Keeping the Vision Afloat

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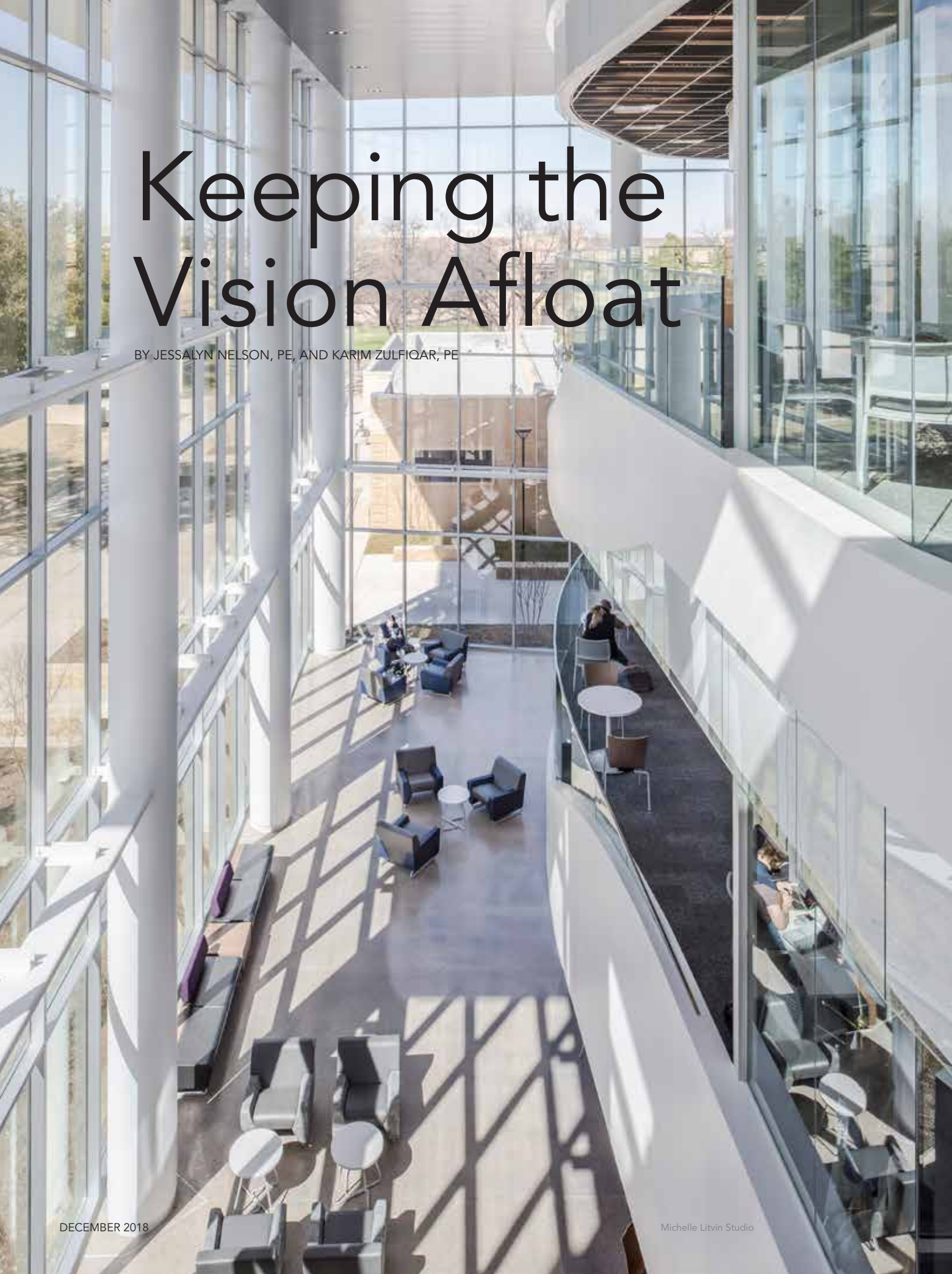
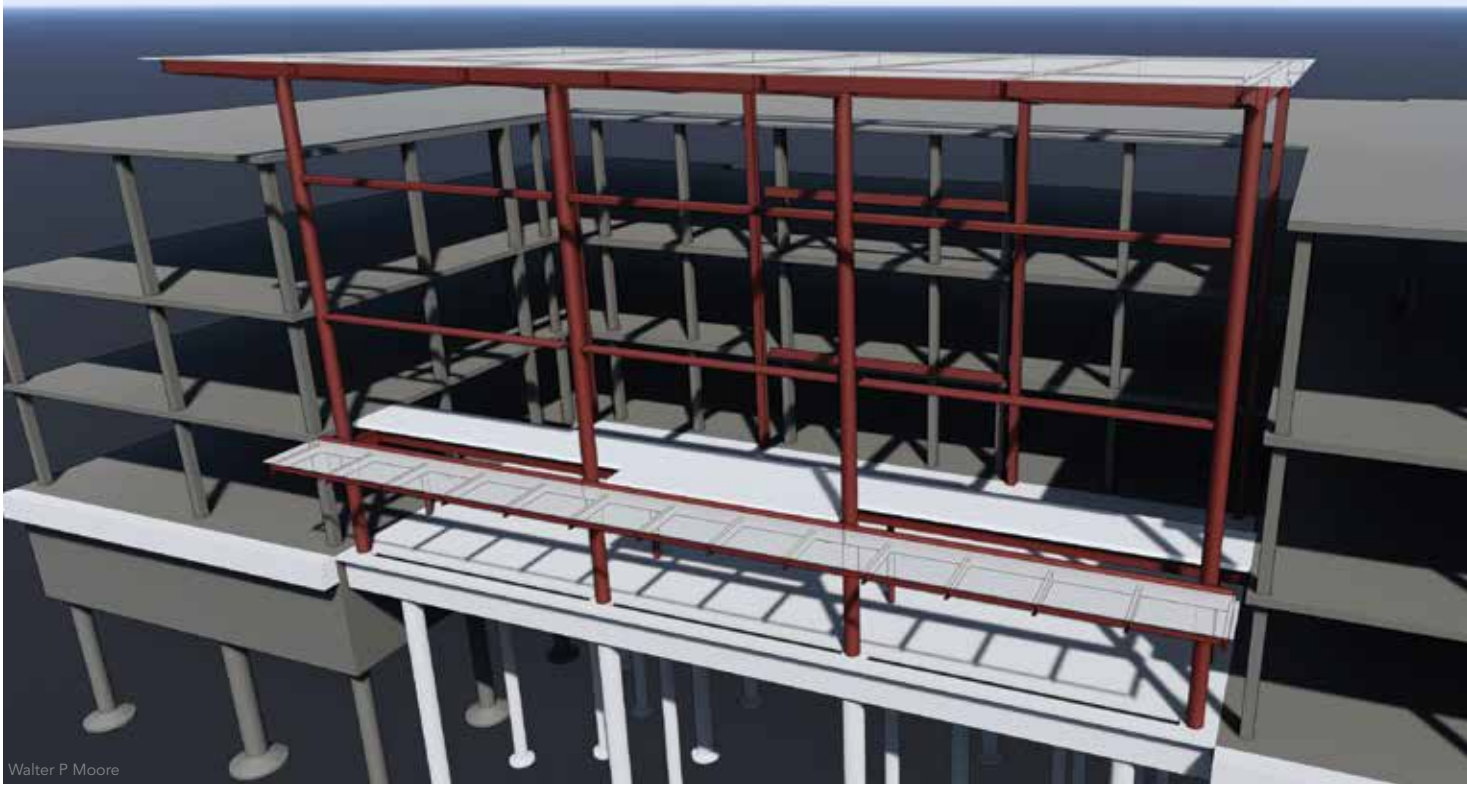


