CASE STUDY

Theodore Roosevelt Presidential Library



Modern mass timber hybrid honors former president's conservation ethic

Rising from the rolling hills of the North Dakota Badlands, this unique library was designed to embody the conservation legacy of Former President Theodore Roosevelt. The rugged and remote location, on top of a grassy butte across from Theodore Roosevelt National Park and hours from any city, is a natural part of its draw.

“We first arrived on site in spring 2020, and once our team fully processed the awe of the Badlands landscape, we tried to wrap our minds around how we could create a building that was grounded in this place,” said Aaron Dorf, Director and Architect at Snøhetta. “We wanted to give visitors an experience they couldn’t get anywhere else.”



To honor Roosevelt's environmental values, the building, one of just 17 presidential libraries in America, features glue-laminated timber (glulam) beams and cross-laminated timber (CLT) panels, rammed earth walls, and one of the largest native green roofs in the country. Its sculptural shape helps the building almost disappear into the surrounding prairie, meeting the design goal of creating architectural harmony using natural materials.

Sustainable Design Reflects Roosevelt's Influences

Roosevelt once said that if it weren't for his time in North Dakota, he never would have become president. The northern plains state was a formative place for him, a place of rebirth where he escaped to grieve after both his mother and his wife died on the same day in New York City. While Roosevelt was considered somewhat of an aristocrat when he left New York, he eventually became known as an outspoken Western figure—part hunter, part cowboy, part soldier, and eventually, full-time politician.

PROJECT DETAILS

Theodore Roosevelt Presidential Library

LOCATION:	Medora, North Dakota
STORIES:	One (plus two mezzanines)
SIZE:	94,829 square feet
CONSTRUCTION TYPE:	I-B
COMPLETED:	2026

PROJECT TEAM

OWNER:	Theodore Roosevelt Presidential Library Foundation
ARCHITECTS:	Snøhetta *(Design Architect)* JLG Architects *(Architect of Record)*
STRUCTURAL ENGINEER:	Magnusson Klemencic Associates
CONSTRUCTION MANAGER:	JE Dunn Construction
MASS TIMBER DESIGN ASSIST & SUPPLIER:	Mercer Mass Timber
MASS TIMBER INSTALLER:	Seagate Mass Timber Inc.
MASS TIMBER FINISHES:	Sansin
FASTENERS & CONNECTORS:	Rothoblaas

Connect with the Theodore Roosevelt Presidential Library project team at *www.woodworksinnovationnetwork.org/projects/theodore-roosevelt-presidential-library*

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His life in the West gave him deep respect for the environment. During his presidency, from 1901 to 1909, Roosevelt created the U.S. Forest Service and established over 200 national forests and federal bird reserves, protecting more than 200 million acres of public land.

Both Snøhetta and JLG Architects were challenged by how to design a project dedicated to someone who is considered by many to be 'the conservation president,' so they began with a design that is deeply rooted in Roosevelt's environmental beliefs. The Theodore Roosevelt Presidential Library is designed to meet the requirements of three ambitious building certifications: Living Building Challenge v4.0 – Full Certification, LEED BD+C v4.1 Platinum, and SITES v2 Platinum.

"Our design goals centered on what we called the Four Zero approach: zero carbon, zero energy, zero water, and zero waste," said Dorf. "Sourcing the mass timber became an important part of this goal, since the Living Building Challenge has strict guidelines with respect to material sourcing. So, wood was a critical character-defining element from the beginning."

The Landscape is the Library

The building's structural shape came about through what Dorf calls "a happy accident." He said they were playing with natural elements found in the landscape, and the idea came from two pebbles covered by a leaf, which led to the concept. The resulting silhouette intentionally blurs the line between building and landscape to reflect the impact that North Dakota had on Roosevelt, with a building that seems to disappear into the surrounding prairie. The walkable living roof supports almost 2 feet of soil and native grass plantings, contributing to the project's sustainability goals. The roof gives visitors expansive views across the 93-acre site, and serves as an ideal location for nighttime stargazing.



"We couldn't imagine a typical building in this landscape," said Dorf. "Our goal was to create a building that looked like a part of the landscape, and then we tucked spaces within it. The outline of the earth-covered roof, which itself is both architecture and landscape simultaneously, is a visual echo of the three-quarter-mile boardwalk that loops around the site. The experience of the land is an integral part of the experience of this presidential library, every bit as important as going in to see exhibits or an event in the auditorium."

