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.

Meet the Jury

William D. Bradford, owner juror. William is an assistant director/project manager with the University of Illinois at Chicago's Office for Capital Programs, which manages the major planning, design and construction projects for the campus. He currently is overseeing the restoration of the exterior façade of University Hall and the 28-story Administration Building; major remodeling projects for the Outpatient Care Center, Human Resources Building and Stevenson Hall classrooms; and planning for a new Advanced Chemical Technology Building for chemistry, physics and biological sciences. Prior to joining UIC, William was in private practice for over 30 years, designing facilities for various institutions of higher education. A licensed architect in five states, he holds a Master of Architecture from the University of Illinois at Urbana-Champaign, has served as president of the Chicago Chapter of the American Institute of Architects and the Illinois State Council of the AIA, and is a past recipient of the AISC Design Excellence Award.

Roger E. Ferch, AISC staff juror. Roger, AISC's president since 2005, has been active in the steel construction industry for more than 40 years. He began his career as a Naval Civil Engineer Corps officer then joined the steel construction industry with The Herrick Corporation in 1974, where he supervised various departments during his 30 years with the company. He was promoted to vice president in 1989 and was responsible for managing the purchasing and engineering departments as well as the firm's major projects. Some of the noteworthy buildings he's worked on include the Boeing 777 Assembly building, the San Francisco Airport International terminal and the Frank Gehry-designed Walt Disney Concert Hall in Los Angeles. Roger's education includes a Bachelor of Science in civil engineering from the University of Washington and a Master of Business Administration from the University of California, Berkeley. A licensed civil engineer in California, he served on AISC's Board of Directors from 1998 to 2005 and also served as vice chairman of the AISC Specification Committee.

Kem Hinton, architect juror. Kem is a founding principal of Tuck-Hinton Architects in Nashville, whose most prominent projects include the Country Music Hall of Fame and Museum, the Tennessee Bicentennial Capitol Mall, the Frist Center for the Visual Arts, Middle Tennessee State University Sports Hall of Fame, the Tennessee World War II Memorial, Nashville Public Square and the Music City Convention Center. Kem received his Bachelor of Architecture from the University of Tennessee and his Master of Architecture from the University of Pennsylvania. He is the author o*f A Long Path, the Search for a Tennessee Bicentennial Landmark and contributor to The Work of Tuck-Hinton Architects: 1984-2014*.

Wanda Lau, trade media juror. Wanda is the senior editor of technology, products and practice for *ARCHITECT* and *Architectural Lighting* magazines, and has a decade of AEC experience. She holds a Bachelor of Science in civil engineering from Michigan State University, a Master of Science in building technology from MIT and Master of Arts in journalism from Syracuse University.

Paula Pritchard, general contractor juror. Paula is a partner, construction manager and vice president of Plant, where she has worked since 2000. She has over 25 years of construction experience, building a variety of projects including new construction, high-rise residential, tenant interiors and remodels of occupied spaces throughout the United States and Canada. She joined Plant after relocating to the Bay Area from Portland, Ore., where she was a project manager in charge of construction of Nike's NikeTown stores. Paula is a licensed civil engineer in California and received her Bachelor of Science in civil engineering from the University of the Pacific.

Colter Roskos, engineering student juror. Colter is a Ph.D. student in the University of Texas at Austin's Department of Civil, Architectural and Environmental Engineering's Ferguson Structural Engineering Laboratory. He has earned a Bachelor of Science and a Master of Science in civil engineering from Montana State University. Colter worked for two years as a project engineer for Eclipse Engineering, focusing heavily on designing light-gauge truss/fabric structures and structural steel connections for steel fabricators. His current project at UT, "Partial Depth Precast Panels on Curved Bridges," involves the development of a method to connect precast panels to the top flanges of I-girders and tub girders so that the panels can be relied on for stability bracing of the girders during construction of the bridge.

Jason B. Stone, P.E., structural engineer juror. Jason is a senior associate at Leslie E. Robertson Associates (LERA) and is currently the project manager for the Hyundai Global Business Center—a large mixed-use development in Seoul, Korea—in addition to several projects in New York. Some past projects that he has been involved with include the New Academic Building– CUNY John Jay College, World Trade Center – Tower 4, the Shanghai World Financial Center and the William Jefferson Clinton Presidential Center in Little Rock, Ark. He is an associate adjunct professor of architecture at Columbia University and holds a Master of Science in structural engineering from Stanford University and a Bachelor of Science in civil engineering from the University of Illinois at Urbana-Champaign.

Brian Wessel, steel fabricator juror. Brian is the general manager of Cives Steel Co.–Mid-West Division, located in Wolcott, Ind., an AISC Member and Certified fabricator, where he began his career in 1997 as a project engineer. Since then, he has steadily risen through the ranks, being promoted to project manager in 2001, estimating manager in 2008, operations manager in 2014 and his current position—in which he oversees all plant operations—last year. Some of Cives Mid-West's current projects include the River Point high-rise in downtown Chicago, the Detroit Event Center (the new home of the Detroit Redwings) and the McCormick Place Event Center in Chicago. He is a graduate of Rose-Hulman Institute of Technology in Terre Haute, Ind.


