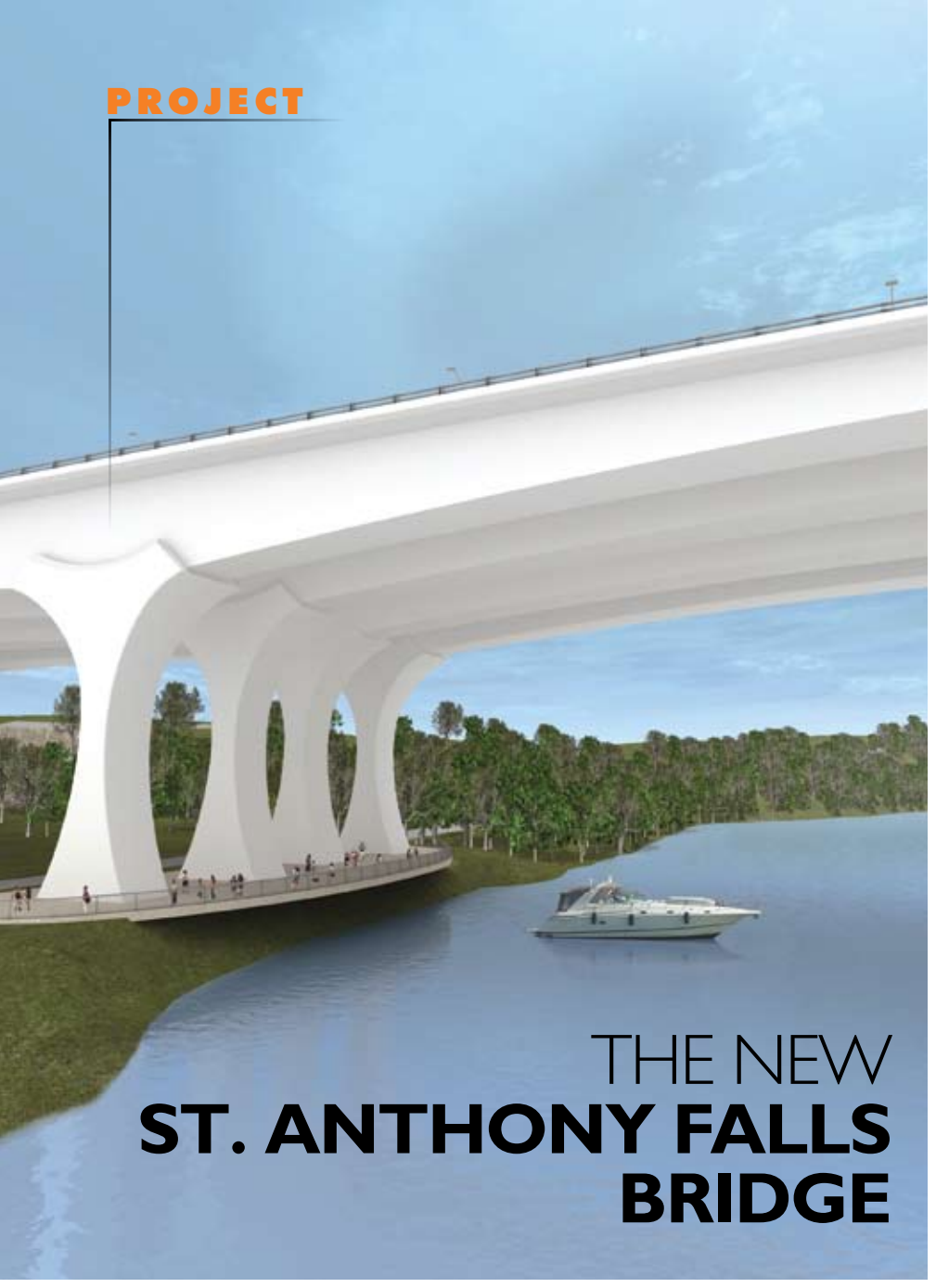
PROJECT



THE NEW ST. ANTHONY FALLS BRIDGE

by Jon Chiglo, Minnesota Department of Transportation and Linda Figg, FIGG

A Modern Concrete Bridge Spanning the Mississippi River in Minneapolis

The new St. Anthony Falls (I-35W) Bridge will be a modern concrete bridge spanning the Mississippi River with a 504-ft-long main span and a focus on the future. On October 8, 2007, the Minnesota Department of Transportation (Mn/DOT) awarded the design/build contract for this important bridge to a joint venture of Flatiron Constructors Inc. and Manson Construction Company, with Johnson Brothers in a key support role. FIGG is leading the design phase of the project for the construction joint venture and is engineer of record for the new bridge, with TKDA of St. Paul, Minnesota, responsible for general civil, storm water/drainage, 2nd Street overpass, and other engineering support services. Oslund and Associates from Minneapolis is responsible for the landscape design.

