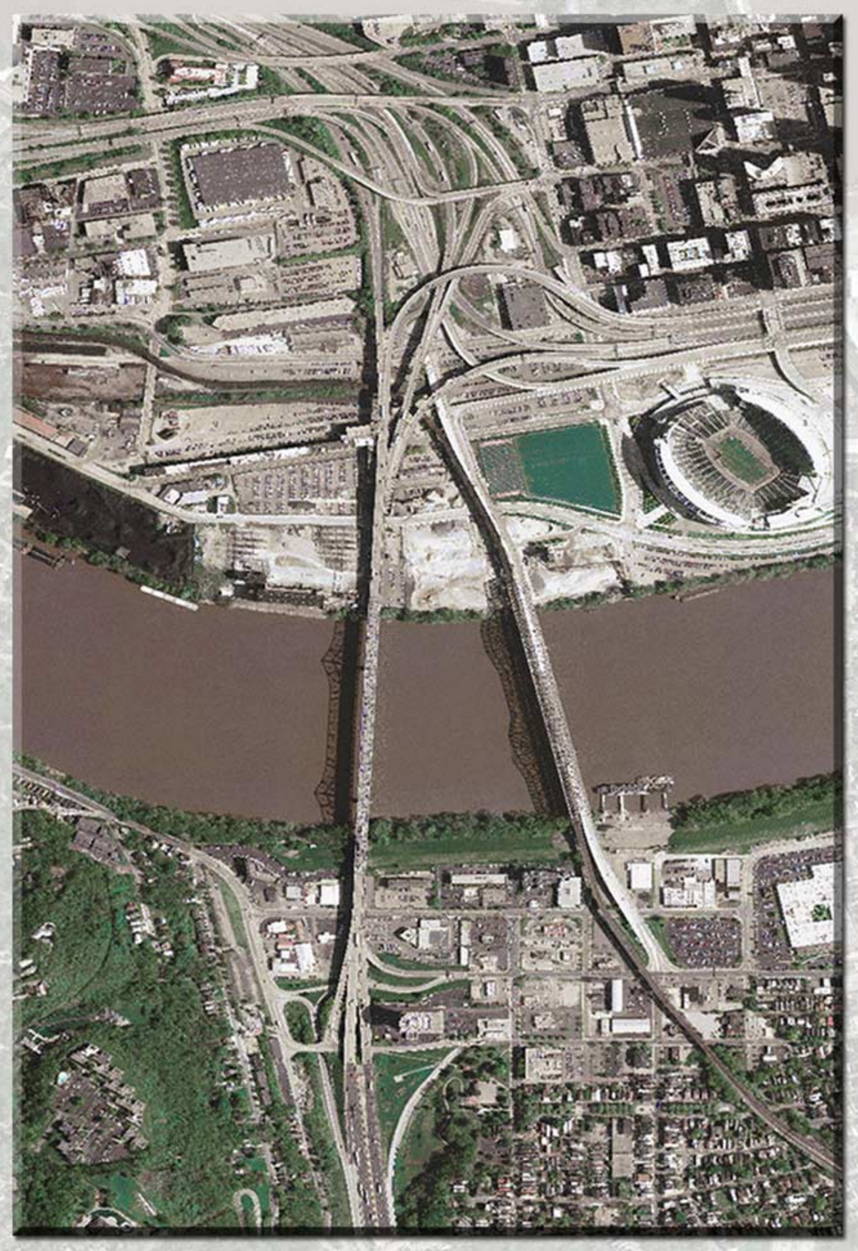
U.S. Department of Transportation
Federal Highway Administration

