

# US 51 Purpose & Need and Screening Criteria

## 1.1. Introduction and Project History

The US 51 Bridge carries US 51, US 60, and US 62 traffic across the Ohio River between Wickliffe, KY and Cairo, IL. The US 51 Bridge is also known as the Wickliffe-Cairo Bridge or simply, the Cairo Bridge. It is located near the confluence of the Mississippi and Ohio Rivers, at Kentucky milepoint 7.372 along US 51 and at Ohio River navigation milepoint 980.4.

The US 51 Bridge carries approximately 5,400 vehicles (including 35% trucks) across the Ohio River each day. Approximately half a mile further south, US 60/62 leads to the US 60/62 Mississippi River Bridge and Missouri. The nearest alternate river crossings are the I-24 Ohio River Bridge upstream at Paducah, KY; the I-57 Mississippi River Bridge, northwest of Cairo; and the I-155 Mississippi River Bridge downstream near Caruthersville, MO (downstream).

Constructed by the Cairo Bridge Commission as a toll facility, the US 51 truss bridge was opened to traffic in 1938. Tolls were removed from the crossing on November 11, 1948, when the highway departments of Kentucky and Illinois took over maintenance of the structure. The two lane structure is 22.6 feet wide curb-to-curb, with an approaching roadway width of 24 feet, including shoulders.

## 1.2. Project Purpose: What Should the Project Accomplish?

The primary purpose of the project is to rehabilitate or replace the existing US 51 Ohio River Bridge in order to:

- Improve or replace the functionally obsolete/structurally deficient bridge;
- Maintain cross-river connectivity between Wickliffe, KY and Cairo, IL; and,
- Improve safety on the bridge and its approaches.

The purpose is based on several observed needs, discussed in the following subsections.

## 1.3. Project Need: What is the Problem?

The following discussion describes the primary factors that demonstrate the need for action. These factors correspond to the main elements of the Project Purpose statement.

### 1.3.1. Project Need: Improved Bridge Structure

Several concerns have been identified with respect to the US 51 Bridge structure, including the following:

- The existing bridge width of about 22.5 feet does not meet current state or national standards for road widths and clearances defined for bridges in the *Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials. For this reason, the US 51 Bridge is designated as Functionally Obsolete, meaning the historic design is not consistent with its current use.
- The condition of highway bridges is routinely inspected and rated as part of the National Bridge Inventory. Based on the 2010 inspection, the US 51 Bridge has a sufficiency rating of 39.8, rated out of 100 possible points. Bridges with a sufficiency rating less

than 50.0 are eligible for replacement with federal funds under the Federal-Aid Highway Bridge Replacement or Rehabilitation Program.

- The bridge can carry all legal loads (i.e., vehicles within the size and weight limitations for US highways) at this time, but permit loads (i.e., special permits issued by KYTC for oversize or overweight vehicles) are not allowed. Oversize and overweight vehicles must use an alternate river crossing. Because the original design load for the bridge is less than today's current design standards, the US 51 Bridge is rated Structurally Deficient.
- It is anticipated that bridge repairs and/or improvements will be required to maintain the bridge at the existing load rating over the next 25 years. To maintain the existing bridge for the next 25 years, rehabilitation work is needed on the bridge deck, structural steel, and paint system. In addition, potential needs to address bridge scour, seismic loading, and barge impacts have also been identified. Technical information is presented in the *US 51 Bridge Deficiencies White Paper*.

The identified project need is to provide an improved bridge structure that meets current state and national design standards and that can serve modern vehicle and traffic needs, including anticipated 2040 vehicle volumes.

