
Fast + Epp
CENTRE FOR INTERACTIVE
RESEARCH IN SUSTAINABILITY

# CENTRE FOR INTERACTIVE RESEARCH IN SUSTAINABILITY

**Vancouver, BC**

# CANADIAN CONSULTING ENGINEERS AWARDS 2012

**Project Owner:** University of British Columbia Properties Trust

**Project Client:** Perkins + Will Canada

**Other Consultants:** Stantec Consulting – Mechanical, Electrical
Exp. (formerly Trow Associates Inc.) – Geotechnical Engineer
PWL Partnership – Landscape Architects

**Construction Managers:** Heatherbrae Builders Co. Ltd.

Four-storey state-of-the-art 'living' lab showcasing innovative green technologies, built almost entirely with wood to LEED Platinum standards.

Fast + Epp

201 - 1672 West 1st Avenue
Vancouver, BC V6J 1G1
T: 604.731.7412
F: 604.731.7620
mail@fastepp.com
ATTN : Sandi Wiggins

## PROJECT HIGHLIGHTS

The Centre for Interactive Research on Sustainability (CIRS) seeks to be at the forefront of sustainability research. The 5,500 sq. m. building, located on the University of British Columbia campus, was designed to perform living research and education with regards to the importance of sustainability. The four-storey structure encompasses modular multi-use offices and workstations, lecture halls, conference rooms, a 100-seat theater, exhibition spaces, and laboratories for research and testing.

With a target of LEED Platinum and the Living Building Challenge status in mind, the structural design team – in close collaboration with architects at Perkins + Will Canada – set out to maximize the use of wood in the project.

Seldom, if ever, are multi-storey academic facilities on university campuses constructed entirely with wood. The viability of wood as a building solution has generally been discounted in the initial concept design stage due to concerns regarding structural strength, durability, combustibility and cost. However in this instance, the value of wood as a locally-available, renewable, quickly-growing, and carbon-sequestering product with low embodied energy spoke strongly in favour of capitalizing on its sustainable features. Additionally, the project met the budgetary structural objectives set out at the beginning of the project and remains cost-competitive with traditional concrete and steel options.

To overcome initial cost objectives, Fast + Epp created a relatively-simple structural system. Engineers explored solutions that could easily be prefabricated and assembled by construction crews, without the benefit of special skilled labour or equipment such as CNC machinery. The result was a disciplined grid of glulam beams and columns on 3.3 metre spacing. This grid supports a solid wood deck, consisting of 2x4's nail laminated together in 1.2-metre-wide prefabricated panels, and sheathed on site with a layer of plywood.

The architect and client desired to maximize daylight penetration into the space, minimizing opportunities to incorporate conventional plywood shear walls to resist lateral forces arising in the prevailing severe seismic zone. Engineers incorporated a four-storey-high ductile timber moment frame in the east-west direction to withstand the large seismic forces. In the interests of economy, they designed a simple prefabricated spandrel panel – one that could easily be installed between the vertical glue-laminated column elements. The exact dimension of a standard sheet of plywood, (1200 x 2400mm) these panels eliminate material wastage. They consist of conventional framing lumber 140mm wide, sandwiched by a layer of plywood on both sides, which are fastened to vertical columns with steel straps and lag screws. The result is a strong, stiff frame with excellent ductility characteristics that enable the frame to absorb seismic energy. This manner of multi-storey moment frame construction is believed to be a first in North America, and possibly the world.

Fast + Epp also developed clean connections for all exposed structure, especially in the atrium space, which features long-span stairs constructed with cranked timber stringers – yet another unusual structural application, rarely, if ever seen. Considerable thought was put into developing a connection at the intermediate landing/crank location that would result in a seamless visual continuation of the stringer.

