



EXCELLENCE IN STRUCTURAL ENGINEERING

NCSEA 13TH ANNUAL AWARDS PROGRAM

2010 Panel of Judges

Alex Abel

City & County of Denver

Jonathan Akins

University of Colorado-Boulder

Paul Doak

Martin/Martin

Paul Hause

Structural Consultants, Inc.

Bob Hunnes

JVA

Susie Jorganson

Leo Daly

Andrew Kelsey

Ascent Group, Inc.

Brant Lanherst

KL & A

Rob Leberer

Anderson

Jerry Maly

Wiss, Janney, Elstner

Brent Norris

J.R. Harris & Co.

David Poe

Anchor Engineering

David Renn

S.A. Miro

JD Shafer

Stresscon

Tom Skinner

JVA

Brian Tinkey

Martin/Martin

Bruce Wolfe

Structural Consultants Inc.

At their annual meeting in Jersey City, NJ in October, NCSEA announced the winners of the 2010 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, a bridge or transportation structure category, international structures, forensic-renovation-retrofit-rehabilitation structures and an "other" category which encompasses all types of non-building or bridge structures. All structures must have been completed, or substantially completed, within the past three calendar years.

The 2010 Awards Committee was chaired by Carrie Johnson (Wallace Engineering, Tulsa, OK). The judges this year were provided by SEAC and the judging took place in Denver on August 11th. Ms. Johnson noted: "We had a record number of entries this year, and the quality and complexity of projects entered into the competition continues to grow. The judges said they had an interesting time seeing the creative ways structural engineers resolve unique and challenging problems. This year, there were more projects than ever that I'd consider traveling to see."

Outstanding Project Awards were presented in eight categories. Please join STRUCTURE® magazine and NCSEA in congratulating all of the winners. More in-depth articles on several of the 2010 winners will appear in the Spotlight Department of the magazine over the course of the 2011 editorial year.

NEW BUILDINGS UNDER \$10 MILLION

Outstanding Project

Wild Beast Music Pavilion

California Institute of the Arts (CalArts); Valencia, CA
Thornton Tomasetti, Inc.

This unique 3,200-square-foot music pavilion, featuring a flowing arched roofline, has 20-foot-tall, 30-foot-wide hangar-style doors that open to transform the 100-seat indoor space into an outdoor amphitheater. Thornton Tomasetti collaborated closely with the architect to develop a special roof framing system that expresses the structural steel members and details, and allows the floating acoustical enclosure to be exceptionally thin. The pavilion's slender form is clearly seen in the structural steel members and their connections, which are expressed both internally and externally.



Courtesy of Tom Bonner, 2009.



NEW BUILDINGS \$10 MILLION TO \$30 MILLION

Outstanding Project

300 New Jersey Avenue

Washington, D.C. Smislova, Kehnemui & Associates, P.A.

300 New Jersey Avenue is a 10-story concrete office building with an adjacent atrium and 6-story parking garage. It is the first commercial office building designed and built in the United States by world renowned architectural firm, Rogers Stirk Harbour + Partners. The project's most notable feature, a full height atrium, is highlighted by a complex bright yellow boomerang truss and tree structure that supports the skylight, glass walkways and stair platforms extending from the center of the atrium. Two lattice columns supporting the truss are constructed of HSS pipe sections and pre-tensioned cables with roller pins at each outrigger.



NEW BUILDINGS \$30 MILLION TO \$100 MILLION

Outstanding Project

San Joaquin County Administration Building
Stockton, CA *Crosby Group*

Designed and built within 27 months with a goal of LEED Gold, the new 250,000-square-foot, six-story San Joaquin County Administration Building, with its striking glass atrium structure, creates a new landmark for the city of Stockton, California.

Overcoming design challenges like the nearly 60-foot cantilevered sixth-floor boardroom, high seismic



demands, intricate detailing for the spectacular glass atrium, fluctuations in steel price and an aggressive schedule, the Design-Build team delivered the project on time and budget. With enhanced seismic performance, via Buckling Restrained Braces, the building will ably serve the people of San Joaquin County for the foreseeable future.

NEW BUILDINGS OVER \$100 MILLION

Outstanding Project

Cowboys Stadium
Arlington, TX *Walter P Moore*

This exciting project established numerous world and industry “firsts”, including: the world’s longest single-span roof structure at 1225 feet; the world’s largest roof-hung HD video display board; the world’s largest operable glass doors; operable roof panels that traverse the steepest incline of any North American retractable stadium; a first-of-its-kind



rack-and-pinion roof drive system; and, one of the world’s first installations of a Teflon® (PTFE)-coated fiberglass tensile membrane with a photo catalytic titanium dioxide coating that breaks down dirt through sunlight, cleaning the roof automatically.