Brent Spence Bridge
Replacement/Rehabilitation Project

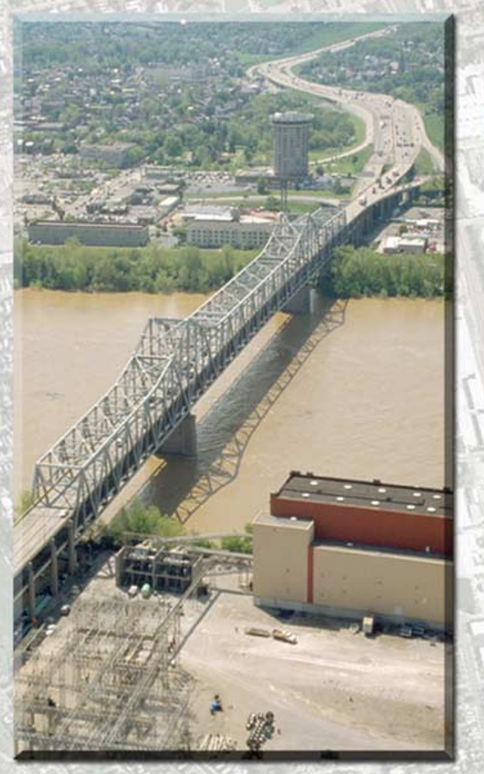
Planning Study Report

ODOT PID No. 75119
HAM-71/75-0.00/0.22
KYTC Project Item No. 6-17

September 2006





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EXECUTIVE SUMMARY

The Ohio Department of Transportation (ODOT) in a joint effort with the Kentucky Transportation Cabinet (KYTC) has started planning and developing conceptual alternatives for the Brent Spence Bridge Replacement/Rehabilitation Project along the I-71/I-75 corridor in the Greater Cincinnati/Northern Kentucky region. I-75 within the Greater Cincinnati/Northern Kentucky region is a major thoroughfare for local and regional mobility. Locally, it connects to I-71, I-74 and US Route 50. The Brent Spence Bridge provides an interstate connection over the Ohio River and carries both I-71 and I-75 traffic. The bridge also facilitates local travel by providing access to downtown Cincinnati, Ohio and Covington, Kentucky. Safety, congestion and geometric problems exist on the structure and its approaches.

ODOT and KYTC, with the review and approval from the Federal Highway Administration (FHWA), are moving the project forward with four purpose and need goals: 1) improve traffic flow and level of service, 2) improve safety, 3) correct geometric deficiencies, and 4) enhance connection to key regional and national transportation corridors.

The Brent Spence Bridge Replacement/Rehabilitation Project is following ODOT's 14-Step Major Project Development Process (PDP). A major component of the Brent Spence Bridge Replacement/Rehabilitation Project is public involvement. Public involvement was initiated in Step 1 of the PDP. During various steps of the PDP process the public is actively engaged for comment and feedback on the design and placement of the new facility.

The first public meetings were held on May 2 and 4, 2006 in Ohio and Kentucky. Comments received at the public meetings will help direct the project as the recommended conceptual alternatives are carried forward for further development and more detailed engineering documents are produced. As the project moves forward in the PDP process, more public meetings will be held to ensure active engagement of the public and all interested parties in the Greater Cincinnati/Northern Kentucky Area.

As part of the Public Involvement Plan (PIP), an Advisory Committee and Aesthetics Committee were formed to provide interaction between ODOT, KYTC and interested communities, organizations, and government entities. The Advisory Committee provides review for the various components of the project. Feedback from these committees ensures that the views of the community are clearly addressed as the project develops.

The Aesthetics Committee, a subcommittee to the Advisory Committee, was formed to provide a voice concerning aesthetics of the project. The Aesthetic Committee consists of representatives from key organizations and communities and function as reviewers for the various aesthetic components of the project.

Steps 1 through 4 are primarily information gathering and early planning which is documented in technical reports. These reports are summarized in the Planning Study Report.

- *Brent Spence Bridge Replacement/Rehabilitation Project: Red Flag Summary Report* (December 2005)

The *Red Flag Summary Report* identifies "Red Flags" for the Brent Spence Bridge Rehabilitation/Replacement Project. The Red Flags are not intended to identify locations that must be avoided, but to identify locations that may entail further study, creative management or design, or increased costs.

