

Soaring hollow steel writes a new chapter in the history of an architecturally significant high school in suburban Chicago, demonstrating a new take on the original Gothic style.



# LIVING History

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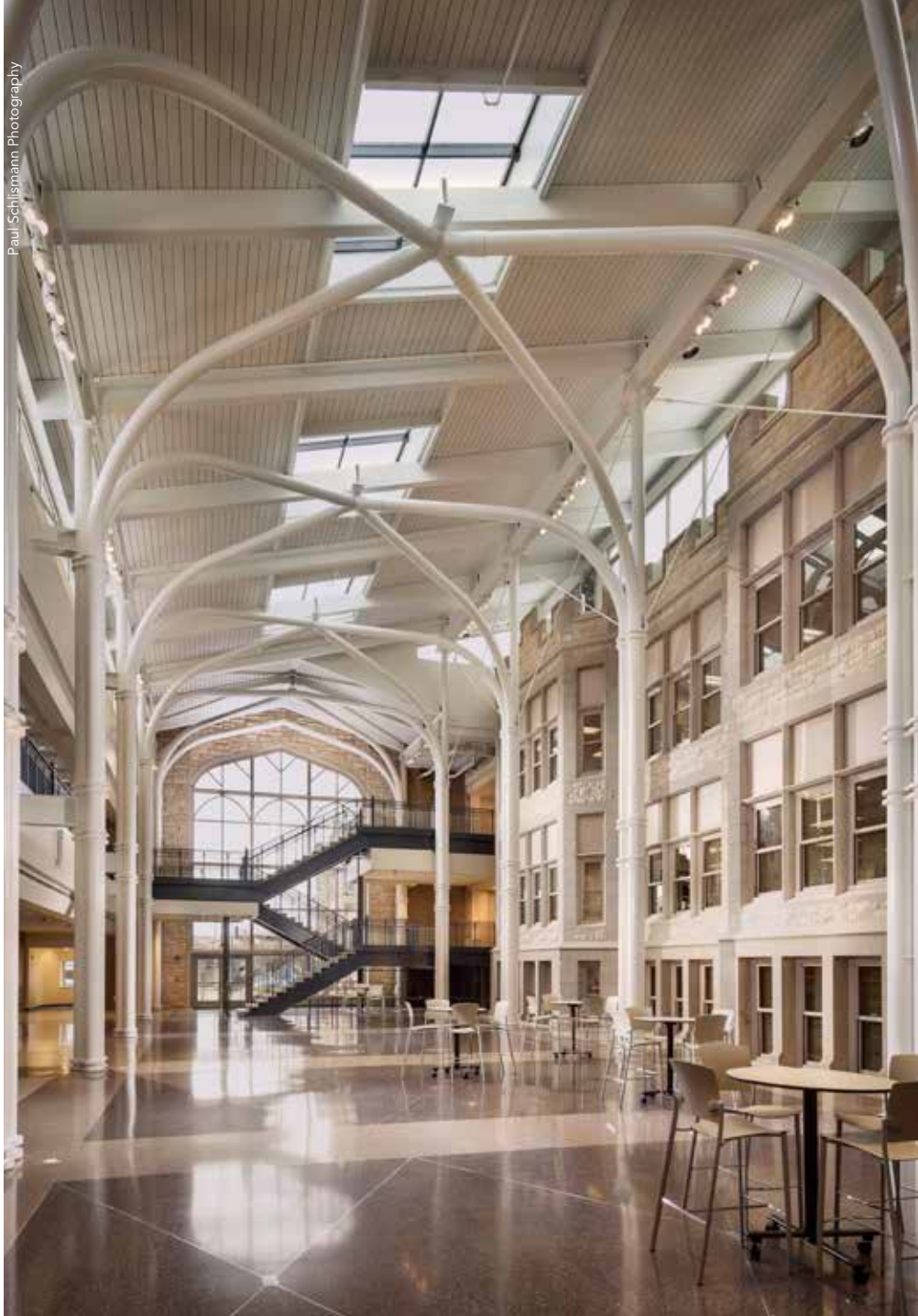


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**JOLIET CENTRAL HIGH SCHOOL** boasts quite the early 20th century architectural pedigree.