Jeff Goldberg, Esto

BuroHappold Engineering


Jeff Goldberg, Esto

NATIONAL AWARD Over $75 Million National September 11 Memorial Museum Pavilion, New York


BuroHappold Engineering

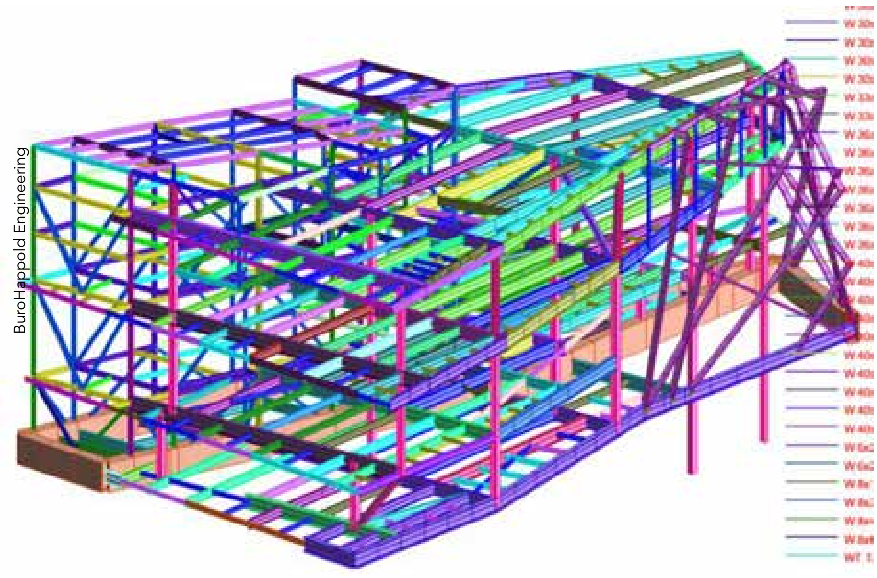
THE NATIONAL SEPTEMBER 11 Memorial Museum Pavilion is a striking presence on the memorial site not only because of its dramatic, angular structure and prominently displayed steel tridents, but also because it is the only above-ground portion of the museum.

While it protrudes four stories into the air, the remainder of the facility, including the two pools that represent the footprints of the original World Trade Center towers, are all below-grade. The 47,600-sq.-ft cultural facility orients visitors within the memorial grounds, acting as an entry point to the museum and belying the complexity of the site.

Overcoming the many constraints of a site that is situated in dense urban environment and that has been continually transforming since September 11, 2001, required rigorous coordination and interplay among architect, engineer and other project teams working on site. Integrated structural systems, both above and below grade, impacted the building's design as well. The team had to take into consideration support for the museum below and other underground infrastructure when calculating structural loads.

The majority of the pavilion is supported over the PATH (Port Authority Trans-Hudson) train station and tracks while the remainder sits atop the museum. Analysis of these below-grade structures, the memorial pools and surrounding infrastructure identified, in addition to the pavilion's concrete core, limited the supports capable of carrying the loads of the pavilion. A full-story-tall steel truss extends from the pavilion's core to effectively cantilever the building over the PATH station hall.

While the concrete core provides lateral stability for the pavilion, its location above the PATH tracks and station hall complicated the transfer of lateral forces to the ground. To solve this issue, the pavilion is ringed with steel and reinforced-concrete composite drag beams that transfer the forces to the museum's shear walls. To construct the pavilion shear walls over the tracks, erection trusses support the full weight of the four-story pavilion's walls.


BuroHappold Engineering


BuroHappold Engineering


Jeff Goldberg, Esto


Jeff Goldberg, Esto

> "Wow! The design team got it right on this one. A powerful and humbling project." —Brian Wessel


Jeff Goldberg, Esto

One of the most Pavilion's most striking features is the pair of 80-ft-tall artifacts known as the tridents, which originally formed the iconic outer structural support of the original towers. The tridents are housed in a full-height steel and glass atrium that also extends one story below grade. The atrium steel support is a complex configuration of HSS20×8 and HSS20×12 clad with a uniform rectangular curtainwall system set at an angle. Due to their size, the tridents were installed prior to the installation of the atrium's structural steel framing system—and they were protected as the atrium and remainder of the pavilion were constructed. Within the atrium, the pavilion's freestanding, HSS-supported grand stair is 30 ft tall and widens as it descends, bringing visitors within close proximity of the tridents. The stair has limited support points, creating the appearance of floating within the space.

For more on the National September 11 Memorial Museum Pavilion, see "Monument of Perseverance" in the "What's Cool in Steel" feature in the August 2015 issue, available at www.modernsteel.com.