- *Brent Spence Bridge Replacement/Rehabilitation Project: Existing and Future Conditions Report* (February 2006)

  The *Existing and Future Conditions Report* provides details of the existing and future conditions of the project area as they relate to the natural and social environment as well as safety and traffic issues. This report provides information related to the transportation system (including traffic analysis and crash analysis), natural environment, geotechnical conditions, social environment, cultural resources, hazardous materials, and air quality.

- *Brent Spence Bridge Replacement/Rehabilitation Project: Purpose and Need Statement* (May 2006)

  The *Purpose and Need Statement* identifies and describes transportation and socioeconomic needs to be addressed by the proposed project. Transportation and socioeconomic factors addressed include traffic flow and level of service, safety, operational characteristics within the I-71/I-75 corridor for both local and through traffic, congestion and safety–related issues as a result of inadequate capacity to accommodate current traffic demand and maintenance of national, regional, and local highway systems.

- *Brent Spence Bridge Replacement/Rehabilitation Project: Conceptual Alternatives Solutions* (March 2006)

  The *Conceptual Alternatives Solutions* document evaluates 25 conceptual alternatives that were developed, including the No Build alternative. Evaluation criteria included congestion mitigation, safety, engineering, environmental resource impacts, access/accessibility, construction cost, constructability, and subcomponents of each. The alternatives were described using four segments per alternative. All alternatives were presented using a comparison matrix to provide ease of comparing and evaluating by segment and holistically.

A total of six alternatives and twelve sub-alternatives were recommended for further study and include the No Build alternative. The No Build alternative does not meet the requirements of the purpose and need, but is retained as the baseline condition to measure the potential impacts of the other alternatives. The five conceptual build alternatives meet the project Purpose and Need and stakeholders goals and measures of success. They also have good ratings for the evaluation criteria. The five conceptual Build alternatives being carried forward for further study are:

- Alternative 1: Queensgate Alignment I-75. New Queensgate Bridge (2x5 lanes) for I-75 and rehabilitation of existing Brent Spence Bridge (2x2 lanes) for I-71 and local traffic.
- Alternative 2: Queensgate Alignment for I-75 and I-71. New Queensgate Bridge (2x7 lanes) for I-71/I-75 and rehabilitate existing Brent Spence Bridge (2x2 lanes) for local traffic.

- Alternative 3: New bridge just west of the existing bridge for I-75. New double-deck bridge (2x5 lanes) on west side of the existing Brent Spence Bridge for I-75 and new/rehabilitation double-deck bridge (2x2 Lanes) at existing Brent Spence Bridge for I-71 and local traffic.
- Alternative 4: New bridge just west of the existing bridge for all traffic. New double-deck bridge (2x5 lanes each direction on top) for I-75 and (2x3 lanes each direction on bottom) for I-71 and local traffic on west side of the existing Brent Spence Bridge and remove existing Brent Spence Bridge.
- Alternative 5: New bridges for I-75 traffic use on both sides of the existing bridge. New single-deck bridges (2x5 lanes) on each side of the existing Brent Spence Bridge for I-75 and rehabilitation of existing Brent Spence Bridge(2x3 lanes) for I-71 and local traffic.

The sub-alternatives being carried forward for further study include:

- I-75 Northbound KY 12th Street Ramp (2 sub-alternatives)
- I-71/US 50 Interchange (2 sub-alternatives)
- I-71/I-75/US 50 Interchange (3 sub-alternatives)
- I-75 Ohio Collector - Distributor Road/Arterial Improvements (2 sub-alternatives)
- Western Hills Viaduct Interchange (3 sub-alternatives)

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1.0 PROJECT HISTORY AND OVERVIEW

1.1 Introduction

Interstate 75 (I-75) within the Greater Cincinnati/Northern Kentucky region is a major thoroughfare for local and regional mobility. Locally, it connects to I-71, I-74 and US Route 50. The Brent Spence Bridge provides an interstate connection over the Ohio River and carries both I-71 and I-75 traffic (Exhibit 1). The bridge also facilitates local travel by providing access to downtown Cincinnati, Ohio and Covington, Kentucky. Safety, congestion and geometric problems exist on the structure and its approaches. The Brent Spence Bridge, which opened to traffic in 1963, was designed to carry 80,000 vehicles per day. Currently, 150,000 vehicles per day use the Brent Spence Bridge and traffic volumes are projected to increase to 200,000 vehicles per day in 2025.

