Colleges and universities are meeting similar challenges with a variety of steel solutions.

# Getting Across Campus

BY JOSEPH E. SHIELDS, P.E., LEED AP

**PEDESTRIAN BRIDGES** on college and university campuses often play a symbolic role in addition to their physical role in providing a valuable connection between two points. Many schools have been making great strides to increase the inter-disciplinary nature of their institutions and in doing so have been taking extra effort to bridge both the physical and organizational separations that exist on campus.

A perfect example is the Knapp Center for Biomedical Discovery, at the University of Chicago, which includes two new pedestrian bridges on its Hyde Park campus on Chicago's south side. The longer of the two is a 90-ft span connecting the Knapp Center at its third floor to the nearby Gordon Center. The second is a 35-ft span to the Donnelley Biological Sciences Learning Center.

The 90-ft pedestrian bridge is elevated three floors above the sidewalk below and is supported by the Knapp Center on one end. On the opposite end the bridge is supported by a narrow braced frame, less than 4-ft wide, positioned eccentric to the bridge. This peculiar means of vertical support was driven both by the architect's desire to make the supports look as slender as possible and a need to avoid existing underground chiller and steam tunnels. Additionally, one face of the bridge is covered in limestone while the opposite face is a relatively lightweight glass curtain wall. This dramatic difference in cladding materials coupled with the eccentric support condition proved to be a particularly challenging aspect to the bridge's design. The end result is something that could be made possible only through the use of a steel frame structure.

Just a few miles north, on the campus of Northwestern University in Evanston, Ill., two steel vierendeel trusses that support a two-story office wing—and which span 99 ft—are the main structural feature in the new Richard and Barbara Silverman Hall for Molecular Therapeutics and Diagnostics. In addition to its impressive span, the office wing cantilevers 14 ft beyond the edge of the truss, providing the faculty offices column-free space and beautiful unobstructed views of the Northwestern campus and adjacent Lake Michigan.

Supported on built-up cruciform columns, the trusses are fabricated from heavy W36 and W40 wide-flange sections. Vertical truss members are attached to the continuous top and bottom chords using full penetration welds. The truss chords required vertical stiffeners and web doubler plates to achieve the extreme moments at these connections. The design team also provided the contractor the option of using a plate girder to avoid the use of stiffeners and doubler plates. Based on steel availability and cost determined by the steel fabricator and detailer, it was more cost effective to use the stiffened wide flange as opposed to the plate girder option. Rather than clad the entire truss, a portion of the vertical elements on one side is painted and exposed. The beauty of the underlying structure is shown in plain sight and if you pay careful attention to the flange thickness of the exposed members you can observe the variation in force as it flows through the truss.


**Above**: A 14-ft cantilever beyond the truss structure provides additional office space on this bridge on the campus of Northwestern University.

**Below**: Two vierndeel trusses support the 99-ft span of the new Richard and Barbara Silverman Hall for Molecular Therapeutics and Diagnostics. Photo (c) Mark Ballogg Photography, courtesy of ZGF.

**Opposite page**: Two new bridges connect the Knapp Center for Biomedical Discovery to other buildings on the University of Chicago campus. An eccentrically located narrow braced frame provides support at one end of this 90-ft bridge, made more challenging by a significant difference in the weight of the cladding materials on the sides of the bridge. Photos by the author except as noted.

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**Caption**: Architecturally exposed HSS sections form the verticals and diagonals of the trusses on this bridge linking the Health Careers and Natural Sciences building to the student union at the College of DuPage.

## Going West

One of the newest and most featured building additions to the College of DuPage, in the Chicago suburb of Glen Ellyn, Ill., has been integrated into the existing campus using a 96-ft clear-span pedestrian bridge. The bridge links the new Health Careers and Natural Sciences building to the existing student union. It consists of two traditional Warren type trusses supported at each end on steel columns. Truss verticals and diagonals are composed of architecturally exposed HSS sections. An AESS criterion was specified for the truss elements and connections to ensure a finished look for the exposed portions.

Our specifications required members indicated as AESS to be in compliance with the AISC *Code of Standard Practice for Steel Buildings and Bridges*, Chapter 10. In addition we have unique specification language regarding the fabrication, connection, surface preparation, and finishing of AESS members to satisfy the architect's desired look.

The pedestrian bridge began as an alternate, but thanks to a favorable bidding environment, it was able to become a reality. It is clad in alternating clear and translucent glass panels that match the exterior of the adjacent building and provide a distinctive addition and contemporary look to the growing College of DuPage campus.

The many pedestrian bridges on college campuses, although sometimes overlooked among the buildings themselves, can prove to be a visually dramatic and functional addition. Each of these bridges has become a signature aspect of the buildings to which it connects, and all have improved the overall connectivity of the schools themselves, providing an easier means of transporting students and faculty across campus, but also providing a more unified campus environment overall. From the structural engineer's perspective, the pedestrian bridge is an opportunity to provide design services for elements such as long spans and trusses that may not be encountered in typical building construction.

MSC

### Knapp Center for Biomedical Discovery, University of Chicago

**Architect**
Zimmer, Gunsul, Fransca Architects LLP, Los Angeles

**Structural Engineer**
Thornton Tomasetti, Inc., Chicago (AISC Member)

**Steel Fabricator**
Zalk Josephs Fabricators, LLC, Stoughton, Wis. (AISC Member)

**General Contractor**
Turner Construction, Chicago

### Richard and Barbara Silverman Hall for Molecular Therapeutics and Diagnostics, Northwestern University

**Architect**
Zimmer, Gunsul, Fransca Architects LLP, Los Angeles

**Structural Engineer**
Thornton Tomasetti, Inc., Chicago (AISC Member)

**Steel Detailer**
Waukegan Steel Sales, Inc., Waukegan, Ill. (AISC Member)

**Steel Erector**
Area Erectors, Wheeling, Ill. (IMPACT and TAUC Member)

**General Contractor**
Turner Construction, Chicago

### Health Careers and Natural Sciences Building, College of Dupage

**Architect**
Hellmuth, Obata + Kassabaum (HOK), Inc., Chicago

**Structural Engineer**
Thornton Tomasetti, Inc., Chicago (AISC Member)

**Steel Fabricator and Detailer**
LeJeune Steel Co., Minneapolis (AISC Member)

**General Contractor**
Gilbane Building Co., Chicago