BURNS McDONNELL

CASE STUDY

Gateway at a Crossroads: Reconstructing a Century-Old Thoroughfare

In one of its largest construction projects, the Kansas Department of Transportation relied on innovation, collaboration and a commitment to community partnerships to revitalize a historic river crossing.

Challenge

Strong partnerships and detailed design were needed to help navigate a major river bridge challenge and a constrained urban setting. The Lewis & Clark Viaduct is composed of a series of bridges that carry eastbound and westbound Interstate 70 traffic over the West Bottoms and Kansas River, providing a vital connection between Kansas City, Kansas (KCK), and Kansas City, Missouri (KCMO).

The original bridge, called the Intercity Viaduct, was constructed in 1907 as a toll bridge that carried two lanes of traffic and a streetcar. When money raised from tolls failed to cover the bridge's construction cost, the Kansas Legislature authorized KCK to collaborate with KCMO to purchase the bridge. In 1918, the two cities celebrated with a ribbon-cutting and reopened the bridge to non-toll traffic. In 1962, a companion

Project Stats

Client
Kansas Department of Transportation

Location
Kansas City, Kansas, and Kansas City, Missouri

$65M
COST OF WESTBOUND BRIDGE REPLACEMENT

23.5K
DAILY TRAVELERS

20
SPANS

3K
FEET OF NEW BRIDGE

bridge was constructed north of the original to carry only westbound traffic, and the original structure was reserved for eastbound traffic. The bridges now are known as the Lewis & Clark Viaduct and carry motorized vehicles, bicyclists and pedestrians.

As the structures aged, the cost for maintenance and repairs continued to increase and the alignment geometry for some of the connections did not meet modern guidelines. Additionally, the highway structures were struggling to support an ever-increasing traffic volume. Recognizing the importance of this critical connection to the bistate metro and broader region, the Kansas Department of Transportation (KDOT) initiated plans to reconstruct the viaduct system.

Solution

From the beginning, KDOT recognized the value of bringing local and regional communities together through each phase of this project. A spirit of collaboration among the public, project owner, engineering consultant and general contractor led to the successful design and reconstruction of the viaduct.

KDOT selected Burns & McDonnell to design the Phase 1 Westbound I-70 bridge reconstruction. The firm brought extensive experience in the design and construction of major river crossings.

Steel and Concrete Soar Above the Kansas River

The new bridge has 20 spans extending from the state line on the east to the west bank of the Kansas River. Uniform spans of prestressed concrete girders make up the eastern portion, and longer welded steel-plate girders are used on the west. The final western section is highlighted by a 750-foot river unit made up of two equal spans.

The 12-foot girders take the roadway up 100 feet above the river. Each girder line is made up of 11 individually fabricated field sections. Architectural features, including unique barriers, railings and bridge piers, were developed in this phase and will continue to be used in future phases of the project.

One of the biggest challenges for the contractor was flooding of the Kansas River and Missouri River. In multiple instances, high water flowed over the contractor's cofferdams, delaying construction of the river piers and spans. To help make up for lost time, the contractor adjusted the plan to advance construction activities on the landside spans, including bridge rails, fencing, decks, lighting, signage and aesthetic treatments.

Working in an Established Urban Environment

In this urban setting, the team was careful to minimize impacts to adjacent properties and provide an aesthetic that would honor the city's rich history. The team worked closely with community members to develop comprehensive urban design guidelines that have been adopted by the Unified Government of Wyandotte County and Kansas City, Kansas, and incorporated into its downtown master plans. This approach will give each phase of the project a striking and consistent look.

The Lewis & Clark Viaduct threads through existing developments, is adjacent to the KCK Wastewater Treatment Plant, crosses the Union Pacific Railroad twice, is bounded by the Kansas River and Missouri River, and is within the FAA approach for the Charles B. Wheeler Downtown Airport. These constraints required extensive stakeholder coordination regarding alignment, signage, lighting and aesthetics. The new bridge was designed on the same alignment as the existing bridge, with connections to existing tie-ins and accommodations for future phase connections.

Managing Traffic Through an Evolving Project

The project's geometrics and space constraints required a full closure of westbound I-70 between KCMO and KCK for two construction seasons. The design team developed a transportation management plan that included traffic control plans, public outreach and construction management. The traffic impacts extended into Missouri and the downtown loop in KCMO and required coordination with a number of other infrastructure projects. These included:

- Missouri Department of Transportation (MoDOT) completed construction of the Fairfax Bridge prior to beginning the construction of the westbound Lewis & Clark Viaduct.
- MoDOT completed maintenance overlays through the downtown loop in advance of westbound Lewis & Clark Viaduct construction.
- MoDOT limited lane closures for a lighting project on I-70 under Bartle Hall to nonpeak hours.
- KDOT reopened westbound I-70 in advance of MoDOT's replacement of the Buck O'Neill Bridge.
- KCK adjusted temporary sanitary sewer lines to protect lines from bridge demolition.
- KDOT provided temporary security fencing and relocated permanent fencing around the KCK Wastewater Treatment Plant to reflect temporary easements and permanent right-of-way.

Logistics and operations for the commercial and industrial areas of downtown KCK, as well as the West Bottoms and Fairfax Industrial District, were affected, so our team met with local representatives to help them understand the impact of construction and identify alternative routes. The construction phase benefited from collaborative efforts implemented during planning and design. Local public agencies were regularly invited to participate in pre-bid and pre-construction meetings, where a variety of issues were discussed.

Results

The revitalized viaduct addresses significant population and travel growth in the Kansas City metro area. Despite a challenging urban setting, our experienced team's design resulted in highly responsive bidding and construction processes.

The work was completed while maintaining respectful relationships with stakeholders, including federal and state agencies, local municipalities, airports, business owners, DOT staff, residents, and economic development and humanitarian organizations. And with the Riverfront Heritage Trail located under the eastbound viaduct and parallel to the entire westbound reconstruction site, this project created an exciting opportunity to provide multiple tours to all interested in the reconstruction of this historic community connection.

About Burns & McDonnell

Burns & McDonnell is a family of companies bringing together an unmatched team of engineers, construction and craft professionals, architects, and more to design and build our critical infrastructure. With an integrated construction and design mindset, we offer full-service capabilities. Founded in 1898 and working from dozens of offices globally, Burns & McDonnell is 100% employee-owned. For more information, visit **burnsmcd.com**.

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