It is an enormous revenue generator, pumping \$7 to \$16 billion into the city’s economy over the course of the next 30 years.

NEW BRIDGE AND TRANSPORTATION STRUCTURES

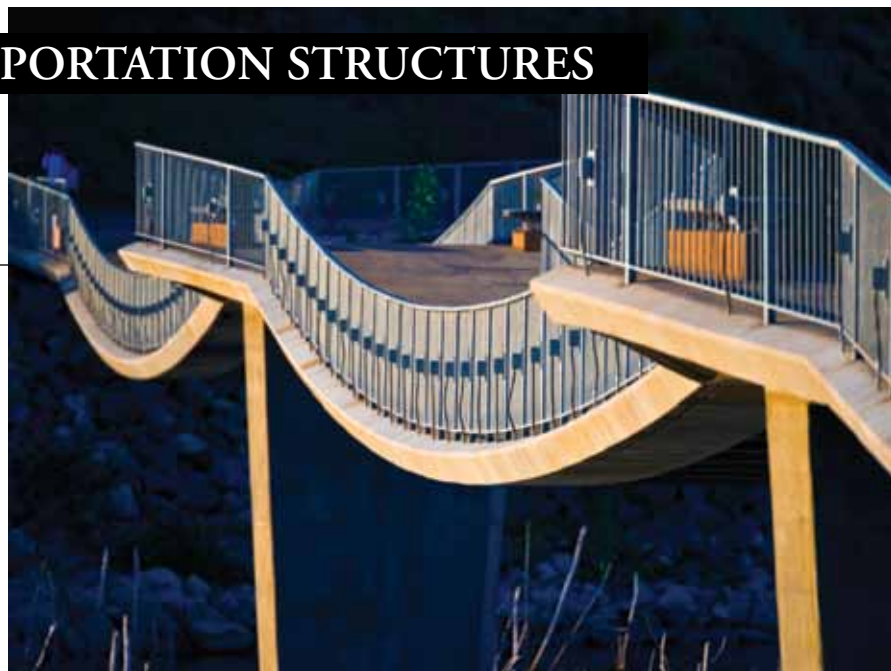
Outstanding Project

David Kreitzer Lake Hodges Bicycle Pedestrian Bridge

San Diego, CA T.Y. Lin International

The David Kreitzer Lake Hodges Bicycle Pedestrian Bridge is a unique structure and is the world's longest stress ribbon bridge. As the Engineer for the San Dieguito River Park, T.Y. Lin International provided services from initial design development through construction. The 1000-foot crossing of Lake Hodges provides a vital route by connecting separate trail segments within the San Dieguito River Park.

The innovative design was chosen to minimize impacts to the sensitive habitat. At Lake Hodges, it provides a unique, beautiful and dramatic crossing that "floats" harmoniously within its natural setting, and provides the region with a landmark structure.



INTERNATIONAL STRUCTURES

Outstanding Project

Burj Khalifa

Dubai, UAE Skidmore, Owings & Merrill LLP

The Burj Khalifa is the world's tallest building, and the world's tallest structure. At 828 meters (2,717 feet; over ½ mile!) in height, it surpasses the previous world's tallest building by a staggering 319 meters (1,047 feet). A new structural system was developed to support the height of this building – the "buttressed" core. Primarily a reinforced concrete structure, this system is very efficient and also fosters constructability. The building also utilized a wind tunnel to confirm and refine massing and shaping, such that wind vortices are disorganized, thereby reducing wind forces and motions on the Tower.



Outstanding Project

UCSF Medical Sciences Buildings and Moffitt Hospital Separation Project

San Francisco, CA

Degenkolb Engineers

As prime consultant, Degenkolb Engineers employed state-of-the-art analysis and designed a creative solution to retrofit UCSF Medical Center. The two buildings, the Medical Sciences Building (MSB) and Moffitt Hospital, were structurally separated while allowing the buildings to remain fully occupied and operational during construction. The large application of non-linear analysis and the torsional component developed for the Modal Pushover Analysis (MPA) procedure are breakthroughs in structural engineering.

In an unconventional move, the two structures were separated and a moving seismic joint that runs the entire length of the two fifteen-story buildings was devised. This allowed the buildings to seismically perform as two separate structures.