The I-75 corridor within the Greater Cincinnati/Northern Kentucky region is experiencing problems, which threaten the overall efficiency and flexibility of this vital trade corridor. Areas of concern include, but are not limited to, growing demand and congestion, land use pressures, environmental concerns, adequate safety margins, and maintaining linkage in key mobility, trade, and national defense highways.

The I-75 corridor has been the subject of numerous planning and engineering studies over the years and is a strategic link in the region's and the nation's highway network. As such, the Ohio Department of Transportation (ODOT) and the Kentucky Transportation Cabinet (KYTC), in cooperation with the FHWA, are proposing to improve the operational characteristics of I-75 and the Brent Spence Bridge in the Greater Cincinnati/Northern Kentucky region through a major transportation project.

1.2 Project History

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) identified High Priority Corridors on the National Highway System (NHS). I-75 and I-71 in Ohio are included on the priority list (Table 1-1).

Table 1-1. Interstates 75 and 71 as Listed Under Section 1105(c) ISTEA (P.L.102-240), as amended through P.L. 109-59

Item Number	Corridor	Location
76	Interstate Route 75	Ohio
78	Interstate Route 71	Ohio

More recent federal surface transportation legislation (the 1998 Transportation Equity Act for the 21st Century [TEA-21] and the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users [SAFETEA-LU]), continued funding for the High Priority Corridors. Table 1-2 shows six of the high priority projects listed under SAFETEA-LU that include the Brent Spence Bridge Replacement/Rehabilitation Project and adjacent projects.

Table 1-2. High Priority Projects Listed Under SAFETEA-LU Located in or near the Brent Spence Bridge Replacement/Rehabilitation Project

Item Number	State	Project Description	Amount
685	OH	Study and design of modifications to I-75 interchanges at M.L. King, Jr. Boulevard, Hopple Street, I-74, and Mitchell Avenue in Cincinnati, Ohio	$2.4 million
3385	KY	Replace Brent Spence Bridge, Kenton County, Kentucky	$1.6 million
4217	KY	Transportation improvements to Brent Spence Bridge	$34 million
4621	OH	On I-75 toward Brent Spence Bridge, Cincinnati, OH	$10 million
4623	OH	Reconstruction, widening, and interchange upgrades to I-75 between Cincinnati and Dayton, Ohio	$5 million
4624	OH	Replace the Edward N. Waldvogel Viaduct, Cincinnati, Ohio (US Route 50)	$6 million

In response to ISTEA, ODOT completed a statewide transportation study and strategic plan, *Access Ohio* in 1993, which was updated in 2004. This long-range transportation plan identified "Transportation Efficiency and Economic Advancement Corridors" also known as "macro corridors" throughout the state of Ohio. These corridors are defined as "highways with statewide significance that provide connectivity to population and employment centers in Ohio and the nation by accommodating desired movements of persons and goods". The I-71, I-74, I-75, and US 50 corridors are included in the list of macro corridors.

The Brent Spence Bridge Replacement/Rehabilitation project is included in ODOT's four-year State Transportation Improvement Program (STIP) for Fiscal Years (FY) 2006-2009. The FY 2006-2009 STIP was approved by the US Department of Transportation effective July 1, 2005 and remains in effect through June 30, 2007. This project is listed in the first three years of the STIP, which indicates that it is eligible for federal funding.