### 1.3.2. Project Need: Cross-River Connectivity

Maintaining cross-river connectivity is important to the local communities and businesses in the Wickliffe, Kentucky-Cairo, Illinois area. The following cross-river factors demonstrating the need for continued cross-river connectivity have been identified:

- Approximately 5,400 vehicles per day use the existing river crossing between Wickliffe, KY and Cairo, IL. About 35% of the daily traffic is made up of commercial vehicles.
- Employers and commuters rely on the bridge for access to workforce and jobs. Six of the major local employers in Wickliffe and Cairo employ approximately 1,100 people from Kentucky, Illinois, and Missouri. The six companies include NewPage Paper Mill, James Marine, Community Health and Emergency, American Commercial Lines, Delta Center and Daystar Care Center. According to county data from the 2006-2010 *American Community Survey* collected by the US Census Bureau, 109 residents of Ballard County commute into nearby Illinois or Missouri counties. Additionally, an estimated 145 residents in nearby Illinois and Missouri counties commute into Ballard County, Kentucky. The US 51 bridge provides the most direct link for these commuters.
- Local farming operations rely on the bridge to transport crops and farming equipment between states. During the traffic counts completed in January 2013, over 150 farm, grain, and logging trucks were observed using the bridge over an 8-hour period. During this same period, one oversize load was observed using the bridge to transport a mobile home; however, this size load is not permitted.
- The US 51 Bridge provides access for emergency response and health services for local residents and between major facilities, including Missouri Delta Medical Center in Sikeston, MO; St. Francis Medical Center in Cape Girardeau, MO; and both Western Baptist and Lourdes Hospitals in Paducah, KY.

There are alternative river crossings in the project region, but the travel distances do not make these crossings viable choices for local traffic. Other major river crossings include the following:

Ohio River (upstream, between KY and IL)

- US 45 Bridge at Paducah, KY (37 miles northeast of US 51 Bridge)
- I-24 Ohio River Bridge at Paducah, KY (34 miles northeast of US 51 Bridge)

Mississippi River (upstream from confluence with Ohio River, between IL and MO)

- I-57 Bridge northwest of Cairo, IL (7 miles northwest of US 51 Bridge)
- US 60/US 62 Bridge south of Cairo, IL (1/2 mile south of US 51 Bridge)

Mississippi River (downstream, between KY/TN and MO)

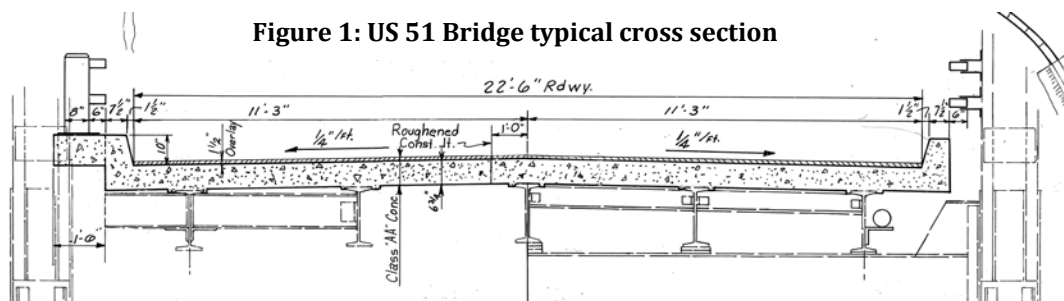
- Dorena-Hickman Ferry (40 miles south of US 51 Bridge)
- I-155 Bridge near Caruthersville, MO (84 miles south of US 51 Bridge)

The identified project need is to maintain convenient, efficient cross-river connectivity between the communities of Wickliffe, KY and Cairo, IL. If the US 51 Bridge were not available for local traffic, the detour trip between Wickliffe and Cairo increases from 7 miles to 80+ miles per direction.

### 1.3.3. Project Need: Safety

Substandard geometric conditions on the existing US 51 Bridge and its approaches present safety concerns, including the following:

- During 2008-2012, 18 crashes occurred on the bridge and its approaches, between the sharp curve on the KY side and the first intersection on the IL side. The primary crash types observed are single vehicle collisions (i.e., a single car hitting the guardrail) and opposite direction sideswipes (i.e., cars traveling in opposite directions that brush against one another broadways).
- The typical section of the bridge includes two 10-foot wide lanes, two 1'-3" wide shoulders, and curbs. The cross section is illustrated in **Figure 1**. This 22.5-foot width does not meet current state or national standards for road widths and clearances defined for bridges. The predominant crash types observed (single vehicle collisions and sideswipes) reflect the correlation between narrow lanes and safety.



- The 24-foot wide bridge approach widths are also substandard and pose the same safety concerns.

