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DESIGN IDEAS
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Open Learning. Open Spaces.

The University of Arizona Health Sciences Innovation Building is a state-of-the-art instructional facility. The massive, open-learning space in the center of the 220,000-square-foot structure was framed using long-span composite floors, but shoring it up during construction proved a healthy challenge.

Illustration courtesy of CO Architects

The design of the University of Arizona's new state-of-the-art educational facility encourages collaboration between students, faculty, and health professionals with wide open spaces. The Health Sciences Innovation Building is 220,000 square feet and features a three-story, 80-foot interior open-learning space. The project has been hailed as the vanguard for interprofessional health education in the United States.

To bring this design to life, the construction of the space had to answer a unique challenge: shoring during floor construction. It was simply not an option due to the cost and safety risks associated with staging that would require up to 60-foot-tall support towers.

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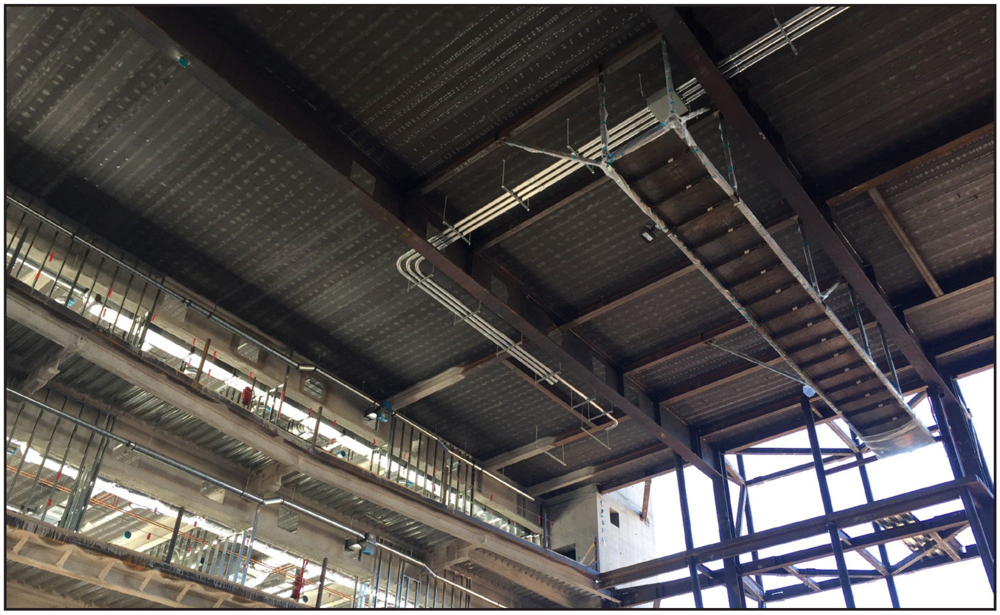
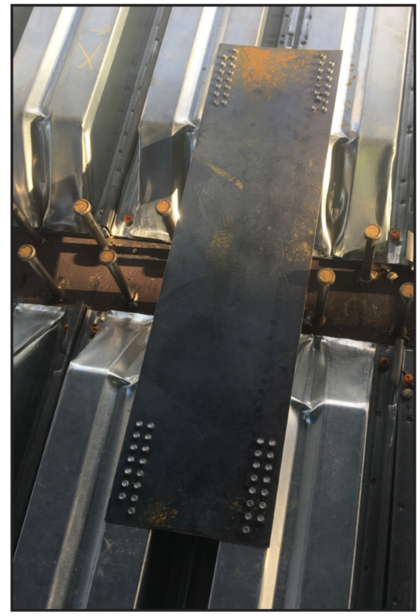


The massive, open-learning space in the center of this 220,000 square foot learning facility was framed using long-span composite floors to create thin slabs that are set on 80-foot-long plate girders. Shoring during floor construction was not an option, so a creative solution was required.



Shoring was eliminated by the installation of continuity plates to bridge the deck ends on both sides of the girder beams.

Long spans. High ceilings.

The right floor system had to have visual appeal — since it would be left architecturally exposed — and the strength to support heavy superimposed loads. The 85-foot by 25-foot bays (2,125 square feet total) had to control floor vibration below the threshold suitable for research environments. It also had to possess a two-hour self-performing fire endurance rating.

"To meet all these requirements, Deep-Dek® Composite Cellular Acoustical 6.0 was chosen. The floor system could span 24.5-feet between 80-foot-long plate girders," says Trent Fowler, Specialty Deck Project Manager for New Millennium Building Systems.

"With wide open spaces like this, you can just imagine the possibilities for classrooms, labs, auditoriums, and so on. But we couldn't shore it during construction," adds Marty Williams, Design Development Manager for New Millennium Building Systems. "The costs and safety risk associated with assembling support towers between the tall floor-to-floor heights was just not feasible: up to 60-feet tall in one area between the first and second levels alone."

Defending against deflection

"The deck alone had sufficient strength to support construction loads (workers, equipment, and wet concrete) over the 24-foot-long unshored span," says Trent. "Deck deflection, however, would exceed limits outlined in current design specifications."

To limit deflection, continuity plates were installed that bridged the deck ends on opposing sides of the girder beams. These tension plates helped create a multi-span deck installation resulting in additional stiffness, which eliminated the need to shore up the floors during construction.