The successful past working relationships between members of the team on other design/build bridges over major waterways helped prepare them for the challenge of completing the design and construction of this $234 million project in 15 months, or by December 24, 2008. Construction activities officially began on site November 1, 2007, with the drilling of a test foundation shaft. Mn/DOT and the design/build team are committed to creating a new bridge with the top priorities of safety, quality, and a world-class design that reflects the community's values.

As the design was underway, the community received an opportunity to select their preferences on various aesthetic aspects during a full day FIGG Bridge Design Charette™ held on October 24, 2007. A cross section of the community including residents, business people, government officials, representatives of the cultural arts, University of Minneapolis, and others, voted on a curved pier shape, open railing for new vistas, bridge color of white, native stone gabion walls, and feature lighting.

The bridge will be 1219 ft long with twin structures, each 90-ft 4-in. wide, using two box girders per structure; thereby, providing multiple levels of

The superstructure of the 504-ft-long main span consists of four variable-depth precast concrete segmental box girders supported on 70-ft-tall piers on each side of the river. Photos: FIGG.

This sculptured bridge theme of arches, water and reflection was developed to create a consistent concept, as well as to develop all elements in the same family.

structural redundancy. Span lengths are approximately 319, 504, 248, and 148 ft. The bridge design criteria required 10 lanes of traffic with future accommodations for light rail and bus rapid transit or HOV. The sweeping variable depth superstructure has an arching parabolic curve, which varies in depth from 25 ft at the main piers to 11 ft at the center span over the river and seamlessly connects to 70-ft-tall piers anchored on each side of the river. The main span will use precast segmental construction and the long-line method of construction with four casting lines, while the approach spans will be cast-in-place concrete on falsework.

The smooth surfaces of the superstructure box girders feature inclined walls and continuous flat planes. As a result, the appearance is sculptural; the shape and concrete material combine to create a visually clean and quieter space under the bridge. The bridge layout and shapes maximize openness and green space, providing new opportunities for observation platforms, landscaping, recreation, and reflection along the river in the area underneath the bridge, beside the waterway.

Designing and Building for Safety

Both the design and construction focus on safety. During design, emphasis is given to multiple levels of structural redundancy, low maintenance, and providing a high tech, high performance bridge utilizing "smart" technology. Sensors positioned at key locations in the structures will communicate real time information and monitor the long-term bridge performance, relay weather conditions, and provide data during construction. Utilizing local material resources, local labor, and precasting at the project site results in energy-efficient construction and a sustainable bridge. The project is environmentally friendly by minimizing equipment in the river, collecting storm water, and preserving an historic wall.

A Modern Concrete Bridge for the Future

The new bridge is expected to open to traffic by December 24, 2008; within 15 months of notice to proceed. It is a bridge for the future, designed and constructed for safety, quality, and aesthetics. It demonstrates the versatility of concrete to address the function, while enhancing the form. This bridge will be a new resource to reflect on as communities look ahead to the replacement of deficient bridges and strengthening our economy for future generations.

Jon Chiglo is Project Manager with the Minnesota Department of Transportation and Linda Figg is President/CEO/Director of Bridge Art with FIGG.

Context Sensitive Solution

The elegant simplicity of the design was chosen after careful review of the context of the site. The region demonstrates a strong value for historic preservation like the Stone Arch Bridge, Mill Ruins Park, St. Anthony Falls, and the 10th Avenue Arch Bridge. Then juxtaposed to these structures is a passion for the modern, like the Guthrie Theater and the Weisman Art Museum. Each structure is appropriate to its time and place along the river valley. The bridge crosses the river immediately below the only falls along the Mississippi River, St. Anthony Falls, a National Historic Site. For the new bridge to gracefully coexist in harmony with the environment, it was important that it be respectful of the forms and materials of its neighbors and complement, without overpowering.

A theme was developed to create a consistent concept and develop all elements in the same family. In keeping with the features of the site, a theme of ***"Arches, Water, Reflection"*** was chosen. ***Arch*** forms are incorporated with graceful proportions and elegant simplicity in the connecting elements of the bridge and its site. The project centerpiece, ***Water***, is framed as a point of interest, bringing the focus back to the Mississippi River and ***Reflection*** is both the literal reflection captured by the shapes, natural light, and water, as well as the spiritual reflection that this bridge site evokes. The site itself is a dense urban area congested by utilities, rail lines, and local streets, which required special attention to geometric enhancements for improvement of future overpass constructability and ramp access safety. The project site has many unique challenges requiring special attention to the alignment geometry, foundation configurations, and types and construction techniques. These include a capped environmental site on one end, three roadways, bike-trail pathways, two large storm water outfalls, guide wall for the Corps of Engineers navigation locks, deep foundations from the previous bridge, dredged spoil site, historic wall, railroad track, future transportation corridor, and steam line/utility tunnels. Using four parallel concrete box girders, each with their own series of identical piers provided the flexibility to accommodate the existing site requirements.

For more information on this or other projects, visit www.aspirebridge.org.