Michelle Litvin Studio

A university science building incorporates hidden hangers and cantilevers to meld higher education with high design.



above: Framing for the column-free interior lobby space is highlighted in this model.

left: Abilene Christian University's new Halbert-Walling Research Center (HWRC) is part of a three-phase plan to upgrade the school's science facilities.

SEVERAL SCIENCE DISCIPLINES have a new steel-framed home at Abilene Christian University (ACU), all under one roof.

In developing a plan for a new science building on its Abilene, Texas, campus, the small private school envisioned a new and innovative space to house its biology, chemistry and biochemistry departments. The new 54,000-sq.-ft building, the Halbert-Walling Research Center (HWRC), is part of a three-phase plan to upgrade the science facilities on campus, which also includes façade and interior renovation work on the existing Onstead Science Center. Not only does it bring new laboratories, classrooms, lecture space and state-of-the-art equipment to the school, but it also adds a signature, modern edifice that stands out among the stately buildings that populate ACU's campus.

Pod Life

Architect Perkins+Will worked with ACU to develop a striking exterior and a column-free interior lobby space, and structural engineer Walter P Moore (WPM) designed a framing system to support this vision. The three-story building, which opened last year, incorporates a steel braced frame lateral system, with the roof and high roof—the latter a combination of transfer girders and long cantilevers separated from the regular roof by few feet—also framed with steel; 550 tons of structural steel was used in all. The project employed the integrated project delivery method, the first for steel fabricator Basden Steel, who was brought in early to provide expertise on material procurement, connection design and constructability.

Throughout the project, the use of steel enabled WPM to develop innovative solutions to support the expansive glass façade, thin roof profile and a prominent "floating" interior space. This latter, eye-catching feature, a two-story pod structure that appears to float above the first floor, includes auditorium and collaboration spaces as well as a corridor that wraps around the perimeter. A 6-ft-tall glass handrail runs along the corridor and pod edge, providing an airy, open walkway. While attractive, this element

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Walter P Moore

The building's two-story pod structure appears to float above the first floor and includes auditorium and collaboration spaces as well as a corridor that wraps around the perimeter.

limited the use of hangers around most of the space, which necessitated a combination of hidden hangers and cantilevers. To develop this hidden support system, WPM performed analyses using Grasshopper visual programming within the Rhino 3D modeling package, including parametric modeling to optimize and balance hanger and cantilever support points, seeking to emphasize the floating appearance. This approach allowed for column-free space on Level 1 with almost 30 ft of uninterrupted overhang.

Another structural challenge with the pod was that various student spaces within the assembly were susceptible to vibrations. As such, WPM incorporated vibration studies in the design and analysis, following AISC Design Guide 11: *Vibrations of Steel-Framed Structural Systems Due to Human Activity* (**www.aisc.org/dg**) criteria for office spaces and limiting peak acceleration to 0.5% gravity. This enabled the team to size the steel beams appropriately to mitigate the impacts of expected excitations while still maintaining

The caltilevered roof framing elements were painted as protection against potential water intrusion, as they are not within the building envelope. They were also supported via temporary kickers during construction.

Cantilevered framing for the roof.

The tall glass façade is uninterrupted by columns and topped by a thin-profile cantilevered high roof.

above: Steel bracing at the main roof and high roof.

above: Framing for the pod assembly, which hangs from the ceiling in the atrium space.

below: The HWRC incorporates 550 tons of structural steel in all.

the thin profile desired by the architect and owner.

To further enhance the lightness of the structure, Perkins+Will designed the glass handrail around the perimeter of the pod to be uninterrupted by metal supports. The solution was to produce "button" supports along the base of the glass within the depth of the structure to achieve the desired effect. The buttons appear inconspicuous within the depth of the primary structure but were engineered to support the above glass on their own.

Uninterrupted Façade

While the floating pod is a striking feature within the building, the tall glass façade—uninterrupted by columns and topped with a thin-profile cantilevered steel-supported high roof—makes an equally strong visual statement on the outside and acts as a new, modern focal point for ACU's campus. The façade pairs amiably with the newly renovated Onstead Science Center, which also features a glass façade and sits adjacent to the HWRC. To support the façade, WPM coordinated with Perkins+Will to design and detail curtain wall back-up steel, which incorporated hidden connections and embed plates, as well as exposed connections ground smooth to accomplish the streamlined look. The architectural expectations of the thin roof were met through careful configuration of the overhead transfer girders supporting the hangers via additional cantilevers within the tight soffit space.

The success of the HWRC project hinged upon close cooperation within a team that worked together on solutions from preliminary design stages through construction, keeping in mind the shared goal of reaching the aesthetic and performance expectations. Recognizing these end goals and striving to integrate solutions throughout the design process was crucial, as was viewing the process holistically. And the result is a new research center that serves as a campus icon not only for its aesthetic appeal, but also for the competitive educational advantages it brings to ACU's students and faculty. ■

Owner
Abilene Christian University, Abilene, Texas

General Contractor
Hoar Construction, Austin

Architect
Perkins+Will, Houston and Dallas

Structural Engineer
Walter P Moore, Houston

Steel Fabricator, Erector and Detailer
Basden Steel, Burleson, Texas