Despite the demanding technical aspects of the project, engineers were careful to never overlook aesthetic details that ensured an elegantly exposed structure, as per architectural intent. Additionally, structural sustainability was achieved in a cost-effective manner. Engineers used material resources with low-embodied energy, a minimal carbon footprint, sequestration capability, local availability, and future demountability. They "made more with less," exposing structure in an aesthetically-pleasing manner rather than adding non-structural materials, such as drywall, to achieve artistic goals. Their efforts maximize occupant comfort and supported design goals to maximize daylight and a warm ambience. By using staple products of the local forest industry and developing simple, easy-to-construct-and-erect floor and spandrel panels, the all-wood scheme became a viable alternative to the typically insurmountable concrete and steel options.

Figure 1 – Exterior view of the Centre at UBC. *Photo credit: Perkins + Will Canada*

Figure 2 – Crews construct the timber moment frame. *Photo credit: Stephan Pasche*

Figure 3 – Completion of moment frame construction. *Photo credit: Stephan Pasche*

Figure 4 – Auditorium features exposed glulam and solid wood roof. *Credit: Perkins + Will Canada*

Figure 5 – Office bar exposed structure and partition walls. *Photo credit: Perkins + Will Canada*

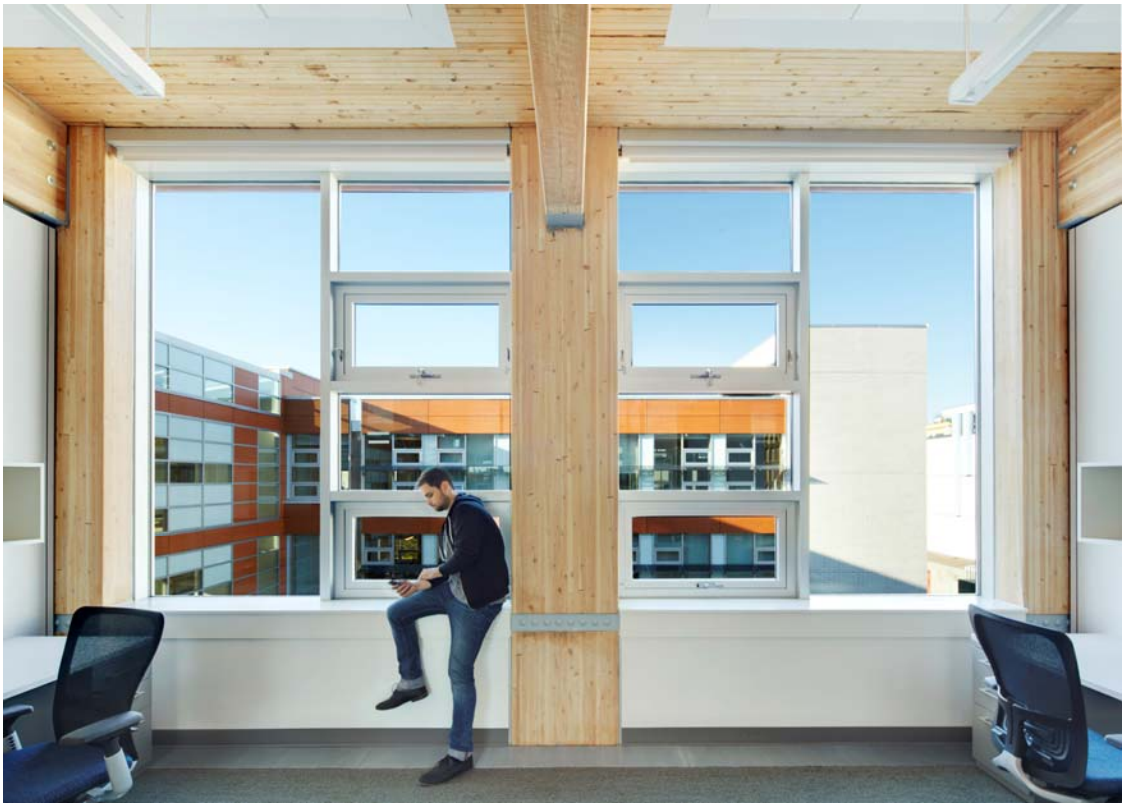

Figure 6 – Moment frame steel strap is exposed on the interior. *Credit: Perkins + Will Canada*

