

WOOD INNOVATION RESEARCH LAB

LOCATION
Prince George, BC

SIZE
1,070 m²

COMPLETION
March 2018

ARCHITECTS
Stantec

TRUSS MANUFACTURER
Winton Homes Ltd.

STRUCTURAL ENGINEER
Aspect Structural Engineers

GENERAL CONTRACTOR
IDL Projects Inc.

WOOD SUPPLIER/FABRICATOR
Western Archrib

PROJECT PARTNERS
Government of Canada,
Province of B.C., City of Prince
George, University of Northern B.C.

PROJECT OVERVIEW

The Wood Innovation Research Lab (WIRL) at the University of Northern British Columbia (UNBC) gives students and researchers much needed space to test state-of-the-art building systems. The WIRL provides an opportunity to study ways to integrate wood into more structural designs for industrial buildings.

The research facility was built using some of the same innovative wood building products and systems that students learn about in the lab. The building is located adjacent to the Wood Innovation and Design Centre, which houses UNBC's Master of Engineering in Integrated Wood Design program.

The WIRL is noteworthy in that it is the first industrial building in North America certified to rigorous Passive House energy standards. Certified Passive House buildings use up to 90 per cent less energy for heating and cooling and up to

70 per cent less energy overall compared with standard buildings. WIRL's achievement of Passive House standard is particularly remarkable given the large volume-to-floor-area ratio of the structure and the cold climate of its location in northern British Columbia.

The project team integrated strong floor and wall structures to accommodate heavy testing equipment; they also designed a superstructure which supports the roof and the overhead crane used to maneuver heavy materials. All building structural systems were constructed of wood.

The WIRL is a showcase for innovative wood construction and pioneers the application of wood with high performance design standards in industrial buildings.



Rendering courtesy of Stantec

“This building has caught the attention of Passive House researchers around the world because it demonstrates how an industrial structure, constructed with wood, in a northern climate exceeds a rigorous, internationally recognized energy efficiency standard.”

**Dr. Guido Wimmers, Chair/Associate Professor,
Engineering Graduate Program, UNBC**

WOOD USE

The WIRL is a single-storey mass timber structure, composed of glue laminated timber (glulam) columns and beams on a concrete raft slab foundation. The building is 10-metres in height and consists of high-head lab space, classrooms and office space.

Instead of using standard wood studs, the 10-metre tall wall panels are framed with prefabricated 0.5-metre thick upright wood trusses. The walls are insulated with mineral wool specifically designed to achieve the high thermal performance required for Passive House certification. The trusses were fabricated by a Prince George-based company using dimension lumber from a local sawmill. Designers also used I-joists for the second-level floors. Sheet goods used to sheathe the floors, roof and wall assemblies were left exposed to provide the interior finish for the lab portion of the building.

Researchers conducted a comparative Life Cycle Assessment on the WIRL so that the team could quantify the relative impact of the wood material selection compared to the impact of the operational energy of the building. By lowering the operating energy requirements through Passive House design, global warming impact of the WIRL structure was reduced by 70 per cent, primarily due to the reduction in energy used for heating.

Renewable biogas is used to heat the 1,070 square-metre structure. Due to the high performance of the Passive House design and wood use in the structure, the low heating requirement for the building is similar to that of a typical family home. The decision to use wood, when considering the environmental impact from materials alone, showed a 22 per cent improvement over steel due to wood’s lower carbon footprint and ability to sequester carbon.



Construction of the WIRL in Prince George, B.C.
Photos courtesy of UNBC

ESTIMATED ENVIRONMENTAL IMPACT OF WOOD USE

V	Volume of wood products used: 165 cubic meters	GHG EMISSIONS ARE EQUIVALENT TO:
	U.S. and Canadian forests grow this much wood in: 27 seconds	
C	Carbon stored in the wood: 144 metric tons of CO2	95 cars off the road for a year
	Avoided greenhouse gas emissions: 307 metric tons of CO2	Energy to operate 48 homes for a year
	Total potential carbon benefit: 451 metric tons of CO2	<small>*Estimated by the Wood Carbon Calculator for Buildings, cwc.ca/carboncalculator. *CO2 refers to CO2 equivalent.</small>

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