in Iowa is due to be completed in April 2019 – also becoming the first dowel laminated timber (DLT) office structure in North America.

With a nod to its turn-of-the-century wood and masonry elders, 111 East Grand will feature fully exposed mass timber

on the interior, a showcase for DLT. This innovative project joins several other new buildings in the area; in 2013, a mixed-use residential steel and hollow-core precast building was erected, followed by another mixed-use residential structure of similar construction. An ongoing collaboration between the development team, led by JSC Properties Inc., Neumann Monson Architects and Ryan Companies (general contractor), resulted in a willingness to “push the envelope” – hence, this newest project. Four storeys (60 ft. in height) will provide 65,000-sq.ft. of space, with the first level home to retail and restaurants, while the upper three floors house various office spaces. The ground level is wrapped with storefronts, visually connecting vehicular and pedestrian traffic to the exposed structural frame.





The design team went through an extensive interview process with various subcontractors, selecting StructureCraft Builders as the design-build timber partner during the early schematic stages of design; StructureCraft had previous experience working in the Midwest, recently completing T3, a mass timber office building in Minneapolis, MN (a Wood Award “Citation” winner in 2016). Visiting this precedent helped the developer team confirm that mass timber was the right direction to go. DLT, or Dübelholz in Europe, was chosen as the floor and roof slab system. This mass timber product utilizes a series of dimensional softwood lumber strands fastened together face-to-face, with a hardwood dowel hydraulically inserted (perpendicular) to create a strong friction-fit mechanical bond. This system has been used in Europe for the past couple of decades and just recently found its way to North America.

Construction began the summer of 2018, with Ryan Companies erecting a series of precast panels that form the service core and provide the primary lateral support for the building. The subsequent arrival of the mass timber in early August enabled StructureCraft to be the only trade on site during its erection. Each individual column, beam and panel were assigned a number and shipped to the site in chronological order for erection. Akin to a basswood model in architecture school, the 13 structural bays were erected east to west in approximately six weeks with a crew of eight, including two supervisors and six local carpenters.

Glulam columns and beams (spruce) were shipped from Austria. The 2x8 DLT floor panels and 2x6 roof panels (SPF) were fabricated in-house by StructureCraft, at the first plant to produce DLT on a large scale in North America. Early on, Neumann Monson expressed their desire to integrate the electrical conduits with the timber structure. The inherent linear laminations of DLT aided in the creation of a 4x4-inch channel using shallower boards at the panel edges. In addition, StructureCraft worked closely with the architect to develop details which “socket” the beams into the columns, creating an aesthetic



that celebrates the wood and reduces the amount of exposed metal and intumescent paint required to achieve the one-hour rating between the first and second levels.

Future tenants eagerly await their move-in date (including Neumann Monson Architects and Ryan Companies) and the opportunity to be in a space that offers visual, tactile, olfactive and biophilic connections to its inhabitants. Sensibility as much as sustainability are growing ever more imperative in the construction industry. The current global situation strongly suggests an exploration of alternative construction methodologies, and depending on the market, a timber building's structural cost is similar to that of steel or concrete. Properly designed, they can accommodate the distribution of services tastefully. They require neither dropped ceilings nor wrapping of beams and columns. Continued innovations in engineering have enabled these structures to perform very well under fire conditions and to be erected quicker than any other type of structure. 111 East Grand aims to embody these values and help to fuel the timber momentum that has already begun to make its way across North America. 🌲

**ARCHITECT**

Neumann Monson Architects  
Des Moines, IA

**STRUCTURAL ENGINEER**

Raker Rhodes Engineering  
Des Moines, IA

**MASS TIMBER STRUCTURAL ENGINEER AND BUILDER**

StructureCraft Builders  
Vancouver, BC

**GENERAL CONTRACTOR**

Ryan Companies  
Clive, IA

**M.E.P.**

Baker Group  
Ankeny, IA

**PHOTOGRAPHY**

Neumann Monson Architects,  
StructureCraft Builders

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# Mass Timber Education

As mass timber construction booms, so does the need for know-how

Jana Manolakos

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Rapid global uptake of mass timber is literally pushing the wood industry skyward, with products like CLT enabling taller structures with minimal use of concrete and steel, while offering a friendlier eco-footprint. Mass timber construction is moving so fast, in fact, that many people in the industry are having a hard time keeping up with new high-tech materials, sophisticated connection systems and fabrication equipment.