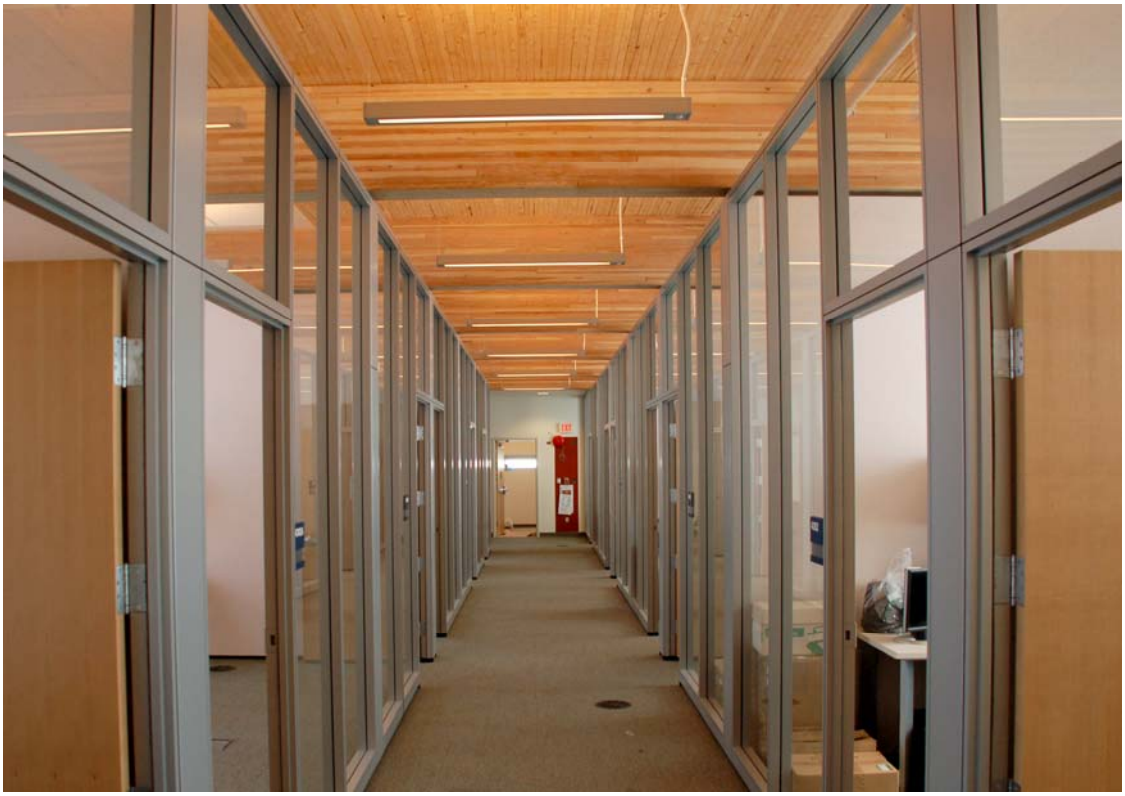

Figure 7 – Repetition of structural bays allowed for prefabrication and quick erection, resulting In a cost-effective design. *Photo credit: Stephan Pasche*