- One of the sag vertical curves on the Illinois approach does not meet the criteria in AASHTO's *A Policy on Geometric Design of Highways and Streets*, 2011, for headlight sight distance. This curve limits how far ahead drivers can see at night.
- The Kentucky approach has a substandard horizontal curve that is currently posted at 20 mph. This location has been identified as a high crash spot with a critical rate factor of 1.13, where crashes are occurring more often than can be attributed to random chance.
- Anecdotal evidence also indicates that truck mirror sideswipes and near-misses are common on the bridge, but not often reported. Approximately 35% of the traffic using the bridge is commercial trucks.

The identified project need is to improve the US 51 bridge and its approaches to meet current standards to resolve the existing safety issues.

#### 1.4. Screening Criteria for Purpose and Need

To evaluate how well each alternative meets the Project Purpose and addresses identified Needs, screening criteria have been developed corresponding to the Project Purpose and Need. These are presented in **Table 1** below.

**Table 1- Purpose and Need Screening Criteria**

Purpose	Screening Criteria	Performance Measure
Improve or replace functionally obsolete/structurally deficient bridge	Improve river crossing	- Addresses functional obsolescence (y/n) - Addresses structural deficiencies (y/n) - Improves sufficiency rating (y/n) - Anticipated lifespan of proposed improvement (<25 yrs, >25 yrs)
Improve or maintain cross-river connectivity	Improve/maintain a cross-river link between Cairo and Wickliffe	- Maintains or decreases travel time between Wickliffe and Cairo (distance) - Maintains linkage between Wickliffe and Cairo (y/n) - Maintains similar travel distance between Wickliffe and Missouri (distance)
Improve safety	Address existing safety issues on bridge/approaches	- Meets design requirements for stopping sight distance on bridge and approaches <sup>1</sup> (y/n) - Meets design requirements for horizontal alignment on bridge and approaches <sup>1</sup> (y/n) - Meets design requirements for lane width (y/n)

<sup>1</sup> Approaches will be defined for each alternative, as appropriate

The US 51 Bridge Project is intended to rehabilitate or replace the existing US 51 Ohio River Bridge and its approach roadways (as needed), in order to eliminate its current functional deficiencies and safety issues and maintain cross-river linkage between Wickliffe, Kentucky, and Cairo, Illinois.

#### 1.5. Other Project Goals and Considerations

In addition to the primary purposes for the project, a number of secondary goals and considerations have been identified. These factors describe other values, issues, and concerns that may be considered

as the project moves forward, and are subject to change based on input received through the agency coordination and public involvement processes.

A preliminary list of secondary considerations is shown in **Table 2** along with potential measures that describe how an alternative might address these factors.

**Table 2 – Secondary Considerations**

Factor	Screening Criteria	Performance Measure
Cost-effective, constructible solution	Provides constructible solution	- Relative complexity (high, med, low)
	Minimizes maintenance and construction costs	- Estimated construction cost - Relative maintenance costs (high, med, low) - User costs during construction (high, med, low) - Estimated service life
Sensitive to local resources	Support local freight routes	- Maintain/improve access to ports? (y/n)
	Minimize disruption to Wickliffe and Cairo	- Duration of bridge closure - # business/residential relocations
	Minimize disruption to historic resources	- Proximity to known historic resources - Proximity to known archaeological resources
	Minimize human and natural environmental impacts	- Acreage in floodplain - Park impacts - EJ populations - Farmlands - Recreational Boating Facilities - Species habitats - stream crossings - Wetlands - Wildlife management areas
System reliability during/after construction	Consistent travel time	- Travel time from Wickliffe to Cairo during construction - Travel time from Wickliffe to Cairo after construction
	Decreased delay due to incidents on bridge	- Sufficient width to divert traffic? (y/n) - Meets FHWA seismic design guidelines (y/n)
Provide safe cross-river mobility for bicyclists	Connect to existing/planned paths	- Provides bike path on bridge?
Provides for commercial river navigation	Addresses horizontal and vertical span clearances criteria provided by United States Coast Guard (USGC)	- Recommended for further study by USCG? (y/n)