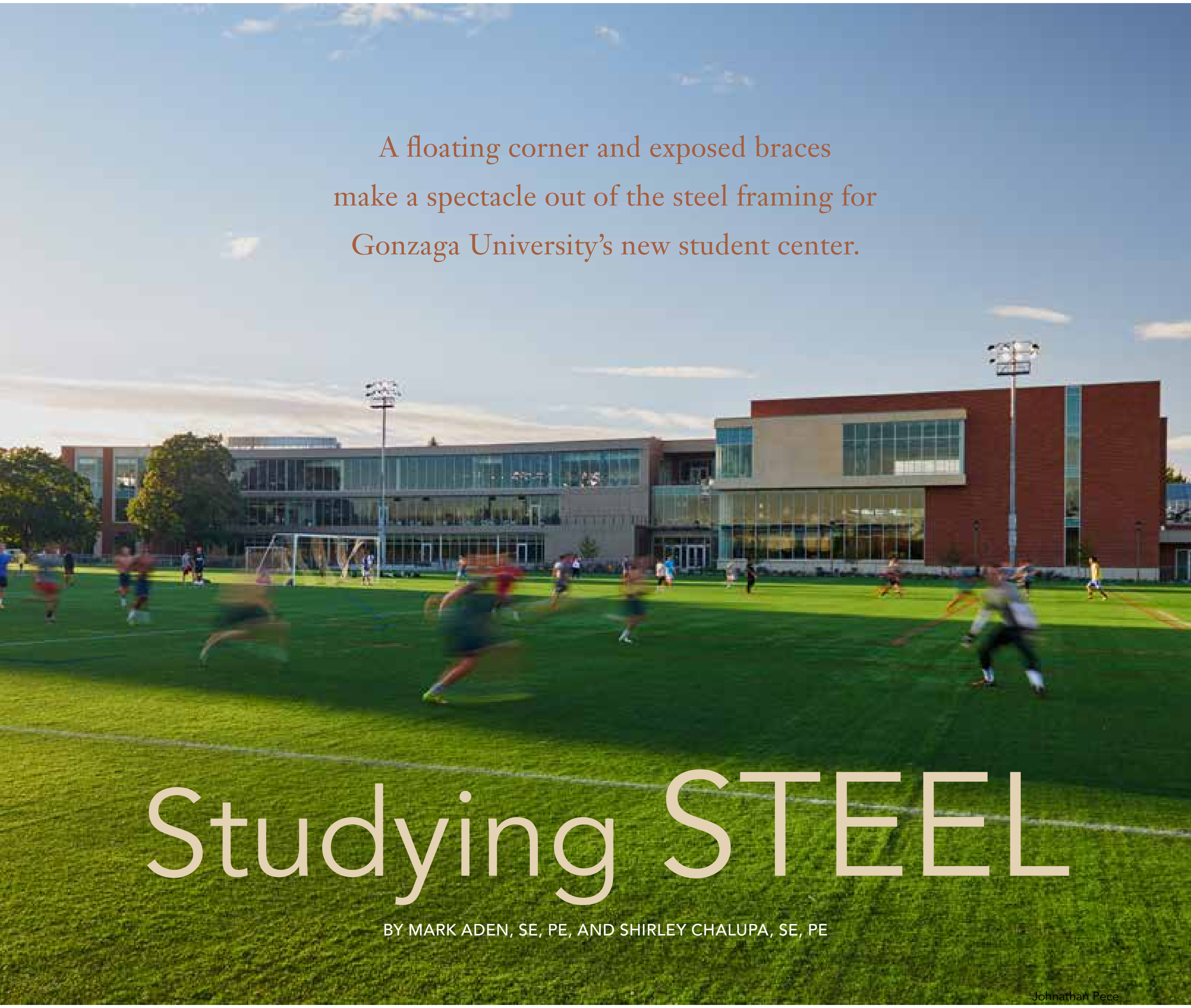
A floating corner and exposed braces make a spectacle out of the steel framing for Gonzaga University's new student center.