“There are very few designers and contractors who are well versed with the material,” says structural engineer Eric Karsh in a video posted on the **Timber Online Education** (TOE) homepage. “The knowledge we need to design exposed wood structures is a lot greater and a lot more specialized than it might be with other materials, but the information is often difficult to get.”

TOE ([timbereducation.org](http://timbereducation.org)) is one of only a handful of reputable groups around the world that have stepped up to close this critical information gap, offering educational programs – often online – that address a range of specialized topics around mass timber.

TOE’s free program, which is currently under development, will gather some of the world’s leading authorities to deliver online courses aimed at teaching Canadians and the international com-

munity how to build wood buildings in a safe, economical and sustainable manner. Courses will be taught by experts in their native tongue and delivered in several languages to broaden understanding of the issues. The program is being launched by Design Build Research, a Vancouver non-profit founded by architect Michael Green; the organization’s focus is global design and construction education, along with research on building for climate, environment, disaster and global shelter needs.

While TOE will offer the type of global education needed to ensure safe, climate-sensitive building practices around the world, it will also direct users of the online platform to local resources within their country or region. In Canada’s case, TOE aims to complement the Canadian Wood Council programs that specifically educate architects and engineers, at the same time encouraging owners and developers to consider building in wood.

In October, the Government of Ontario launched the **Mass Timber Institute** ([masstimberinstitute.ca](http://masstimberinstitute.ca)), a public-private collaboration and virtual hub for research and development, as well as specialized courses in mass timber tall wood buildings and the use of advanced wood products. When fully completed, the site will offer online classes and hands-on training in forestry, engineering, design, architecture and construction – specifically conceived for architects, engineers, designers and builders. Four tall wood building projects currently in the early stages of development are being used as “living labs” or learning landscapes; these include The Arbour at George Brown College, the mass timber building slated for the University of Toronto and two projects at Brock Commons, in Vancouver.

Oregon’s **TallWood Design Institute** ([tallwoodinstitute.org](http://tallwoodinstitute.org)) took the lead in launching a first-of-its-kind certificate program for mass timber manufacturing this year. A research collaborative among Oregon State University’s College of Forestry and College of Engineering and the University of Oregon’s College of Design, the Institute focuses on the advancement of structural wood products and mass timber design. In the certificate program, learners are given a combination of online instruction, classroom sessions in partnership with various community colleges, and hands-on design-build experiences – some of which will take place in the A.A. “Red” Emerson Advanced Wood Products Laboratory, a 15,000-sq.ft. facility currently under construction at Oregon State University. 🌲

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Many courses are offered around the world through manufacturers, dedicated organizations and academic institutions, but very few specialize in mass timber:

- Finland’s Metsä Wood offers free online Timber Academy courses built around its wood products for construction, industrial and distribution customers.
- Italy’s Tree and Timber Institute (IVALSA) offers comprehensive training courses covering all aspects of wood for both the public and private sectors.
- The American Wood Council offers free e-learning on a range of topics around tall mass timber building and construction.
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## Formed by Nature, Crafted by Man

Once again, GR Plume Company is pleased to be a member of a collaborative design-build team, this time, for the Everett University Center, the first building of the new Washington State University branch campus. Led by architectural firm SRG Partnership with general contractor Hoffman Construction, the heart of the project is the Innovation Forum space which showcases a four story, cantilevered, Douglas fir glulam custom staircase, fabricated and assembled in Ferndale by GR Plume. Wood was chosen for the stair, not only to reference the storied history of the Pacific Northwest timber industry but also as a visual counterpoint to the glass and concrete surfaces of the building. Wood continues to provide both warmth and strength to modern buildings, combining renewable resources with creative ambition and advanced manufacturing technologies. What better application than a new campus focused on science, technology, engineering and math?



# The “fourth industrial revolution” changes the game in timber construction



## CONSIDER THIS

According to a 2017 report by the Brookfield Institute for Innovation + Entrepreneurship, automation will replace human labor by 61% in the manufacturing sector, 52% in forestry and 51% in construction.

Two cooperating robots precisely position the timber beams in a spatial arrangement predefined by computational design. © NCCR Digital Fabrication/Roman Keller



Wander Wood Pavilion at UBC. PHOTO CREDIT: David Correa.

Design and engineering trailblazers in Germany, Canada and Switzerland are propelling timber construction into what has been coined “the fourth industrial revolution,” a new world in which the lines between humans and machines have blurred in a fusion of digitization, automation and robots.