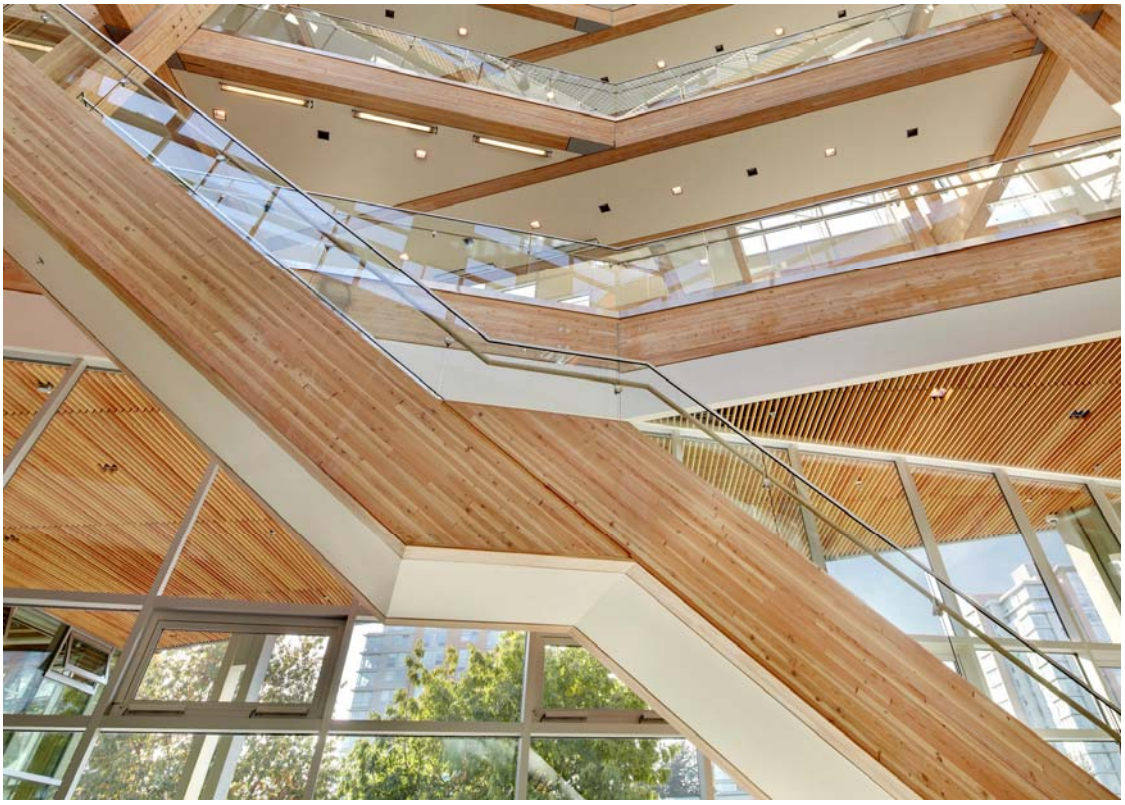

Figure 8 – Hidden moment connection in feature stair stringers. *Credit: Perkins + Will Canada*

