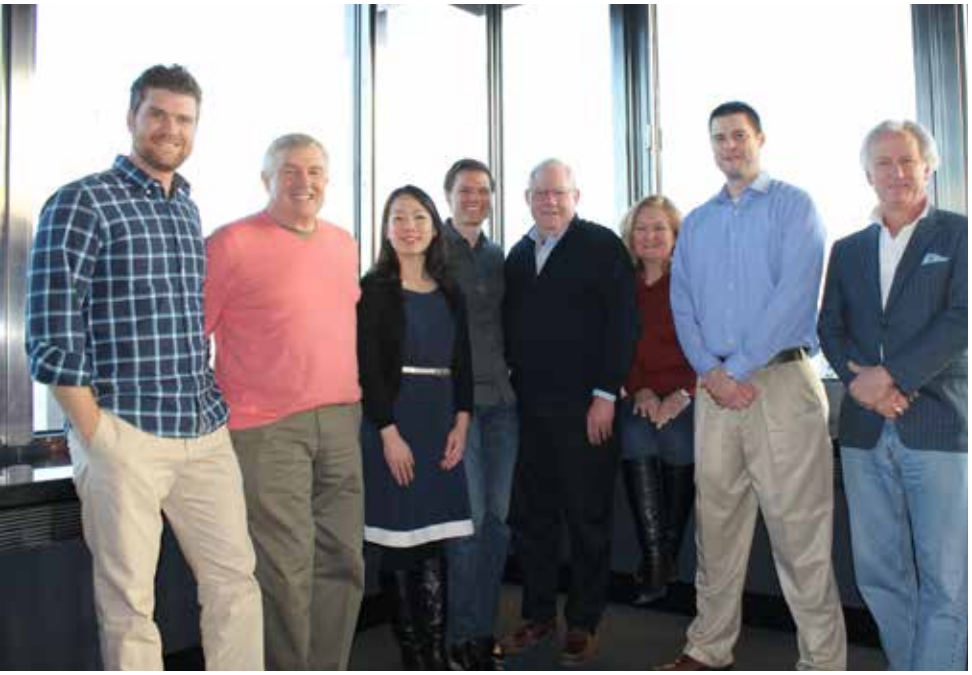
2016 IDEAS² awards



INNOVATIVE DESIGN
in ENGINEERING and
ARCHITECTURE
with STRUCTURAL STEEL

MODERN STEEL CONSTRUCTION IS PROUD to present the results of AISC's annual IDEAS² Awards competition, which recognizes Innovative Design in Engineering and Architecture with Structural Steel. Awards for each winning project will be presented to the project team members involved in the design and construction of the structural framing system, including the architect, structural engineer of record, general contractor, owner and AISC member fabricator, erector, detailer and bender-roller. New buildings, as well as renovation, retrofit and expansion projects, were eligible, and entries were asked to display, at a minimum, the following characteristics:

- A significant portion of the framing system must be wide-flange or hollow structural steel sections
- Projects must have been completed between January 1, 2013 and December 31, 2015
- Projects must be located in North America
- Previous AISC IDEAS² award-winning projects are not eligible

The judges considered each project's use of structural steel from both an architectural and structural engineering perspective, with an emphasis on:

- Creative solutions to the project's program requirements
- Applications of innovative design approaches in areas such as connections, gravity systems, lateral load resisting systems, fire protection and blast protection
- The aesthetic impact of the project, particularly in the coordination of structural steel elements with other materials
- Innovative uses of architecturally exposed structural steel
- Advancements in the use of structural steel, either technically or in the architectural expression
- The use of innovative design and construction methods such as 3D building models, interoperability, early integration of steel fabricators, alternative methods of project delivery and sustainability considerations

A panel of design and construction industry professionals judged the entries in three categories, according to their constructed value in U.S. dollars:

- Under $15 million
- $15 million to $75 million
- Over $75 million

National honors were awarded in all three categories, merit awards were given in two categories and a Presidential Award of Excellence in Engineering was also given. In addition, this year's jury recognized steel's important role in public art by selecting an outstanding sculpture project.

THE AMERICAN PHYSICAL SOCIETY'S (APS) newly renovated headquarters in Ridge, N.Y., is somewhat of an object lesson in physics.

Founded in 1899, the nonprofit organization's objective is to "advance and diffuse the knowledge of physics," and its new facility does just that with its new addition. Because the Long Island Pine Barrens Preservation Act prohibited expanding the building's footprint, the building had to expand upward. The result is an 18,000-sq.-ft level atop the original one-story 30,000-sq.-ft building.

The team was tasked with meeting the project's $6 million construction budget without interrupting the operation of the office—which eliminated the option of leasing temporary space and temporarily relocating APS' 150 employees—so all construction was achieved with the building fully occupied.

The existing structure—footings, columns, roof framing and lateral system—did not have the capacity to support the second story loads. The long-span design with a column grid as large as 38 ft by 62 ft resulted in a spacious, column-free and architecturally flexible interior with minimal penetrations through the existing ground floor. The majority of the perimeter columns were located outside the walls of the existing building, forming an exoskeleton in the courtyard.

