

## **Purpose and Need**

### **US 421 Bridge over the Ohio River Between Milton, KY and Madison, IN**

#### **Introduction and Project History**

The Milton-Madison Bridge Project is a joint effort between the Kentucky Transportation Cabinet (KYTC), the Indiana Department of Transportation (INDOT), and the Federal Highway Administration (FHWA) to repair or replace the aging US 421 Bridge over the Ohio River between Milton, Kentucky and Madison, Indiana. The existing US 421 Bridge over the Ohio River is a steel truss structure with a total length of 3,181 feet 6 <sup>3</sup>/<sub>8</sub> inches. It has two 10-foot travel lanes and no shoulders. The existing US 421 Bridge over the Ohio River was built in 1929 between Trimble County, Kentucky and Jefferson County, Indiana. It is one of only two bridges across the Ohio River between Louisville, Kentucky and Cincinnati, Ohio. The John F. Kennedy Bridge in Louisville is about 46 miles downstream, while the Markland Bridge is about 26 miles upstream of the US 421 Bridge over the Ohio River.

In the mid-1990s, KYTC undertook a planning study and environmental overview to replace the US 421 Bridge over the Ohio River. This study identified a number of potential river crossing alternatives and assembled information on the environmental constraints existing at that time. However, no final alternative was selected for implementation. Therefore, the existing structure was rehabilitated in 1997 to extend the life by 10 to 20 years. Since that time, the information contained in the study has become outdated. Numerous changes in the project area have occurred that may affect the alternatives development and evaluation processes. Significantly, a large portion of downtown Madison has been designated as a National Historic Landmark District since the previous study.

A *Needs and Deficiencies Report*<sup>1</sup> has been prepared which summarizes the existing conditions in the project area, and specifically as related to the US 421 Bridge over the Ohio River. That document contains additional technical information about the project area needs, including area roadways, the condition of the existing US 421 Bridge over the Ohio River, and existing and future traffic characteristics. This Purpose and Need Statement relies upon, and hereby incorporates by reference, the detailed information and analyses contained in the *Needs and Deficiencies Report and Appendices* which are available for review on the Milton-Madison website at [www.MiltonMadisonBridge.com](http://www.MiltonMadisonBridge.com).

### **Project Need: What is the Problem?**

The Project Need describes the transportation deficiency. It is the foundation of the entire decision-making process. The Need provides data and facts to support the Purpose and explains why the project is needed.

The Need for the Milton-Madison Bridge replacement/rehabilitation is based on the following factors:

- Bridge Deficiencies
  - Functionally Obsolete (geometry doesn't meet current standards)
  - Structurally Deficient/Service Life (member age and condition)
- Safety on the Bridge

The facts that support the functional/structural deficiencies and safety issues are discussed in more detail in the following sections.

### **Project Purpose: What should the Project Accomplish?**

While the Need for the project describes the deficiencies, the project Purpose defines the problem to be solved. Defining the Purpose is necessary to determine the range of

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<sup>1</sup> *Needs and Deficiencies Report*, published by Wilbur Smith Associates, March 20, 2009. Available online at <http://miltonmadisonbridge.com/project-overview/project-documents.aspx>

alternatives which will be considered; each alternative must meet the Purpose and address the identified Need to be considered a viable solution.

The Purpose of the US 421 Milton-Madison Bridge replacement/rehabilitation project is to:

- Improve or replace the functionally obsolete/structurally deficient bridge
- Improve or maintain cross-river mobility and community connectivity between Milton and Madison
- Improve safety

**Supporting Evidence: What data show there is a Need?**

The following discussion provides the support for the Purpose and Need of the project. This supporting evidence is organized by the main elements of the Purpose statement.

