

I-76 SUSQUEHANNA RIVER

Construction is complete on the first concrete segmental bridge on the nation's first superhighway, the Pennsylvania Turnpike. The new Susquehanna River Bridge opened to traffic on May 17, 2007 following a community fund raising event that saw more than 2,000 runners complete a race that included "one turn and done" on the new structures.

The bridge design features twin structures, each 5,910' in length and 57' wide to accommodate three lanes of traffic in each direction with wide shoulders. Typical spans are 150' and were erected span-by-span on cast-in-place piers founded on drilled shafts. The twin bridges cross the shallow, non-navigable Susquehanna River, in addition to rail lines, a state roadway on the river bank and Culver Island, in the middle of the river.

Innovation of design and/or construction

The Pennsylvania Turnpike Commission took a bold step forward by committing to the introduction of concrete segmental construction in the Commonwealth of Pennsylvania.

Traditional span-by-span erection was completed with a self-launching underslung erection truss that was advanced from the eastern end of the bridge for the first half of the eastbound structure, then returned to begin the westbound structure, building from the eastern end to Culver Island in the middle of the river. The temporary causeway that had been constructed in the river on the eastern side of Culver Island, then shifted to the west side and the structures completed from Culver island to the western shore. This allowed for the economic delivery of segments over the completed structure from the casting yard that had been established on a hillside in close proximity to the bridge site.

The contractor used a unique segment setter to set segments as they were delivered to the erection site across the most recently completed spans. The segment setter efficiently lifted the segments from a low - boy transport truck and lowered them to the truss. The low profile of the setter alleviated concerns over using a traditional crane with a tall boom in close proximity to Harrisburg International Airport. Additionally, the segment setter was able to work under transmission lines at one end of the bridge, allowing the lines to be reset to their new permanent location in one move and eliminating an intermediate and temporary line relocation.

Rapid construction

The project was bid in the fall of 2004, and the low bid was \$82 million. Notice to proceed was given soon after, and casting of all 1,040 segments was completed in less than two years. The 40 spans in each of the twin bridges were erected sequentially, utilizing one erection truss. The contractor easily and regularly achieved an erection rate of two 150' spans per week.

Aesthetics and/or harmony with the environment

The Susquehanna River Bridge is the longest bridge on the Pennsylvania Turnpike system and in close proximity to the Commission's headquarters. During the design phase of the project, an owner's charette was held with participants from the Commission who reviewed options for the pier shape and aesthetic treatment, the superstructure box shape and aesthetic lighting of the bridge. A form liner was used during the casting of piers to mold a stone inlay that reflects the quarried limestone facade of the Headquarters building. The form liner created a ribbon of texture vertically up the center of the pier, visually adding to the pier slenderness. At the top of the pier, the limestone texture splays across the pier cap in the shape of a keystone, honoring Pennsylvania, the Keystone State.

Accent lighting is located under a lip on the segment wing. The emanating light is captured by a slight curvature formed in the segment web at the bottom soffit interface. An open barrier rail provides those crossing the new bridge with clear views of the wide river valley.

JURY COMMENTS

The uniform spans and constant depth girder design of the I-76 Susquehanna River Bridge are appropriate for a broad river crossing site. Efficient precast construction and erection resulted in an economical structure at \$120.00 per sq. ft. Inlaid stone pier treatment and accent lighting provide enhanced aesthetics. A beautiful structure.

Cost competitiveness/Minimization of construction impact on the traveling public

Low bid for the twin 5,910' structures was \$82 million or approximately \$120 per square foot of bridge deck. This price is competitive with historical Pennsylvania bridge costs at the time of the bid. Selecting precast concrete segmental technology offered the shortest construction duration of major bridge types, a significant advantage.

BRIDGE



CREDITS

Owner: Pennsylvania Turnpike Commission

Designer: **FIGG**

Contractor: Edward Kraemer/G.A. and G.F. Wagman Joint Venture Team

Construction Engineer: **McNary Bergeron**

Construction Engineering Inspection: **Parsons/FIGG**

Formwork for Precast Segments: **Southern Forms, Inc.**

Erection Equipment: **DEAL**

Post-Tensioning Materials/Stay Cables:
Dywidag Systems International, USA, Inc.

Bearings and Expansion Joints:
Bearings – Seismic Energy Products
Expansion Joints – Watson Bowman Acme Corp.

Epoxy Supplier and Prepackaged Grout:
Sika