In 1999, the KYTC completed its current long-range multimodal transportation plan (Kentucky Transportation Cabinet, *Statewide Transportation Plan FY 1999–2018*, December 1999). The transportation plan is a 20-year plan for all modes of transportation. The plan consists of two phases – the short range element, which is the Six-Year Transportation Plan, and the long-range element, which is a 14-year plan beyond the six year plan. The long-range element is the principal source for new projects added to the Six-Year Transportation Plan.

Kentucky's Recommended Six-Year Transportation Plan FY 2005-2010 lists six "Mega-Projects" (projects that will cost or are in excess of $1 billion). The I-71/I-75 Brent Spence Bridge Project is one of the six "Mega-Projects". The plan notes that I-71/I-75

Brent Spence Bridge "is the focal point for some of the heaviest traffic volumes in Kentucky", which not only provide a link between two major urban centers (Covington, Kentucky and Cincinnati, Ohio) but also connects the region to one of the nation's busiest airports, the Cincinnati/Northern Kentucky International Airport located in Boone County, Kentucky.

Kentucky's STIP covers a three year period, FY 2005-2007. The STIP includes only federally funded projects for non-MPO area counties and only regionally significant state-funded projects. In Kentucky, projects listed on a Metropolitan Planning Organization's Transportation Improvement Programs (TIP) are incorporated into the STIP through the amendment process by reference.

The Ohio-Kentucky-Indiana Regional Council of Governments (OKI), *2030 Regional Transportation Plan 2004 Update*, includes improvements to I-71/75 and the Brent Spence Bridge in Kenton County in the TIP for FY 2006-2009. Funding is committed for additional capacity for I-71/I-75 only for a 2.5 mile section south of the Brent Spence Bridge as well as for replacement of the bridge itself.

The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) and the Miami Valley Regional Planning Commission (MVRPC), the Metropolitan Planning Organizations serving the I-75 corridor, formed a partnership in 2000. This partnership was formed to analyize the section of the I-75 corridor from the I-71/I-75 Interchange in northern Kentucky to Piqua, Ohio to address the current and future transportation issues in the corridor. This analysis, known as the *North-South Transportation Initiative* (2004) was a traditional Major Investment Study (MIS) conducted as part of the merged National Environmental Policy Act (NEPA) process. One goal of this study was to identify strategies to ensure that the I-75 corridor remains effective and efficient at moving people and goods through the region. The study addressed major improvements to all existing modes of transportation and identified appropriate transportation alternatives that need to be incorporated into the Regional Transportation Plans. A preferred program of projects was defined based upon a thorough assessment of transportation needs and consensus of where the region wants to be.

The *North-South Transportation Initiative* recommended a number of capacity and safety improvements for the I-71 and I-75 corridor in Kentucky and I-75 in Ohio. The southern limit of the study area for this project was the I-71/I-75 Interchange in Kentucky. The northern limit was on I-75 north of Piqua, Ohio. A number of major replacements and rehabilitations were recommended for advancement into the NEPA Process as a part of the *North-South Transportation Initiative*. One key recommendation was the the Brent Spence Bridge Replacement/Rehabilitation Project (PID 75119) in order to provide for improved capacity, access, and safety in this portion of the corridor.

KYTC initiated an engineering feasibility study to investigate replacement options for the Brent Spence Bridge in 2003. The results of this study are documented in the *Brent Spence Bridge Feasibility and Constructability Study* (2005). The study area for this analysis began south of Kyles Lane in Kentucky and extended to the Western Hills Viaduct in Ohio. Concurrently, ODOT began evaluating a number of alternatives for improving segments of I-75 in Ohio, from the area north of the Western Hills Viaduct, to a point north of I-275.

Two projects north of the Brent Spence Bridge were also recommended by the *North-South Transportation Initiative,* the Thru-the-Valley project (PID 76256) and the Mill Creek Expressway project (PID 76257). These two ODOT projects are being conducted as part of an overall program to improve I-75. Preservation of right-of-way and assuring that short term improvements made to the corridor build on each other and provide improved capacity are primary goals.