Functionally Obsolete Bridge: The existing US 421 Bridge over the Ohio River was constructed in 1929. It has two 10-foot wide travel lanes with curbs but no shoulders. This does not meet current state or national standards for clear roadway widths defined for bridges in the *Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials. Therefore, the US 421 Bridge over the Ohio River is classified as functionally obsolete. Despite the configuration, the capacity is adequate to serve existing (10,700 vehicles per day in 2007<sup>2</sup>) and projected (12,900 vehicles per day in 2030<sup>2</sup>) traffic volumes.

Structurally Deficient Bridge: The age of the US 421 Bridge over the Ohio River and the type of steel used to build it lead to concerns about the remaining service life of the US 421 Bridge over the Ohio River.

Since the 1997 rehabilitation, some floor beams and truss members have deteriorated to poor condition. A 2006 Fracture Critical Inspection and a 2008 Draft Load Rating

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<sup>2</sup> *Needs and Deficiencies Report*, published by Wilbur Smith Associates, March 20, 2009. Available online at <http://miltonmadisonbridge.com/project-overview/project-documents.aspx>

Report identified specific members and gusset plates that need repair in the future. These inspections identify specific members that need to be reinforced/repared, rather than recommending the rehabilitation of the entire US 421 Bridge over the Ohio River. The reports noted that typical conditions on the existing US 421 Bridge over the Ohio River include pack rust in numerous locations and pitting/section loss on numerous members.

Fatigue issues are also a concern: bridges made from carbon steels will corrode if the paint system is allowed to fail. Corroding members lose strength due to pitting and corrosion. Reduced member cross sections and low temperatures negatively impact the steel's strength. Recent studies<sup>3</sup> on similar steel truss bridges suggest that the US 421 Bridge over the Ohio River may be approaching its life expectancy based on the volume of traffic that has used it since it first opened to vehicular traffic. Based on a 2008 inspection of the US 421 Bridge over the Ohio River, KYTC posted a 15-ton weight limit restriction in April 2009.

Cross-River Mobility: Mobility describes how effectively vehicles can get from one point to another, specifically across the river between Milton and Madison. Travel times and costs are common measures used to describe mobility.

The existing bridge currently provides important cross-river mobility and community connectivity, and one of the purposes of any repair or replacement project must be to preserve and/or enhance that existing mobility and connectivity.

Approximately 10,700 vehicles per day use the existing US 421 Bridge over the Ohio River<sup>4</sup> between Milton and Madison. Included in this traffic volume is an estimated 400 commercial trucks<sup>4</sup> that primarily travel to and from local destinations. The next nearest

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<sup>3</sup> As described in the 2008 study by Albrecht and Lenwari, cited in the Milton-Madison Bridge Deficiencies White Paper. The white paper was developed by Michael Baker Corporation, published December 2, 2008, and is available online at <http://miltonmadisonbridge.com/project-overview/project-documents.aspx>

<sup>4</sup> *Needs and Deficiencies Report*, published by Wilbur Smith Associates, March 20, 2009. Available online at <http://miltonmadisonbridge.com/project-overview/project-documents.aspx>

river crossings are located at Markland Dam (26 miles upstream) and I-65 in Louisville (46 miles downstream).

Citizens of Milton rely on businesses in Madison for access to a number of goods and services. Commuters in both counties travel the US 421 Bridge over the Ohio River to access jobs across the river. The rural population in Trimble County depends on the US 421 Bridge over the Ohio River for access to emergency and health service facilities in Madison. Traffic studies<sup>5</sup> show that approximately 70% of the trips crossing the US 421 Bridge over the Ohio River have origins or destinations within Madison.

Community Connectivity: Despite the barrier caused by the Ohio River, Madison and Milton function as one larger community socially and economically. Many people in the area live in one state and work or shop in the other<sup>5</sup>. Also, family lines and social interactions routinely cross the river between the two communities. Currently one of the largest man-made features in either city, the US 421 Bridge over the Ohio River is a unifying focal point and part of the regional character. The US 421 Bridge over the Ohio River preserves the practical ability for these two communities to interact on a day-to-day basis. Both Milton and Madison have grown to depend on the US 421 Bridge over the Ohio River being in service to provide a link between the two cities.