OTHER STRUCTURES

Outstanding Project

The Ledge at Skydeck Chicago

Chicago, IL

Halcrow Yolles

The Ledge features four all-glass observation boxes, comprised of 1.5-inch glass panels that extend 4.3 feet out from the edge of the existing tower wall, providing an unobstructed view of up to 50 miles and four states... and straight down the face of the tower.

The nearly invisible support was accomplished by hanging the boxes from cantilevered steel frames and strategically hiding structural supports behind ceilings.

The visible hint of support appears as small clips on the sides or floor of the structures, which measure 12 feet high by 10 feet wide. The boxes are retractable for maintenance.



Photos courtesy of Skydeck Chicago.



Award Winner – New Buildings \$10 – \$30M

Seton Women's Center

Austin, TX Datum Engineers, Inc.



Courtesy of Kelly Thibodeaux.

Seton Women's Center is a 5-story, 119,270-square-foot horizontal and vertical expansion of the main Seton Medical Center campus in Austin. This complicated project provided much needed space, while squeezed into a tight site. The addition spans over an existing campus roadway and emergency vehicle lane. A story-height truss system was used to suspend three new floors of the expansion above the existing 2-story Emergency Department. An 85-foot truss spans across the existing ED, and is supported by another truss cantilevering 20 feet to support the corner. This solution enabled the Emergency Department to function with zero interruptions throughout construction.

Award Winner – New Buildings \$10 – \$30M

UIC Forum

University of Illinois at Chicago Thornton Tomasetti, Inc.



The jewel of the University of Illinois at Chicago's new South Campus is the \$28.5 million, 75,000-square-foot Forum. Located in a prominent area on UIC's campus, the Forum serves as a venue for both the University and the public, accommodating a variety of events within its flexible floor plan. The building establishes a new identity and image for both the campus and the surrounding neighborhood. The Forum affords stunning views both to and from the campus. The venue's overhanging, trellis-like metal roof visually connects the structure to the modern architecture featured in the skyline of downtown Chicago.

Award Winner – New Buildings \$30 – \$100M

The University of Louisville Clinical and Translational Building

Louisville, KY Rangaswamy & Associates, Inc.



Courtesy of Prakash Patel.

The University of Louisville's Clinical and Translational Building is a building that became an evolving project during the course of its design and construction. The bio-medical research facility was originally planned for construction in two phases, but it was ultimately designed and built in one phase. During construction, LEED practices were utilized and it was decided to pursue LEED certification. By using innovative structural design, sustainable materials and energy saving and green building practices, the building was constructed requiring less time and money than expected. This efficient approach resulted in a Gold certification from the US Green Building Council (USGBC).

Award Winner – New Buildings Over \$100M

Sutardja Dai Hall

University of California, Berkeley Forell/Elsesser Engineers, Inc.



Sutardja Dai Hall, on the University of California, Berkeley campus, is the new home of the CITRIS (Center for Information Technology Research in the Interest of Society) Headquarters, the Banatao Institute@CITRIS Berkeley, and the Marvell Nanofabrication Laboratory. The 141,000-square-foot facility houses faculty researchers and students from four UC campuses (Berkeley, Davis, Merced and Santa Cruz), providing wide-ranging disciplines, including engineering, energy, health, law, public policy, political science and new media.

Award Winner – New Buildings Over \$100M

Curtis R. Priem Experimental Media and Performing Arts Center

Rensselaer Polytechnic Institute; Troy, NY Buro Happold



Rensselaer's new Experimental Media and Performing Arts Center (EMPAC) offers an ambitious, international artistic program, providing opportunities for interaction and exchange between artists and researchers in science and technology.

The building incorporates a wide variety of venues, which accommodate both the traditional performing arts and new, experimental media. Also provided are artist-in-residence studios, audiovisual production and postproduction suites, audience amenities, and student and support facilities.

All program areas, including the atrium, are designed to exceptional performance standards. All venues throughout the building are wired to the production and postproduction suites, which can receive sounds and images from every part of the building and can transmit sounds and images in turn.

Award Winner – New Buildings Over \$100M

Escala

Seattle, WA Cary Kopczynski & Company, Inc.



The architectural goal for Escala, a 30-story luxury condominium tower in Seattle, was to create open spaces unimpeded by walls and columns. Cary Kopczynski & Co. developed a unique system for seismic resistance that integrated exceedingly well with the architectural layout.

Seismic columns utilized an exceptionally high concrete strength of 14,000 psi, requiring heavy reinforcing and creating congestion. Working with City officials, CKC gained approval to use reinforcing bar with an ultra-high strength of 100 ksi, alleviating most rebar congestion.

Escala became the first building in North America, and perhaps the world, to use 100-ksi steel for seismic reinforcing.