Owner
National September 11 Memorial and Museum at the World Trade Center

Architects
Snøhetta, New York
Adamson Associates International, New York

Structural Engineer
BuroHappold Engineering, New York

General Contractor
Bovis Lend Lease, New York

Steel Fabricator, Erector and Detailer
AFCO | W&W Steel, Oklahoma City, Okla.

THE MARIPOSA LAND PORT OF ENTRY in Nogales, Ariz., is one of the busiest land ports in the United States.

Processing over 2.8 million northbound vehicles each year and serving as the entry point to 37% of the produce imported to the U.S. from Mexico, it was in need of modernization and expansion due to the growth in trade since it was built in the 1970s. Completed in 2014, the updated 55-acre site now contains 270,000 sq. ft of buildings, inspection facilities and kennels for both south- and northbound traffic. The total cost for the LEED Gold-certified project was $187,000,000.

The circulation design consists of four parallel zones: a southbound traffic zone, a northbound privately owned vehicles (POV) zone, the "oasis" and a northbound commercial traffic zone. The oasis is the central spine of the port, a desert garden that runs the length of the main buildings and uses landscaping to provide respite from the harsh Sonoran climate and the day-to-day stress of security and border protection. The Sonoran Desert experiences huge amounts of rainfall during the monsoon season. Therefore, the pavement and roof structures throughout the Mariposa campus are designed to collect the rainfall and convey it to a 1 million-gallon underground storage tank use for landscape irrigation. The large steel scuppers throughout the project celebrate the collection of rainwater. The inspection canopies, trellises and roof structures are constructed of weathering steel, adding to the visual richness of the port as it develops a natural patina over time.

The most distinguishing feature of the Mariposa Land Port of Entry is the large amount of exposed structural steel throughout the site. The most prominent of these structures is the large shade canopy spanning across the entry to the port. The canopy's trusses provide shade from the desert sun, facilitate overhead inspection of vehicles by way of a continuous catwalk and create the dynamic red, white and blue entry threshold to the United States.

In addition to the entry canopy, the two main buildings (both over 1,000 ft long) have large structural steel overhang trellises. These shade structures as well as the roof overhang structures all consist of long-span, custom designed steel trusses carefully articulated to direct rainwater movement. The trusses were designed and detailed in the structural engineer's office for each span and loading condition as the architecture required different steel shapes than those in typical pre-fabricated trusses. In addition, all steel connections are expressed and custom detailed.

The trusses along the largest canopy structure span 64 ft on average with additional 18-ft cantilevers at each end. The trusses are spaced as much as 15 ft on center and support 3-in., 18-ga. steel decking and HSS while accommodating vehicular movement below. The trusses bear on deep custom steel joist girders, and the girders span 38 ft and are supported on high-strength HSS columns. These girders are nearly 1,000 ft long, transitioning from the inspection

Bill Timmerman

Bill Timmerman

MERIT AWARD Over $75 Million
Mariposa Land Port of Entry, Nogales, Ariz.

Brian Farling

Bill Timmerman

canopy to the interior of the main processing lobby and back to exterior canopy.

The majority of the custom trusses consist of HSS for the top and bottom chords and a combination of HSS and channel sections for the web members. A large portion of the HSS was required to be high-strength steel due to the large internal stresses induced, and some of the longer-span trusses were assembled on-site.

Another unique element of the port is the set of serpentine shade structures for pedestrian crossing at the international border. These structures consist of rigid steel bents spaced at approximately 10 ft o.c. and made of wide-flange sections and steel channels. Smaller HSS members are used as infill to create a unique shade pattern.

Construction of the Mariposa Port occurred over four phases spanning 58 months. The new facility was constructed in the footprint of the previous facility, and the team knew from day one that there could be no interruption of port operations at any point during construction. The orchestration of multiple tenant moves became an art unto itself as temporary facilities wove between the new buildings and other elements as they were being constructed. These efforts were further complicated by the reality of needing to keep thousands of semi-trucks rolling through the facility without obstruction. Conceptual phasing plans were developed by the design team and refined and implemented by the contractor, and the site team worked closely with the port's directors to ensure that it remained operational at all times while not impeding construction activities. Staying on schedule was facilitated by port liaisons, who participated in weekly project meetings with the project team. Not only was the project delivered on time, (and some portions were even completed early), but the building team was also able to accommodate and integrate more than $20 million in tenant-requested added scope without any time loss on the project.

Owner
General Services Administration, Region 9, San Francisco

Owner's Representative
GSA - Design + Construction, San Francisco

Architect
Jones Studio, Phoenix

Structural Engineer
Bakkum Noelke Consulting, Phoenix

General Contractor
Hensel Phelps, Phoenix

Steel Fabricator and Erector
S&H Steel, Gilbert, Ariz.


