Chapter 2

Purpose and Need

The Purpose and Need Statement for the Milton-Madison Bridge Project was developed through a rigorous process to get a broad range of input from Section 6002 Agencies, Section 106 Consulting Parties[1], Project Advisory Group (PAG) members, and the public. At the November 2008 PAG meeting, PAG representatives and other members of the public in attendance were asked to describe how they use the existing US 421 Bridge, why it is important to the community, and any concerns they have with the existing structure. Additionally, requests for agency feedback were sent to Participating and Cooperating Agencies. Input from these groups has been incorporated into the Purpose and Need document.

2.1 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.

[1] Any organization or individual with a demonstrated interest in historic preservation who participated in the Section 106 consultation process, as defined in 36 CFR 800(c).

2.2 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 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

2.3 Supporting Evidence

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. Additional information about the existing conditions in the study area can be found in the *Needs and Deficiencies Report,* available on the project website at *www.MiltonMadisonBridge.com*.

2.3.1 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 two lane capacity is adequate to serve existing (10,700 vehicles per day in 2007) and projected (12,900 vehicles per day in 2030) traffic volumes, although the narrow lanes create safety concerns (see **Section 2.3.5**).

Existing lane widths on the US 421 Milton-Madison Bridge do not meet current AASHTO guidance. Lanes are 10 feet wide.

2.3.2 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, a 2008 Load Rating Report, a 2009 Fracture Critical Inspection, and a 2009 In-Depth Inspection identified specific members and gusset plates[2] that need repair in the future. These inspections identify specific members [deficiencies] that need to be reinforced/repaired. The reports noted that typical conditions on the existing US 421 Bridge over the Ohio River include pack rust[3] in numerous locations and pitting/section loss in numerous members.

Photographs from the 2009 Fracture Critical Inspection

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 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.

2.3.3 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 between Milton and Madison. Included in this traffic volume are an estimated 400 commercial trucks that primarily travel to and from local destinations. The next nearest 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 show that

[2] A gusset plate is a metal plate used to reinforce the connection between steel members.
[3] Pack rust is a type of corrosion that creates crevices in steel bridge components.

approximately 70% of the trips crossing the US 421 Bridge over the Ohio River have origins or destinations within Madison.

2.3.4 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. 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.

2.3.5 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 safety concerns. The current US 421 Bridge over the Ohio River consists of two lanes, each 10 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 configurations to access commercial properties adjacent to the approaches creates safety concerns. These elements contribute to the crash trends discussed in the previous paragraph.

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.