Studying STEEL

BY MARK ADEN, SE, PE, AND SHIRLEY CHALUPA, SE, PE



Johnathan Pece

GONZAGA UNIVERSITY'S men's basketball team came in a close second in this past spring's NCAA Tournament, falling to the University of North Carolina.

But its new John J. Hemmingson Student Center is a clear winner. The university had grand visions for the facility, which would serve as a focal point of the university's Spokane, Wash., campus as well as a community gathering place. Meeting this lofty goal while ensuring an efficient structure required an innovative approach to structural steel design.

The needs of the building's end users were extremely varied: an 800-seat multipurpose space capable of hosting conferences, a 200-seat theater for live shows and movies, private prayer rooms, classroom space for academic programs such as the Center for Global Engagement and Center for Experiential Leadership, student leadership groups, a bike repair shop, study lounges and multiple restaurants and cafes. In addition, the university had high aesthetic standards for the three-story, 167,000-sq.-ft building, calling for natural light to reach the interior from all sides, curved lines and plentiful sightlines to the rest of the university.

Captivating Corner

Steel was key to achieving these and other design features, such as the main entry corner. The primary design goal for this element was to create a "floating" student lounge that visually projects its occupants over the main pedestrian mall. From both the inside and outside, the space appears to defy gravity and creates an open, transparent front door to campus.

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Gonzaga's 167,000-sq.-ft Hemmingson Student Center features an 800-seat multipurpose space, a 200-seat theater for live shows and movies, private prayer rooms, classroom space for academic programs and other amenities.

The corner of the truss, which supports multiple large exterior precast panels, was carefully monitored for deflection with phased loading during construction. The truss has a span of 44 ft and a back span of 62 ft. At the roof, the truss and beams cantilever in two directions. This structural feature provided support for hanging the second and third floors from the truss above them.

To create the double cantilever at the roof, a truss (matching the height of the third floor) was installed to make the first cantilever over the second-story space. At the cantilever end of the truss, W30×235 roof beams cantilever through the top chord of the truss,

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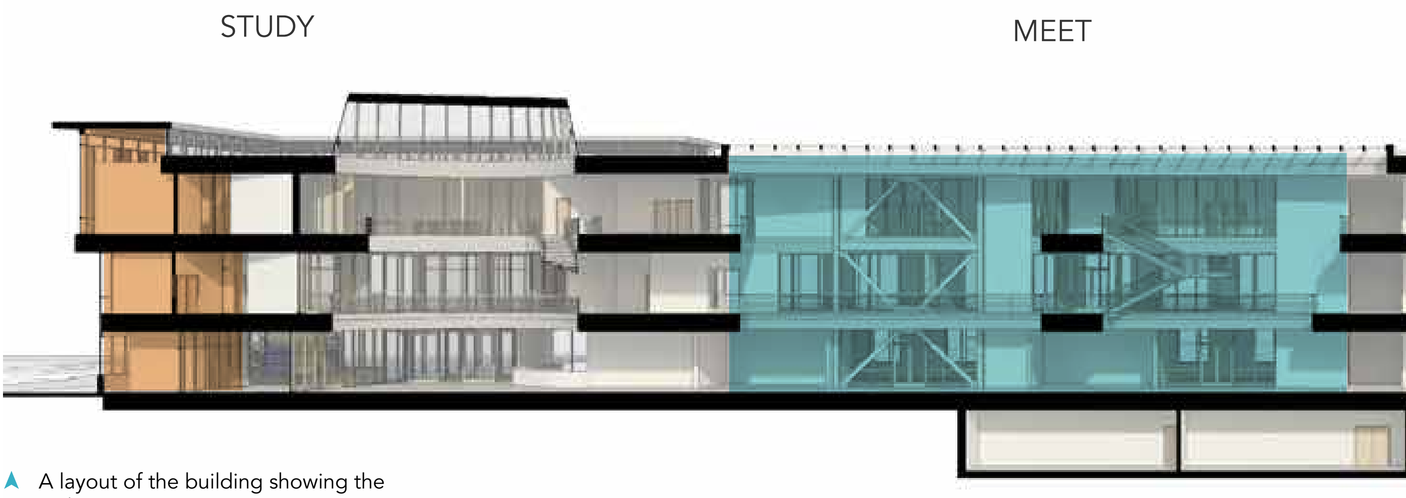