Bill Timmerman

"Simple materials beautifully detailed. The design fits the desert location."
—William Bradford


Bill Timmerman


Bill Timmerman


Bill Timmerman

Nic Lehoux

Nic Lehoux

Nic Lehoux

Nic Lehoux

"The design is sleek and the cantilevered conference rooms are wonderful."
—Paula Pritchard

Bohlin Cywinski Jackson

Bohlin Cywinski Jackson

Bohlin Cywinski Jackson

NATIONAL AWARD $15 Million to $75 Million
Nu Skin Innovation Center, Provo, Utah

THE NU SKIN INNOVATION CENTER transforms Nu Skin Enterprises' corporate campus in Provo, Utah, into an inspiring new headquarters that reflects the modern sensibilities of a global company.

The new $74 million, 170,000-sq.-foot facility houses research laboratories, conference spaces, two cafés, a retail storefront, a fitness center, three floors of executive offices and a data center in a series of elegant, light-filled spaces that reflect the aspirational qualities of the Nu Skin brand and its line of anti-aging products.

The new facility is the culmination of three components: a three-story building to the north, a six-story steel-framed building to the south and a four-story steel-framed atrium. A canopy on the south elevation that extends the interior spaces into the landscape is supported by 18-ft-tall, 6-in.-diameter HSS columns, and an airfoil-shaped mechanical penthouse tops the south building.

Typical framing for this building is composed of structural steel columns supporting composite steel beams and floor slabs. One of the first-floor meeting rooms needed to be column-free, so six tower columns are transferred at the third floor and are supported by two 67-ft-long built-up steel plate girders in the north-south direction and two 85-ft-long story-deep trusses spanning east-west.

The atrium is the heart of not only the two new buildings, but the Nu Skin campus as a whole. The glass roof is supported by steel girders that span between the north and south buildings, along with intermediate steel beams and tension bracing. The translucent glass ceiling is hung from delicate trusses, which are in turn suspended from the roof girders. The 10-ft, 6-in.-wide feature stair rises 29 ft between levels 1 and 3 and runs 93 ft continuously along the atrium; the stringers and treads and both fabricated with steel channels.

For more on the Nu Skin Innovation Center, see "Extreme Makeover" in the February 2016 issue, available at ***www.modernsteel.com****.*

Owner
Nu Skin Enterprises, Provo, Utah

Architect
Bohlin Cywinski Jackson

Structural Engineer
Magnusson Klemencic Associates, Seattle

General Contractor
Okland Construction, Salt Lake City, Utah

Steel Team

Fabricator
Tech-Steel, Clearfield, Utah

Detailer
Axis Steel Detailing, Inc.

Bender-Roller
Paramount Roll & Form, Santa Fe Springs, Calif.

TEN Arquitectos

TEN Arquitectos

NATIONAL AWARD $15 Million to $75 Million
Rutgers University School of Business, Piscataway, N.J.

THE 150,000-SQ.-FT RUTGERS BUSINESS SCHOOL is more than just an academic building; it also serves as the gateway to Rutgers University's Livingston Campus in Piscataway, N.J.

Organized into three layers—classroom, office and public spaces—the building consists of two towers connected by a "floating" L-shaped portion that features a 92-ft, column-free span (made possible by 60-in.-deep built-up plate girders) This connector portion is supported 60 ft above ground level by 12 exposed 65-ft-long, 36-in.-diameter round sloping columns. These columns are filled with self-consolidating concrete and coated with intumescent paint.

Due to the open nature of the building, numerous openings in the floor diaphragms were required. Along with the L-shaped building mass connecting the two towers, these openings spurred the team to carefully follow the load paths of the wind- and seismic-induced loads into the building's exposed X-brace framing. In order to mitigate vibration issues in the floating L-shaped portion of the building, the design team created a finite element model was created to study human induced vibrations for floating L-shaped portion, and a time history analysis, following the AISC Design Guide 11: *Floor Vibrations Due To Human Activity* recommendations, was also performed. Fortunately, the studies confirmed that human-induced vibrations would be considerably less than the acceptable vibration levels defined in the guide.

The building, like all new construction at Rutgers, is LEED Silver equivalent. Solar panels located above the adjacent parking lot provide power, and cooling and heating needs are augmented by neighboring geothermal bore fields built below the quad. All storm water is managed through bioswales and retention ponds on-site. In addition, the atrium provides high levels of daylighting, and the mechanical system is optimized for lower energy use.

For more on the Rutgers University School of Business, see "Elevating Business" in the January 2016 issue, available at www.modernsteel.com.

Owner
Rutgers University, Piscataway, N.J.

Owner's Representative
Structure Tone, New York

Design Architect
TEN Arquitectos, New York

Executive Architect
Richard Bienenfeld AIA, New Rochelle, N.Y.

Structural Engineer
WSP, New York

General Contractor
Century 21 Construction, River Edge, N.J.

