CASE STUDY

The Bloomberg Student Center

Cascading mass timber structure encourages community, creates space to connect

When Johns Hopkins University decided to build the first dedicated, on-campus student center in their 150-year history, they envisioned a place that provided relief from the academic rigors of their institution, a vibrant 'living room' for campus life. After months of study and an international design competition, architects landed on this striking structure featuring a series of cascading timber-framed volumes designed to connect interior spaces with outdoor landscapes.

Located on a steep slope, the terraced building comprises 29 distinct volumes that read as a unified roofscape, seamless in visuality and design transparency. The top level features glue-laminated timber (glulam) columns and beams, and dowel-laminated timber (DLT) panels. The mass timber structure is built on cascading levels of concrete, from one to four stories tall and, at their deepest point, set 45 feet into the hillside. The roof planes are aligned to blend seamlessly from one volume to the next, inside to out, while extensive glazing allows the timber to shine.

"Mass timber met the design intent in that it created a connection to nature; the timber columns are evocative of a nearby grove of trees," said Matthew Gifford, a Principal at Shepley Bulfinch. "Use of wood also supports the University's broader sustainability and biophilic goals, creating a warm and welcoming place for students, faculty, and others to meet."

mechanical constraints. Altogether, the panels generate about 40 percent of the Center's annual energy needs. The project is on track to achieve LEED Platinum certification.

Inside, glulam columns are set at 14-foot intervals around the perimeter of most volumes. This grid varies from 28 to 42 feet in the interiors, always in 7-foot increments, which matches the width of the DLT panels. Lateral bracing is provided by cross-laminated timber (CLT) shear walls, concrete cores, and steel cable brace frames; the top surfaces (roof side) of the DLT panels are covered with plywood to form the roof diaphragm. Lateral systems also accommodate differential movements between the interconnected volumes. Some glulam beams were manufactured with camber to minimize vertical deflection and maintain tight tolerances with the glazed façade.

Sleek Roof Expression Hides Structural Complexity

The Bloomberg Student Center provides a wide variety of spaces, ranging from a commons area, food hall, theater, and gaming lounge to meeting rooms and offices for student organizations, creative studio spaces, and more. All are designed to invite connection and collaboration while allowing flexibility for future changes.

The clean lines of this elegant building hide the complexity of its design. Each of the 29 volumes looks visually similar but is distinctly sized and shaped for its intended purpose. With orientation, slopes, and roof overhangs, the volumes are carefully tailored to maximize light exposure while providing shading to reduce heating and cooling loads. Each roof supports its own set of photovoltaic panels, installed to align with the top edge of the fascia and accommodate other

Decision to Use DLT Checked Several Boxes

The project team initially chose DLT for its unique design aesthetic, but the panels also provided the desired acoustical performance.

"Architecturally, we wanted to see the horizontal lines, the cadence, and the panel intervals that DLT provides," said Michael Harrison, Senior Designer at Shepley Bulfinch. "The product gave us a refined, distinctive ceiling expression. And because panels can be specially manufactured with integrated acoustic treatments, we had the ability to customize the product to provide noise control in the large volume spaces."

PROJECT DETAILS

The Bloomberg Student Center

LOCATION:	Baltimore, Maryland
STORIES:	Four
SIZE:	150,000 square feet
CONSTRUCTION TYPE:	III-A
COMPLETED:	2025

PROJECT TEAM

OWNER:	Johns Hopkins University
ARCHITECT:	Shepley Bulfinch *(Executive Architect)* BIG – Bjarke Ingels Group *(Design Architect)*
STRUCTURAL ENGINEER:	knippershelbig Inc.
STRUCTURAL CONCEPT & BUILDER OF HYBRID STRUCTURE:	StructureCraft
GENERAL CONTRACTOR:	Clark Construction Group
TIMBER INSTALLATION SUBCONTRACTOR:	Quality Buildings
MASS TIMBER:	DowelLam (DLT) Element5 (CLT) Western Archrib (Glulam)
MASS TIMBER FINISHES:	Sansin

Connect with The Bloomberg Student Center project team at *woodworksinnovationnetwork.org/projects/the-bloomberg-center*

WOODWORKS INNOVATION NETWORK.ORG

Acoustic DLT panels are manufactured with channels on the exposed bottom surface. Grooves are cut into the sides of each lamination, which are then filled with acoustic foam. Panels at the Bloomberg Student Center achieved a noise reduction coefficient (NRC) of 0.7.

