

SIX-STOREY WOOD CONSTRUCTION IN BRITISH COLUMBIA

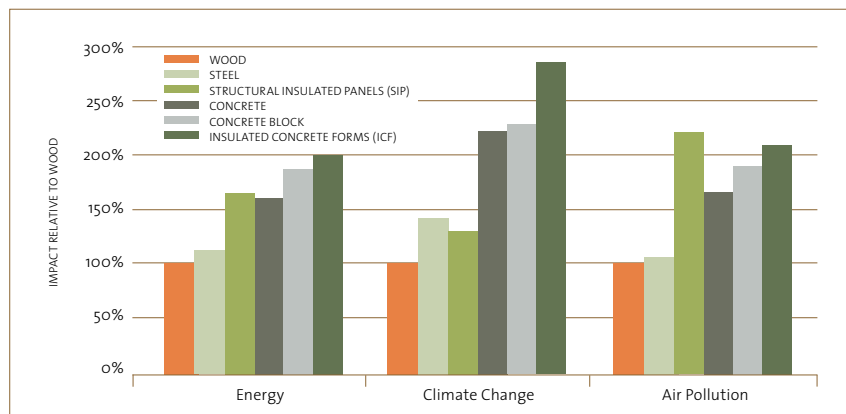


In the past two years the government of British Columbia, Canada has implemented new policies designed to reduce the overall carbon footprint and environmental impact of construction projects in both the public and private sector. The measures include:

- The Wood First Act, which requires that wood be considered as the primary structural material for all provincially funded projects.
- New legislation that increases the allowable height of wood frame residential buildings from four to six storeys.

As a result of these changes, there are currently almost 50 mid-rise wood frame projects underway in British Columbia.

Embodied environmental impacts of various exterior wall assemblies



CARBON REDUCTION

- Wood has the lowest embodied energy of any major construction material and substituting it for concrete or steel reduces the carbon footprint of a building.
- Growing trees absorb and store carbon from the atmosphere. When converted to durable building products, wood becomes a long-term carbon storage system.

ENERGY EFFICIENCY

Wood frame construction is easy to insulate using a variety of materials laid in the cavities between the studs and rafters. The building envelope can be sealed against air leakage. Continuously-operating heat recovery ventilators can be installed to recover energy from waste heat.



SEISMIC PERFORMANCE

A full size prototype of a six-storey wood frame building successfully passed a seismic ‘shake table’ test conducted in front of 400 international observers in Miki City, Japan in 2009.

- Subjected to seismic forces greater than those of the 1995 Kobe and 2001 Seattle earthquakes, for a period of 40 seconds, the structure suffered no visible damage.
- The prototype was built using British Columbia forest products and incorporated construction techniques commonly used in Canada.

STRENGTH AND DURABILITY

Although it is a more recent development in British Columbia, high-rise wood frame construction has a long and successful track record in many parts of the world. While it requires careful design, fabrication and erection, six-storey construction has proven effective in jurisdictions including the United States, Norway and the United Kingdom. Particular attention must be paid to:

- Preventing the deflection of the structure due to wind or seismic forces.
- Limiting the overall shrinkage of building components, and making provision for any shrinkage that does occur.

Strategies may vary from project to project. Specific examples are given under “Library Square” on the opposite page.

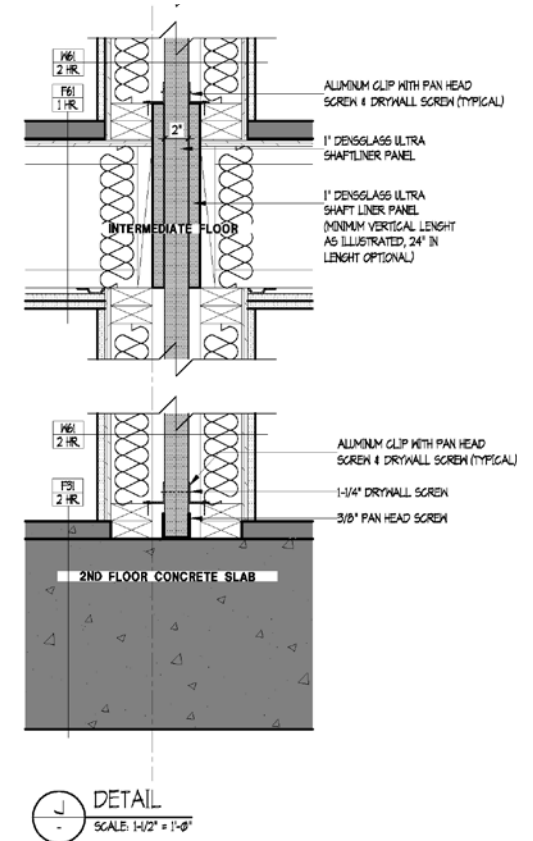
FIRE SAFETY

Wood frame has been the most widely used construction method for residential buildings in British Columbia for more than 100 years. Building codes include provisions for wood frame construction that make it equivalent to other construction methods in terms of fire and life safety. The most common provisions are:

- Sub-division of larger buildings into smaller compartments using horizontal or vertical fire separations.
- Provision of sprinkler systems to suppress any fire that may start, and prevent it from spreading through the building.



