

BROCK COMMONS PHASE 1

UNIVERSITY OF BRITISH COLUMBIA
VANCOUVER, B.C., CANADA

Brock Commons Phase 1 is an innovative tall wood student residence under construction at the University of British Columbia (UBC), scheduled to be finished in 2017. Once complete, Brock Commons will be one of the tallest mass timber hybrid structures of its kind in the world at 18 storeys in height.



HEIGHT

53 metres / 174 feet / 18 storeys

GROSS AREA

15,115 m² / 162,700 ft²

COMPLETION

August 2017

OWNER

University of British Columbia

ARCHITECT

Acton Ostry Architects Inc.

TALL WOOD ADVISOR

Architekten Hermann Kaufmann
ZT GmbH

STRUCTURAL ENGINEER

Fast+Epp

FIRE SCIENCE | BUILDING CODE

GHl Consultants Ltd.

BUILDING SCIENCE

RDH Building Science

**MECHANICAL |
ELECTRICAL | SUSTAINABILITY**

Stantec

CONSTRUCTION MANAGEMENT

Urban One Builders

PROJECT MANAGEMENT

UBC Properties Trust

CLT AND GLULAM MANUFACTURER

Structurlam Products

WOOD INSTALLER

Seagate Structures

PROJECT OVERVIEW

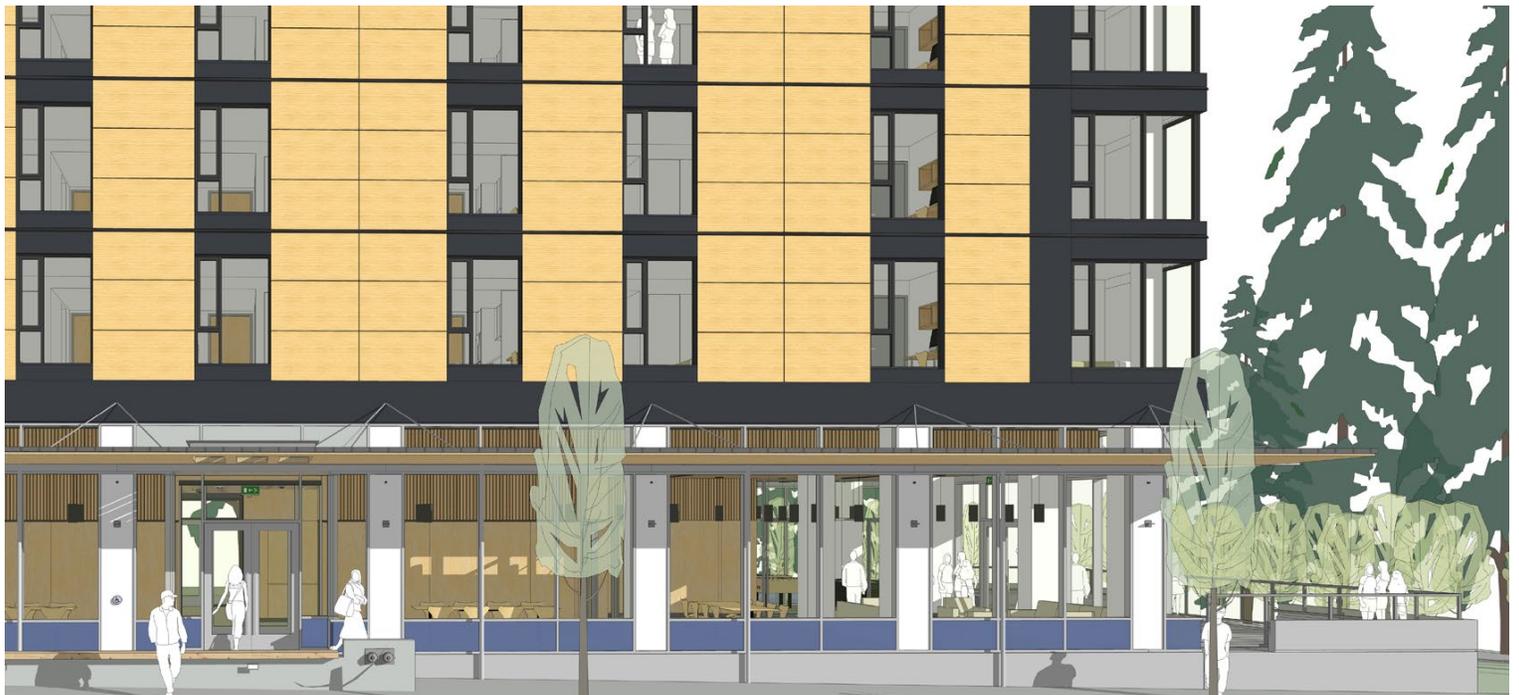
Brock Commons Phase 1 is a new 18-storey mass timber hybrid residence being built at the University of British Columbia (UBC).

