Wood That Educates

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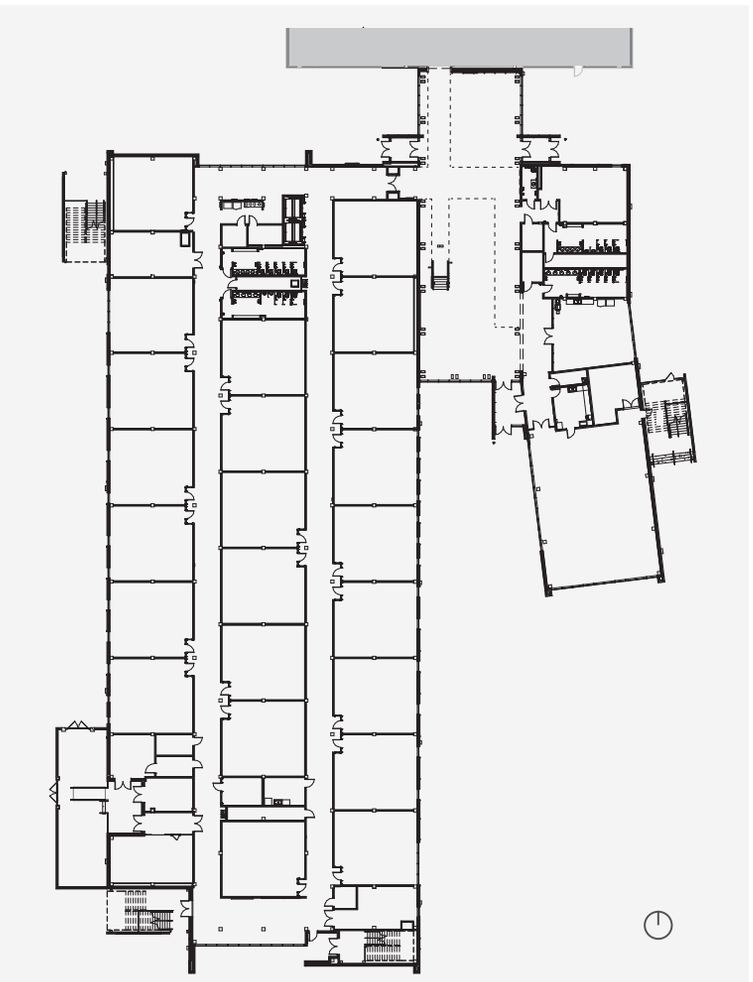
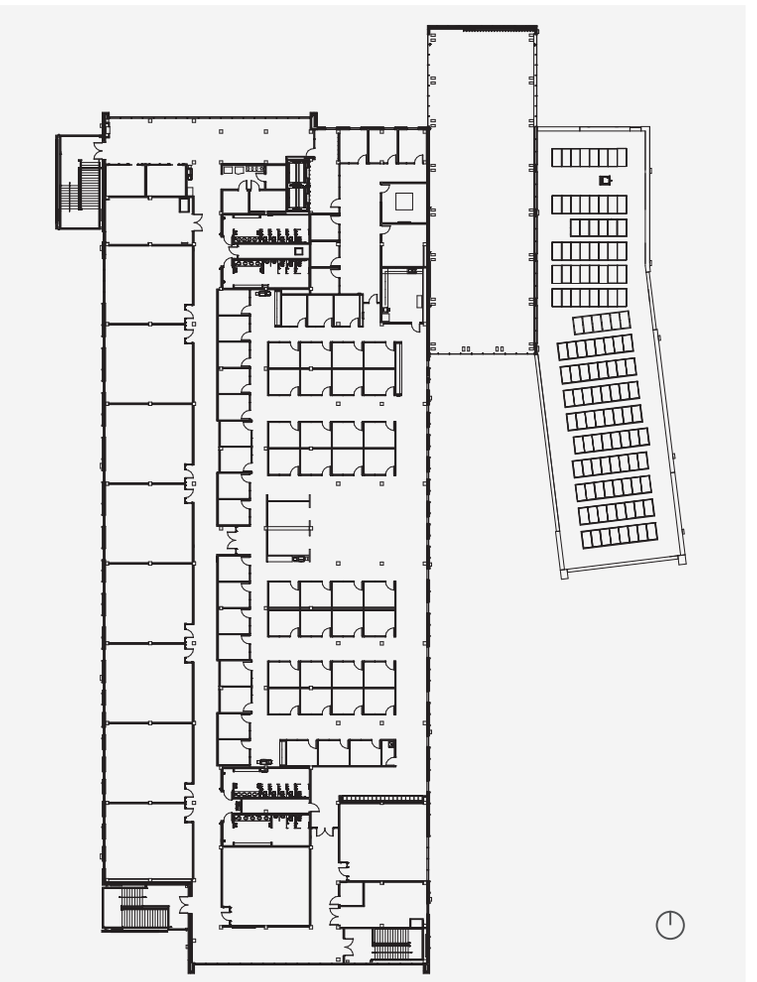
Photography by Leonid Furmansky

A mass timber building has quietly been assembled on the campus of San Jacinto College in Pasadena. The Central Campus Classroom Building (CB), which was completed this spring, is Kirksey Architecture's first mass timber project; as such, we wanted to make the project a bold celebration of wood and worked to retain as much exposed timber as possible. The building is the first structural mass timber project to be realized in the greater Houston area. At over 122,000 square feet spread over two wings and three floors, it's also currently the largest academic mass timber building in the country. Education will happen inside and outside the classroom, as the structure itself is a master class in mass timber and related sustainable practices.

Overall exterior rendering. Courtesy Kirksey Architecture.



First Floor. Courtesy Kirksey Architecture.



Third Floor. Courtesy Kirksey Architecture.