1.3 Study Area

The project study area is located along a 6.5-mile segment of I-75 within the Commonwealth of Kentucky (state line mile 188.0) and the State of Ohio (state line mile 2.7). The study area is shown on Exhibit 2 and is 2.82 square miles in size. The southern limit of the project is 2,800 feet south of the midpoint of the Kyles Lane Interchange on I-71/I-75 in Fort Wright, south of Covington, Kentucky. The northern limit of the project is 1,500 feet north of the midpoint of the Western Hills Viaduct interchange on I-75 in Cincinnati, Ohio.

The eastern and western limits of the study area generally follow the existing alignment of I-75. From the south, the study area is a 1,500-foot wide corridor centered on I-75 northward towards the city of Covington. At Covington, the eastern and western study area boundaries widen and follow city streets as described below:

- Western project limits (from south to north):
    - At 5th Street in the city of Covington, the western boundary extends in the northwesterly direction across the Ohio River to US 50, approximately 1,000 feet west of the Freeman Avenue Interchange.
    - The western limit extends northerly parallel to Dalton Avenue to Hopkins Street.
    - The western limit extends westerly along Hopkins Street to the western limits of Union Terminal, where it then extends northerly along the western limits of Union Terminal to Kenner Street.
    - The western limit follows easterly along Kenner Street to the intersection with Dalton Avenue.
    - The western limit parallels Dalton Avenue to north of Findlay Street, where it follows in the northerly direction with a consistent 750-foot offset from the I-75 centerline.

- Eastern project limits (from south to north):
    - In the city of Covington, the eastern boundary follows Philadelphia Street to its intersection with KY 5th Street.
    - The eastern boundary follows KY 5th Street to its intersection with Main Street and then follows Main Street to the Ohio River.
    - The eastern boundary parallels the Clay Wade Bailey Bridge across the Ohio River to Pete Rose Way in the city of Cincinnati.
    - Through downtown Cincinnati, the eastern boundary follows OH 2nd Street and US 50 eastbound to approximately the I-71/US 50 interchange over Broadway Avenue, north on Broadway Avenue then westerly along

OH 4th Street to Plum Street, then northward until it reaches West Court Street.

- From West Court Street, the eastern boundary extends west to Linn Street, where it follows Linn Street to Central Parkway.
- The eastern boundary extends north paralleling Central Parkway to Linn Street.
- From Linn Street, the eastern boundary extends westerly to Bank Street.
- From Bank Street, the eastern limits extend in the northerly direction with a consistent 750-foot offset from the I-75 centerline.

1.4 Organizational Structure

Federal and state governments in cooperation with local governments are sponsoring the project. Members of the public have been involved with the current and continued development of this project. To coordinate the planning and preliminary design of the Brent Spence Bridge Replacement/Rehabilitation Project, the state of Ohio and commonwealth of Kentucky entered into a Bi-state Agreement on November 23, 2004 (Appendix A).

The Bi-state Agreement defines project responsibilities, environmental process, ownership, and funding. Key components of the agreement are listed below.

- The Bi-state Agreement establishes ODOT as the lead agency for the environmental and preliminary design.
- KYTC and ODOT will jointly manage the environmental and preliminary design phases of the project.
- Ownership is determined by number of interstate lane miles within each state. KYTC is responsible for 28.15 lane miles (45.5 percent) and ODOT is responsible for 33.69 lane miles (54.5 percent).
- The term of this agreement cannot extend beyond the biennial budget year for both Ohio and Kentucky.

1.4.1 Project Sponsor

This project is jointly sponsored by ODOT and KYTC. ODOT and KYTC have provided a project manager to jointly manage and represent each state during all stages of the project. During detailed design and through construction, each state will perform as the lead agency for work in their respective state. Each state will have equal partnership during these stages.

The Brent Spence Bridge Replacement/Rehabilitation project is following ODOT's 14-Step Major Project Development Process. ODOT and KYTC have entered into a Bi-state Agreement, which establishes ODOT as the lead agency in Steps 1 through 8. After Step 8, the project will be divided between the two states and ODOT and KYTC will manage their respective sections of the I-75 corridor. The Major PDP provides for agency and public participation throughout project development.

