



# EXCELLENCE IN STRUCTURAL ENGINEERING

## NCSEA 15<sup>TH</sup> ANNUAL AWARDS PROGRAM

### 2012 Panel of Judges

The judging was held Wednesday August 7, 2012 in Orlando, Florida at the offices of Cuhaci & Peterson. The 2012 awards jury included the following individuals from the Florida Structural Engineers Association:

Roberto Archila, P.E. *Cuhaci & Peterson*  
Luis Bedoya, P.E. *BBM Structural*  
Kevin Casey, P.E. *Paul J. Ford & Company*  
Luis Correa, P.E. *Integral Engineering, Inc.*  
Justin Gatzemeyer, P.E. *Amore Engineering*  
Tom Grogan, P.E. *The Haskell Company*  
Roger Jeffery, P.E. *AMEC Environmental & Infrastructure*  
Amy Miller, P.E. *National Ready Mixed Concrete Association*  
Ron Milmed, P.E. *FSEA Southern Florida*  
Brett Rylands, P.E. *Cuhaci & Peterson*  
Mark Scala, P.E. *A. Mark Scala, P.E., Inc.*

At their annual meeting in St. Louis, Missouri on October 5, NCSEA announced the winners of the 2012 Excellence in Structural Engineering Awards. This awards program annually highlights some of the best examples of structural ingenuity throughout the world. Awards are divided into eight categories: four building categories which are separated based on construction cost, bridge or transportation structures, international structures, forensic-renovation-retrofit-rehabilitation structures and an “other” category which encompasses all types of non-building or bridge structures. In each category, three award winners were named with one project being named the Outstanding Project. All structures must have been completed, or substantially completed, within the past three calendar years.

The 2012 Awards Committee was chaired by Carrie Johnson (Wallace Engineering, Tulsa OK). Ms. Johnson noted: “We had an outstanding group of projects this year and the variety of entries was fascinating. The quality of entries and the complexity of projects continues to grow. The judges had an enormous task to evaluate all of the projects and they did an outstanding job. The judging was really close in several of the categories, and the judges indicated that they had an interesting time reading about the various creative ways structural engineers resolve unique and challenging problems. It continues to make me proud to be a structural engineer.”

Please join STRUCTURE® magazine and NCSEA in congratulating all of the winners. More in-depth articles on several of the 2012 winners will appear in the Spotlight Department of the magazine over the course of the 2013 editorial year.

## Outstanding Project

### Robert Wood Johnson University Hospital Proton Therapy Vault

New Brunswick, NJ O'Donnell & Naccarato, Inc.

Robert Wood Johnson University Hospital's New Proton Therapy building is designed to house two MEVION S250 Proton Beam Therapy treatment machines which emit positively charged atomic particles that can be focused precisely on tumors.

The 4,900 square-foot, three-story below grade concrete structure is located directly adjacent to a one-story medical office building, beneath its parking lot. Due to the confined site, deep excavation, radiation shielding requirements and coordination requirements with the medical equipment's tight tolerances, the team had to incorporate many unconventional and innovative solutions into the design to produce a cost effective project on a tight schedule.



## Outstanding Project

### Salvador Dali Museum

St. Petersburg, FL Walter P Moore

Located in downtown St. Petersburg, Florida, the new 66,400 square-foot Salvador Dali Museum is an engineered work of surrealist art that houses the largest collection of Salvador Dali's work outside of his hometown in Spain. The challenge for the engineering team was to balance the aesthetic needs of a building of architectural significance while protecting the art and providing a structure capable of withstanding hurricane-force winds and flooding. Perhaps the most stunning feature – both architecturally and structurally – is the 60-inch-tall helical central stair that is supported by a singular stringer beam and was inspired by Dali's life-long fascination with DNA structure.





## Outstanding Project

### **Milstein Hall, Cornell University**

Ithaca, NY Robert Silman Associates

Cornell University's new building for the College of Architecture, Art and Planning befits its role as a place where design is taught. The two-story structure contains flexible studio space, a presentation area, gallery space, and a 250-seat auditorium. The challenging design incorporates a reinforced concrete dome at the basement level that rises from the concrete foundation wall up through the first floor, where it is crossed by a reinforced concrete bridge. On the second floor, a series of five steel hybrid trusses, that incorporate features of conventional and Vierendeel trusses, allows the building to cantilever dramatically fifty feet over University Avenue.