TEN Arquitectos

Allen Thompson courtesy of WSP

“A project that invites you in and begs you to touch and wonder at it. It’s easy to forget that it’s a functioning building and not just a wonderful piece of sculpture.” —Jason Stone

Allen Thompson courtesy of WSP

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

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

David Sundberg - Esto

Gilsanz Murray Steficek

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

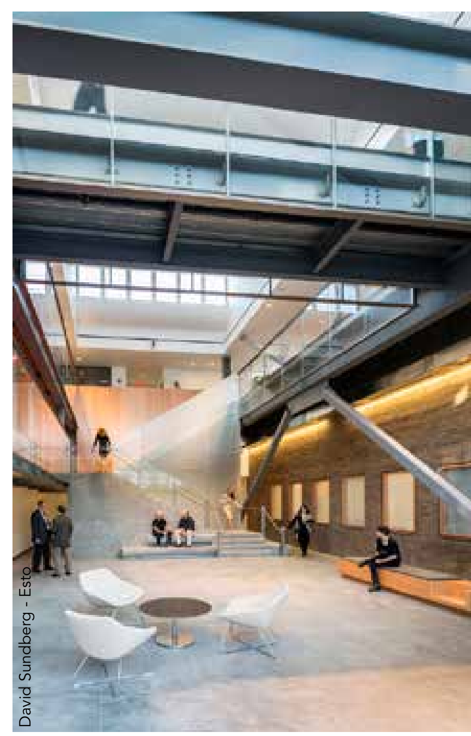
General Contractor
T.G. Nickel & Associates, Ronkonkoma, N.Y.

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

David Sundberg - Esto

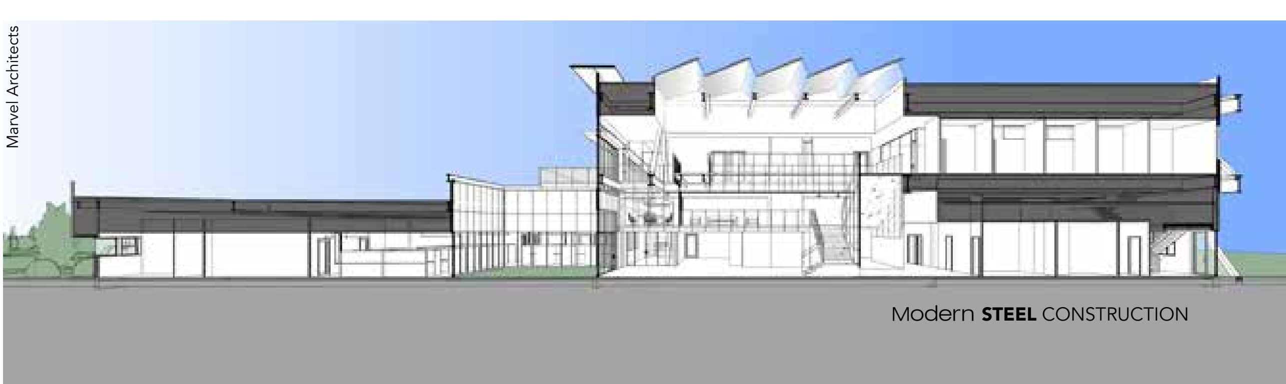
David Sundberg - Esto

"An honest project that celebrates the existing building and steel expansion structure without overwhelming you." —Jason Stone



David Sundberg - Esto

Gilsanz Murray Steficek



Marvel Architects

NATIONAL AWARD Under $15 Million
Vertical House, Dallas, Texas

IN A METRO AREA known for sprawl, this Dallas house bucks the trend.

Located on one of the highest sites in the city, the vertical volume of the five-story residence rises 58 ft above the surrounding landscape and is rotated from the adjacent neighborhood grid to capture views of the downtown skyline.

The compact footprint of the project is sectionally integrated into the site via a carved spiraling entry drive that allows for an almost subterranean experience, while the verticality of the two exterior screen walls accents the home's slenderness and height. This curvilinear geometry emanates from the master suite and extends out into the landscape. Visitors to the house arrive at natural grade and then cross over the excavated area via an internally stabilized architecturally exposed structural steel footbridge to the front entry. The 4-ft-wide foot bridge is framed with a pair of C15×50 edge stringers, each spanning 43 ft. Vertical and horizontal diaphragm cross-bracing is provided in panel bays of 4 ft, 3½ in., with a steel grating floor accented by thin strips of glass flooring on the edges.

The house is conceived as two interlocking oppositional volumes: one highly transparent and oriented toward distant views and one solid and oriented towards the site. The taut transparent volume is delicately flanked at either end by a vertical steel screen of HSS6×2 columns spaced at 6 in. on center, which simultaneously and elegantly shades and structurally supports this portion of the house.

