Bridge Award Winners
Feature Range of Benefits

Bridge designers focus on aesthetics, speed, durability and variety in creating precast concrete bridge designs.

The range of innovative ways bridge designers can take advantage of precast concrete’s attributes can be seen in this year’s award-winning projects. They feature a wide range of use for the material, which provided a wider array of benefits. Specific benefits mentioned by the award-winners in their submission entries are:

Aesthetics: One of the key benefits that precast components provide is a strong aesthetic value, both for traditional vehicle bridges as well as pedestrian spans. This was especially true of the Coton Bridge in Lansdowne, Va., a 446-foot bridge spanning a “scenic river.” Its use of a custom-stone finish produced a dramatic and fitting look. The new Colonial Williamsburg Bridge To The Past pedestrian bridge also presents an attractive design that blends with the historic area in which it is sited.

Durability: Designers realize that precast’s high durability, especially when high performance concrete is specified, offers both short- and long-term advantages. The material can create great design flexibility and longer spans due to its high strength, and it also provides strong durability that lowers maintenance throughout the bridge’s lifetime and extends that life significantly.

Best Bridge With Spans
Less Than 65 Feet

Coton Bridge, Lansdowne, Va.

Precast Licensee: BridgeTek, Fredericksburg, Va.
Precast Specialty Engineer: CON/SPAN Bridge Systems, Dayton, Ohio
Geotechnical Services: ECS, Chantilly, Va.
General Contractor: Westlind Construction, Chantilly, Va.
Owner: Lansdowne Development Co., Lansdowne, Va.

Precast Solution: A nine-cell, 446-foot precast concrete bridge complete with custom-stone finishes was designed to connect new upscale residential developments. The bridge, over a stream noted by the state as a “scenic river,” resembles other historic arched-span structures in the area. Seven 48-foot spans and two end spans of 42 feet were used to create the aesthetically pleasing design.

Judges’ Comments: “This is a good-looking structure with an outstanding architectural treatment. It’s very impressive, creating an almost entirely precast structure. By using precast components so exclusively, designers were able to duplicate as close as possible the original bridge construction.”
Best Rehabilitated Bridge

Jacques Cartier Bridge, Montreal

Engineer: SNC-Lavalin Inc., Montreal
Precaster: Consortium SMDB (led by SNC-Lavalin Inc.) with several local precasters
General Contractor: Consortium SMDB (led by SNC-Lavalin Inc.), Montreal, Quebec
Owner: The Jacques Cartier & Champlain Bridges Inc., Longueuil, Quebec

Precast Solution: The 1.7-mile, five-lane bridge, which crosses a major river and carries more than 43 million vehicles every year, had to replace an existing one carrying more than 43 million vehicles annually, making it one of the busiest bridges in North America on a per-lane basis. The new structure offers a design service life of more than 50 years.

Judges’ Comments: “The use of precast concrete for this important rehabilitation project is exemplary. The HPC deck will be very durable, and the precast solution should also improve maintenance problems. The incorporation of the pedestrian rail elements into the modular deck panels prior to installation sped construction effectively.”

Durability was a key concern for the Jacques Cartier Bridge, which was designed with 8,700-psi concrete. The bridge replaces an existing one carrying more than 43 million vehicles annually, making it one of the busiest bridges in North America on a per-lane basis. The new structure offers a design service life of more than 50 years.

Speed: Precast’s speed of fabrication and erection often are the driving forces for designers to use the material, as these advantages add benefits in many ways. Not only do they bring the bridge into service quicker, but the speed enhances worker safety by reducing time in the field. The 38th Street Bridge in Tacoma, Wash., is an example of what can be achieved, with removal and replacement of an existing 325-foot bridge taking only 10 months. This easily met the state’s commitment to open the bridge within one year.

Best Bridge With Spans Between 65 And 135 Feet

Little Oak Creek Bridge, Corson County, S.D.

Engineer: Interstate Engineering Inc., Wahpeton, N.D.
Precaster: South Dakota Concrete Products, Pierre, S.D.
General Contractor: A.J. Construction Co., West Fargo, N.D.
Owner: Standing Rock Sioux Tribe, Fort Yates, N.D.

Precast Solution: A single-span precast concrete bridge featuring six bulb-tee girders was designed due to its functional ease, cost, constructability and aesthetics. Time was considerably reduced thanks to the use of one 95-foot span.