## Outstanding Project

### **Crystal Bridges Museum of American Art**

Bentonville, AR Buro Happold Consulting Engineers, PC

The 201,000 square-foot Crystal Bridges Museum of Art is an iconic museum inspired by the local Arkansas landscape and the exotic suspension bridges of Bhutan. Its complex geometric forms were made possible because of creative design, cutting-edge engineering solutions, BIM technologies, and a thoroughly integrated design team. Unique among the eight-structure campus are two of the "water" buildings. Their foundation acts as a weir creating a pool and serves as the floor. The roof, constructed of glulam beams and clad in copper with skylights, is suspended from stainless steel cables.



*Photos courtesy of Timothy Hursley.*



## Outstanding Project

### Harbor Drive Pedestrian Bridge

San Diego, CA T.Y. Lin International

The Harbor Drive Pedestrian Bridge is one of the longest self-anchored suspension bridges in the world. It was constructed to provide a safe, elevated footbridge over the busy Harbor Drive and existing train and trolley tracks.

The main span of the bridge is 354 feet and the pylon is 131 feet tall. The pylon is inclined at a 60 degree angle from the horizontal and leans over the deck to support the single pair of suspension cables. For this bridge, the main cable is completely enclosed in a continuous stainless steel guide pipe.

The Harbor Drive Pedestrian Bridge serves as a southern gateway to downtown San Diego and truly is a bridge fitting for America's Finest City.



Photos courtesy of Brooke Duthie.



## Outstanding Project

### Regent Emirate Pearl Hotel

Abu Dhabi, UAE DeSimone Consulting Engineers

Located amongst palaces and high profile skyscrapers on the Cornich Street of Abu Dhabi, the new mixed-use \$287 million Regent Emirates Pearl development will rise and twist 840 feet above ground. The expansive plot area of 146,500 square feet provides some of the best views of the Capital City.



The Pearl's signature feature is the 45-story twisting elliptical floor plan and columns which contains 60 luxury serviced apartments occupying levels 1 thru 10 and a 5-star hotel occupying levels 11 thru the Roof. In plan, each floor rotates 0.56 degrees each level, with a total of 25 degrees of total rotation from Level 1 to the Roof. The expansive podium area includes five levels of restaurants, retail areas, spas, swimming pools, gym and more, with another 5 levels of underground parking. The total project build up area is 55 stories and 1.4 million square feet.





## Outstanding Project

### BC Place Revitalization

Vancouver, British Columbia

Geiger Gossen Campbell  
Engineers, PC

Decades after its opening, BC Place Stadium required updating. The stadium's primary systems, the roof aside, remained sound and renovation was preferable to new construction. The original air-supported roof was deflated in May 2010 and renovations completed in September 2011.

The new retractable roof and clerestory provide an open-air, or an enclosed but naturally-lit, configuration. The energy-intensive snowmelt required by the old air-supported roof is eliminated. Programmable, energy-efficient architectural lighting animates the venue.

Revitalization was achieved with minimum intrusion and avoided costly and time-consuming structural alterations, resulting in a world-class, modern facility that is a new iconic Vancouver landmark.

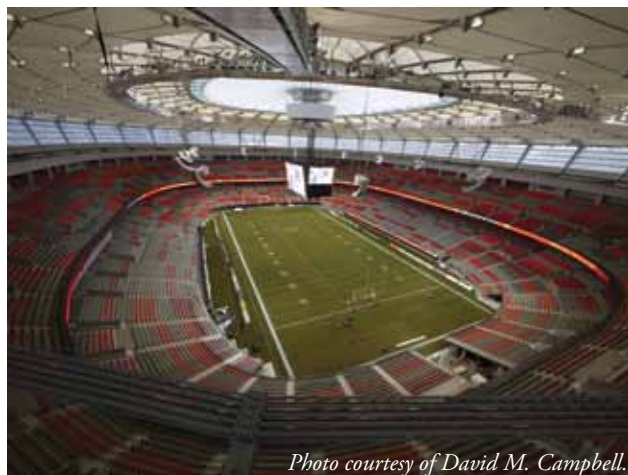


Photo courtesy of David M. Campbell.