A layout of the building showing the various programs.

creating the second cantilever. The second floor was then hung from the cantilevered roof beams by hollow structural sections (HSS) that aligned with the exterior window mullions. The top chord of the truss is a W30×235, the bottom chord is a W24×229 and the webs are a series of HSS and W-sections. The complex steel system made it possible to maximize a column-free interior corner space and achieve the ultramodern, clean aesthetic the university desired. Natural light is abundant throughout the structure, particularly in the three-story interior atrium. Some parts of the building feature nearly uninterrupted three-story-tall windows.

The building's main rotunda is circled with sweeping steel stairs and crossed by bridges to create a strong sense of interconnection—a nod to the theme of "connecting the campus community." The rotunda roof was envisioned as a floating sloped plane that captures the movement of the sun during the day through 360° of clerestory windows. Architect Opsis worked closely with structural engineering firm DCI to use HSS support columns aligned with the oval-shaped sloping window wall to achieve virtually invisible supports; DCI was able to locate the HSS columns at the same locations as the window jambs thanks to the Revit model.

Drift Control

Inside the main building atrium, buckling resistant braced frames (BRBFs) were used as the lateral system in order to save on foundation


DCI Engineers

BRBFs were used as the lateral system in order to save on foundation costs and control drift of the building—and were also left exposed to serve as a teaching tool.


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EAT


Opsis Architecture

➤ Erecting a truss.

▼ The cantilevered corner, which creates a "floating" student lounge.


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▼ A total of 953 tons of steel was used to meet Hemmingson Center's ambitious aesthetic goals.


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▲ The main rotunda.

▼ An isometric CAD view of the building.


Opsis Architecture


DCI Engineers


Johnathan Pece

▲ An interior view of the completed project.

◄ Located near the geographic center of campus, the project site required a 15-ft-deep mass excavation.

An overhead view of Hemmingson Center and the surrounding campus; the building is at the very center of the image.

costs and control drift of the building. Since the frames help to lower the overall seismic forces in the building, smaller and fewer braced frames were used in the design. The exposed BRBFs also turn the building into a teaching tool for Gonzaga's engineering students and others interested in how innovative structures can provide seismic safety. Nine BRBF variants were installed in the lateral system. The BRBs have up to 7-sq.-in. steel cores and up to 12-in. casings. Also, a combination of welded connections and lug connections were used.

Located near the geographic center of campus, the project site required a 15-ft-deep mass excavation to accommodate the basement. This was designed with maximum allowable temporary cut slopes to minimize impacts to adjacent streets and preserve existing mature trees. The abundance of natural light, facilitated by steel framing, contributes to the LEED Gold building's natural temperature-regulation systems, which include geothermal heating and cooling. A hydroponic greenhouse produces fresh produce and an apiary serves as an educational tool for the campus community.

A total of 953 tons of steel was used to meet Hemmingson Center's ambitious aesthetic goals, while also providing an efficient structural design for a facility that will be a first-rate campus landmark for generations.

Owner
Gonzaga University, Spokane, Wash.

General Contractor
Hoffman Construction, Portland, Ore.

Architect
Opsis Architecture, Portland, Ore.

Structural Engineer
DCI Engineers, Spokane and Portland offices

Steel Team

Fabricator
Advanced Welding and Steel, Grangeville, Idaho

Detailer
Anatomic Iron Steel Detailing, North Vancouver, British Columbia