Judges’ Comments: “This project presents an overall excellent use of precast components for simplified construction. The integral deck riding surface combined with the bowed “T” shape provided for a very short construction time frame.”
It took slightly more than three months to construct the **Little Oak Creek Bridge**, a single-span, 94-foot-long structure in Corson County, S.D., using precast bulb-tee girders. Beginning in August, the project was open to the public on December 10, 2002, here again easily meeting the owners’ goal of opening the bridge in less than four months.

“Condensed construction timeframe” was given as a key reason for using precast concrete on the 67-foot-long **Colonial Williamsburg Bridge**, which also was completed in 10 months, opening on Thanksgiving Day, 2002. The innovative **AirTrain Light Rail System** also used precast concrete components to aid efficiency. The use of precast segmental construction allowed as much as 800 feet of the superstructure to be completed each week, designers report.

**Wider Range:** As designers use precast girders and deck panels more often, they are expanding the types of materials being fabricated from precast concrete as well. Piers and pier caps, architectural panels and other components are being included. This was exemplified in the 3,450-foot **Ocean-City Longport Bridge**, which replaced an existing bridge in Ocean City. It comprises not only panels and three types of AASHTO girders but also cylinder piles, cofferdams, double tees and pier caps. For details on that project, see page 22 in the report on the Harry H. Edwards award winners.

**Environment:** Precast’s durability and span lengths are helping the environment, as several of these projects show. Longer spans minimize the number of piers that must penetrate the landscape or waterways. The Ocean City project minimized time needed to work in the water, a particular advantage due to the swift currents and rough seas.

At the **Little Oak Creek Bridge**, the use of one 95-foot-long precast span eliminated any piers in the water, minimizing the environmental impact and making precast the obvious choice.

Officials on the local Scenic River Advisory Board for the **Coton Bridge**, also were impressed with precast’s environmental friendliness. Casting more than 4,865 tons of precast at the plant rather than on-site reduced the environmental disruption, and burying utilities in five feet of infill across the top of the bridge rather than routing them...
under the stream bed also minimized impact.

**Segmental Construction:** The ability to post-tension precast segments is being used more often by designers and can be seen to best advantage in the *Jacques Cartier Bridge*, which was rehabilitated using existing steel superstructure components. The bridge deck consists of 1,680 precast panels that are subjected to transverse and longitudinal post-tensioning after installation. The deck features an area of more than 645,000 square feet. Each span features four precast, prestressed concrete panels installed side by side to create a 77-foot width and then post-tensioned. This eliminated the tensile stresses at the top fiber of all joints between the panels.

Segmental construction also was a key ingredient for the *AirTrain Light Rail System* at JFK Airport in Queens, N.Y. It successfully allowed the project to build over major highways, within inches of existing structures, while navigating a massive network of underground utilities. Specially designed erection trusses allowed span-by-span construction to be used for 90 percent of the work. A balanced-cantilever sequence was used for the rest. Two sets of trusses, with a 55-foot launching nose, ensured that each truss always was supported by at least two towers as it was launched. Typically, each truss was launched with a simple winch to the next span.

This array of benefits is becoming more commonplace as designers take full advantage of precast concrete’s capabilities. As these projects and the others in this issue suggest, the material’s potential continues to be tapped.

— Craig A. Shutt

**Best Owner-Designed Bridge**

**38th Street Bridge, Tacoma, Wash.**

**Engineer:** Washington State Department of Transportation, Olympia, Wash.

**Precaster:** Concrete Technology Corp., Tacoma, Wash.

**General Contractor:** Max J. Kuney Co., Spokane, Wash.

**Owner:** Washington State Department of Transportation, Olympia, Wash.

**Precast Solution:** This bridge replacement was accomplished in 10 months, thanks to the use of precast trapezoidal tub girders for the main spans on the two-span project. The superstructure consisted of six lines of girders with three precast tubs per span. The tubs were temporarily supported on falsework and then post-tensioned after casting the deck. The prime schedule-saving factor on the project was derived from the use of precast deck panels instead of a cast-in-place deck.

Judges’ Comments: “This project represents an excellent use of precast concrete, with aesthetic applications that extend the use of shallow precast U-beams for longer span applications. The clever use of relatively short sections to construct the slender-looking 160-foot spans resulted in a very good looking structure.”

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