

## Cleveland's New Fulton Road Bridge - July 14, 2008

Partnering propels construction of 11-span bridge over zoo

Cleveland's new Fulton Road Bridge, an open spandrel deck arch bridge, is quickly taking shape over the Cleveland Metroparks Zoo. The \$45.9-million project has been propelled by a strong partnering effort from a variety of the groups, most notably Cuyahoga County, Ohio Department of Transportation (ODOT), the designer of record – Michael Baker Jr. Inc., the prime contractor – Kokosing Construction Co., and the zoo.

The various parties are working together as one team to meet several key logistical and construction challenges associated in the construction of an 11-span structure that will stand 110 feet above Big Creek Valley, the zoo and Norfolk Southern and CSX railroad lines. "This is a special project," says Ray Bencivengo, P.E., construction area engineer for ODOT District 12. "But without partnering, this project would be a disaster. It would be very difficult to build."

He adds, "I have been an area engineer for 15 years and have done a lot of complex projects, but in this job everything has sort of aligned with the cooperation of all of the project stakeholders."

Slated for completion in November 2009, the new Fulton Road Bridge will serve as a key transportation link crossing the Big Creek Valley. Situated between Fulton Parkway on the south and Denison Avenue on the north, the new bridge replaces a highly visible landmark bridge which stood for 75 years before being demolished in 2007.

The new structure will be distinguished by its design and its close proximity to the zoo, neighborhoods, railroad lines, and recreational area, says Greg Kronstain, P.E., project engineer for ODOT District 12. The zoo exists on both sides of the bridge site, owns land under the new bridge, and has primary access points that cross the construction site. Also, animal facilities exist near the bridge.

With attendance exceeding 1 million visitors a year, visitors to the zoo pass under the structure on a daily basis. As a result, the bridge is constantly in the public eye. "More people will see the new bridge from below than from above during the course of a year," Bencivengo says.

Along with the zoo, CSX and Norfolk Southern railroads cross under the new bridge site, with limited clearance envelopes. The bridge crosses directly over the Brookside Park Bridge, a historic concrete arch bridge crossing Big Creek that must be protected during construction; and the Cleveland Metroparks Brookside Reservation is under and adjacent to the bridge, points out Mike Dzurnak, transportation engineer for ODOT District 12.

Stretching 1,583 Feet

As designed by Michael Baker Jr. Inc., Cleveland, the new Fulton Street Bridge will be 1,583 feet long and 81 feet wide. Six 210-foot main precast arch spans will follow the same basic footprint as the original arch spans, and will be accompanied by five shorter approach spans – two at 53 feet, 6 inches and three at 67 feet.

The new bridge will carry four lanes of traffic (over 23,000 vehicles are expected to travel the span daily). It will have two 5-foot-wide bike lanes and two 10-foot-wide sidewalks, with an overlook near the middle of the bridge, and feature a combination of high level roadway lighting and lower level lighting. The structure will be free of any scuppers, downspouts or intermediate expansion joints.





A shared use path will be constructed as part of the project to enhance neighborhood connectivity from the Brooklyn Centre neighborhood north of the bridge with the Brookside Reservation.

The Fulton Road Bridge will be similar in appearance to the old bridge, but will be "quite a bit different in design," says Jeff Broadwater, P.E., project manager for Michael Baker Jr. Inc. "The original structure was a cast-in-place structure constructed on falsework. This is a segmental concrete structure using precast pieces connected by post-tensioning."

He adds, "The roadway profile is very similar. However, the new bridge will be a little bit higher near mid-span because we put in a vertical curve so that we could drain water off both sides of the bridge, and that allowed for no drainage facilities to be required on the new structure. That was one of the problems with the old bridge – it had a nearly flat, straight grade all the way across the structure from one end to the other and there were drainage facilities at every main arch pier to accommodate that drainage. The drainage structures were internal to the piers for aesthetic reasons, but through the years those things became plugged and corroded and led to other problems."

#### Bridge Construction

Kokosing Construction Co., with headquarters in Fredericktown, Ohio, is serving as general contractor for the project.

The contractor is responsible for guiding erection of the concrete arch bridge, a process that includes erecting precast arch segments onto temporary tower supports; connecting arch segments using post-tensioning steel; constructing cast-in-place spandrel columns and caps; erecting concrete I-beams onto spandrel caps to form the bridge's main superstructure; and constructing the cast-in-place deck (8-1/2 to 9 inches thick depending on location), sidewalk and parapets.