San Jacinto College decided to pursue mass timber early in their planning process. The institution began by evaluating the cost-effectiveness of cross-laminated timber (CLT) when compared to traditional structural systems. The idea to utilize wood was a response to the potential variability of future steel tariffs; the later rise in steel costs experienced during construction validated this decision. Aesthetic appeal played a minor but crucial role, as the exposed wood could create warm interiors. Once this direction was established, local officials were engaged so all parties could understand the project's intricacies. Throughout the design and construction phases, San Jacinto College continued its educational mission by holding numerous conferences for design professionals onsite.

The CB occupies the site of two previous buildings and connects to an existing classroom building. The relatively lightweight mass timber structure allowed for the reuse of the previous buildings' foundations; new beams were introduced to distribute loads to those piers. Given the spanning constraints of the mass timber, the building is based on the regular grid spacing of a 28'×28' classroom. Within this module, the facility also contains faculty offices, a robotic lab, a lecture hall, a presentation event space, a large commons, and dispersed student collaboration spaces.

As part of the campus master plan, the CB holds the eastern edge of the campus. As such, it's one of the first parts of the campus seen from the college's new Welcome Center. Upon arrival, the curtain wall panels between brick runs reveal the warmth of the wood within. At the open end of the two-story wing, a large glue-laminated timber brace is visible as it interacts with the CLT floor and roof decks. The three-story wing, also open on its ends, engages the street and the campus quad, exhibiting open student collaboration spaces that again express their wooden interiors.

At major entrances, large curtain wall assemblies are held in place by horizontal timber girts that run across doubled wood columns, securing the glazing against hurricane-force winds. This notched girt-to-column detail connection was inspired by Japanese woodwork. Inside the atrium, the second-floor walkway, feature stair, and ramp all highlight mass timber in unique ways. One can appreciate the tectonics of the building when exploring the exposed and concealed structural connections in this space.

The corridors and open student collaboration spaces are tightly coordinated to require minimal finished ceilings. Wood ceilings are preserved in the hallways. In classrooms, the entries are defined by an exposed column and beam connection, creating a threshold as one enters and exits the space. A lightweight topping slab reduces vibration and provides the appropriate sound isolation for learning environments. At the perimeter of each classroom, the ceilings are held back from the window, allowing the timber structure to be seen on the exterior. The lecture hall and event space also maximize their timber expressions.

Throughout, educational infographics tell the building's story and highlight its sustainable efforts. Beyond the use of mass timber, these elements include the collection and reuse of graywater, tubular daylighting, electrochromic glazing, and the reuse of existing foundations and salvaged exterior materials from the demolished buildings.

Mass timber on this project was a first not only for San Jacinto College but also for the entire design and construction team, which included Tellepsen Builders as the general contractor. All facets of this structural system were studied for deep comprehension. Elements such as cross bracing were researched to see if components should be custom manufactured or procured from available options.

Establishing the precise type of mass timber to specify helped identify possible manufacturers and availability for the CB's glue-laminated timber and CLT; these products were supplied by Nordic Structures, based in Canada. The choice of these prefabricated elements positively impacted construction speed, as they arrived at the site routed and ready for installation.

The structural grid was important to get right. Extensive analysis by Walter P Moore Engineers compared combinations of CLT thicknesses with varying column and beam placements. These studies impacted cost, construction, and utilities. In this case, a grid with beams that ran parallel to the corridors and used a five-ply CLT deck as a diaphragm was the most efficient solution. CLT shaft walls for elevators were also used but required conversations with city officials, as there was concern about their performance during a fire. This usage is safe as mass timber, when exposed to flames, creates a sacrificial char layer, thereby protecting its interior area.

Mass timber requires extensive coordination that starts sooner than other typical structural systems because production must occur earlier. On this project, Tellepsen Builders was involved for feasibility studies even during the conceptual design phase. Nordic Structures joined after the schematic design phase, while other trades like mechanical, electrical, plumbing, and fire suppression started coordination before design development drawings were finalized. As this project exposed as much wood as possible, it was important to organize conduit and sprinklers, in addition to any penetrations that could and should be made in wood members. And, because this was the first building using this system in Pasadena, many meetings were conducted with city officials. Along the way, numerous events engaged Houston's development, design, and construction communities.

There were concerns about mass timber weathering when exposed to water. Tellepsen Builders took several measures to protect the structure, including suspending reinforced plastic around the entire structure and installing a temporary membrane roof. There were no weather-related issues, even during Winter Storm Uri in 2021.

Mass timber strength is heavily dependent on the species used, its manufacturer, and their capabilities. Availability per manufacturer is also important to evaluate when selecting a mass timber partner. We found value in having all mass timber products be specified as the same species for a coherent look for this project. Black spruce was used; the timber is Forest Stewardship Council certified and was harvested from Nordic Structure's own forest. A sealer was applied prior to transportation, and then onsite another was used for UV protection. Cracks, dents, scratches, and splits were a concern, but, unlike other construction materials, wood can be sanded, and, if needed, lamellas can be patched without an issue.

Structural systems have an impact on a building's carbon footprint. Here, the use of mass timber reduced the structure's embodied carbon by 75 percent when compared to the use of steel. More importantly, the use of photovoltaics on the roof will have a significant impact on the building's operational carbon in the years to come.

It's also important to understand mass timber's effects on forests. Nordic Structures calculated that the Canadian boreal forest, where CB's wood was sourced, grows the equivalent of the building's wood fiber in approximately four and a half minutes.

It's our hope that mass timber structures will soon become commonplace, but today this new building is starting the conversation in Houston. This structural system was a first for San Jacinto College Central Campus and the design and construction team; it was also a success. This new building demonstrates that innovation is possible. We hope that others are able to learn in and from this wood beacon, shining bright.

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