CASE STUDY

State Nebraska Bank & Trust Campus Branch

Last minute design pivot demonstrates mass timber's versatility

This project was unique from the start.

While executives of the family-owned State Nebraska Bank & Trust initially set out to replace a 1970s-era branch drive-through, the project evolved into a mass timber building that includes the bank, office space for local businesses, and a place for the community to shoot hoops and play pickleball.

State Nebraska Bank's new Campus Branch combines a walk-in lobby, ATM, and drive-through lanes with office space and an indoor basketball and pickleball court, available for use by residents of the small community and students at nearby Wayne State College. The spacious two-story lobby anchors the bank and provides views into the court, while a floating catwalk links the second-floor offices and allows people to watch the sports action from above.

The original design featured glue-laminated timber (glulam) columns and beams with an affordable yet unremarkable acoustical tile ceiling. But a last-minute substitution, suggested at the project's ground-breaking ceremony, introduced glue-laminated timber panels (GLT) as a more sustainable, beautiful, and economical way to cover the court area. The exposed wood ceiling transformed the space and further differentiates the distinctive building.

The project demonstrates that there are many ways to incorporate mass timber into a building, regardless of size or construction schedule.

Unique Building, Unique Purpose

Founded in 1892 and run by the same family for five generations, State Nebraska Bank & Trust is well known for their long-standing commitment to the community of Wayne, Nebraska, population 5,990.

"The bank's CEO has a lifelong love of basketball, so his vision influenced the unusual building typology," said architect Roy Ley, Principal and owner of Hoke Ley. "He also wanted to create a sense of place with the project. The central area of the building fits a half basketball court or full pickleball court; the bank even provides equipment. Anyone can use the court space, regardless of whether they're a bank customer. It's a great community marketing tool."

Wood's prominence reflects the client's commitment to sustainability, "not only on principle, but because they wanted to create a building worthy of sticking around for another 130 years," said Ley. "There is something to be said for choosing a material that will be just as appealing many years from now as it is today."

PROJECT DETAILS

State Nebraska Bank & Trust

LOCATION:	Wayne, Nebraska
STORIES:	Two stories
SIZE:	15,300 square feet *(mass timber portion = 3,300 square feet)*
CONSTRUCTION TYPE:	Type V-A
COMPLETED:	2020

PROJECT TEAM

OWNER:	State Nebraska Bank & Trust
ARCHITECT:	Hoke Ley
STRUCTURAL ENGINEER:	R.O. Youker, Inc.
GENERAL CONTRACTOR:	Otte Construction
MASS TIMBER INSTALLER:	Timberlyne
MASS TIMBER SUPPLIER:	Rosboro

Connect with the State Nebraska Bank & Trust Campus Branch project team at *https://www.woodworksinnovationnetwork.org/projects/state-nebraska-bank*

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Last Minute Design Substitution

The initial design for the building's roof structure featured glulam beams and columns with a traditional wood truss system and acoustical tile drop ceiling. The tile ceiling did not reflect the bank's goals for a welcoming space, but an alternative with sound dampening ceiling planks was deemed too expensive.

At the groundbreaking ceremony, the architect discussed the ceiling challenge with the CEO of Timberlyne, a turnkey supplier of heavy timber and mass timber structures—which happens to have a fabrication facility in Wayne.

What is GLT?

When glue-laminated timber is made into columns and beams, it's typically referred to as glulam. When made into panels, it's called GLT or in some cases glue-laminated decking. GLT isn't new, but designers and builders are discovering new ways to incorporate it into their projects. GLT is...

- **Suitable for a variety of unidirectional single and multi-span floor and roof applications**
- **Manufactured using dimension lumber glued with the wide faces together, so panels are available in 12 to 48-inch widths, a variety of depths, lengths up to 66 feet, and species approved for use under ANSI 117-2020**
- **Accepted in the building code as heavy timber with 1- and 2-hour fire-rated options**
- **Easy to engineer with readily available design values**
- **Easily fabricated with openings and pre-installed connectors**
- **Manufactured so that it only requires bearing support perpendicular to the span, allowing for the use of floor-to-ceiling curtain wall systems below GLT panel edges**
- **Easy to install by conventional framers, with no special equipment required**
- **Usually installed with a gap between panels to leave room for panel expansion and contraction**
- **Readily available**

"It was a random rub of elbows," said Michael Ratliff, Executive Director of Commercial Sales for Timberlyne, "but we got a call the next day to help solve the ceiling problem. The project was already down the road in terms of design, but we were able to come up with a great mass timber panel alternative that would work structurally and economically and wouldn't add to the schedule."

Foundations were scheduled to be poured within a month of the encounter, so the switch had to be made quickly. Timberlyne collaborated with the architect and structural engineer to substitute GLT panels for the roof trusses.