Completed in 1901 and now called Joliet Township High School, the building was designed by a prominent architect of the time, Frank Shaver Allen, and employed Daniel H. Burnham Company as the architect for a subsequent major addition. Located in downtown Joliet, Ill., it is listed on the National Register of Historic Places.

The exterior façade of the building was designed in the Collegiate Gothic style using Joliet limestone



Paul Schilsmann Photography

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▲ Joliet Central High School's exterior was designed in the Collegiate Gothic style, using local limestone.

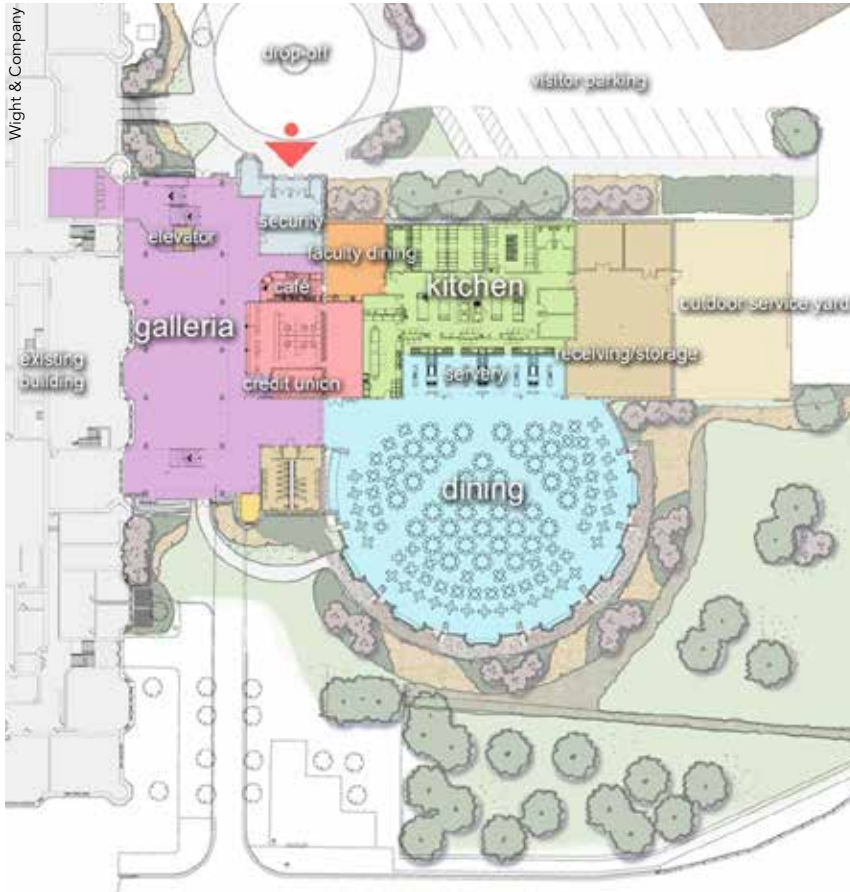
▲ The new atrium, framed with HSS, provides a gathering space for the school's 2,600 students.

and Bedford stone trim material. The building features arched entrance doors and an elaborate interior with plaster relief panels, marble wainscoting and decorative cast iron staircases. Interior features and materials consistently portray the Gothic arch motif.

Now, more than a century after it was built, it has undergone another, 43,000-sq.-ft addition. Designed by Wight & Company (Wight), the new structure features a three-story glass curtain wall façade that leads into a bright and inviting student center atrium. Beyond that is a spacious, open-plan dining pavilion, also steel-framed, that can seat up to 600 people for events. The focal point of the addition is a soaring structure

of hollow structural sections (HSS) that defines a collaborative space for the school's 2,600 students, where they can study, socialize and access student services.

The design team envisioned a space that would serve as the heart of the school, connecting the new with the old. The new atrium references elements of this landmark building's original style but interprets it in a modern way that takes advantage of structural steel to create a wide-open, bright, airy space. The design, which required approval from the state government due to the building's historic designation, incorporates a limestone wall of the existing school, treating it as artwork on the interior of the new structure.



