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A New Teacher on Campus

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The UMass Amherst Design Building literally shows students how it works

When the disciplines of Architecture, Construction, Building Science, Landscape Architecture and Regional Planning are taught at the university level, professors have readily available resources to augment and reinforce their instruction. University campuses are uniquely equipped for these curricula with buildings and structures of varying ages, styles, construction methods, and qualities—all that can serve as good (and sometimes bad)—examples. As a secondary source of support, literature and the internet supply exhaustive and detailed precedent studies with text, graphics, images, and videos.

Graphics rarely measure up, however, to the immersive and immediate educational experience of studying in an architecturally or technologically advanced building. The building itself can function as educator, with its structural columns, walls, floors, and other elements enduring the various loads and forces imposed by occupants and climate. Heating, cooling, and ventilation systems cycle on and off, maintaining comfort and health as occupancy and seasonal changes fluctuate and dictate. Plumbing responds effectively, transporting water and waste as demands are made. Electricity is instantly available at the flick of a light switch or finger pressure on a computer key.

While these building components and services are all certainly present, they commonly remain invisible in traditional buildings. Storage or mechanical rooms are usually off-limits once a building is occupied and many elements are only visibly accessible during the construction process. Structural columns, girders, braces, and shear walls are often concealed within the roof, ceiling, and wall assemblies. Mechanical appliances (boilers, furnaces, air handlers) are on view in the restricted access mechanical rooms, but the extensive distribution systems (ducts, pipes, wires) dispensing warm and cool air, hot and cold water, plumbing waste, electricity, data, and fresh air are out of sight. Some are concealed within interior ceiling and wall assemblies, but in the majority of larger buildings, these cavities are far too small and interrupted with structure to accommodate all the requisite elements because of size, quantity, and direction of travel limitations. It is even more unfortunate when non-standard or advanced technologies are utilized and hidden because an instructor cannot capitalize on their educational value.

Planning the Design Building at UMass Amherst

When the University of Massachusetts (UMass) decided to replace a deteriorating 1960s concrete building with a new structure, three opportunities were presented. First, three academic units that teach design in the built environment (Architecture, Building and Construction Technology, Landscape Architecture and Regional Planning) could be brought together from aging buildings and co-located.

Second, a new building could be designed in ways that support the university's extensive sustainability efforts. One highlight of that was the decision to use engineered wood as the main structural material, which also allowed the building to become a showcase and an educational tool, showing how it can be used in contemporary buildings. And third, the building design itself could demonstrate existing faculty research in structural wood systems as well as water-efficient landscapes.

Two years later, under the guidance of lead designer Leers Weinzapfel Associates, a planning process, which involved all of the building's future users, led to the construction of the 87,500 sf, four-story, timber-framed, and aluminum-clad Design Building located prominently near the entrance to the Amherst flagship campus of the UMass system. To capitalize on the opportunities provided, reduce costs, and remedy the shortcomings of hidden structures and systems, a directive was issued that, wherever possible, the building would expose and showcase all elements of its technologies for educating its students. The university was fully supportive of the strategy, which reinforced its educational mission.

The Building as Instructor

Leers Weinzapfel Associates' process from concept design through construction provided concrete validation of the Architecture program's design pedagogy. Incorporation of each of the three discipline's space and program requirements, while addressing sustainable strategies (e.g., reducing solar loads, daylighting, passive ventilation, glare mitigation) is evident in all corners. The integration of entrance spaces, gathering spaces (small and large), interior and exterior geometries, materiality, and shadow play with aesthetics is tangible inspiration for Architecture's students.

In the landscape design by Stephen Stimson Associates, the physicality of the building both encloses and is surrounded by landscaping strategies focused on the expression of a shared environmental ethic. Their design incorporates the regional and indigenous landscape of the Pioneer Valley. Native plantings provide shade and microclimates for entry gardens. Ground pavements extend through the building, into the heart of the indoor space, blending interior and exterior environments. Site and roof runoff feed a series of check dams flowing through groves of fern, hemlock and beech, terminating at stormwater gardens, planted with collections of native grasses and shrubs. Bioswales are sited carefully to provide the essential amount of water quality treatment required by the MA DEP and LEED, and provide visible expressions of the Design Building's academic mission. Finally, a rooftop courtyard provides both a quiet space for outdoor classes and an illustration of plant selection and placement optimizing passive solar mitigation and other sustainable strategies.

The structural design by Equilibrium Consulting and Simpson Gumpertz and Heger not only uses wood structurally but also show- cases it extensively. The central courtyard roof (which also supports the roof garden) is a beautiful example of a hybrid wood-and-steel space truss system, called a "zipper truss." Columns, beams, braces, and many of the ceilings are comprised of black spruce glued laminated timber (glulam) and cross-laminated timber (CLT), not only presents beautiful wood grain, color, and even aroma in the building, but it also reduces costs for finishes. To top it off, structural connections are exposed in many places, which again showcases, rather than hides, a key element of the building in which this timber engineering topic is taught.

While structure has, for some, a degree of intuitive understanding as gravity transfers loads to the earth, this is not the case for mechanical systems and their distribution systems. How air or water is tempered to meet a building's multiple requirements has been a mysterious process to most and a hidden process to all. This is remedied in the design by BVH Integrated Services that exposes ducts and pipes wherever feasible. Only spaces that have higher acoustic requirements (e.g., classrooms) feature a traditional ceiling system. Other spaces, like the main commons area, keep ceiling ductwork partially hidden behind a slatted system that offers clear visibility from beneath and opacity from afar.

As a result of these design choices, every aspect of the Design Building's structure and mechanicals are in view—not in every space, but in many—more than adequate to complete the mission of the Building and Construction Technology program, while providing a source of visual instruction.

Summary

The design of this building transitions it from a traditional role of academic "home" for the disciplines of the built environment to a most welcome new teacher and tectonic faculty member. The Design Building was always envisioned as a living laboratory for learning, deeply intertwined with the curriculum and progressive mission of the Design Building's disciplines.

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Read the full article (Learning by Design Fall 2017, page 20) at:

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