
2011

# Bridge Awards of

## In recognition of the owners of bridges which exemplify concrete

In the fifth biennial American Segmental Bridge Institute (ASBI) Bridge Award of Excellence competition, nine projects were selected as outstanding examples of segmental concrete bridge construction. Judging for the 2011 program took place at the Florida Department of Transportation office in Tallahassee, Florida, hosted by Robert Robertson, Jr., State Structures Design Engineer, Florida Department of Transportation—Structures Design Office.

# Excellence

segmental bridge design and construction excellence.

All concrete segmental or cable-supported bridges located within the 50 United States and completed between January 1, 2009 and August 1, 2011 were eligible for the 2011 awards competition. The jury also considered international projects involving ASBI members. Entrants in the competition were judged on the basis of the following criteria:

- **Innovation of Design and/or Construction**
- **Rapid Construction**
- **Aesthetics and/or Harmony with Environment**
- **Cost Competitiveness**
- **Minimization of Construction Impact on the Traveling Public (When Applicable)**

# 4th Street Bridge

*The 4th Street Bridge is a major east-west route through the center of historic downtown Pueblo, connecting I-25, downtown, and western residential neighborhoods. It carries State Highway 96A over a small city street, the UPRR/BNSF Railroad Yard containing a total of 28 tracks, a floodwall painted with community art, the Arkansas River, and the Arkansas River trail and recreation area.*

*The Bridge Owner recognized not only the challenges of constructing a new bridge at this complex site, but also the importance of strong community involvement for a new bridge that would become a focal point defining the City of Pueblo. Minimizing disturbance to Railroad operations, the traveling public, and local businesses, while preserving environmental wetlands and recreational areas along the Arkansas River were coupled with developing a bridge project with community vision and consensus.*

## Innovation of Design and/or Construction

Geometrics of the railroad yard, its proximity to the river and local businesses, and the need to maintain busy yard operations during construction required a unique design and construction solution. After carefully studying many different layouts and structure alternatives, the bridge designer determined a long-span, cast-in-place concrete segmental bridge was the most cost effective solution with minimal disruption to both the Contractor and the Railroads during construction. Careful pier placement and longer spans ensure that required clearances were met, while building from above in balanced cantilever fashion allows rail operations and river use to continue.

Pier locations within the yard were chosen to satisfy railroad clearance requirements. To span the 23 UPRR tracks, a single, long-span was required. One main-span pier was located beyond the westernmost track along the toe of the floodwall, and the other along the edge of the east yard road, adjacent to the UPRR mainline track. These pier locations led to the Colorado-record 378-foot clear span over the UPRR.

Span balancing for the most efficient design and site constraints dictated pier locations outside of the yard. Side spans of approximately 230 feet provide clear spans over the BNSF yard with five tracks to the east and the floodwall and Arkansas River to the west.

The resulting layout reduced the number of piers in the railroad yard from five to one, enhancing safety and greatly opening the yard. Balanced cantilever construction from above eliminated the need for large, ground-based equipment within the rail yard and Railroad operations were virtually unaffected by bridge construction. Side spans were constructed on falsework, taking advantage of the readily available ground access on each side of the project. The side spans were joined to the cantilever construction through eight-foot long closure joints to establish continuity of the bridge.

## Bridge Aesthetics

The 4th Street Bridge has a long history, being a critical link and focal point of the Pueblo community for more than 100 years. Although the complex site conditions drove the 4th Street Bridge design, a focus on community involvement during the design process created a unique, signature

## Jury Comments

The difficult challenge of completing the project over 28 active sets of rail tracks, while minimizing disruptions to the traveling public and local businesses, was solved using segmental construction. The project included a Colorado record span and was completed ahead of schedule for $165/sq.ft.!

bridge for the City of Pueblo. Aesthetic and urban design features, such as project theme, color, sidewalk, pier and end treatments, lighting, and pedestrian railing style, were presented and selected through a consensus voting process.

Combined themes of Contemporary Sculpture, Natural Environment, and Pueblo Heritage chosen by the community led to bridge form and guided aesthetic treatments. Pueblo's local art focus is planned to be represented in special pier medallions, bridge end monuments, and pedestrian treatments. The new bridge is a landmark structure defining the landscape and providing a gateway to Pueblo.

## Cost Competitiveness

The winning Contractor was awarded the contract for a total price of $27.7 million, resulting in a cost of $165 per square foot. At the time of bid, the Owner allowed Contractors the option to bid on alternate designs to consider other structure types and increase competition. The two alternate bridge designs did not specifically address impacts to the Railroad operations during construction and were approximately $5 million higher than the segmental design.

## Minimization of Construction Impact on the Traveling Public

In addition to keeping the rail yard operational during construction, traffic also needed to keep moving on the existing bridge. Continual traffic flow during construction was one of the Owner's major goals. To keep traffic moving through the corridor, the westbound bridge structure was constructed first, and then all four lanes of traffic were temporarily transferred to the new westbound structure while the eastbound bridge was completed. Construction began in December 2007 and was completed in December 2010, approximately six months ahead of the contract completion date.

## CREDITS

Owner:
Colorado Department of Transportation

Owner's Engineers: **FIGG**

Designer: **FIGG**

Contractor: **FLATIRON**

Construction Engineering Services: **Finley Engineering Group, Inc.**

Constructability Review/Estimating Services: **FIGG**

Construction Engineering Inspection: **FIGG**

Form Travelers for Cast-in-Place Segments: **VSL**

Post-Tensioning Materials: **VSL**

Bearings: **The D.S. Brown Company**

Expansion Joints: **Watson Bowman Acme – A BASF Company**

Prepackaged Grout: **Sika Corporation**

Pier Forms: **EFCO Corp.** and **DOKA**

All Photos Courtesy of FIGG