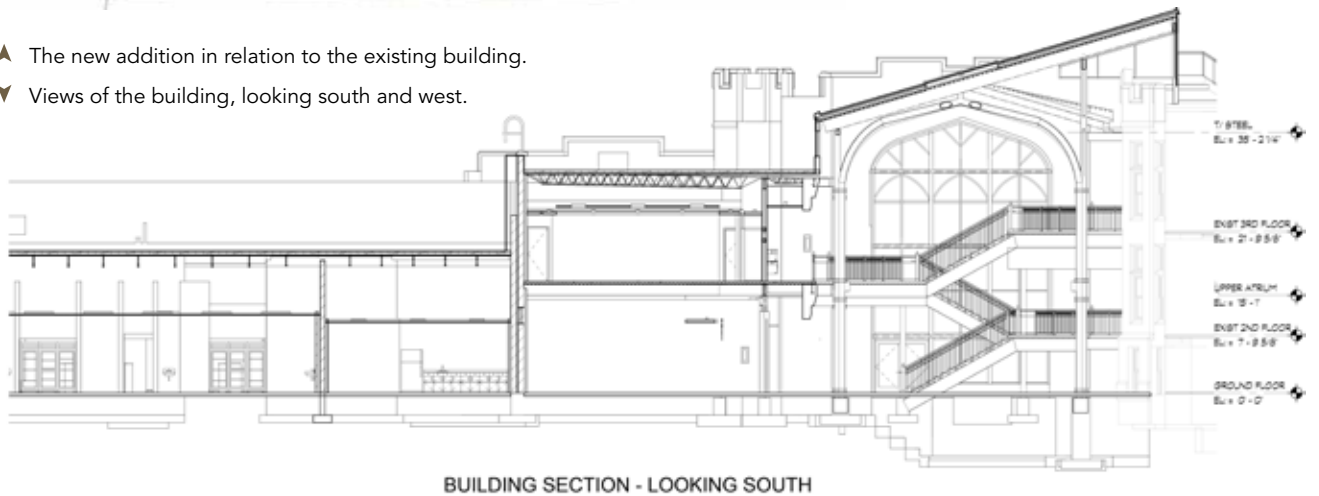
### Alluring Atrium

The structural steel frame of the 50-ft-tall atrium consists of a series of bundled steel HSS columns that branch out in all directions to form the arched roof geometry. These tubular elements come together at a central node located at the peak of each arch, which, in turn, support a series of roof girders, exposed architectural roof decking and skylight frames. The three-story curtain wall encloses the atrium at each end and is laterally braced by horizontal HSS members, allowing for small secondary mullions and improved light transmission and visibility.

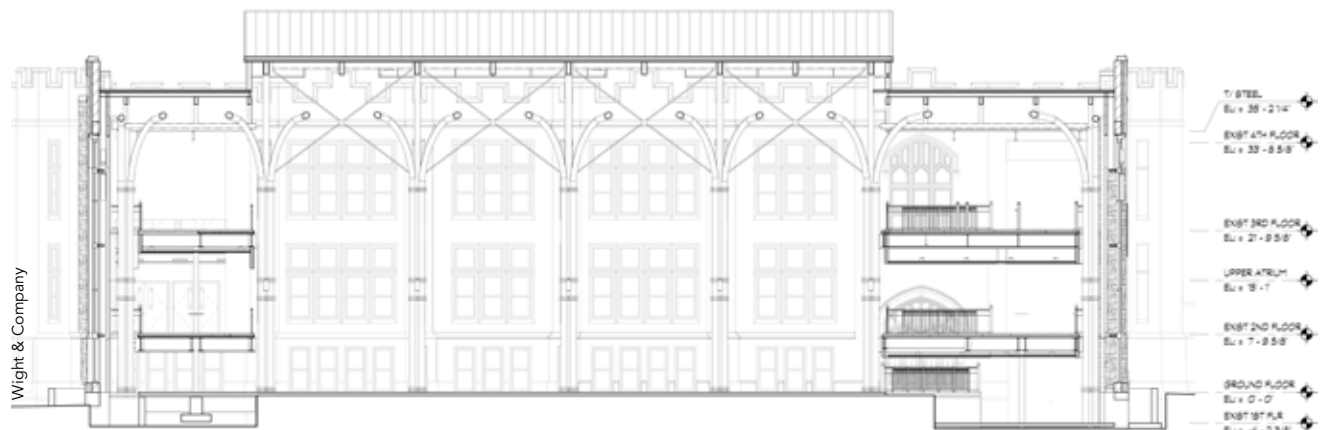
The new atrium is structurally independent from the existing school, and the sloped roof structure rises above and cantilevers over the existing school in order to enclose a portion of the gothic limestone façade. New multi-level stairs from the atrium to the existing school bear on the limestone façade but use slide bearing assemblies for lateral isolation.