"The building had already been designed with glulam columns and beams; I wasn't familiar with GLT," said Ley. "But switching to a mass timber panel was an easy choice—the GLT was economical, easy to substitute, quick to procure and install, and beautiful. The sport court and lobby of the building are the centerpiece of the whole project, and GLT gave us a warm wood aesthetic for that area."

Making the Switch

The building's design made for an easy swap, since the mass timber portion of the structure is essentially a glass box, with 92-foot spans and a 26-foot ceiling height.

Ratliff said they considered several options but chose GLT because...

- The mass timber panels served as both interior finished ceiling and structural roof decking.
- GLT was able to span the basketball court without need for additional supporting beams.
- The area was a simple grid with few penetrations, so the panels required very little fabrication.
- The panels were readily available from Rosboro and could be shipped with the glulam beams and columns for a turnkey order.

- GLT was a good visual match with the Douglas-fir glulam beams and columns already being used for the support structure.
- The 4-foot-wide panels were easy to install; Timberlyne was able to navigate the small site and install the panels with their existing equipment.

GLT laminations are all oriented in one direction, so panels have exceptional bending strength and increased span capacity along their length (strong axis), which makes them well-suited for spans between beams. However, GLT has limited bending capacity along its width or depth (weak axis) when compared to the strong axis, and the State Nebraska Bank building had one 18-inch overhang in the weak axis. While Ley said they could have cantilevered the beams to support the GLT panels, they chose to embed steel angles into the beams, which allowed the panels to extend past them. He said it was an easy solution, but a design consideration, nonetheless.

State Nebraska Bank & Trust Campus Branch

Volume of wood products used:
1,825 cubic feet

U.S. and Canadian forests grow this much wood in:
8 seconds

Carbon stored in the wood:
45 metric tons of CO_2

Avoided greenhouse gas emissions:
18 metric tons of CO_2

TOTAL POTENTIAL CARBON BENEFIT:
63 metric tons of CO_2

EQUIVALENT TO:

13 cars off the road for a year

Energy to operate 7 homes for a year

Source: US EPA

Estimated by the Wood Carbon Calculator for Buildings, based on research by Sarthre, R. and J. O'Connor, 2010, A Synthesis of Research on Wood Products and Greenhouse Gas Impacts, FPInnovations.
Note: CO_2 on this chart refers to CO_2 equivalent.

Reducing Carbon Impact

The use of wood lowers a building's carbon impact in two ways. Wood continues to sequester carbon absorbed by the trees while they were growing, keeping it out of the atmosphere for the lifetime of the building—longer if the wood is reclaimed at the end of the building's service life and re-used. Meanwhile, the regenerating forest continues the cycle of carbon absorption. Wood products also require less energy to produce than other building materials, and most of that comes from renewable biomass (e.g., bark and sawdust) instead of fossil fuels. Substituting wood for fossil fuel-intensive materials is a way to avoid greenhouse gas emissions and reduce embodied carbon.

Aesthetically, the switch to wood was a big win. "The warmth of the wood surfaces appeals to the senses and draws the eye inward," said Ley. "The goal of the project was to make the center ceiling as minimal as possible. The strength of the GLT panels relative to their thickness allowed us to make the roof even thinner than it was with the truss design. We originally had HVAC running through the trusses, but we were able to tuck in a spiral duct between the beams. So, it wasn't a huge change design-wise, but a big change aesthetically."

Ready Availability, Fast Installation

Since the decision to use GLT was made at the last minute, speed was important. Jeff Morrison, Strategic Development Manager at Rosboro, said they manufacture GLT using the same equipment they use to make glulam beams and columns, making the panels quick and efficient to produce. Once on site, Timberlyne used a crew of four people to install the beams, columns, and panels, followed by a layer of 1/2-inch structural wood roof sheathing. The installation took just one week.

"Start to finish, including design and procurement, our involvement was only 15 weeks," Ratliff said. "Even though it was a last-minute substitution, there were no project delays."

Quick Pivot, Beautiful Results

It isn't often that a main building component is swapped out at the last minute, but State Nebraska Bank's design team made it happen.

"This project had an eight-foot grid and a lean design, so mass timber was an easy switch," said Ratliff. "We'd never been involved with a last-minute change like this, but it gave the client the right aesthetic, the right timeline, and the right cost. We learned that GLT can be applied to almost any type of project, and with the right design and the right manufacturer, it can be delivered quickly."

Ley agreed, saying he'd never had to pivot so quickly to switch out one of the main components of a building. "It was a bit stressful, but we learned a lot," he said. "For example, I discovered that GLT exists; I had no idea. I also learned that mass timber can be cost-effectively used on a small- to medium-sized project like this, where it's not usually expected.

"If I were to design this again, I would use mass timber for the entire building," added Ley. "There's something so beautiful about the GLT decking; you get to see the beauty of the wood. Timberlyne's proposal to use GLT gave us the look we wanted at a price that worked for State Nebraska Bank."

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Images: Jackalope (finished photos) / StructureCraft (p.3 top)