As part of UBC's mandate to increase student housing on campus, Brock Commons will have capacity for just over 400 upper year and graduate students. Each unit will contain a kitchen and bathroom, with floorplans ranging from single bed studios to 4-bed accommodations.

Study and social spaces will be located on the ground floor with a student lounge on the 18th floor, where the wood structure will be left exposed for demonstration and educational purposes.

UBC's building requirements reflect the university's commitment to sustainability. Wood, a renewable material, was chosen in part to reflect this commitment, and the building was also designed to meet Leadership in Energy and Environmental Design (LEED) Gold certification.

The project will be a living laboratory in which UBC faculty and grad students, as well as architecture, engineering and forestry practitioners, can collaborate with UBC operational staff and industry partners on the design, development, and construction of tall wood buildings.



Rendering courtesy of the University of British Columbia and Acton Ostry Architects Inc.

“This beautiful, new tall wood building will serve as a living laboratory for the UBC community. It will advance the university’s reputation as a hub of sustainable and innovative design, and provide our students with much-needed on-campus housing.”

**Martha Piper, Interim President,
University of British Columbia**

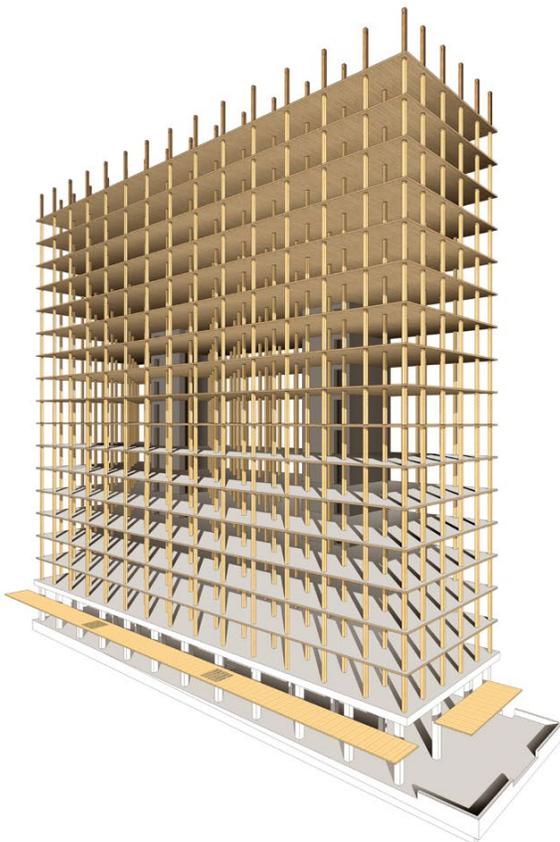
BUILDING AND STRUCTURE

Brock Commons will be a hybrid structure, comprised of 17 storeys of mass timber construction above one storey of concrete and two concrete stair cores serving all floors. The podium level will be wrapped with curtain wall glazing and glass spandrel panels. An extensive cross laminated timber (CLT) canopy will run the length of the building.

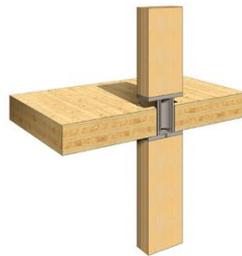
The floor structure will be comprised of 5-ply CLT panels supported on glue laminated timber (glulam) columns on a 2.85 X 4.0 metre grid. This results in the CLT panels

acting as a two-way slab diaphragm, which eliminates the need for load-carrying beams. To avoid a vertical load transfer through the CLT panels, a steel connector allows for a direct load transfer between the columns and also provides a bearing surface for the CLT panels.