Four lines of arch ribs will support the deck of the new Fulton Road Bridge. Each arch rib will consist of three arch segments placed end-to-end and post-tensioned together.

Seventy-two arch segments comprising the arch ribs were cast by Carr Concrete Corp. in Waverly, W. Va. The end sections of the arch ribs are erected first, each with one end supported on a cast-in-place thrust block and the other end supported on a temporary support tower. Then after the crown section is erected and supported on the temporary support towers, there will be a 1-foot, 6-inch closure pour made between the crown section and each of the two end sections to complete an arch rib.

According to Ryan Cocco, field engineer for Kokosing, 315 precast, prestressed concrete I-beams (AASHTO Type 3 and ranging from 42-foot spans to 67-foot spans), supplied by Prestress Services Inc., will be used in conjunction with the arches to support the deck. In addition to the arches and I-beams, approximately 18,345 cubic yards of cast-in-place concrete will be used during construction.

All of the new construction is completely supported on new foundations – a combination of spread footings sitting on shale bedrock and foundations supported on drilled shafts.

Scott Mesick is Kokosing's project manager for the bridge project, and Dan Sigado is project superintendent. During a late May job site visit by Construction Digest, Kokosing – with a workforce of about 40 working five days a week – was proceeding at a rapid pace on both ends of the job, including erecting the end segments in spans 7 and 8, the first two of the six arch spans.

"We're not wasting any time on the project," says Cocco. "By mid-summer, we would like to have three spans of the arches erected."

**Janssen & Spaans Engineering Inc.**, Indianapolis, is providing construction engineering services for Kokosing. "They have worked with us very closely from day one to set up a lot of the construction sequences," Cocco says.

#### Planning/Designing New Structure

Plans for rehabilitating the old Fulton Road Bridge (originally a city of Cleveland bridge) date back to at least the early 1980s when the project was initially programmed with ODOT. The decision to replace the old bridge was made in the mid-1990s. The condition of the bridge had deteriorated to a point that rehabilitation was no longer viable economically or physically.

Multiple structural types for the new structure were evaluated based on their ability to achieve an "arch-type" appearance. The precast concrete deck arch alternate was eventually selected to preserve the original structure's cultural and architectural significance of the local community while minimizing construction duration and impacts on the property below.

Due to the scope and cost of the project and the degree of coordination involved in bring it to fruition, Cuyahoga County volunteered its services to the city to act as the local public agency and project sponsor for the new bridge. "When Bob Klaiber Jr. became county engineer at the end of 1999, this project had been on the books for nearly 20 years," says Brendan Finn, chief bridge design engineer for Cuyahoga County. "He really brought everybody to the table – ODOT and federal representatives – to get the project moving and working. And within two or three years of becoming engineer, he hired Michael Baker Jr. (hired in 2002 as prime consultant for the new structure) and the ball began to roll."



Cuyahoga County has extensive experience in administering and managing large-scale Local Public Agency (federal-aid projects). The county in turn negotiated ODOT's cooperation to administer the construction contract for the bridge project.

During planning and design, a Technical Advisory Committee (TAC) was formed with key stakeholders to guide project development and decision making. Michael Baker Jr. managed the input of the TAC that included representatives from the city of Cleveland, Cuyahoga County, the Cleveland Metroparks Zoo, ODOT, and the Federal Highway Administration.

In addition, Baker conducted stakeholder meetings with local neighborhood coalitions, urban development groups and individual city council members. Everybody's input was gathered to make informed decisions at every stage of project development.

A context sensitive design process was followed, which engaged project stakeholders throughout the entire design process. One-on-one meetings were held with project stakeholders that included political, governmental and community organizations. Two public meetings were held at key project milestones to allow for public input into the project development process.

#### Maintaining Operations

When outlining plans for a new Fulton Street Bridge, the design team focused its attention on the Cleveland Metroparks Zoo. "The bridge basically cuts right through the zoo," Broadwater says.

During the design process, Baker and fellow stakeholders worked closely with zoo officials to alleviate their concerns about access to their property. "They have three access points of access through the bridge for their operations," says Broadwater. "We worked with zoo to set up access improvements that could be made as part of the project. We wanted to make sure that the contractor had room to work, as well as making sure the zoo was able to maintain operations."

"Kokosing has extended that close working relationship with the zoo," he says. "They have really developed a good relationship with the zoo, allowing both operations (zoo and construction) to proceed side by side."



Other Participants

Numerous companies are playing key roles in the design/construction of the new bridge, including Chagrin Valley Engineering Ltd, HNTB, Resource International, TranSystems Corp., and Utility Land Co.