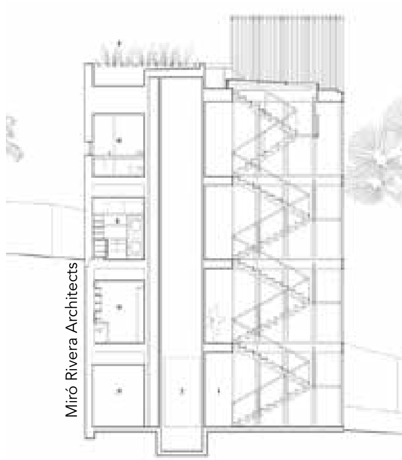
The interior elevated floor framing consists of a series of very shallow wide-flange beams with shear studs, supporting a 1½-in.-deep composite metal deck filled with 2¾-in. concrete above the deck flutes. Wide-flange floor framing ranges in size from W10×17 to W10×100, and each beam is connected via welded moment connections to a stiff C15×50 steel channel along the perimeter walls, which distributes the vertical loads from the conventionally spaced interior beams to the closely-spaced exterior screen columns. The steel HSS curtain, which provides vertical support for the floors, is set 1 ft, 4 in. clear of the floor edge. This visual break between the floor and supporting screen of columns was critical to the ar-

Juan Miró

Juan Miró

Juan Miró

Juan Miró



Miró Rivera Architects

"I want to live there!"
—Paula Pritchard

Juan Miró

chitectural effect. Each screen column, positioned proud of the exterior walls, is connected to the perimeter channel via a vertical ¾-in.thick steel plate at each floor level; each plate not only transmits the dead and live loads to the columns, but also provides the required stability bracing against weak axis flexural buckling of each 58-ft-tall screen column via weak-axis bending of the cantilevered plate. The stresses in the connection system were relatively small when compared to the nominal capacities, as the structural design of each plate was materially governed by the flexural stiffness requirements for nodal bracing.

The solid volume, clad in locally abundant limestone, is tectonically differentiated from its butt-glazed counterpart with inset windows, providing a pronounced shadow line at penetrations. A glass and steel "floating stair," along with an adjacent elevator core, provide the primary vertical circulation of the residence. The steel stair is comprised of 1-in. × 4-in. steel plate stringers oriented in a zig-zag geometry that follows the pattern of the tread and riser plates. The stair terminates at an inviting fifth-level open-air roof terrace that provides breathtaking 360° views of the city; the terrace is shaded from the afternoon sun by an extension of the HSS6×2 screen columns, which folds at the roof level to form a horizontal roof trellis. The intermediate stair landings are cleverly suspended via two disguised thin steel rods; each rod hangs from the screen-turned-trellis, created a "floating stair" aesthetic. Captured rain water from the roof will is used throughout the site as supplement to surrounding landscaping.

Owner's Rep and Architect
Miró Rivera Architects, Austin, Texas

Structural Engineer
Datum Engineers, Austin, Texas

THE SCOPE of the Hillary Rodham Clinton Children's Library and Learning Center is, like its namesake, rather ambitious.

The new facility is based on experiential learning, where children are educated through hands-on activities that teach life skills needed to become responsible adults. Referred to as a "community-embedded, supportive learning center," this library offers not only books, but also a performance space, a teaching kitchen, a greenhouse, a vegetable garden and an arboretum. The challenge from the library's director was to create a playground without equipment, where nature and imagination combine to create grand adventures on a six-acre site in the heart of Arkansas' capital city.

Sited adjacent to Interstate 630, which bisects the city, the project incorporates the sustainable principals of protecting and restoring habitats, storm water quality and control and heat island mitigation. The site filled a significant hole identified in a neighborhood planning study, which concluded that a community center was greatly needed in the area. The architecture speaks to the the technical nature of construction, expressing all connections and systems, much like an Erector Set or Tinker Toys. The steel structure's honest expression and craft of its detailing allowed every column, beam, bolt and connection to be exposed in functional fashion. The great reading room's roof lifts to the north in response to the idea of "lifting expectations," and the entire upper library becomes loft-like, with tree house study rooms cantilevered and floating in balance over educational spaces below. Like a barn, the space is a physical, flexible container where objects can be rearranged as needed, and the steel spans were facilitated minimal columns (four).

The upper library sits at the level of the elevated Interstate, allowing kids to watch traffic zoom through the trees. Just as importantly, traffic can see the entire open floor of the library. By contrast, at the ground level the sound of rustling water overcomes the highway noise. The building's base reaches out and touches the water with "reading steps." Vertical interstitial spaces where the square upper library plan and broader building parallelogram overlap become visual and physical connectors to education programs below and the landscape beyond. Both open stairs physically extend outside the building envelope proper, giving the feeling of being out in the site. The auditorium reading steps serve as monumental stair, hang-out space and a movie/performance theater traditional seats.