The library itself also brings the landscape inside. Rammed earth feature walls, designed to reflect the layered colors of the Badlands, flank the main lobby. Seating, the ticketing desk, and other furniture were custom-built with reclaimed wood.

"Years ago, caretakers had to take down an old copper beech tree at the President's home at Sagamore Hill on Long Island," said Dorf. "It was a sapling that TR had planted. The family kept the wood, and those boards now form the surface of the ticketing desks, giving people a direct, tactile connection to Roosevelt himself."

Design Guides Visitor Experience

The Library is split into two distinct areas. One side is single-story, with exhibits, cafe and a gift shop. The other is two stories and includes an auditorium, rooms for events and educational programming, and administrative offices. A back-of-house section contains space for artifact conservation management, loading docks, and mechanical services.

While there are some artifacts from Roosevelt's life safely enclosed in light, temperature, and moisture-controlled cases, the exhibits are mostly 'experience galleries' that provide a hands-on, immersive journey through Roosevelt's life and legacy. Large skylights invite natural light into the space and strategic windows highlight views of the surrounding landscape.



The two sides are joined by a soaring mass timber structure, which supports the earthen roof. Described as 'central to the experience of the library,' the structure includes a striking grid of Douglas fir glulam beams, some as deep as 54 inches, below 7-ply CLT panels. The wood structure follows the curves of the roof and both the glulam and CLT are left exposed to many spaces below. Steel columns and girders, wrapped in glulam to provide a consistent wood character as well as fire resistance, help support the hybrid system where required. Where these elements are 'touchable,' the glulam is sanded smooth and has an extra layer of protective finish.

"We even used mass timber in the curtain wall," said Beau LaCroix, Project Architect at JLG Architects. "All of the mullions are glulam, as wood's thermal performance provides benefits that extend beyond those of an aluminum system."

Engineered for Heavy Roof Loads

The Library roof isn't a typical green roof where soil is specially engineered for reduced weight. "We wanted the roof to have the same plants as the surrounding prairie, so we added about 15 inches of native soils, which are naturally heavier," said LaCroix. "The entire buildup, from the bottom of beams to the top of the parapet, where we have thicker planting areas, is around 11 feet deep. That meant we needed a sturdy wood structure."

Roof loads are supported by the CLT panels over a unique glulam beam layout, whereby up to six beams, most spanning up to 32 feet and some as much as 40, share a connection at the top of steel columns.

LaCroix says, every beam is doing work for a fully optimized wood structure. "None of those beams are just sitting there," he said. "We utilized their full spans, and by using a diagonal beam that goes through each bay, we were able to go from a 9-ply to a 7-ply CLT panel. A 3-inch concrete diaphragm runs across the top of everything and helps the lateral loads resolve themselves where the building ties into a retaining wall on the east side. A concrete wall around the auditorium and strategically-placed steel brace frames near the exhibits provide additional lateral support."

The roof's grid design and curved geometry resulted in more than 400 unique connections, and architects worked closely with others on the team using advanced digital modeling to create a seamless aesthetic. "It's worth noting," added Dorf, "that all the wood members are straight pieces."