Extensive structural and building information modeling (BIM) was used to evaluate the performance of the structure under prescriptive loading. The complex geometry

- ▲ The new addition in relation to the existing building.
- ▼ Views of the building, looking south and west.



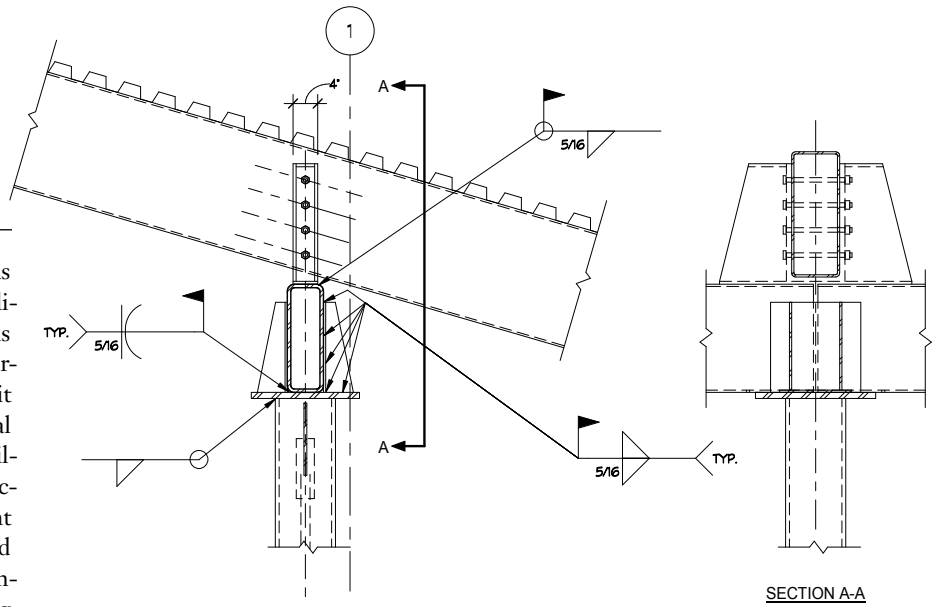
BUILDING SECTION - LOOKING SOUTH



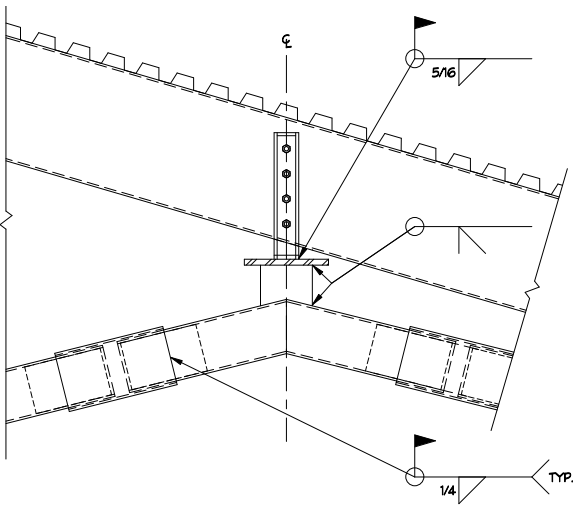
BUILDING SECTION - LOOKING WEST TOWARD GALLERIA

- Custom stiffened plate connections are designed to transfer the sloped roof structure gravity and lateral thrust forces along all major axes to the arch frame below.

required uniquely detailed connections that met the design aesthetic and facilitated erection. A compatibility analysis was undertaken to ensure proper performance of the atrium structure as it interfaces and engages with the original building as well as the new dining pavilion construction. The detailed connections were derived from the standpoint of achieving the desired aesthetics and also took into account shipping and installation factors, all while minimizing cost impact to the project.