Safety: The existing US 421 Bridge over the Ohio River demonstrates vehicle crash frequencies at 1.3 times the statewide rate, based on Kentucky crash data and methodologies. During 2004 to 2007, there were 48 reported crashes on the bridge between First Street in Madison and milepoint 18.7 (east of Cooper's Bottom Road intersection) in Kentucky. Of these crashes, 12 resulted in injuries. Approximately half of the total crashes were rear end collisions.

Lane widths and stopping sight distances on the existing bridge are another safety concern. The current US 421 Bridge over the Ohio River consists of two lanes, each 10

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<sup>5</sup> *Needs and Deficiencies Report*, published by Wilbur Smith Associates, March 20, 2009. Available online at <http://miltonmadisonbridge.com/project-overview/project-documents.aspx>

feet wide. There are crest and sag locations on the US 421 Bridge over the Ohio River that have substandard sight distances on vertical curves. The current driveway configuration to access commercial properties adjacent to the approaches creates safety concerns.

In considering another aspect of safety, the US 421 Bridge over the Ohio River serves as a critical link between the hospital in Madison and the population of Trimble County. A reliable, safe, efficient cross-river movement is essential in emergency response situations.

**Screening Criteria for Purpose and Need: How will we know if an Alternative meets Purpose and Need?**

To evaluate whether each alternative meets the “Purpose” and addresses identified “Needs,” screening criteria were 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	<ul style="list-style-type: none"> <li>- Addresses functional obsolescence (y/n)</li> <li>- Addresses structural deficiencies (none, some, all)</li> </ul>
Improve or maintain cross-river mobility and community connectivity	Improve/maintain a cross-river link between Milton and Madison	<ul style="list-style-type: none"> <li>- Maintains/decreases travel time/cost between US 421 intersection with KY 36 and US 421 intersection with SR 56 (Main St/Jefferson St)? (y/n)</li> <li>- Maintains linkage, including a visual linkage, between Lower Milton and Lower Madison (y/n)</li> <li>- Anticipated lifespan of proposed improvement (&lt;30 yrs, &gt;30 yrs)</li> <li>- Improves connections to the regional network<sup>1</sup></li> </ul>

<p>Improve safety</p>	<p>Addresses existing safety issues on bridge/approaches</p>	<ul style="list-style-type: none"> <li>- Meets design requirements for stopping sight distance on bridge and approaches<sup>1</sup></li> <li>- Meets design requirements for horizontal alignment on bridge and approaches<sup>1</sup></li> <li>- Maintains or improves intersections on the approach roadways to allow truck turning movements.</li> <li>- Improves or maintains control of access points</li> </ul>
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<sup>1</sup> Approaches will be defined for each alternative, as appropriate

Alternatives which satisfy all three project purposes will be further considered in the project decision-making process. If an alternative does not address the Purpose and Need, it will not move forward for future consideration or screening against other factors.

The Milton-Madison Bridge Project is intended to repair or replace the existing US 421 Bridge over the Ohio River, based on functional and structural deficiencies and safety issues associated with the existing bridge. Approaches will be defined for each alternative, as appropriate.

**Stakeholder Coordination**

In the development of this Draft Purpose and Need statement, the project team coordinated with the PAG, resource agencies, local and state officials, Participating and Cooperating Agencies, and members of the public.

At the November 13, 2008, PAG meeting at Milton Elementary School, PAG members and other members of the public in attendance were presented with an outline of the existing deficiencies in the study area. They were also given an opportunity to describe how they use the existing US 421 Bridge over the Ohio River, why it is important to the community, and any concerns they have with the existing US 421 Bridge over the Ohio River. Additionally, a request for agency feedback was sent in December 2008 and again in February 2009 to Participating and Cooperating Agencies. Input from these groups has been incorporated into this document.