

# Best Bridge with All-Precast Concrete Solution and Main Span from 76 to 149 ft

## Rich Street Bridge

Columbus, Ohio

<b>Owner</b>	Ohio Department of Transportation District 6, Delaware, Ohio	<b>Bridge Architect</b>	Bridgescape LLC, Columbia, Md.
<b>Client</b>	City of Columbus, Department of Public Service, Columbus, Ohio	<b>Precaster</b>	Prestress Services Industries, Melbourne, Ky.
<b>Engineer of Record</b>	Burgess & Niple Inc., Columbus, Ohio	<b>Contractor</b>	Kokosing Construction Co. Inc., Columbus, Ohio
<b>Construction Engineering</b>	Finley Engineering Group, Tallahassee, Fla.	<b>Overall Project Cost</b>	\$30,533,000
<b>Structural Engineer</b>	Leonhardt, Andrä und Partner Beratende Ingenieure VBI AG, Stuttgart, Germany	<b>Bridge Construction Cost</b>	\$12,453,000
		<b>Bridge Length</b>	562 ft (171 m)
		<i>Photos</i>	<i>Randall Lee Schieer Photography, Columbus, Ohio</i>



The new Rich Street Bridge in Columbus, Ohio, had to do more than just offer cars and pedestrians a way across the river. The bridge was going to be a centerpiece for the city's thriving downtown riverfront and a venue for festivals and community events.

"The owner wanted an iconic design that fit the style of the city," says John Shanks, project manager with Burgess and Niple, the engineer of record for the project.

The new structure would replace a historic but structurally deficient concrete spandrel-filled arch bridge, but it would be built on a new alignment slightly farther downstream.

Originally, the engineers envisioned a cast-in-place concrete ribbon arch bridge; however, midway through the design process, the engineer and architect were challenged to reduce the overall cost of the project and shorten the construction time frame. "We determined that a precast concrete bridge was the only solution that would meet those project goals," Shanks says. "It allowed for greater speed and efficiency of construction, it was a lower-cost option, and it had greater expected durability than cast-in-place concrete."

The new design is a 562 ft (171 m) modern rib arch bridge with semi-lightweight precast, post-tensioned concrete arch ribs. Using lightweight precast concrete arch ribs instead of the cast-in-place arch plates reduced construction time and allowed for a minimal number of field segments, which were precast locally and transported via truck to the site.

The radii of the ribs and all other relevant dimensions are standardized from span to span. Along with the biaxial symmetry of the structure, this standardization allowed all of the precast structural members to be cast with just one set of three custom adjustable forms, saving both time and money. All post-tensioning strand-end anchorages were arranged to be concealed and terminate above flood level for added durability. The change to precast concrete ultimately shortened construction by seven months and reduced estimated project costs by \$10 million.

"The use of precast concrete also provided distinct advantages when incorporating bridge aesthetics," Shanks says. The modern arch structure used precast concrete beam, arch rib, and arch apex segments stitched together with a combination of prestressing and field post-tensioning. This created a fully continuous frame, eliminating intermediate expansion joints and spandrel columns, to allow for a slender open design that provides clear views of the water and city skyline. To create additional drama, architectural lighting was installed both above and below the bridge deck to light up the structure at night, creating a dazzling display that reflects off the river.

"The new bridge has such widespread appeal that it regularly appears as the backdrop for local newscasts, newspapers, and tourism materials," Shanks says. "The use of semi-lightweight precast concrete, field-spliced post-tensioning, and a minimal number of efficiently tailored segments helps advance the boundaries of what can be achieved with precast concrete, melding aesthetic, durable, and economical bridge design."

**"These graceful high-performance precast arches created a local icon for decades to come."**

*Joey Hartmann, Transportation Awards Jury*