The west façade's 15-ft-deep porch and fritted glazing minimize heat load while maximizing light and views. The roof directs water to large scuppers, flowing as waterfalls to spillways, expressively feeding the wetland. The Tinker Toy-like sculptural tube structure draws pedestrians into the site, leading to the plaza and amphitheater beyond. Extended steel beams at southern roof edges are capped with galvanized steel grates, expanding sun protection. The building's main use is expressed in a simple, colorful gesture: the giant letters "r-e-a-d." The steel letters were made to be climbed on and have become a favorite family photo opportunity.

Owner
Central Arkansas Library System, Little Rock, Ark.

Architect
Polk Stanley Wilcox Architects, Little Rock

Structural Engineer
Engineering Consultants, Inc., Little Rock

General Contractor
East Harding Construction, Little Rock

Timothy Hursley

MERIT AWARD Under $15 Million
The Hillary Rodham Clinton Children's Library and Learning Center, Little Rock, Ark.

Timothy Hursley

Timothy Hursley

Timothy Hursley

Timothy Hursley

Timothy Hursley

"With a community-driven mission, the library showcases steel in its purest form and use in a whimsical but purposeful manner." —Wanda Lau

PSW Architects

Timothy Hursley

Paul Crosby

Paul Crosby

"The sleek metal roof cuts through the sky like the razorblade." —Colter Roskos

Paul Crosby

MERIT AWARD Under $15 Million
Principal Riverwalk Pavilion,
Des Moines, Iowa

Paul Crosby

THE PRINCIPAL RIVERWALK PAVILION is one piece in a plan to encourage Des Moines residents and visitors to take advantage of the Iowa capital's scenic riverfront.

Situated next to a new recreational trail and waterfront promenade and riverfront promenade at the west end of the historic Court Avenue Bridge, the triangular 2,200-sq.-ft pavilion was designed to mimic the prow of a boat. The $1.2 million angular space is clad with a folded black zinc skin and roof. The west façade is "louvered" to allow for views upriver to the north while blocking the harsh, western sun. To accomplish this visual effect, an exposed steel frame was used to support the zinc skin, and steel tube sections are concealed within the skin itself. This structure discretely accommodates the multiple cantilevers and reduces the apparent thickness of this folded plane.

A moment frame system supports the gravity loads and resists the lateral loads imposed on the building. A row of W14×30 columns along the west side of the building spaced at 16 ft on center support one end of the W14×30 roof beams spaced at the same dimension, and a welded moment connection was used at the top of the column-and-beam intersections.

The W14×30 beams were cantilevered on the east side of the building over the top of a series of built-up column sections that acted as the prop. These welded built-up column sections consisted of back-to-back C6×13 with a ½-in. steel plate sandwiched between them. The plate extended 2½ in. past the flanges of the channels to provide support and a place to fasten the window glazing system. This detail allowed the columns to appear as a part of the glazing system while still allowing it to be a continuous plane from the exterior; the profile also allowed for the desired unobstructed views of the river and river walk.

For more on the Principal Riverwalk Pavilion, see "Back to the River" in the November 2015 issue, available at ***www.modernsteel.com****.*

Owner
City of Des Moines, Des Moines, Iowa

Architect
Substance, Des Moines

Structural Engineer
Charles Saul Engineering, Des Moines

General Contractor
Covenant Construction Services, Waukee, Iowa

Scott Adams

Scott Adams

Scott Adams

Scott Adams

"Interactive steel allows the Gourd to be more than just a sculpture. Children will enjoy this one for many years to come." —Brian Wessel

Scott Adams

Patrick Winn

SCULPTURE Jury Recognition
The Gourd, San Antonio, Texas

EVER WONDERED WHAT IT'S like to hang out in a bird-house? Head to San Antonio and seek out the Gourd.

Built for the San Antonio Botanical Gardens' human-sized birdhouse competition, the Gourd is a testament to working for and with community, and offers a playful platform in which to contemplate the complex relationship between humans and the natural world through expressed structure.

The Gourd is built out of 70 plates of 12-ga weathering steel that are wrapped around a robin's egg blue internal octahedron structure. More than 1,000 holes dot the sculpture, each of them fitted with a Ball Mason jar that brings light to the interior. Each steel plate, unique in shape and size, emulates the pattern of a dragonfly wing. The entire thing is held above the ground via schedule 80 pipe legs and is accessible via a thin metal stair. The three legs attach to concrete spread footings that are connected via underground tension cables and turnbuckles that prevent each footing from splaying in the direction of the angled leg.

The steel octahedron structure is fabricated from rolled arcs of schedule 40 pipe connected with custom laser-cut and bent steel hubs. Each hub is designed around an X-shaped disk with four rounded arms, laser cut from ½-in. steel plate, and then bent 15° inward. On the upper end of the Gourd, these disks have a 3-in. extension pipe connecting a round bolt plate for fastening the steel skin. At the lower three connection hubs, the extension pipe is fastened on both sides of the X-shaped disk and is gusseted with ½-in. plate for additional transfer of lateral loads to the legs.