The roof will be made of prefabricated sections of steel beams and metal decking, with the roofing membrane pre-applied to achieve quick water tightness during construction. The building envelope is a prefabricated panel system clad with wood fibre high-pressure laminate.



hybrid mass timber structure and concrete core



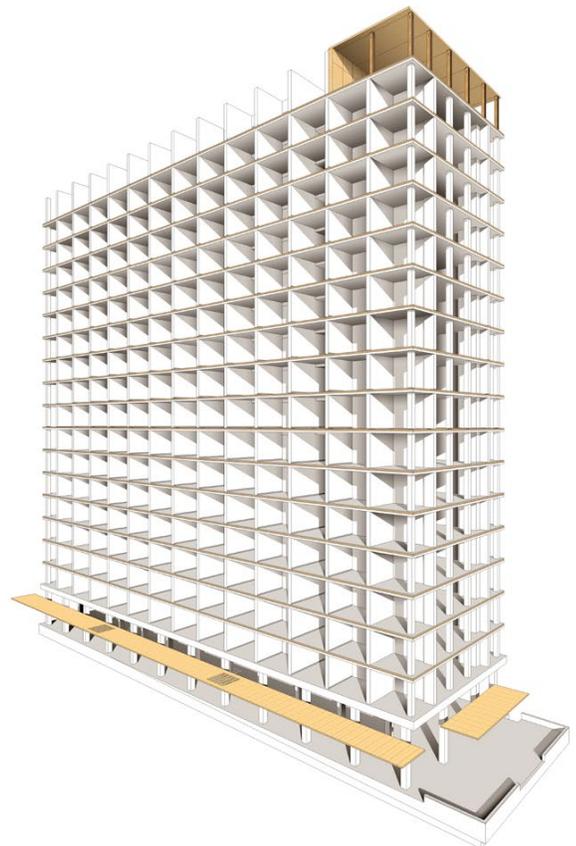
CLT floor slabs with glulam columns and steel connectors



partial encapsulation during construction



completed construction



encapsulated structure

BRITISH COLUMBIA WOOD. SUSTAINABLE BY NATURE. INNOVATIVE BY DESIGN.

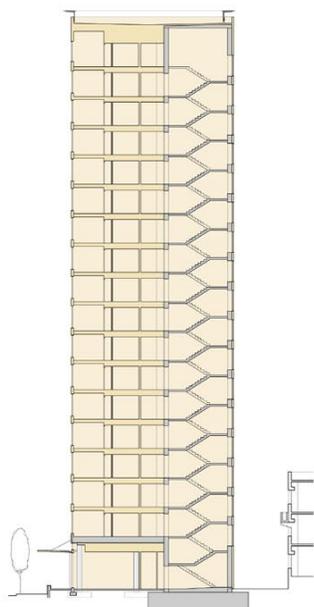
SAFETY AND PERFORMANCE

The fire safety design of Brock Commons underwent a peer-review process involving a panel of leading fire safety experts, scientists, authorities having jurisdiction and firefighters.

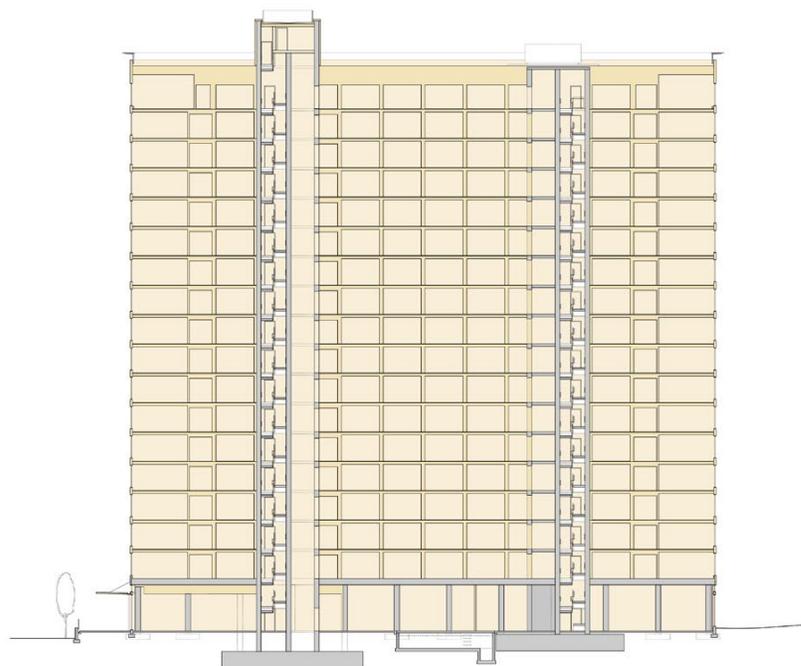
The building is comprised of a series of repetitive, highly compartmentalized small rooms so that in the event a fire originates in one suite, it is extremely likely the fire would be contained in the compartment in which it originated. A back-up water supply and emergency power supply will be installed so the sprinkler system will function even if the building loses its standard water and electrical supply.