In 2014, a team at the University of Stuttgart completed an unprecedented structure of lightweight timber enabled by

robot fabrication, computational design and three-dimensional surveying. Taking a cue from nature, the 1,560-sq.ft., 56-ft.-tall Landesgartenschau Exhibition Hall structure was inspired by the plate joints found in sand dollars. The unusual form and symmetry of the different sized polygon panels, made of lightweight beech plywood and fitted together by finger joints, was made possible by a computer-controlled machine that cut each panel into its approximate

shape, and an industrial robot which refined the edges, finger joints and screw pockets with a milling bit. Connecting the prefabricated panels required manual labor, with onsite construction taking four weeks. The Landesgartenschau Exhibition Hall launched a series of subsequent pavilions produced annually by students of the school’s Institute for Computational Design and the Institute of Building Structures and Structural Design.

## IDEAS&APPLICATIONS

In 2016, a newer structure in the same pavilion series incorporated similar components, using robots to mould and stitch together the laminated plywood; it was the first project of its kind to employ industrial sewing of wood elements on an architectural scale. The stitching transfers tensile pressures, similar to the connections found between the plates of a sea urchin's shell. The series aims to showcase the new architectural aesthetic enabled by computational design and robot fabrication; several other wood projects have been produced, with plans for another innovative structure (the BuGa Wood Pavilion) to be completed in the spring.

This fall, a group of industry leaders and students at the University of British Columbia created the Wander Wood Pavilion, an undulating wood structure built with robotically controlled tools. Assembled with interlocking components secured by 2,200 rivets, the pavilion is formed by rows of wooden slats in which a curved form creates a park bench on the university's Vancouver campus. As a temporary structure with a one-year lifespan, the pavilion is meant to illustrate the use of robotic technology in a variety of timber structures.

Earlier this year, in a game-changing move, ETH Zurich (the Swiss Federal Institute of Technology) took that same digitization and automation to a whole new level. Here, researchers introduced a new method for digital timber construction, called Spatial Timber Assembly (STA), which builds on existing methods of timber framing by adding the robot's ability to produce and assemble parts rapidly. This eliminates the need for reinforcement plates because the precision and geometry of the timber construction provides extraordinary rigidity and load-bearing capacity. The method delivers the ability to create buildings which previously could not have been built out of wood.

STA allows for the efficient construction and assembly of load-bearing timber modules that have been prefabricated by robots. Instructed by information from CAD, a robot selects and guides a timber beam that it saws to size. After an automatic tool change, a second robot drills the required holes to connect the beams. Finally, the two robots work in tandem in a fantastic techno-

ICD/ITKE Research Pavilion 2015-16



Landesgartenschau Exhibition Hall



PHOTO CREDITS: ICD/ITKE/IIGS University Stuttgart





DFAB House. PHOTO CREDIT: Empa via Twitter (@Empa\_CH)

logical *pas de deux* to position the beams precisely according to the computer layout, accompanied by an algorithm that continuously calibrates the robots' moves to avoid collisions during construction. Workers then manually bolt the beams together. Throughout the process, if any change is necessary, the computer model can adjust

to the new requirements.

This method was piloted in Dübendorf for the construction of the DFAB House (above), a three-storey residential unit slated for completion in 2019. Six geometrically unique timber modules were fabricated at ETH's Robotic Fabrication Laboratory, the world's first research plat-

form for large-scale robotic fabrication in architecture, and then transported to the construction site. "We are convinced that it will become an international flagship project for digital fabrication in architecture and construction," stated Enrico Marchesi, NEST Innovation Manager, at the structure's topping-out celebration. 🇨🇭



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# W o o d W A R E



## A low-carbon computer

MicroPro, a small computer design and manufacturing company in Ireland, has won global recognition for its “green” computers. This year it introduced the iameco D4R (Design 4 Reuse) laptop, a truly low-waste, high-performance computer with a carbon footprint that is 70 percent less than the average PC; hazardous materials are reduced to a minimum and replaced with environmentally friendly alternatives. To achieve this, not surprisingly, the plastic frame has been replaced with wood, sourced from sustainable forests and furniture industry offcuts. There’s no tropical hardwood here.

Developed with high-level partners in industry and academia, the D4R laptop also uses fewer parts and is a modular design to allow for upgrades, extending the computer’s life to an estimated 10 years, while mitigating the impact of planned obsolescence. Almost all of its components are recyclable, resulting in official EU Eco Flower certification. The company also produces a touchscreen wood-frame computer and accessories: a computer mouse is available in solid ash, beech or oak, and keyboards can be ordered in sapele, ash and beech.   
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