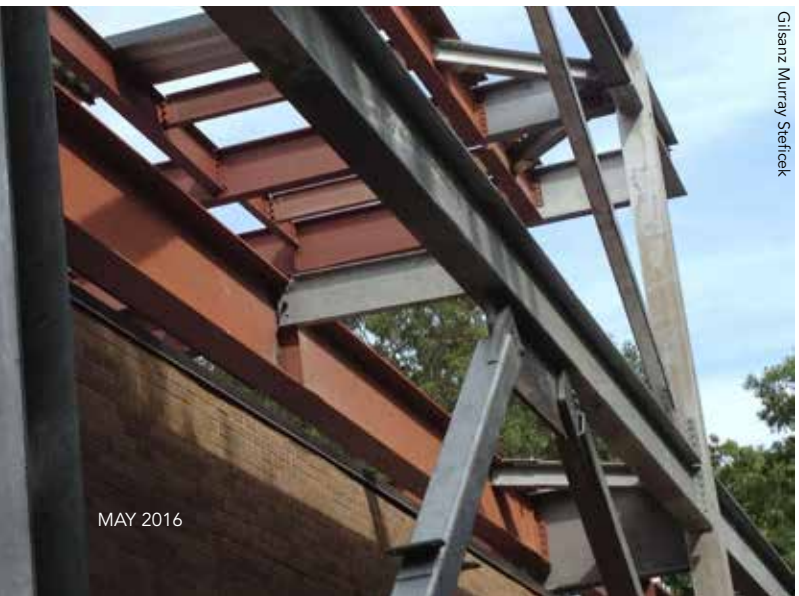
The W12 columns of the new frame are situated 5 ft to 9 ft outside the perimeter of the existing structure, which eliminated any interference with the existing foundation and allowed most of the foundation work to be done outside the building. Only six columns penetrate the interior of the existing building, and these columns and footings were installed one at a time, with limited impact to the occupied building. The new second floor is elevated 4 ft over the existing roof, with the interstitial space housing mechanical services. In addition, the existing roof served as a working platform for the erection of the addition.

The thermal analysis of the exoskeleton accounts for the differential expansion and contraction created by the temperature differences between the interior and the exterior of the building. All members that penetrate the building envelope are insulated for the first 8 ft as they enter the building. A series of skewed W8×24 members brace the exterior beam-column connections to not only resist lateral loads but also to dissipate the increased stresses caused by the temperature differentials.

The long-span design took into account the deflection, vibration and construction of the steel members. The 57-ft-long W24 filler beams span north to south between W30 to W36 east-west girders, which in turn frame into columns at the interior. At the north side, the girders are offset from the columns, serve as spandrels beams and are located within the building envelope. These spandrels frame into 62-ft-long W30 beams at the north-south column line that extend through the envelope and connect to the exoskeleton columns.

The building's lateral system consists of eight braced frames,

David Sundberg - Esto


Gilsanz Murray Steficek

NATIONAL AWARD Under $15 Million
American Physical Society, Ridge, N.Y.


David Sundberg - Esto

which use diagonal HSS8×8 braces that frame at three locations around the perimeter of the exoskeleton, two locations within the existing single-story section of the structure and three visually exposed locations at the new double-height interior atrium. The existing one-story building was laterally upgraded by tying it to the new two-story structure so that both behave as one.

Floor slabs consist of 2½-in. normal-weight concrete on 3-in. metal deck. To moderate deflection that occurs in long-span frames, the concrete was placed from the center of the diaphragm outward. The design called for slip joints at the top of all interior partition walls so that deflection under snow loads or other live loads would not cause interior partitions to buckle.

The exoskeleton supports an eco-mesh made of 0.135-in. woven wire mesh with a unique bridge wire for stabilization and framed on four sides with 16-ga metal channel. These "green screens" carry native vines, enveloping the complex in a green blanket and mitigating solar heat gain from the building's façade.

The exposed portion of the existing roof was converted into a light-weight green rooftop, over which shorter green screens are supported by HSS6×6 "eyebrows" that cantilever from the new second-floor roof. A new second-floor terrace was designed to accommodate possible future expansion within that area, and a new mezzanine level over the western portion of the atrium is suspended from the upper structure using W6 and W8 hangers. Interior steel was left exposed and fire-protected with intumescent paint.

This project was developed using Revit, and a BIM consultant facilitated coordination between the design team and contractors from the outset and reduced the duration of design development by avoiding any major unanticipated interference. This process also enabled the structural engineer to verify the alignment of steel members within the construction documents and confirm the connections and load transfers. The collaboration between the architect's talent for aesthetic emphasis and the engineer's innovative structural design resulted in a state-of-the-art, high-performance and cost-effective facility.

Owner
American Physical Society, Ridge, N.Y.

Owner's Representative
LePatner & Associates, New York

Architect
Marvel Architects, New York

Structural Engineer
Gilsanz Murray Steficek, New York

General Contractor
T.G. Nickel & Associates, Ronkonkoma, N.Y.

Steel Fabricator and Detailer
STS Steel, Schenectady, N.Y.


David Sundberg - Esto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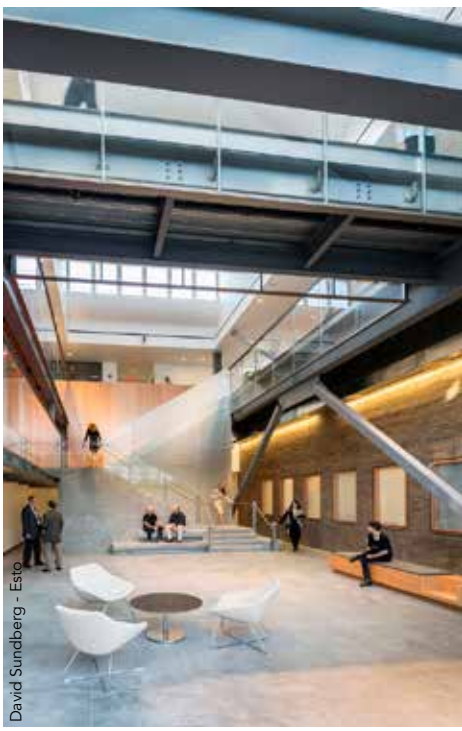
"An honest project that celebrates the existing building and steel expansion structure without overwhelming you." —Jason Stone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Marvel Architects