Award Winner – New Bridge and Trans. Struct.

The Ron Venderly Family Bridge

Fort Wayne, IN Engineering Resources, Inc.



The Ron Venderly Family Bridge is a cable-stayed pedestrian structure crossing the St. Joseph River at the campus of Indiana University – Purdue University, Fort Wayne (IPFW). The bridge has a main span of 385 feet and total length over 555 feet. The 115-foot pylons were constructed of induction curved, 36 inch diameter pipe. As a result of a sectional wind tunnel test conducted at RWDI of Ontario, stainless steel wind fairings were required along each longitudinal girder to mitigate wind dynamics. The \$3,800,000 bridge was constructed by cantilevering from each side of the river, which allowed the substructure to be constructed on the river banks.

Award Winner – New Bridge and Trans. Struct.

Hillhouse Pedestrian Bridges

New Haven, CT Guy Nordenson and Associates



When the Hillhouse Avenue vehicular bridge was reconstructed, the pedestrian passageways were separated as independent foot bridges aligned with the axes of the avenue's sidewalks. Spanning 60 feet clear over a former canal and railway on Yale University's campus, the pedestrian bridges are made from high-performance, high-strength steel (HPS70W) and supported on concrete abutments with granite coping. Excluding their widths, 10 feet and 8 feet respectively, the east and west bridges are identical, each with two 46-inch-deep steel plate girders that comprise the primary structure as well as the handrails. The first of their kind, the plate girders have 1/4-inch-thick corrugated, perforated webs.

Award Winner – International Structures

YAS Marina Link Bridge

YAS Island, Abu Dhabi, UAS Arup



The Yas Marina Hotel Link Bridge is more than the typical linkage between buildings; it is a destination. Designed as a vantage point for viewing the Formula 1 races on the course situated below the structure, the Yas Marina Hotel Link Bridge was constructed in 17 months through a fast-track construction process where all stakeholders were involved from the design stage.

As part of the Yas Marina Hotel Project, the link bridge opened in time for the 2009 Formula 1 Etihad Airways Abu Dhabi Grand Prix. The iconic bridge connects the Hotel's two primary towers. The hotel structures are wedged together by a spectacular illuminated steel and glass veil.

Award Winner – International Structures

United Arab Emirates Pavilion

Shanghai World Expo, Shanghai, China Halvorson and Partners



Courtesy of Foster + Partners.

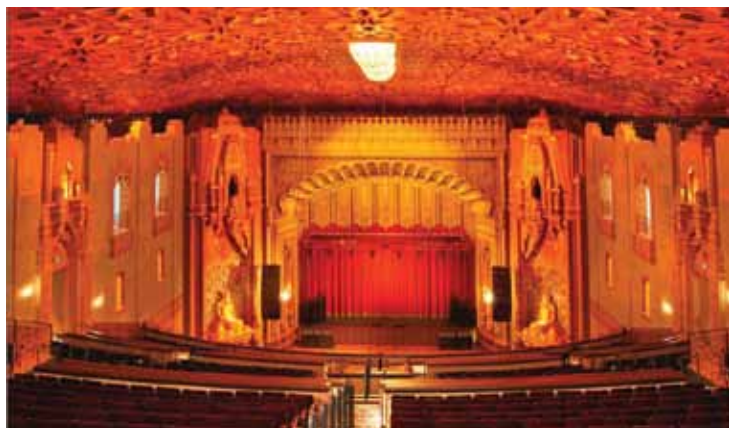
Rising to a height of 20 meters (66 feet) with a plan diameter of roughly 60 meters (197 feet), the sand-dune inspired pavilion encloses 3900-square-meters of exhibition showcasing the UAE at the World's Fair. After the Expo, this pavilion will be disassembled and rebuilt at a permanent site in its home country – on Saadiyat Island in Abu Dhabi, UAE.

The roof structure was inspired by the sand dunes that dominate the deserts of the UAE. The interior space under the “dunes” is column free to provide flexibility in the main exhibition space. The most effective way to form the roof structure was to treat each of the three dunes as a shell structure.

Award Winner – Forensic/Renovation/Rehab...

Fox Oakland Theater Seismic Retrofit

Oakland, CA The KPA Group



The historic Fox Oakland Theater operated from 1928 until closing in 1966. In 2005, the City of Oakland and a private developer raised \$87 million for the retrofit and restoration of the theater, and construction of two new school buildings. Construction was completed in 2009.

The retrofit presented many challenges, including bracing and preserving historic painted plaster ornaments and decorations, and developing schemes to address many different existing systems and materials. None of the retrofit work is visible today.

