



2008 Eleventh Biennial
Bridge Awards
Competition



Concrete
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Portland Cement Association

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Nine Concrete Bridges Selected for Awards of Excellence

Ten winners have been named in PCA's Eleventh Biennial Bridge Awards Competition. The competition, instituted in 1988, recognizes excellence in design and construction of concrete bridges. This year's competition was co-sponsored by Roads and Bridges magazine.

The 2008 program attracted 42 outstanding entries from Canada and the United States. All structures were essentially completed between June 2006 and March 2008. Entries covered a variety of structure types and construction methods.

The winners were selected based on creativity, functionality, and economy by a jury of three prominent bridge professionals:

Edward Wasserman, Civil Engineering Director, Structures, Tennessee Department of Transportation; Myint Lwin, Director, Office of Bridge Technology, FHWA Washington, DC; and Barney Martin, Jr, President, Modjeski and Masters, Inc.



All winning entries will receive an Award of Excellence at the American Concrete Institute Awards Program to be held in November 2008 in St. Louis.



The award-winning entries are listed below without regard to ranking or category.

- Maple Avenue Bridge - Redmond, Oregon
- Forty Foot Road Pedestrian Bridge - Montgomery County, Pennsylvania
- Port Columbus International Crossover Taxiway - Columbus, Ohio
- Agua Hedionda Lagoon Railroad Bridge Replacement - North County Transit District in Carlsbad, California
- Otay River Bridge - San Diego, California
- South Slough Bridge #91 - Snohomish County, Washington
- Big Cottonwood Canyon Bridge - Salt Lake County, Utah
- Selmon Expressway Expansion - Tampa, Florida
- McEwen Drive Interchange at Interstate 65 - Franklin, Tennessee

Maple Avenue Bridge

Redmond, Oregon

The City of Redmond, Ore., needed an affordable, functional bridge to provide an east-west link across Dry Canyon, a recreational open space within the city. In addition to enhancing the area's aesthetics, the City wanted a bridge that if necessary, could be widened in the future. Designers chose a cast-in-place concrete bridge with three beautiful arch spans of 210 feet and two 75-foot post-tensioned approach spans. All the substructure elements of the bridge are slender in the profile view of the bridge. This gives the bridge the strength it needs while making it graceful in appearance. The stem tees of the double tee deck section match the spacing of the arch ribs and a cantilever sidewalk is attached to each side of the bridge. This bridge has a transverse expansion joint through the deck at each column bent and intermediate deck diaphragms, transverse beams, and transverse arch braces are absent contributing to the openness of the structure.

Photo Courtesy of OBEC Consulting Engineers



Project Principals: City of Redmond, *owner*; OBEC Consulting Engineers and Jiri Strasky, *engineer*; Cascade Bridge, LLC, *contractor*; Central Oregon Redi-Mix, *concrete supplier*.

Jury Comments: The strength of concrete in compression is demonstrated best in the arch form and none better in the lightness of the components of this open spandrel design. It sits lightly on the landscape of its setting.

Forty Foot Road Pedestrian Bridge

Montgomery County, Pennsylvania

Concrete's economy, durability and aesthetic potential made it the clear choice for a pedestrian bridge in Montgomery County, Pennsylvania. When a highway project was needed to improve the intersection and approaches of Sumneytown Pike and Forty Foot Road (Route 63), the ultimate widening of Forty Foot



Photo Courtesy of Simone Collins, Inc. Landscape Architecture

Road to five lanes would inhibit pedestrian crossing or slow traffic if signals are used, thus the pedestrian bridge. A cultural landscape symbol of a new Town Center, the 40-foot wide deck was designed as an attractive and comfortable environment for moving people and community activities safely. Two architectural concrete fascia beams and three standard concrete box beams form the single span bridge structure. The fascia beams completely integrate the engineering with the architectural design.

Project Principals: Towamencin Township, *owner*; QBS International, Inc., *engineer*; Simone Collins, Inc. Landscape Architecture; McMahon Associates, Inc., *highway engineer*; GeoStructures, Inc., *geotechnical engineer*; Road-Con, Inc., *contractor*; Berks Products, *concrete supplier*; Schuykill Products, Inc. (box beams); Architectural Precast (finials & pylon caps); Reinforced Earth Company (MSW wall and cap finials), *precasters*.