Photo courtesy of Michael Elkan.

## Outstanding Project

### Van Alen Books

New York, NY Robert Silman Associates

Van Alen Books was conceived of as an installation for the Van Alen Institute's small storefront, intended to extend their mission of "promoting inquiry into the processes that shape the design of the public realm". The store's primary design feature is a seating area created from cantilevering recycled door stacks suspended



dramatically by steel rods from the existing wood joists above. Visitors to the store are encouraged to use the "steps" to peruse the design-related books that line the signature yellow walls. The effect is a sustainable, stunning, and interactive environment that both reflects and supports the Institute's vision.

Photos courtesy of Danny Bright.

## Category 1 Award Winners

### **Killam Oil Company, Ltd.**

Hollywood Park, TX

Becker Martinez Engineering



When the client requested a building with an architectural design that dictated concrete wall spandrels with horizontal ribbons of glass, the designers invented new technology.

Using typical tilt up wall panel construction, the building design connected spandrels of all the floor levels together with steel columns embedded into panels with standard stud anchors. As a result, the panels could be lifted like typical tilt up panels. The outcome was the creation of a new patent-pending product: ClearView Composite Wall System™. Unlike traditional tilt walls, the resulting panels provide true horizontal bands of unobstructed ribbon glass with load bearing tilt wall cost efficiency.

### **Buckner Companies Home Office**

Graham, NC

Stewart Engineering, Inc.



Buckner Companies, a North Carolina-based steel erector, envisioned a unique headquarters that highlighted past projects and exposed the building's structure. The result is a structure composed of salvaged structural pieces of projects that have been recovered and stored by Buckner over the last 62 years. Examples include the conference room which was built from girders recovered from a renovation of Clemson University's Littlejohn Coliseum and a connecting bridge originally erected by Buckner in 1972 on the campus of UNC Chapel Hill. Instead of components resulting from design decisions, on this project, the components drove the design. Structural engineers were challenged to reinvent the component's intended purposes.

## Category 2 Award Winners

### **Centra**

Iselin, NJ

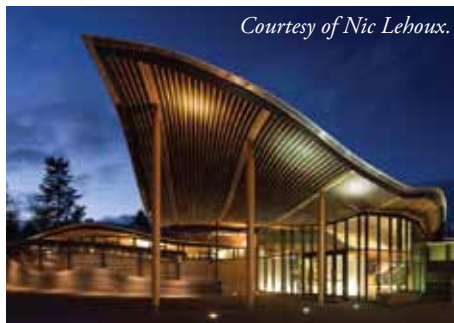
DeSimone Consulting Engineers



Located in Iselin, New Jersey, Centra at Metropark involves renovating and adding to an existing 4-story office building. The design utilizes existing basement space by adding light wells and a central oculus, creating 20,000 square feet of usable below grade office space. An additional 10,000 square feet were added above the fourth floor roofline, creating a new fifth floor. The floor plate of the addition is rectangular in shape while the existing floor plate is L-shaped. A signature tree-like column was created to support this addition and also create a dramatic entrance. The completed building epitomizes the concept of sustainability by updating the codes, standards of efficiency, and function of an existing yet outdated facility.

### **VanDusen Botanical Gardens Visitor Centre**

Vancouver, British Columbia Fast + Epp



*Courtesy of Nic Lehoux.*

The new 19,000 square-foot visitor centre at VanDusen Botanical Gardens provides an iconic entrance point to the grounds. Engineers and architects collaborated to develop a dramatic free-form roof, made almost entirely of timber. Three-dimensional technology, a product of the use of three different modeling programs, ensured accuracy and precision in the design and construction of the multifaceted geometrical shape of the unique roof. The building targets LEED Platinum and Living Building Challenge status, as its 71 unique, prefabricated panels champion innovation, economy and sustainability.

