

CANADA'S EARTH TOWER

DEMONSTRATING THE BENEFITS OF MASS TIMBER

A 37-storey wooden skyscraper, named Canada's Earth Tower, could set a new precedent for sustainable building in the development industry, according to Vancouver-based Delta Land Development. Architecture firm Perkins and Will chose mass timber as the primary structure for this aspirational mixed-used high-rise given its environmental benefits and low carbon footprint. The building's energy efficiency and abundant use of timber will significantly reduce CO₂ emissions while showcasing the option for more climate-friendly, high-density urban living—an ambition the developer is making central to the project to be located in Vancouver at 8th and Pine Street.



PROJECT OVERVIEW

A benchmark-setting tall wood development

Conceived as a landmark timber tower demonstrating cutting-edge, sustainable construction and design, Canada's Earth Tower is set to become a benchmark-setting development. The contemplated project would not only become the tallest wood high rise of its kind, but also serve as an urban centerpiece to Vancouver's Central Broadway corridor.

The mixed-use development combines street level retail with five storeys of offices, topped with 32 storeys of two- and three-bedroom homes. At least 20 percent of residences is set aside for non-market housing, such as rental or co-housing. The building will be situated on a horseshoe-shaped base, landscaped and sited so that it is publicly accessible for neighbourhood use. The structure will use parts of the existing building's concrete foundation, combined with a new concrete core and mass timber building system.

LOCATION

Vancouver, British Columbia

SIZE

33,450 m²

DEVELOPER

Delta Land Development

ARCHITECT

Perkins and Will

STRUCTURAL ENGINEER

StructureCraft Builders Inc. (mass timber) and Glotman Simpson (concrete)

GENERAL CONTRACTOR

Urban One Builders

TIMBER SUPPLY AND INSTALLATION

StructureCraft Builders Inc.

“While the project is still in the preliminary planning stage, it is designed to change perceptions and demonstrate what’s possible with tall wood construction and design. Our goal is really simple: we hope for a call of courage from the city, from us, and other developers to change the way now on how we do things. We don’t have an unlimited time with the climate emergency we face.”

Bruce Langereis, President, Delta Land Development



Tower's horseshoe-shaped base invites the public with a native landscape. Rendering courtesy: Perkins and Will

STRUCTURE+DESIGN

A fire safe hybrid mass timber design

Expansive use of mass timber panels, supported by glulam columns, comprise the floor plates of the timber tower. In some instances, the structure will be left exposed to form stunning, expansive spaces wrapped in the natural warmth of wood, a unique benefit of tall timber construction. A composite technique, that combines mass timber with reinforced concrete cores for elevators and emergency staircases, provides lateral stability to the structure, along with added seismic and fire protection.

The design team is taking a performance-based approach to fire protection, using real-life testing and simulations. This will demonstrate that, in the event of a fire, the wood-hybrid design will retain its structural integrity and meet all code requirements. Extensive research to date has proven mass timber meets code and is fire safe. When exposed to fire, the outer layers of thick mass timber members char to provide natural protection against fire penetration.

Optimizing structural performance

The design team is working with engineers to optimize the beam-to-column and column-to-column connections for structural performance, cost effectiveness and construction speed. Materials, including concrete and wood, compress a certain amount when initially loaded, but at different rates, so the design will accommodate such variances.

Connections to nature and outdoor space

The Tower will incorporate interconnected winter gardens among the 32 storeys of housing. These outdoor terraces will be shared between three floors, providing opportunities for social interaction among residents and a chance to connect with nature. Inside, the design favours natural products, including using wood as both structure and finish whenever possible. This reflects a growing interest in biophilic design—the concept that being exposed to nature—and natural, organic materials—not only calms our mind, but can contribute to a sense of health and well-being.

PRODUCTS+SYSTEMS

Canada's Earth Tower will feature a hybrid building system, using two concrete cores with mass timber for the walls, floor slabs and columns, including glue-laminated (glulam) beams

and columns along with cross-laminated timber (CLT) and dowel-laminated (DLT) floor and wall panels.

Cross-laminated timber

This mass timber product is made by layering and gluing dimension lumber (usually three, five, or seven layers) at right angles to one another under pressure to form large structural panels. CLT is both strong and dimensionally stable, making it particularly effective for use as shear walls.



Dowel-laminated timber

DLT is another mass timber product that can be used for floor, wall and roof panels. It is made by fastening pre-milled boards together on edge with hardwood dowels, using a friction fit. The resulting panel configuration is particularly efficient for horizontal spans, and because it has no metal fasteners, it can be easily fabricated using CNC machinery.



Glue-laminated timber

This engineered wood product is made by bonding layers of dimension lumber together with durable adhesives to form larger members. The grain of the wood laminations runs parallel with the length of the member, forming a beam or column with predictable, reliable strength properties.



SUSTAINABILITY

Canada's Earth Tower is setting a new precedent for eco-friendly tall wood design. Wood's benefits as a sustainable building material, and the developer's desire to advance the industry by altering market perceptions, factored heavily in the architect's decision to choose mass timber over other structural materials for this high-rise project.

Low-carbon solution

The use of wood supports the developer's overall sustainability goals in several ways. Wood is a renewable resource and British Columbia is recognized as a global leader in sustainable forest management. Production of mass timber building components results in lower greenhouse gas emissions than other building products. And as an added benefit, carbon remains sequestered in the wood for as long as the wood components are in use. The building's proposed design would use an estimated 5,000 square metres of wood, generating a CO₂ savings of about 5,400 metric tonnes.

Emissions-free operation

The design team envisions an ecofriendly timber tower that does not require fossil fuel for its operations. The high rise would generate a portion of its own electricity through building-integrated photovoltaics, located on both the skin and the rooftop; they will also use a ground-source heat pump.

The design team is targeting three important sustainability benchmarks—Passive House, the Zero Carbon Building Pilot Program through the Canada Green Building Council, and the City of Vancouver's Zero Emissions Building Plan.



Interconnected winter gardens will be shared between three floors, encouraging interaction.

INNOVATION PARTNERS



Wood will be left exposed in the residences.



Office interior will feature a glulam ceiling.

Renderings courtesy: Perkins and Will

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 building with wood in Canada and the National Building Code visit cwc.ca.

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

naturallywood.com