In a fire, heavy timber chars on the outside, while retaining strength, slowing combustion and allowing time to evacuate the building. Brock Commons has been designed to meet the one and two hour fire ratings required for this type of building, exceeding fire and seismic standards for a concrete or steel structure.

The CLT and glulam components used in the project have been enhanced through complete encapsulation, with three to four layers of fire-rated Type X gypsum board, dependent on location.



lateral section



longitudinal section

“A key achievement for the Brock Commons Phase 1 project is the design of an innovative mass timber structural system that is genuinely economically viable, repeatable and adaptable to other building typologies and uses. This project will positively impact the wood, development and building industries in British Columbia.”

Russell Acton, Principal, Acton Ostry Architects Inc.

CANADIAN WOOD PRODUCTS

The use of a hybrid mass timber and concrete structure was explored by the design team to assess the technical and economic viability for the project. Comprehensive analysis showed the additional cost for research, design and construction of this first of its kind building to have an “innovation premium” of approximately eight percent.

The cost differential is anticipated to decline as mass timber high rise design and construction practices become more established. External funding sources for the project fully cover the additional cost for innovation, and ensure that rental rates for suites in Brock Commons will be equivalent to other student residences of similar suite type and size on campus.

CLT

CLT is a wood panel typically consisting of three, five, or seven layers of dimension lumber oriented at right angles to one another and then glued to form structural panels with exceptional strength, dimensional stability, and rigidity.



GLULAM

Glulam is composed of dimension lumber, specifically selected and positioned based on performance characteristics, and then bonded together with durable, moisture-resistant adhesives. The grain of all laminations runs parallel with the length of the beam.



BENEFITS OF HYBRID CONSTRUCTION

Using the combination of mass timber, concrete and steel provides a cost-effective and sustainable solution to construction challenges, as well as options to improve building performance and design.

There are a variety of benefits associated with using mass timber- concrete-steel hybrid systems, including:

- The construction of a lighter building, particularly advantageous in poor soil condition sites
- Creating opportunities to exemplify wood products as design solutions
- Utilizing prefabricated elements that reduce costs and speed up construction
- The ability to incorporate long, unsupported span distances into the design
- Using wood to increase the strength to weight ratio for the building as a whole



Photo courtesy of naturally.wood

BUILDING WITH WOOD

Aside from providing much needed student residence spaces, Brock Commons will showcase the use of wood as a practical building material in a high-rise application and demonstrate the university's commitment to sustainability.

The choice of products and systems used to construct, renovate and operate buildings has a significant impact on the environment. When specifying any materials, it is important to consider their life cycle environmental impact. Wood products have less embodied energy, are responsible for lower air and water pollution, and have a lighter carbon footprint than other commonly used building materials.

Trees that are sustainably harvested and manufactured into forest products continue to store much of the carbon. By using wood in buildings, this carbon is kept out of the atmosphere for the lifetime of the structure—or longer if the wood is reclaimed and repurposed, such as in the manufacture of other wood products.

Tall wood structures, built with renewable wood products from responsibly managed forests — like those in British Columbia and Canada — can help transform a construction industry that is increasingly focused on accelerating the adoption of more sustainable practices in the built environment.



ESTIMATED ENVIRONMENTAL IMPACT OF WOOD USE



Volume of wood products used:
2,233 cubic meters of CLT and Glulam



U.S. and Canadian forests grow this much wood in:
6 minutes



Carbon stored in the wood:
1,753 metric tons of CO₂



Avoided greenhouse gas emissions:
679 metric tons of CO₂



Total potential carbon benefit:
2,432 metric tons of CO₂

THE ABOVE GHG EMISSIONS ARE EQUIVALENT TO:



511 cars off the road for a year



Energy to operate a home for 222 years

**Estimated by the Wood Carbon Calculator for Buildings, based on research by Sathre, R. and J. O'Connor, 2010, A Synthesis of Research on Wood Products and Greenhouse Gas Impacts, FPInnovations (this relates to carbon stored and avoided GHG).*

**CO₂ in this case study refers to CO₂ equivalent*

ABOUT TALL WOOD BUILDINGS

Modern mass timber products and systems such as glulam, CLT and structural composite lumber, allow us to construct taller and larger wood buildings. Over the past 10 years, over 28 tall wood buildings (seven storeys and taller) have been built around the world.