Top photo, seismic test conducted in Miki City, Japan in 2009. The prototype was built using BC forest products and incorporated construction techniques commonly used in Canada. Bottom photo, detail of column meeting ceiling rafter, Kamloops Library Square project.



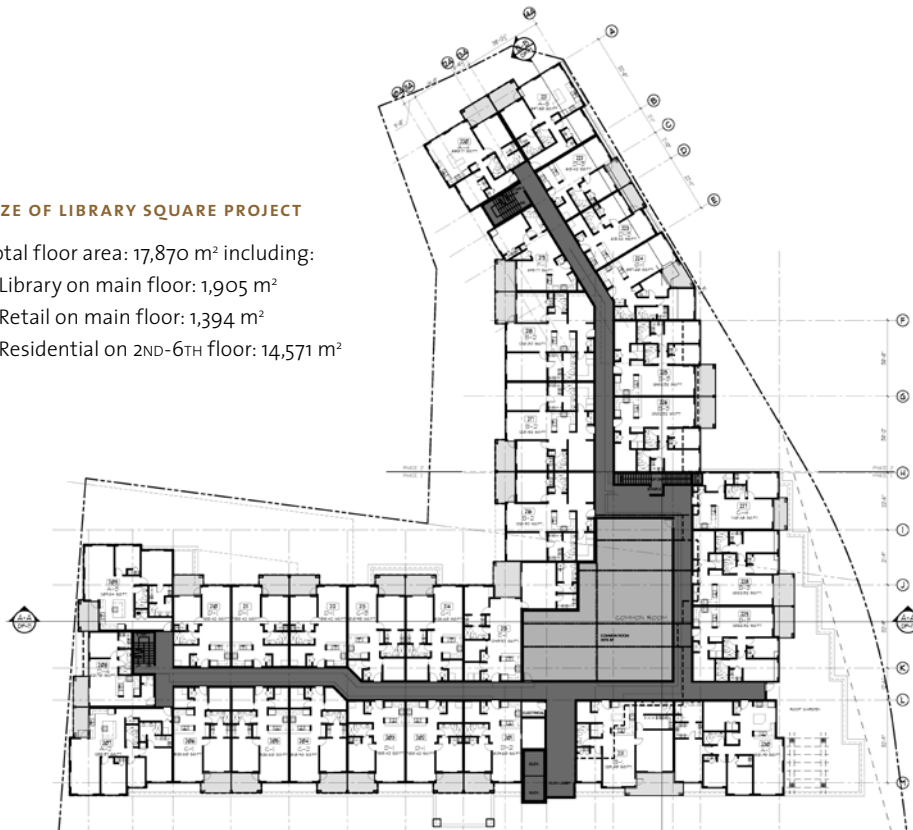
Details of firewall construction, Kamloops Library Square project.



SIZE OF LIBRARY SQUARE PROJECT

Total floor area: 17,870 m² including:

- Library on main floor: 1,905 m²
- Retail on main floor: 1,394 m²
- Residential on 2ND-6TH floor: 14,571 m²



Second floor residential plan, Library Square project, Kamloops, BC.

LIBRARY SQUARE

Under construction in the city of Kamloops, British Columbia, Library Square is a six-storey mixed use development, which includes five storeys' of wood frame residential accommodation on top of a concrete podium that houses a library and retail uses.

Comprising more than 150 apartments, the residential component is separated horizontally from the retail uses by a concrete slab, and vertically into three components by wood frame and drywall fire separations. The stairwells and elevator shafts also act as fire separations and are built in wood frame construction.

With all parts of the building above the ground floor constructed using wood frame, the potential problem of differential movement between different materials is eliminated. To minimize the negative effects of cross-grain shrinkage, the floors are framed using engineered wood I-joists rather than solid sawn lumber. To resist deflection under wind and seismic loads, the building is tied together vertically with a series of proprietary steel tie rods that spread the horizontal forces evenly across all five wood floors of the building.

This project was originally conceived as a concrete building, but was put on hold due to the projected cost. The change in legislation that made it possible to construct in wood frame reduced the price sufficiently to allow the project to proceed.



WOOD, DEFORESTATION AND SUSTAINABLE FOREST MANAGEMENT

According to the United Nations Food and Agriculture Organization's 2001 *Report on the State of the World's Forests*, Canada has retained over 90% of its original forest cover, and the total forested area actually increased over the preceding decade.

The Nobel Prize-winning Intergovernmental Panel on Climate Change concluded that “a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber fibre or energy from the forest, will generate the largest sustained (climate change) mitigation benefit.”

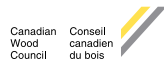
Third-party certification of sustainable forest management practices provides buyers with assurance that the wood products they use do

not contribute to deforestation. British Columbia is a leader in forest management through stringent forest policies and innovative forest practices, and has more certified land than any other jurisdiction in the world, with the exception of Canada as a whole.

These globally-accepted standards are all used in British Columbia and Canada to demonstrate and help promote the sustainability of forest management practices to markets around the world:

- Canadian Standards Association's Sustainable Forest Management Standards (CSA)—(endorsed by the Programme for the Endorsement of Forest Certification),
- Forest Stewardship Council—FSC, and
- Sustainable Forestry Initiative—SFI (endorsed by the Programme for the Endorsement of Forest Certification).

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