

JACOBSON HALL - TRINITY WESTERN UNIVERSITY STUDENT HOUSING

LOCATION
Langley, British Columbia

SIZE
5,145 m²

STOREYS
Five

COMPLETION
August 2018

ARCHITECT
BR2 Engineering

STRUCTURAL ENGINEER
Canstruct Engineering

GENERAL CONTRACTOR
Metric Modular

GLULAM SUPPLIER
Structurlam Products Ltd.

PROJECT OWNER
Trinity Western University

BUILDING TYPE
Modular

PROJECT OVERVIEW

Enrollment has been steadily growing at Trinity Western University (TWU), a private Christian liberal arts university in Langley, but they only had on-campus housing available for less than 25 percent of their 4,000 students. TWU built a wood-framed modular student housing complex that was the tallest of its kind in Canada at the time it was constructed in 2018. Jacobson Hall was built in just nine months, adding beds for another 220 students.

Modular construction brought several advantages to the TWU campus, including a faster schedule, more predictable construction costs, improved quality control, reduced site impact and greater construction efficiency. Wood-framed modular construction also provided TWU with improved energy efficiency and noise control, since both the space between the modules as well as the walls, floors and ceilings of the modules themselves

were insulated. Services such as sprinkler systems and plumbing were pre-installed, as well as all fixtures, electrical and flooring. When the modules were lifted into place, the units contained beds, desks and even the mattresses.

This was the first five-storey modular project built in Canada, and wood easily met the higher seismic, wind, and structural performance requirements. For example, designers tightened wall stud spacing on the bottom two floors and used select Douglas fir dimension lumber, dried to a lower moisture content than typical to minimize framing impacts from shrinking and swelling. For seismic, they installed Anchor Tiedown System (ATS) rods that ran from the concrete foundation up between the modules to tie the entire building to the foundation; they also increased the number and length of seismic straps and installed them with a heavier nailing pattern.



Photo courtesy of Metric Modular

“One of our goals is to provide attractive, comfortable and affordable housing that will foster an environment to promote the success of our students. This new residence helps to accomplish that.”

Scott Fehrenbacher

Senior Vice President, External Relations, Trinity Western University

WOOD USE

Jacobson Hall was framed completely with wood, and contained 90 modules; all were 3.7 metres wide, but lengths varied from 9.8 to 18.9 metres. Cross-laminated timber (CLT) was used to frame the elevator shaft; modules then connected to either side of the CLT structure.

They chose 2x12 floor joists, spaced 16-inches on centre, for the floors of the bottom modules to accommodate thicker insulation (R40) against the slab. Floors on the upper modules used 2x10 dimension lumber, some were doubled for loading.

The roof structures of the lower modules were framed using 2x6 dimension lumber at 16-inches on centre while modules on the fifth storey used 2x12 roof joists to allow for more insulation and to accommodate the tapered roof, slanted for drainage. Wall framing also varied by floor, from 2x4s to double 2x6s, since they needed more structural capacity on the lower levels. Glue-laminated timber (glulam) beams frame openings and common areas

in each of the suites, and floors were covered in both plywood sheathing and underlayment to accommodate any type of finish.

Each of TWU’s 90 modules took about 14 days to complete, a process Metric Modular says is approximately 50 percent faster than conventional construction. Once each unit was assembled, it was shipped by truck to TWU’s campus and craned into place. Requiring five to 10 workers on site at any given time during craning, it took just 11 days to construct the first three floors.

Timing was a key consideration in this project. Metric Modular was awarded the project in December 2017. They started building the modules in their Agassiz, B.C. factory in mid-March; began delivering completed modules and started craning them into place in late May, and all modules were in place by mid-July. Students moved into their new residence hall in September 2018, just in time for school.



Photo courtesy of Metric Modular

ESTIMATED ENVIRONMENTAL IMPACT OF WOOD USE

<p>V Volume of wood products used: 2,376 cubic meters</p>	<p>GHG EMISSIONS ARE EQUIVALENT TO:</p>
<p>T U.S. and Canadian forests grow this much wood in: 6 minutes</p>	<p>1300 cars off the road for a year</p>
<p>C Carbon stored in the wood: 1968 metric tons of CO₂</p>	<p>Energy to operate 650 homes for a year</p>
<p>CO₂ Avoided greenhouse gas emissions: 4183 metric tons of CO₂</p>	<p><small>*Estimated by the Wood Carbon Calculator for Buildings, cwc.ca/carboncalculator.</small></p>
<p>✓ Total potential carbon benefit: 6151 metric tons of CO₂</p>	<p><small>*CO₂ refers to CO₂ equivalent.</small></p>

FOR MORE INFORMATION

This profile is published by Forestry Innovation Investment, the Government of British Columbia’s market development agency for forest products.

For more examples of innovative wood building projects throughout British Columbia, visit:

naturallywood.com

The wood grain featured in this profile is lodgepole pine.