

APA CASE STUDY

CLT, Glulam Deliver Strength, Low Profile, and Aesthetics for BC Office Building



The CLT roof system forms an angled overhang along the entry side of the office building.

When he set out to design his company's new headquarters building on Lakeshore Road in scenic Kelowna, British Columbia, Tim McLennan of Faction Projects knew quickly that cross-laminated timber (CLT) was an ideal material. Several of CLT's key attributes, including a slim profile, fire resistance ratings, ease of installation, and beauty, all contributed to the project's success.

Developed, designed, and built by Faction's integrated team, the 14,000-square-foot office building will also house leased tenants. The site backs up to Mission Creek and a greenway system in Kelowna's Mission neighborhood, home to resort developments and residential areas.

That setting drove McLennan's overall design direction. "We wanted to build in a way that didn't overwhelm the low-density neighborhood," he says. "We looked for opportunities to screen views and protect them."

The resulting three-story structure is respectful of its surroundings, with a low profile, yet modern in its angles and appearance; exposed wood and orange accents offer visual interest and a rustic nod to the Pacific Northwest architecture of the surrounding area.

Project Summary

PROJECT NAME:
3935 Lakeshore Road

LOCATION:
Kelowna, BC

TYPE:
Office Building

COMPLETED:
Summer 2014

ARCHITECT:
EIDOS Architecture

DEVELOPER:
Faction Projects

CONTRACTOR:
Braniff Construction

STRUCTURAL ENGINEER:
Bourcet Engineering

Engineered Wood's Central Role

To achieve the smaller scale without sacrificing profitable density, McLennan looked to the overall building layout and the structural materials themselves.

The building is framed with glulam post and beam, with CLT making up the floor and roof systems. Cross-laminated timber is a three-, five-, or seven-layer wood panel, with each layer oriented crosswise for increased dimensional stability and strength. As a result, CLT provides an unprecedented level of structural integrity, design flexibility, and cost-competitiveness.





The warmth of the exposed CLT and glulam was a key selling feature for new tenants.

For 3935 Lakeshore Road, the team used seven-ply CLT from Structurlam Products Ltd., Penticton, British Columbia, for the floor systems and five-ply CLT for the roof. Unlike the thicker floor build-up of a wood or steel joist system, the seven-layer panels are only 9-1/2 inches thick, similar to the thickness of concrete. This allowed the building to have a slightly smaller massing while still preserving high ceilings.

McLennan's team also managed space constraints by reining in non-leasable areas. For example, they used a scissor stair, which forgoes the typical landing layout for a floor-to-floor system in which two sets of adjacent egress stairs share the same footprint.

The decision to use a full post-and-beam wall structure, with glulam also manufactured by Structurlam, was driven by a previous CLT

project, in which a hybrid system of load-bearing walls and post and beam created alignment challenges with the CLT panels; forgoing the load-bearing walls eliminated those issues. The roughly 8-1/2-inch-square glulam columns are continuous for the height of the building—nearly 40 feet—a decision that cut down on the number of connections and allowed for more uniformity. In addition, the glulam offered predictable performance and uniformity versus solid-sawn lumber, as well as cost and supplier efficiencies for the project team.

For the roof system, the CLT panels extend beam to beam, eliminating any need for secondary structural supports that would interrupt open-concept offices.

On the exterior, CLT's cantilever capabilities add key façade features. On the east-facing side, 5-foot balconies serve as a sunscreen as well as a tenant amenity. On the west-facing side, an angled roof overhang, ranging from 10 feet to 5 feet, enhances the entryway while protecting it from the elements.

APA-member Structurlam produces and certifies its CLT product in accordance with ANSI Standard PRG-320 for Cross-Laminated Timber, the standard that provides requirements and test methods for qualification and quality assurance of CLT. The standard includes seven stress classes covering major wood species in North America.

Simplified Installation

Like other wood products, CLT provides a familiar material for contractors and eliminates much of the hassle related to cast-in-place concrete; panels arrive ready to install with traditional tools. McLennan estimates the entire frame was erected in about three weeks, significantly less than the time required for concrete. In addition, the panels are one-sixth the weight of concrete.

Simplifying installation even further, the architect designed the floor system in a 20-foot structural grid; since Structurlam's CLT is manufactured in 10-by-40-foot panels, this meant that very little of the 400-square-foot panels was wasted.

McLennan specified off-the-shelf Pitzl connectors from Germany, a fully concealed and shop-installed connector, to further streamline interior appearance. On-site installation is also more efficient, resulting in reduced crane and crew costs. All glulam and CLT panels were fabricated on CNC machines; the innovative connectors have very tight tolerances, which Structurlam accounted for when manufacturing the CLT panels and glulam beams and columns.

A layer of architectural-grade Douglas-fir on the exposed CLT serves as built-in finish for the ceilings, another key selling point; the glulam beams and columns, also exposed in most areas, coordinate perfectly. "That helped us with leasability," McLennan says. "They see it, and it's beautiful from floor to ceiling."

Indeed, from the visible to the invisible, cross-laminated timber and glulam provide ample advantages for the 3935 Lakeshore Road office building, with an ideal balance of cost, efficiency, design practicality, and aesthetics.

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