1.4.2 Review Agencies

Review agencies consist of ODOT's District 8 and Central Office as well as KYTC's District 6 and Central Office. The proposed project, which is a federal action, will involve modification to an Interstate Highway System, thus final review and approval of the project will be provided by the Federal Highway Administration's (FHWA) Ohio and Kentucky (Frankfort, Kentucky) divisions and coordinated by the Ohio Division, located in Columbus, Ohio.

1.4.3 Advisory Committee

An Advisory Committee was created to provide interaction between ODOT/KYTC and interested communities, organizations, and government entities. The committee helps define needs and goals of the project, provides review and comment for research and technical studies, and provides input on conceptual alternative solutions.

The Advisory Committee functions as advisors for the various components of the project and its feedback will ensure that the views of the community are heard as the project develops. The Advisory Committee acts as liaisons between the project sponsors and respective organizations and communities. Advisory Committee members are responsible for disseminating information provided by the project sponsors to their constituency. Advisory Committee representatives and their organizations are shown in Table 1-3.

Table 1-3. Advisory Committee Representatives and Organizations.

Name	Organization
Local Agencies	
Gary Moore, Judge Executive	Boone County Fiscal Court
Steve Pendery, Judge Executive	Campbell County Fiscal Court
William Moller	City of Covington
Tom Logan	City of Covington, Engineer Department
Gene Weaver, Mayor	City of Fort Wright, KY
Mike Hellmann, Mayor	City of Park Hills, KY
Ralph Drees, Judge Executive	Kenton County Fiscal Court
Charles Meyers	Kenton County Engineer
Keith Logsdon	Northern Kentucky Area Planning Commission
Mark Mallory, Mayor	City of Cincinnati, OH
Michael Moore	City of Cincinnati Architect
Chad Munitz	City of Cincinnati Economic Development
Eileen Enabnit	City of Cincinnati Transportation and Engineering Department
Martha Kelly	City of Cincinnati Engineering
Steve Niemeier	City of Cincinnati Engineering
Steve Schuckman	Cincinnati Park Board
Ron Miller	Hamilton County Regional Planning Commission
Phil Heimlich, County Commissioner	Hamilton County Commissioners
Bill Brayshaw	Hamilton County Engineer
Bob Koehler	Ohio Kentucky Indiana Regional Council of Governments (OKI)

Table 1-3. Advisory Committee Representatives and Organizations.

Name	Organization
David Malone	Transit Authority of Northern Kentucky (TANK)
Mike Setzer	Southwest Ohio Regional Transit Authority (SORTA)
State and Federal Agencies	
David Kratt	Kentucky Transportation Cabinet (KYTC) Frankfort
Ken Sperry	KYTC, Frankfort
Robert Hans	KYTC, District 6
Mike Bezold	KYTC, District 6
VACANT	KYTC, District 6
Michael Loyselle	Federal Highway Administration (FHWA), KY
Evan Wisniewski	FHWA, KY
Andy Fluegemann	The Advanced Regional Traffic Interactive Management and Information System (ARTIMIS)
Stefan Spinosa	Ohio Department of Transportation (ODOT) District 8
Diana Martin	ODOT, District 8
Jay Hamilton	ODOT, District 8
Keith Smith	ODOT, District 8
Howard Wood	ODOT Central Office
Mark VonderEmbse	FHWA, OH
Local Community Groups	
Nick Vehr	3CDC
Eric Avner	Cincinnati Business Committee
Doug Moorman	Cincinnati USA Regional Chamber
Steve Johns	Citizens for Civic Renewal
Suzann Gettys	Covington Ombudsman/Neighborhood Services Coordinator
Mike Tucker	Lewisburg Neighborhood Association
Gary Toebben	Northern Kentucky Chamber of Commerce
Nick Vehr	Port of Greater Cincinnati Development Authority
Marilyn Wall	Sierra Club
Douglas W. McDonald	Queensgate Business Alliance, Cincinnati Museum Center
Dale Mallory	West End Community Council
Alan Bernstein	SouthBank Partners
Local Businesses	
Bob Bedinghaus	Cincinnati Bengals
Jack Weiss	Cincinnati Bulk Terminals, LLC
John Allen	Cincinnati Reds
Bill Martin	Cincinnati/Northern Kentucky International Airport
Dick Hoff	Duke Energy (formerly Cinergy Electric)
Tony Taylor	United Parcel Service (UPS), Kentucky District
Spencer Crew	National Underground Freedom Center