## Category 3 Award Winners

### **Centre for Interactive Research on Sustainability**

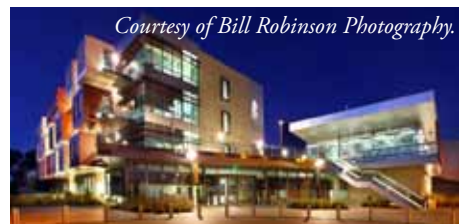
Vancouver, British Columbia Fast + Epp



A cutting-edge facility for environmental development, The Centre for Interactive Research on Sustainability (CIRS) at the University of British Columbia was designed as a research and education facility focusing on the importance of sustainability. With a target of LEED Platinum and the Living Building Challenge status in mind, the designers and architects set out to maximize the use of wood in the project. The 59,202 square-foot (5,500 square meters) building was constructed entirely of the local renewable resource, a rarity in multi-storey academic structures. CIRS encompasses offices, lecture halls, exhibition spaces, and laboratories for research and testing.

### **Sanford Consortium for Regenerative Medicine (SCRM)**

La Jolla, CA Hope Engineering, Inc.



*Courtesy of Bill Robinson Photography.*

SCRM unites San Diego's top research scientists under the "Collaboratory", a 150,000 square foot facility with a total construction cost of approximately \$85 million.

Construction of the main building consists of two-way concrete flat-slabs, concrete columns, and shear walls on a conventional foundation system. "Punched" exterior shear walls serve to maximize interior natural light and provide seismic resistance. Exterior steel framed office "Pods" rest on cantilevered tapered concrete slabs extending over 16 feet from the supporting exterior wall. The auditorium building consists of elevated floors of composite steel beams with metal deck and concrete fill. The cantilevered perimeter framing creates an illusion of a floating structure.



## Category 4 Award Winners

### 8 Spruce Street–Beekman Tower

New York, NY WSP Cantor Seinuk



8 Spruce Street – Beekman Tower is Manhattan's tallest residential building. Designed by Frank Gehry, for client Forest City Ratner, the 870-foot tower rises to 76 stories.

The tower boasts a striking rippled facade, made possible by a ground-breaking structural design. Floor plates and slab edges are unique to each level, and innovative column, beam, and shear wall configurations accommodate the steel curtain walls, providing flexibility for a wide range of interior space configurations while also ensuring structural stability in high winds. At the foot of the building, a six-story podium contains a public school and ambulatory care center.

### Kauffman Center for the Performing Arts

Kansas City, MO Arup



The 356,000 square-foot Kauffman Center for the Performing Arts serves as the focal point of Kansas City's burgeoning arts district.

To achieve the architect's ambitious vision while providing excellent sound quality within the performance spaces, engineers helped design a box-in-box facility that is actually three separate buildings: two dense concrete performance halls covered by a lightweight steel structure with a glass wall and roof supported by a cable net. Structural engineers worked closely with other disciplines to achieve elegant solutions for fire protection, climate control and other issues.

The thoughtful use of steel and concrete for different areas of the facility saved the client time and money.

## Category 5 Award Winners

### Lake Champlain Bridge

Replacement – Crown Point, NY

Chimney Point, VT HNTB Corporation



The Lake Champlain Pedestrian Bridge is a life-line connecting two communities, Crown Point (NY) and Chimney Point (VT). The replacement bridge maintained the signature aesthetics that fit the landscape and provided a stronger, longer lasting bridge from start to finish in just over two years. Several team innovations helped to fast-track construction activities, including the decision to construct the arch span off-site, concurrently with the approach spans, and then float it into place. The team's accelerated project delivery resulted in the bridge opening to traffic in just 20 months – a dramatically shorter time frame than normally associated with traditional methods.

### Tempe Town Lake Pedestrian Bridge

Tempe, AZ T.Y. Lin International



The Tempe Town Lake Bridge connects bike and pedestrian paths from the north and south sides of the lake, allowing runners, walkers and cyclists to cross without having to compete with vehicular traffic at major intersections. The structure is a 4 span simple tied arch bridge, each comprised of tubular parabolic arches that lean into each other and cross at the quarter points, lending to its distinctive shape. Exposed "up-close" connections and simple railing details invite users to observe elegant, yet simple "engineering".