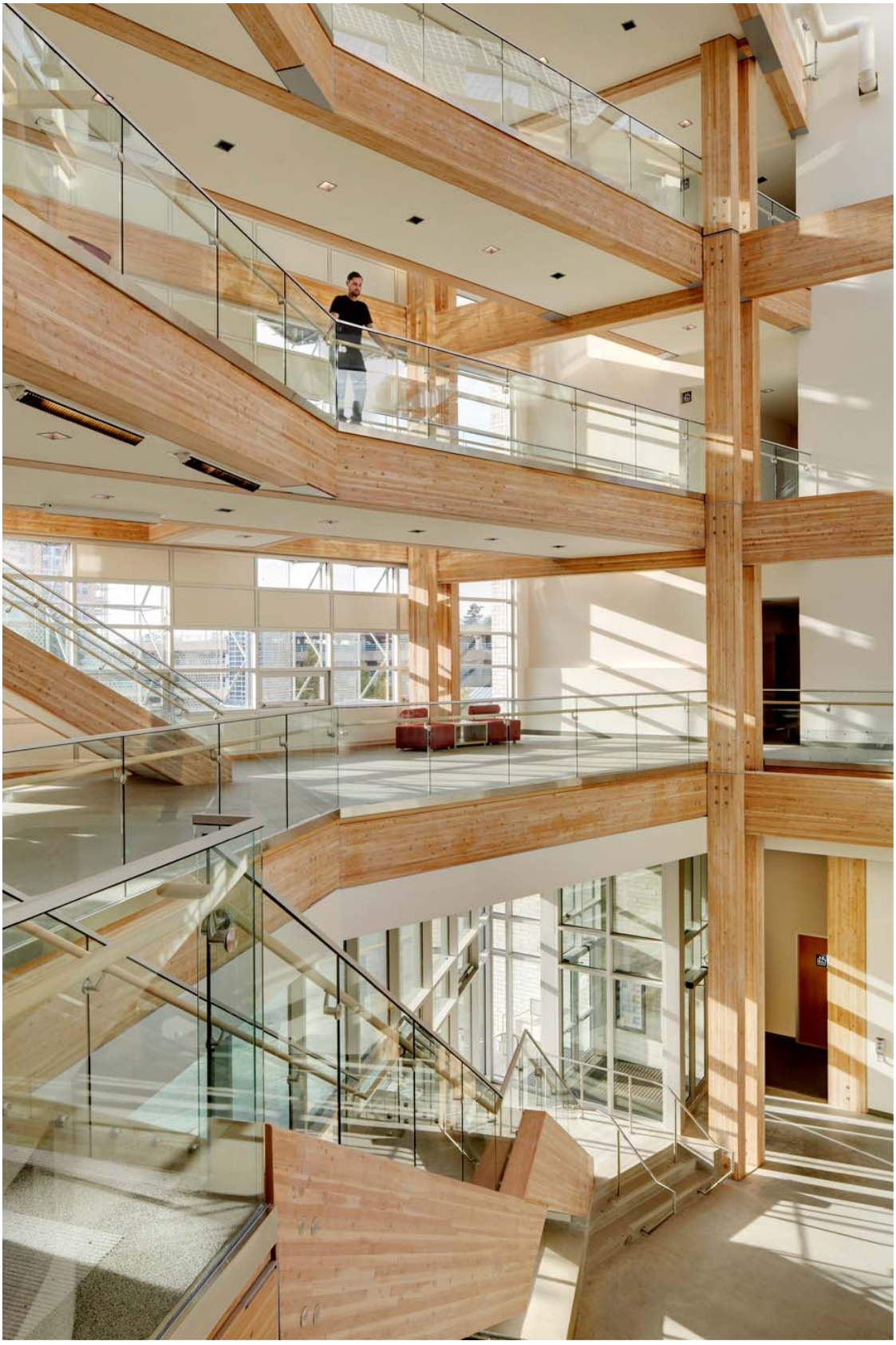

Figure 9 – Exposed glulam was featured throughout the building and atrium to add to the overall sustainability and warm aesthetic appeal of the project. *Photo Credit: Perkins + Will Canada*

