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A whole lot of cross-laminated timber • Daily Journal of Commerce



A cross-laminated timber building being constructed on North Mississippi Avenue will hold two levels of office space and a third-floor residence. (Courtesy of Waechter Architecture)

Ben Waechter, principal architect of **Waechter Architecture**, has long been attracted to **cross-laminated timber**. Soon it will dominate his firm's new headquarters in North Portland.

The new three-story, mixed-use building will feature **CLT** throughout – not only as floors and stairs, but even as shear walls.

“The one thing that we wanted to do with this was to build a CLT or mass-timber building completely out of the material,” Waechter said. “This will be the first 100 percent CLT project in Oregon to use structural wall panels using prescriptive code.”

Ground was broken recently on the 10,000-square-foot building at 4224 N. Mississippi Ave., in a trendy commercial area surrounded by shops, a Prost! pub and a food-cart pod. Waechter Architecture, a 12-architect practice, will occupy the bottom two floors. Waechter himself will live in a third-floor residence (he currently lives above the firm’s leased office on North Williams Avenue).

The project has been more than a decade in planning. Waechter’s family has owned the vacant property for years.

“We’ve been thinking about this project for a long time,” he said. “The land has been sitting there.”

KPFF is lending structural expertise to the project. Anne Monnier, a KPFF principal, said she has worked on several CLT projects, but never one with mass-timber shear walls.

“That’s exciting about this project,” she said. “It brings the CLT conversation to the next level.”

The most challenging aspect is tying the CLT structure into the foundation, Waechter said. “That’s technically and aesthetically a challenge,” he said. “In a seismic event, it transfers enormous forces to the foundation.”

The project has attracted close attention from regulators as the first building to submit to the city’s prescriptive code for CLT structures. The **Bureau of Development Services** at one point requested further structural analysis.

“We always look at what’s the weakest link in the building,” Monnier said.

BDS officials wanted assurance that the joints would not pop, leading to a structural failure in a strong earthquake.

Iain Macdonald, executive director of the **TallWood Design Institute** – a collaboration between Oregon State University and the University of Oregon – said the prescriptive process offers a “speedier pathway” to local approval.

“The more that can fall within the prescriptive process, the better,” he said.

Waechter considered a range of materials for the building. He looked into structural brick, insulated concrete mixtures and autoclave concrete blocks. But Portland's status as a showcase for CLT technology in the United States proved attractive.

"In the last couple of years, mass-timber knowledge being developed in the Northwest, it seemed like potentially the best solution," he said.



A wood model depicts a side view of a three-story, mixed-use building that will include structural wall panels made from cross-laminated timber. (Courtesy of Waechter Architecture)

Waechter opted to rely on **KLH Massivholz GmbH**, an Austrian manufacturer, to supply the CLT for the \$3 million project.

"KLH was able to provide the highest level of quality for the lowest price," he said.

Architecturally, part of the challenge was determining how to avoid covering the CLT.

“What we aspire to is designing buildings that have strong clarity and are fully integrated where material and space and mechanical systems are interwoven and become one office,” Waechter said.

The building will use hydronic heating and cooling – tubes filled with water that run in a 4-inch concrete slab on the ground. For additional cooling, fan coils will blow water-cooled air.

“We’re not using any refrigerants at all,” Waechter said.

The building will also be fully electric (no natural gas). No environmental certifications are being pursued for the project.

Tall windows will grace the front of the building in a simple grid. There will be no front door: Visitors will enter a passageway from North Mississippi Avenue that will lead to an outdoor courtyard surrounded on three sides by the U-shaped building, and on the south side by the cast concrete wall of the neighboring building, Mississippi Lofts.

From there, visitors will be able to enter ground-floor offices and workshops.

The building is designed for maximum flexibility. CLT buildings can be difficult to retrofit, so Waechter sought to make a future retrofit unnecessary. Each floor will be roughed in so that it can function as an office space or apartment. Demising walls could be installed without the need to redo sprinklers and electrical systems. Kitchens could be added.

“In the future, the bottom floor could become retail, the second floor could become office and the third floor could be residential,” Waechter said. “It could be all apartments. Technically, it’s been a little bit of a puzzle, but we’ve achieved it.”

Waechter said the building is designed to accommodate changing economic realities.

“All of the infrastructure is there for these different programs to plug and play,” he said. “So in that way we’re future-proofing it.”