Jury Comments: Structural concrete's ability to be molded into a variety of shapes allowed the designers to create an art deco sculpture that sets this pedestrian bridge apart. It is in itself a work of art.

Port Columbus International Crossover Taxiway

Columbus, Ohio

The Port Columbus International Airport in Columbus, Ohio, needed a crossover taxiway so that aircraft could travel from the terminal building to the outer runways. The bridge has a single 191 foot span, is 217 feet wide and is designed to carry a 747-400 aircraft weighing 894,900 pounds. To achieve this, designers selected a post-tensioned cast-in-place concrete structural system with integral abutments. It is constructed with 7200 psi concrete and 92-27 strand tendons that were used for the main span and 194 -1 ¾ in. diameter vertical PT bars that were stressed at each 30 foot tall, 230 feet long abutment. To keep the deck free from ice in during Ohio winters, a hydronic deicing system consisting of tubes containing glycol from a pump and heater, was embedded into the deck.



Photo Courtesy of RW Armstrong

Project Principals: Columbus Regional Airport Authority, *owner*; RW Armstrong, *engineer*; Rosales, Gottemoeller & Associates, Architect; C.J. Mahan Construction Company, *contractor*; Anderson Concrete (superstructure & abutments) and Arrow Concrete (drilled shafts), *concrete suppliers*.

Jury Comments: This is a very well proportioned structure with very clean lines. The high design loads resulting from aircraft were mitigated with innovative design solutions using cast-in-place concrete and post-tensioning.

Agua Hedionda Lagoon Railroad Bridge Replacement

North County Transit District in Carlsbad, California

To enable passenger trains to run at full speed, the North County Transit District in Carlsbad, Calif., needed to replace a timber trestle bridge. Engineers recommended replacing the current 14-span wood bridge with a new three-span precast concrete bridge to cover the priority wetland section of Agua Hedionda Lagoon. The use of 99-foot long, 7-feet deep precast bulb-tee concrete girders allowed the main span to clear the mouth of the channel, thereby expediting the environmental review process. The use of a cast-in-place



Photo Courtesy of Simon Wong Engineering

concrete deck and ballast retainers built over the girders made it possible to open the bridge just four months after the girders were placed.

Project Principals: North County Transit District, *owner*; Simon Wong Engineering, *engineer*; FCI Constructors, *contractor*; Hanson Aggregates concrete supplier; and Concrete Constructors, *precast concrete*.

Jury Comments: The use of precast bulb-tees sections to support this railroad crossing

allowed for the rapid replacement of an aging trestle while avoiding stream impacts. It provides a bridge with low maintenance costs for the future and demonstrates the strength of pre-stressed beams.

Otay River Bridge

San Diego, California

Engineers faced many challenges with the Otay River Bridge in San Diego, Calif. The bridge is a critical link that carries four lanes of traffic across the wide Otay River Valley, a seasonal river and environmentally sensitive area that is home to a number of protected plants and animals. Construction needed to take place with minimal site disturbance while adhering to strict constructibility and seismic performance standards. This was solved with the selection of a segmental bridge. Spanning a total of 1,012 meters, the bridge is broken into ten spans of 90.5 meters and two end spans of 53.5 meters. It has a twin trapezoidal box girder configuration, connected by a longitudinal cast-in-place concrete closure. The contractor used the balanced cantilever method of construction where the segments were delivered over the completed portion of the deck to minimize site disturbance. The Otay River Bridge is a model for bridge construction and achieves the goals of constructibility, seismic performance, and environmental sensitivity.



Photo Courtesy of South Bay Expressway and International Bridge Technologies, Inc.

Project Principals: South Bay Expressway (a Public-Private Partnership between the State of California and South Bay Expressway), *owner*; Washington Infrastructure Services, *prime consultant*; International Bridge Technologies, Inc., *detail design and construction engineering*; Otay River Constructors, *contractor*; Hanson Aggregates, *concrete supplier*; and Pomeroy, *precast concrete*.

Jury Comments: The use of segmental concrete in the graceful arch spans and the slender columns makes a striking structure that one sees on the vista of this magnificent crossing.