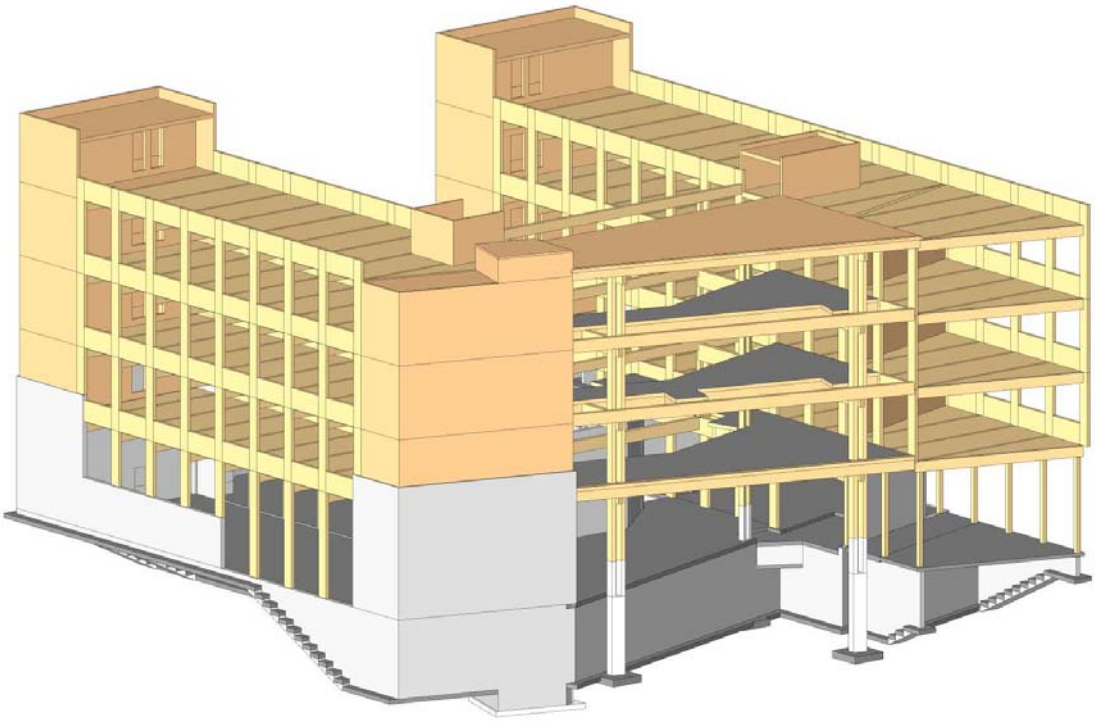

Figure 10 – Three-dimensional model of CIRS shows timber moment frames. *Credit: Fast + Epp*

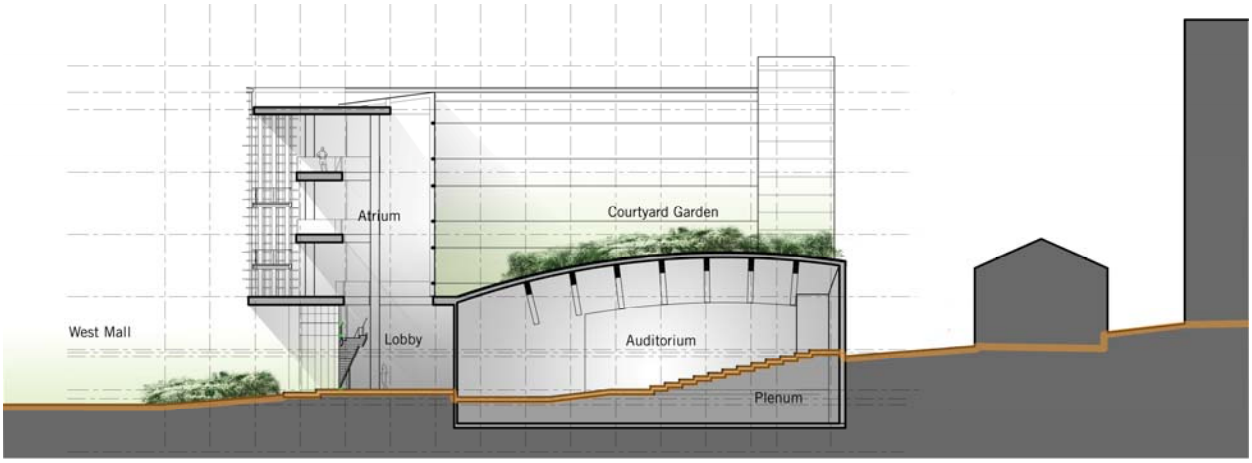


Figure 11 – Cross-section of atrium, auditorium and green roof. *Credit:Perkins + Will Canada*