Bent by hand through the process of assembling each faceted plate together, the steel skin becomes a self-supporting tensile balloon once fully assembled. As each plate flexes inward, the skin self inflates while also providing the tensile support to lift the neck of the bottle gourd into its cantilevered position.

*For more on the Gourd, see "Small Space, Big Imagination" in the "What's Cool in Steel" feature in the August 2015 issue, available at **www.modernsteel.com**.*

Owner and Architect
Overland Partners, San Antonio

Structural Engineer
Datum Engineers, San Antonio

General Contractor
Overland Workshop, San Antonio

Elizabeth Daniels

PRESIDENTIAL AWARD OF EXCELLENCE IN ENGINEERING
Emerson College Los Angeles

Photekt

Elizabeth Daniels

Elizabeth Daniels

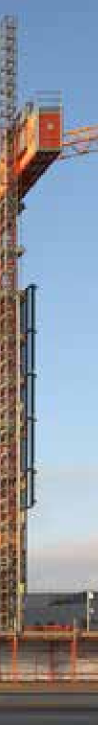
EMERSON COLLEGE LOS ANGELES brings the East to the West.

Located in Hollywood, the $85 million building, which serves as the West Coast home of Boston-based Emerson College, is a small-scale university campus containing below-grade parking, classrooms, performance space, offices and student housing. Located on Sunset Boulevard, the facility adds a dynamic new focal point to the neighborhood while serving as a conduit for Emerson students to intern in the nearby entertainment industry during a work/study semester in Los Angeles. The complicated forms and interconnecting spaces required creative structural problem solving to maintain efficiency of material and constructability while upholding the architect's vision.

The virtually square footprint of the building is based three stories below grade and rises in that shape up to the third level. Above that, the square shape of the building is broken into two separate pieces: the eastern tower, a slender rectangular floor plate housing residential units; and the western tower, a combination of academic space and administrative offices in an irregularly shaped slab adjoined with residential units. The two towers continue to climb, with the western tower's shape continually changing, until the sixth level, where the western tower reduces to a near-mirror image of the eastern tower. The towers terminate at the 11th/roof level, where they are connected by a helistop spanning over the academic structure below.

Mild reinforced concrete slabs are the gravity framing system for the parking, administrative and office spaces. The residential towers are framed using post-tensioned concrete slabs, and the academic form is supported by steel framing and composite deck. Interconnectivity of the multiple systems was addressed by careful detailing and consideration of the construction sequence. The amorphous shape of the academic building presented further structural challenges because of the two intertwining forms and varying floor-to-floor heights between residential and academic program areas. The academic building features a hanging boardroom, simultaneously reinforcing the architect's desired massing and providing a column-free entry pavilion at the second level. To support the academic forms, multiple cantilever elements were outfitted with steel cantilever trusses, one supported by the concrete elevator core walls and the other supported off of steel columns terminating at concrete transfer girders. Discontinuous special concentric braced frames and discontinuous steel moment frames were used to transfer lateral forces from the roof of the academic building down to the supporting concrete transfer diaphragm at level 3.

The helistop that connects the two towers is supported by eleven 120-ft-long, 5-ft-deep castellated beams. These beams add structural load capacity and stiffness without adding weight.



John A. Martin & Associates, Inc.

Elizabeth Daniels

John A. Martin & Associates, Inc.

"A jaw-dropping, monumental accomplishment in structural expression and architectural gusto. This is quite unlike anything I have ever seen."
—Kem Hinton

Elizabeth Daniels

The connection of the two towers, at both the roof and bridges at levels 5 and 6, created structural challenges accommodating the differential deflection of the separated elements. To minimize the movement of the towers, which tended toward deflection amplified by torsional effects, the helistop was ultimately used as a diaphragm to control the torsional deflection of the residential towers. This allowed separation joints between elements to be minimized and provided reduced deflection criteria for the sensitive curtain walls and scrims cladding the towers' exteriors.

A singular and complicated design like Emerson College is best created and explained using three-dimensional models. Multiple building information modeling (BIM) platforms were used by the design teams but were combined to coordinate the structure with the architecture. In developing the structural model for the academic form, multiple iterations of geometry refinement were coordinated with the architect's model. The thickness of the exterior assembly was determined by the factory-assembled panel system, including tolerance and connection details, and the structural shape was set using a 3D shell created by offsetting the architect's exterior shape. Through close collaboration, both the aesthetic and functional intentions of the architecture were used to aid in shaping the appropriate structural systems and geometry.

Owner
Emerson College, Los Angeles

Owner's Representative
Silverman Associates, Newton, Mass.

Architect
Morphosis, Culver City, Calif.

Structural Engineer
John A. Martin & Associates, Inc., Los Angeles

General Contractor
Hathaway Dinwiddie Construction Co., Los Angeles

Steel Team

Fabricator and Detailer
Schroeder Iron Corp., Fontana, Calif.

Erector
Bragg Crane & Rigging, Co., Long Beach, Calif.