The plates served to fortify the deck during construction, supporting both the workers and the initial pouring of a 2-inch-deep regular-weight concrete cover. Factory-pressed, closed deck ends contained the wet concrete and eliminated end closure angle installation. After the concrete cured to minimum strength, the composite floor supported its self-weight and the weight of workers who then poured an additional 3 inches of concrete.

The resulting 5-inch concrete cover provided the desired two-hour fire endurance rating. The use of an acoustical composite floor, with a noise reduction coefficient (NRC) of 1.00, eliminated the cost and added complexity of a suspended acoustical ceiling.

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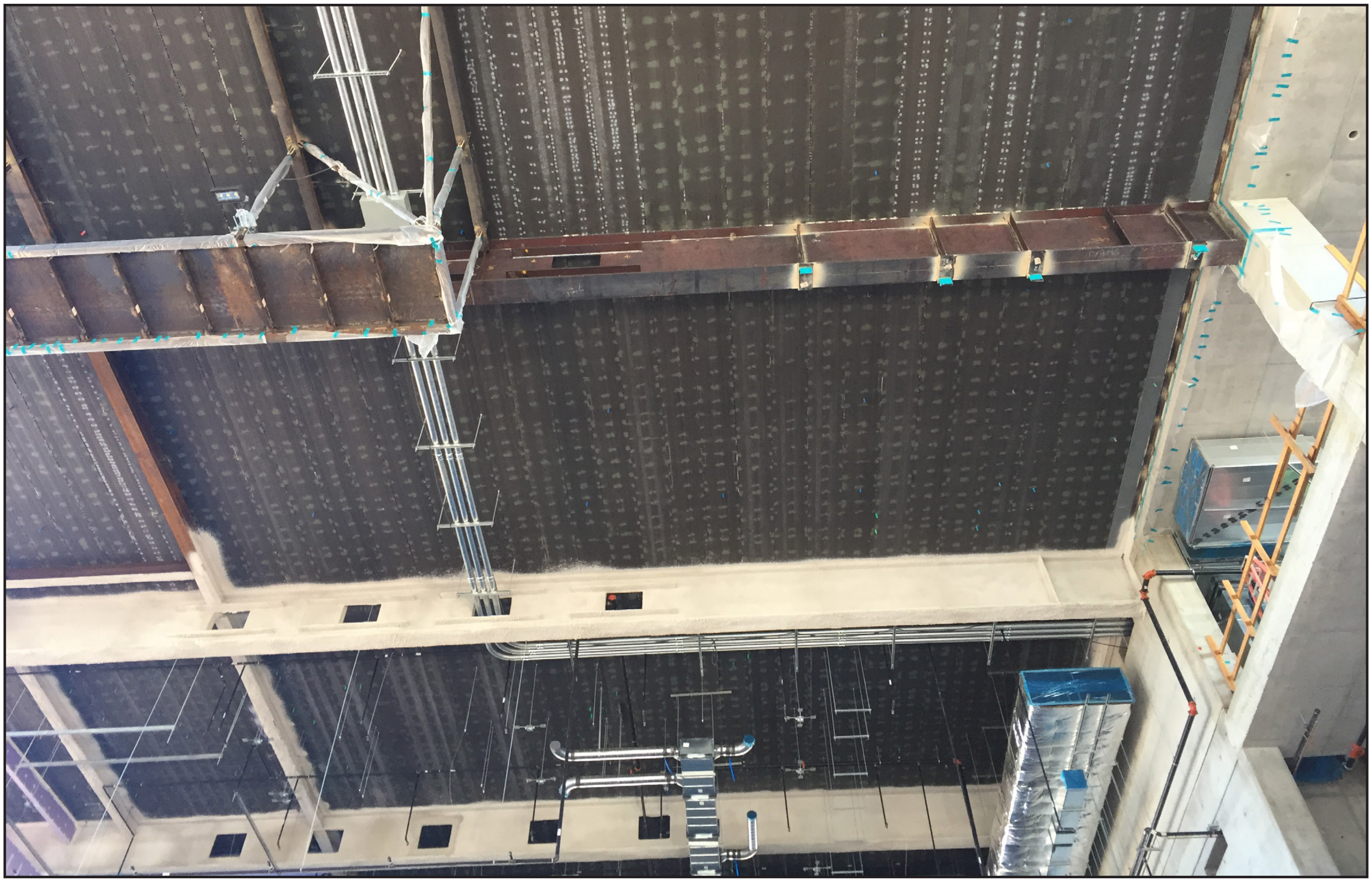

MEP pass-throughs, embedded electrical boxes, and slab penetrations were carefully designed and coordinated.

MEP integration and acoustical treatment

Adding to the design complexity, much effort was put into coordinating and detailing slab penetrations, embedded electrical boxes, conduits, and concrete anchors for suspended MEP components.

“The addition of acoustical treatments to the deck was a late decision,” says Marty. “Initially the designers considered suspending acoustical ceiling treatments from the floor structure until they discovered they could be directly integrated into the deck.”

Doing so required the addition of perforation holes to the liner face and sound-absorbing insulation batts placed in the cavity formed by the liner and top hats. This approach saved both time and expense while helping create tall uninterrupted ceiling planes. Acoustical tests proved that Deep-Dek® Composite Cellular Acoustical 6.0 can achieve the required noise reduction coefficient.

The structure was competed in late 2017, with a grand-opening set for July 2018 to coincide with the beginning of the academic year.

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