Photo courtesy of Tom Pavia.

## Category 6 Award Winners

### Marina Bay Sands

Singapore

Arup



The Marina Bay Sands Integrated Resort was unrivaled in scale, complexity and speed of execution. The engineering design included a number of firsts for the construction industry as a whole. Project highlights include three curving, uniquely shaped high-rise hotel towers topped by a SkyPark (the world's largest public cantilever, lifted into place with one of the highest strand-jacking operations ever undertaken), a lotus-shaped museum, and extensive casino, convention, retail and entertainment spaces. The development necessitated deep excavations across the site. Four cofferdams, among the largest ever used, were deployed at the unusual depth of 62 feet.

Photo courtesy of Timothy Hursley.

### Al Hamra Tower

Kuwait City, Kuwait Skidmore, Owings & Merrill LLP

At 413 meters (1,355 feet), Al Hamra Tower is among the tallest buildings in the world. Its unique sculpted form sets it apart from other towers. The structural system and exterior were developed symbiotically through digital design. A spiraling slice subtracted from a prismatic volume generates the building geometry and results in a cantilevered office wing that wraps around a courtyard. The two resultant cut surfaces are hyperbolic paraboloid reinforced-concrete walls that extend the full height of the tower and participate in the lateral and gravity force resisting systems.

Photo courtesy of Tim Griffith.



## Category 7 Award Winners

### **J. Paul Leonard and Sutro Library**

San Francisco, CA Simpson Gumpertz  
and Heger



In 2007, San Francisco State University undertook an extensive program to remodel, retrofit and expand their existing library. The expansion included a complete seismic upgrade, architecturally significant study spaces, and a high-density vault to house the majority of the library's collection. This was a design-build project, which allowed Structural Engineers to work closely with the architect, owner and contractors while developing design solutions. A performance-based approach to the retrofit resulted in an economical and effective design. For example, engineers designed concrete shear walls to rock on new shallow foundations, eliminating a need for new micropiles.

*Photo courtesy of David Wakely.*

### **Chelsea Piers, Connecticut**

Stamford, CT WSP Cantor Seinuk



Chelsea Piers, Connecticut is a 400,000 square-foot sports, entertainment and educational facility. Formerly a Clairol manufacturing plant, the adaptive reuse design saved the old building from being demolished and ending up in a landfill. An economic solution to remove 23 existing columns was necessary in order to achieve 100-foot column free zones. Leaving the entire roof structure in place, king post trusses constructed out of the in-place existing roof structure allowed for the columns to be cut away. The structural engineering solutions were creative, economical and sustainable, resulting in limited demolition and limited use of new materials.

## Category 8 Award Winners

### **Atrium Operable Roof – California Academy of Sciences**

San Francisco, CA Walter P Moore



The California Academy of Sciences commissioned the design of a replacement operable roof over the Piazza, a glass-covered central atrium. Key factors in the design were visual integration with the Renzo Piano-designed Academy, a high-tech aesthetic, durability, and ease of operation. Eight stainless steel arches span 64 feet across the existing glass roof, blending seamlessly with the existing structure. Lightweight, translucent polycarbonate panels slide along the top of the arches via high-strength, low-friction slide pad assemblies. To ease operation and maintenance requirements, engineered plastics requiring no lubrication were used for exposed components, and roof movement is operated remotely via iPad.

*Photo courtesy of David Wakely.*

### **Miami Beach Soundscape**

Miami Beach, FL Douglas Wood  
Associates, Inc.



Soundscape is a small park in lively South Beach. It's also a state-of-the-art theater for live projection of concerts from the adjacent symphony and for public movie and art presentations.

The park's primary structures are three large aluminum pergolas (shaped to resemble cumulus clouds) and numerous outdoor theater elements, including giant "Ballet Bars" and a project tower (enshrouded in its own "cloud"). Undulating concrete seating walls and a maze of concrete walkways complete the project.

This project stands out for accommodation of its complex audio-visual systems within a sculptural expression of its structural systems.

*Photo courtesy of Robin Hill.*