SECTION A-A



- ▲ A four-pronged, shop-fabricated HSS assembly joins the arch at the crown. The splice detail near the crown was critical in achieving seamless erection of the 3D frame.



Paul Schlisman Photography

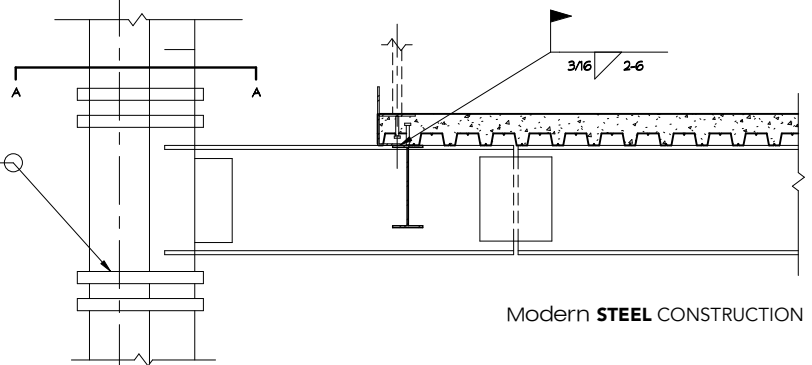
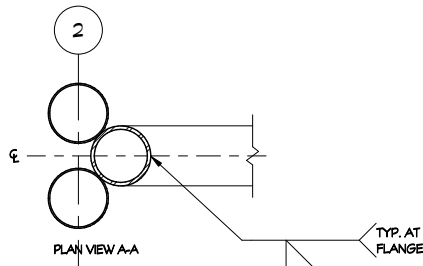
- ▼ The atrium is structurally independent from the existing school.



Paul Schlisman Photography

- ▲ The 50-ft-tall atrium contains bundled HSS columns that branch out in all directions.

- ◀ Framing during construction.



Modern STEEL CONSTRUCTION



Wight & Company



Wight & Company

◀ All exposed steel was inspected at the shop prior to delivery to the site.

### Gothic Nod

The arch geometry references the Gothic style of the existing limestone exterior. Springing up from clustered column bundles, the structural HSS were shaped as Gothic ogee arches that formed overhead cross-vaults evoking the naves of 12th century European church architecture. In this way, Gothic masonry expression was translated into modern design, connecting the centuries between the medieval master builders and 21st century structural engineering.

Regular design meetings were held with steel fabricator Waukegan Steel and the erector (who performed the atrium portion; the dining facility was a separate contract) to evaluate feasibility and constructability of the steel frame, and designer visits to the fabrication shop ensured the final product met the design intent. Complete atrium frames were assembled in the shop to confirm proper fit-up, which allowed for an exceptionally flawless and efficient erection process. In addition, architecturally exposed structural steel (AESS) specifications were adhered to, resulting in a smooth and continuous structure free of imperfections and visible joints.

The importance of collaboration was evident in resolving the constructability of the complex 3D frame. It also helped reinforce a clear vision for the entire team throughout the process regarding the desired design aesthetic and feel. The value of connecting two very different time periods via design and construction capabilities is evident in how the new steel frame relates to the original building—all on prominent, permanent view to students, faculty and visitors. ■

#### Owner

Joliet Township High School District 204, Joliet, Ill.

#### Architect and Structural Engineer

Wight & Company, Darien, Ill.

#### Construction Manager

Gilbane Building Company

#### Steel Team

##### Fabricator and Detailer

Waukegan Steel, LLC, Waukegan, Ill. 

##### Bender-Roller

BendTec, Inc., Duluth, Minn. 



Wight & Company

▲ ▼ The new dining facility, as seen from the exterior and the interior. The open-plan pavilion can seat up to 600 at a time.



Paul Schisman Photography



Wight & Company

◀ A beam splice separating the atrium and dining pavilion (see detail on previous page).