South Slough Bridge #91

Snohomish County, Washington

Originally construction in 1918 in Washington State's Snohomish County, the deck of this concrete arch bridge was less than 20 feet wide, causing safety concerns. Because of its historical value, the county employed a creative design to keep the existing solid arch foundation, while at the same time widening the bridge deck to



Photo Courtesy of Snohomish County Public Works

28 feet. To prevent overloading the arches, earth fill within the arches was replaced with lightweight cellular concrete. Thirty-two precast concrete slabs, 8 feet by 31 feet, were placed side by side and cantilevered 4.5 feet on each side. This fast-tracked project was completed in 17 months from start of design to end of construction and built for \$5 million less than estimated.

Project Principals: Snohomish County Public Works, *owner and contractor*; Parsons Brinkerhoff, *engineer*; Builders EF, *concrete supplier*; and Concrete Technology Corporation, *precast concrete*.

Jury Comments: This project demonstrates an innovative use of lightweight concrete to save the historic Luten arch and reduce construction time and money.

Big Cottonwood Canyon Bridge

Salt Lake County, Utah

Located in Salt Lake County, Utah, the Big Cottonwood Canyon Bridge provides access to a private development in the foothills of the Wasatch Mountains. The site has steep grades, a conservation easement, and is adjacent to protected property. To meet this challenge, the engineer designed two bridges on switchback curves. The lower bridge provides an aesthetic entrance to the development, is sensitive to the environment, and satisfies the concerns of county officials. The bridge is 450 feet long with a switchback radius of only 80 feet and a 12% grade. A cast-in-place concrete triple cell box girder with five 90-foot spans supports the integral concrete deck. The girders are supported by single column bents and integral caps on spread footings. The bridge is designed to resist very high seismic activity with a peak ground acceleration of 176% of gravity.



Photo Courtesy of Michael Baker Jr. Inc.

Project Principals: Wasatch Pacific, LLC *owner*; Michael Baker Jr. Inc., *engineer*; Ralph A. Wadsworth Construction, *contractor*; and Harper Ready Mix, *concrete supplier*.

Jury Comments: This is an excellent design solution to a highly challenging project. This bridge literally fits the site in which it has been placed. The project is an excellent example of the versatility of cast-in-place concrete.

Selmon Expressway Expansion

Tampa, Florida

Precast concrete segmental bridge construction was used to achieve the owner's project goals for this Tampa Fla., overpass. The five-mile long elevated expressway needed to be built without interfering with at-grade traffic, its aesthetics had to satisfy nearby residents and business owners, and construction cost had to be within the budget. Using the span-by-span method of segmental construction, the 59-foot wide deck was constructed on single 6-foot diameter column bents located in the grassed 46-foot wide median between the



Photo Courtesy of FIGG Bridge Engineers

adjacent lanes of traffic. Simultaneous fabrication of the 3032 segments, while the foundations and piers were under construction, shortened the construction time significantly. Full width segments were lifted by the gantry crane or moved to the placement location over the completed spans. The new bridge met all the owner's goals and after one year toll revenue was 25 percent more than estimates.

Project Principals: Tampa Hillsborough Expressway Authority, *owner*; FIGG Bridge Engineers, *engineer*; PCL Civil Constructors, Inc., *contractor and precast concrete*; and CEMEX, *concrete supplier*.

Jury Comments: The designers are to be congratulated on building this difficult, but beautiful serpentine viaduct into the existing roadway section without disruption of traffic.

McEwen Drive Interchange at Interstate 65

Franklin, Tennessee

At the McEwen Drive Interchange in Franklin, Tenn., all traffic movement is aligned and curved to intersect at a single point. This is good for traffic but it creates complexity for the roadway and bridge geometric design. Engineers used high performance precast concrete bulb tee beams for the two span bridge to minimize costs while maximizing the bridge's service life. The beams were installed in a fan arrangement causing a variation in the length of each beam. To eliminate maintenance of expansion joints, the beams are designed as continuous with integral abutments and a fixed bent. Steel railings, attractive light poles, and textured concrete piers on the bridge complement the character of the city known for its Civil War history.



Photo Courtesy of Gresham, Smith and Partners

Project Principals: City of Franklin/Tennessee Department of Transportation, *owner*; Gresham, Smith and Partners, *engineer*; Rogers Group, Inc., *contractor*; CPI Concrete Products, *precast concrete*; and Williamson County Ready Mix, *concrete supplier*.

Jury Comments: The designers of this urban interchange used simple framing and low cost pre-stressed concrete beams to hold down costs, while applying architectural treatments that demonstrate the flexibility of cast-in-place concrete, to send a message of welcome to the city of Franklin.



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