"We were committed to using DLT and knew the product could give us the acoustical baseline for any given space," said Gifford. "Once we had that, we figured out what additional acoustical surface treatments needed to be added to the other five sides of each cube to meet our goals."

Accommodating Weak-Axis Cantilevers

The 29 volumes all have roof overhangs designed to provide shade and outdoor space. Overhang depths vary for each roofline, determined by an in-depth solar radiation analysis. Some are as deep as 12 feet, and many require concealed sprinklers.

Because DLT is designed to span in one direction, it requires supplemental support for cantilevers in the weak-axis direction. For this reason and to achieve the double-cantilever overhangs, the project team attached rectangular steel HSS beams to the tops of the panels. The steel beams were sized to meet the loading and deflection requirements of the cantilever condition.

Fascia heights had been predetermined during the initial design development phase, and changing them would affect other elements of the design. So, the steel beam detail required precise coordination to ensure continuity of the fascia while also achieving proper insulation thickness, slope drainage, and drain locations.

"For example, we determined that we needed to recess the beams into the plywood deck by one inch," said Harrison. "Just that one inch gave us what we needed. We love the result and are glad we chose DLT because it fit our design goals and could be modified to meet our acoustical requirements, but its use required tight design coordination."

Trench System Leaves a Clean Wood Ceiling

Designers wanted to leave the mass timber free from the visible clutter of wiring and conduit, so they developed a trench system between the DLT panels to hide those systems. The trenches, 8 inches wide within 6 to 12-inch deep DLT nominal panels, are covered by one layer of plywood and two layers of 5/8-inch Type X gypsum board. The depth is further reduced by the depth of the recessed cover, which matches the acoustical flutes in appearance.

"We even added wood covers, fabricated with grooves to match the DLT and color-matched to the timber," said Harrison. "The trench covers are fully removable, and the system was designed so we could run both high voltage and low voltage systems through the trench concurrently while maintaining the required separation. Our standardized design provides accessibility and gives us an uncluttered timber ceiling while also meeting fire protection requirements. The only thing left visible is the sprinkler system, and we did that intentionally."

Innovative Air Barrier System Forms Airtight Building Envelope

Since DLT panels have natural gaps between boards, the architects worked with the envelope consultant and mass timber team to develop a novel air barrier detail for the timber-to-envelope interfaces. DLT panels destined for installation on exterior walls were pre-drilled with holes on both sides of the envelope line. The fabricator then injected those holes with a silicone sealant to form an effective air seal. During installation, crews added a bead of sealant onto the top of the partition line and overlaid plywood. An additional extruded silicone sheet and deflection heads allow for timber movement while maintaining a continuous seal from the underside of the DLT panels to the walls.

“We wanted to reduce air infiltration while leaving the timber ceiling clean, so we had to innovate,” said Harrison. “The process of developing this detail was very collaborative.”

A Warm, Welcoming Place to Gather

This complicated yet elegant building combines glulam, DLT, and CLT with concrete, steel lateral bracing, and steel support beams in a way that achieves the original aesthetic objectives. The complex design required precise coordination regarding structural materials and rated assemblies, connections of the mass timber system to other building elements, and commitment to architectural intent. Innovations were made possible by having a collaborative project team and an open process.

“We used what worked best for each situation,” said Harrison. “The mass timber industry has come a long way since we started this project five years ago. As knowledge and experience continue to grow, buildings like this will become easier to do.”

The Bloomberg Student Center addresses the University’s desire to support student well-being by providing a space for people to connect. “The glass façade helps us show off the natural wood to everyone who walks by,” added Gifford. “Mass timber brings many of the elements that students told us they wanted—a connection to nature, and a warm and welcoming environment for them to relax and gather.”

Supporting Sustainable Forests

The Bloomberg Student Center includes 61,000 cubic feet of wood products. It takes North American forests 5 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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