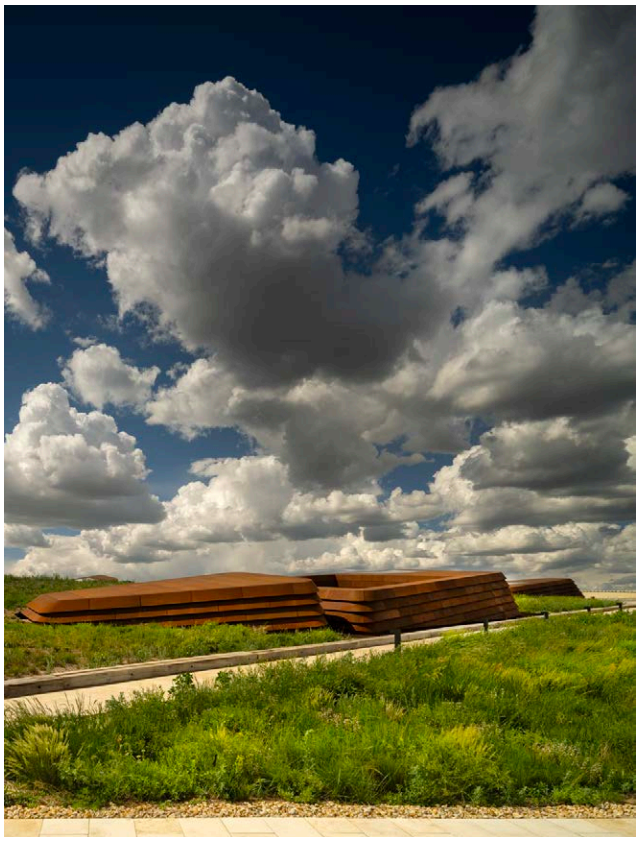
Experience Extends to Acoustics

In a public building designed for experiential qualities, acoustics are important. “We were intentional with acoustics so people, especially crowds, could experience programming that requires quieter focus,” said Dorf. “The lobby is controlled but still acoustically lively, while sound is reduced through additional acoustic finishes as people move into galleries and learning spaces. We used perforated veneer plywood with a soft batt insulation behind it in the auditorium and some of the exhibit areas, which also gave us a flatter aesthetic.” To counter the acoustic reflectiveness of concrete floors, glass façades, and rammed earth walls, designers also added acoustic wood infill panels to the mass timber ceiling grids that didn’t have skylights, and to walls throughout the lobby.

While the exposed wood roof is part of the design expression in public spaces, steel was used in the auditorium, which required acoustic finishes over the roof structure, and back-of-house areas.

Designing Systems for Sustainability

Like the structure itself, design of the heating and cooling systems emphasized sustainability. Geothermal wells located under a shared parking lot connect to radiant heating and cooling systems in the floor slabs. Butterfly-shaped canopies in the same parking area support solar photovoltaic arrays while offering shade for visitors.



For primary air distribution, a chilled beam system offers reduced energy use and airflow while contributing to the clean aesthetic desired by the team. “We required a couple big ducts in specific areas, but the smaller airflow allowed most to be relatively small,” said LaCroix. “In some places, like exhibit areas, we also ran ducts through penetrations in the glulam beams.” The team worked closely with the mass timber fabricator to coordinate penetrations for ducts and other systems, as well as routing for digital and electrical systems in the exhibit areas.

The rammed earth walls, green roof and high-performance envelope add to the value. The walls and roof assembly, which includes the mass timber structure, 18 inches of insulation, and a minimum of 15 inches of soil, provide excellent thermal performance. Skylights are fitted with multi-laminated triple-pane glass, vertical glass is triple-pane, and exterior walls include 6 inches of mineral wool insulation plus a rain screen system. Designers worked hard to ensure an airtight envelope, and testing showed air leakage values well below already-ambitious targets.



Roosevelt's Values Embodied in a Modern Building

Beyond learning about President Roosevelt's impact on American history, visitors will have an opportunity to understand how his conservation ethic can be applied to modern structures. Education programming incorporates information on carbon, energy, water, waste, and ecology, using the Library and its landscape as a demonstration of these themes. There will even be a digital dashboard showing energy and water use in real time, along with other environmental parameters.

While the Theodore Roosevelt Presidential Library shows once again how mass timber can be used to meet ambitious sustainability goals, the overwhelming expression comes from an architectural design that is complex and stimulating yet harmonious and warm.

LaCroix said, "I think people will be surprised to learn that wood buildings don't need to be simply shaped. This Library has hundreds of unique connections, and a building shape in which nothing is plumb or level. Yet we were able to pull that off, with a great deal of precision, proving that beautiful, complex buildings can be made with wood."

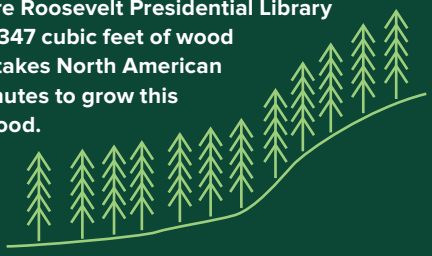
"Our goal was to prominently feature wood and earth in both structure and finish, even furniture," said Dorf. "We believe that the closer you get people to natural materials, the more at home people will feel. Natural materials bring carbon benefits and tend to be more durable and healthier. Wood is the material in the middle of the Venn diagram; it provides value in so many ways."





Supporting Sustainable Forests

The Theodore Roosevelt Presidential Library includes 92,347 cubic feet of wood products. It takes North American forests 7 minutes to grow this volume of wood.



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.

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Funding provided in part by the Softwood Lumber Board
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