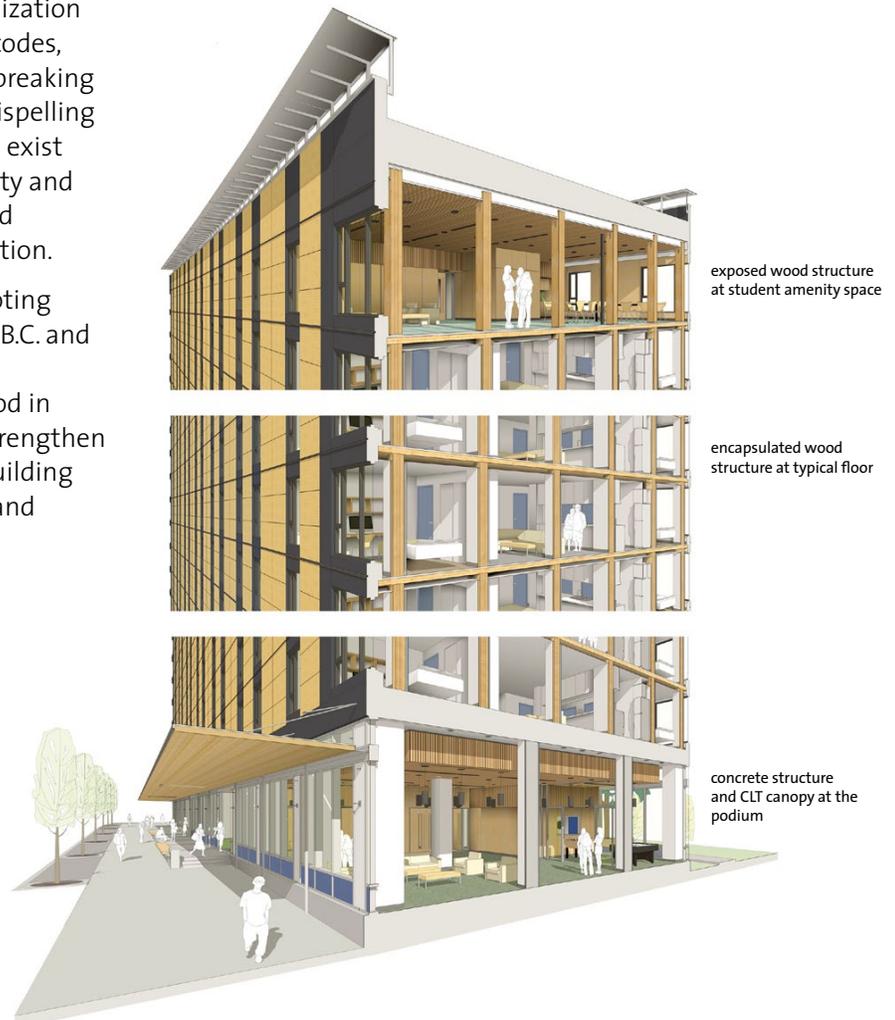
Wood is increasingly being recognized by the construction sector as an important, innovative and safe construction choice. The reduced carbon footprint and embodied energy of tall wood buildings plays an important role in sustainable development and climate change mitigation.

Advancements in wood product research and development, coupled with the ongoing modernization of building and fire codes, contribute towards breaking down barriers and dispelling misconceptions that exist regarding the capacity and performance of wood products in construction.

Adopting and promoting these approaches in B.C. and encouraging the consideration of wood in buildings helps to strengthen the B.C. forest and building sectors both locally and internationally.

“As the tallest wood building in Canada, this project will serve as taking wood construction to new heights – resulting in innovative solutions that are safe, sustainable and viable.”

Michael Giroux, President, Canadian Wood Council



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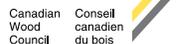
Photo courtesy of naturally:wood

WOOD PRODUCTS AND SUSTAINABLE FORESTS

Canada is recognized as a global leader in sustainable forest management and has more land independently certified to international forest certification programs than any other jurisdiction in the world.

Certification gives added assurance that Canadian forest products are from legal, sustainable sources and are managed to consider environmental, social and economic values.

The range of engineered and mass timber products from Canada offer incredible design versatility and high-performance options for any building project, residential or commercial. B.C. is a leader in wood building systems and technologies, with projects showcased across the province. Many are garnering international attention, creating new market opportunities for B.C. wood products and building technologies.



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 information on B.C. forests and products, and innovative use of wood in buildings, visit www.naturallywood.com.

For more information on building with wood in Canada and the National Building Code visit www.cwc.ca.

For more information on mass timber and tall wood buildings in North America and around the world, visit www.rethinkwood.com/tall-wood-mass-timber.

naturallywood.com