The restored Fox is back as a treasured part of Oakland's heritage, revitalizing a new “Uptown District” of restaurants and housing.

Award Winner – Forensic/Renovation/Rehab...

Glendale Municipal Services Building – Seismic Retrofit

Glendale, CA Nabih Youssef Associates

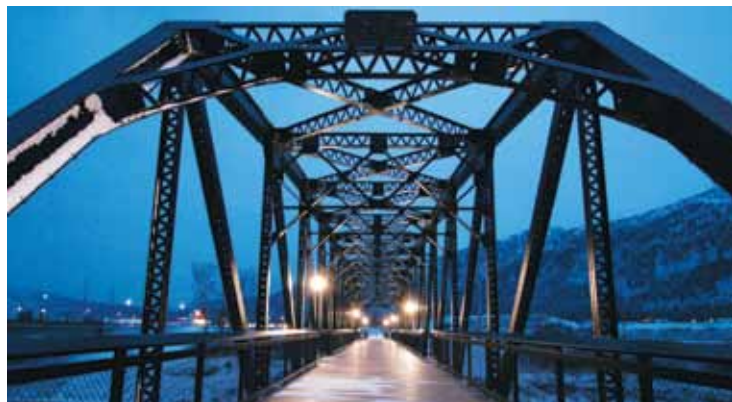


The three-story steel moment frame building cantilevers 36 feet to its outer corners and is supported by four Pilotis. The building was constructed in 1966 and was seismically retrofitted in 2008 using base isolation in lieu of strengthening the welded moment connections. Friction pendulum bearings were installed under the Pilotis and a new Plaza level was constructed above the bearings to create an isolation plane. This approach resulted in higher seismic performance and limited construction to areas below the first occupied floor; and it proved to be cost effective since the building remained fully occupied and operational during construction.

Award Winner – Forensic/Renovation/Rehab...

Bonner Pedestrian Bridge Rehabilitation

Bonner, MT HDR



Courtesy of Thomas Hanou.

The Bonner Pedestrian Bridge was at risk of falling into the Blackfoot River due to pier scour from increased river velocity inherent with the Milltown Dam removal. HDR designed a new three-span bridge consisting of two new prefabricated steel approach spans and a much longer reconstructed center span made from one of the old truss spans. This was made possible, in part, by removing the old heavy concrete deck and installing a lightweight timber deck. The resulting bridge is innovative, showcasing a means by which old truss bridges may be preserved by forward-thinking engineers to meet client and community interests.

Award Winner – Forensic/Renovation/Rehab...

Historic DC Courthouse Modernization & Expansion

Washington, D.C. Robert Silman Associates



Courtesy of Stephanie Potter.

Originally designed by George Hadfield in 1820 to serve as the District's City Hall, the Historic DC Courthouse is a National Historic Landmark and one of the oldest public buildings in Washington, DC. In 2002, Robert Silman Associates was selected as part of a team to design a restoration and expansion program with the goal of restoring the architectural landmark to its previous grandeur while, at the same time, transforming it into a fully-functioning, modern courthouse. Now complete, the courthouse serves as the new home for the District's highest court, the DC Court of Appeals.

Award Winner – Other Structures

Pomona Skyspace

Claremont, CA Gilsanz Murray Steficek



Artist James Turrell's Pomona Skyspace is located at Pomona College in Claremont, CA. It encompasses a garden courtyard, a shallow reflecting pool, a seemingly floating canopy with an oculus, through which the sky can be viewed, all bathed in changing, hidden LED lights, and supported by twelve slender piloti.

GMS collaborated with architects Marmol Radziner to develop a structure that appears to effortlessly support the steel canopy. This team also worked closely with the contractor and steel-fabricator to ensure constructability on the mostly enclosed site.

Skyspace was engineered to be unnoticed, although visitors stare at it directly. Turrell's Pomona Skyspace is elegant and impeccably designed.

Award Winner – Other Structures

An 'Oasis' of Structural Art

Various Cruise Ships Martin/Martin, Inc.



In the past 15 years, Martin/Martin has provided structural engineering for more than 20 major art pieces installed on 14 cruise ships, including the Oasis of the Seas, the most recent and largest such ship ever launched, and Allure, its sister due out this year. The structural engineering work incorporated design of steel, stainless steel, aluminum, bronze, glass, fiber-reinforced polycarbonate, cable and fabric and required special considerations such as roll, pitch and heave movements (which exceeds the highest seismic accelerations on buildings anywhere in the US). ■