To ensure that this project meets local and regional needs, the project sponsors will work closely with the Advisory Committee to understand community problems, define

needs and goals as defined in the PDP, conduct research and technical studies, identify and evaluate conceptual alternative solutions, and develop the Strategic Plan for implementing the project. Three Advisory Committee meetings have been held during Steps 1 through 4 of the PDP. These meetings were held on August 19, October 13, 2005, and March 23, 2006. Meeting minutes and disposition of comments are in Appendix C of this document. The following discussions provide a summary of each meeting.

1.4.3.1 Advisory Committee Meeting Number 1 (August 19, 2005)

The first Advisory Committee meeting was held on August 19, 2005. The purpose of the meeting was to introduce the advisors, agencies, and consultant team and the role of Advisory Committee for the Brent Spence Bridge Replacement/Rehabilitation Project. The Project Management Team (ODOT, KYTC, PB and associates) reviewed the ODOT Project Development Process and outlined specific information necessary to complete Steps 1 through 4 of the PDP. The Advisory Committee members and interested parties were asked to review draft project goals and objectives and provide comments. Comments and discussion provided a basis for the draft project Problem Statement which was developed and approved by the Advisory Committee during future meetings.

1.4.3.2 Advisory Committee Meeting Number 2 (October 13, 2005)

The second Advisory Committee meeting was held on October 13, 2005. The purpose of the meeting was to discuss and review the Problem Statement for the Brent Spence Bridge Replacement/Rehabilitation Project. Additionally, the Committee discussed Goals and Measures of Success that will be used by the Project Management Team (ODOT, KYTC, PB and associates) to create, evaluate, and screen alternatives.

1.4.3.3 Advisory Committee Meeting Number 3 (March 23, 2006)

The third Advisory Committee meeting was held on March 23, 2006. The purpose of this meeting was to update the Advisory Committee on the project status. Step 3 results were presented. The project Purpose and Need was reviewed as well as the evaluation matrix for all alternatives that have been considered. The conceptual alternatives that will be carried forward for further study were presented and comments were requested by March 30, 2006. These comments were incorporated into the meeting minutes and will be addressed in Steps 5. The committee concurred with the conceptual alternatives being carried forward to Step 5.

1.4.4 Aesthetics Committee

An Aesthetics Committee was formed to address the context and design concept of the Brent Spence Bridge. The Advisory Committee and parties interested in this project will be able to voice aesthetic concerns through the Aesthetics Committee, a subcommittee to the Advisory Committee. This committee will make recommendations to the Advisory Committee about bridge and corridor aesthetics. To facilitate this task, the Aesthetic Committee consists of representatives from key organizations and communities. The Aesthetic Committee functions as reviewers for the various aesthetic components of the project and their feedback ensures that the views of the community are addressed as the project develops. The Aesthetic Committee will also act as advisors to the project sponsors and their respective organizations and communities. The Advisory Committee will be responsible for disseminating the aesthetic and urban design information provided by the Aesthetic Committee.

One Aesthetics Committee meeting has been held to date. Aesthetics Committee representatives and their organizations are shown in Table 1-4.

Table 1-4. Aesthetics Committee Representatives and Organizations

Name	Organization
Ron Kull	University of Cincinnati (UC)
Jack Rouse	Rouse & Associates
Vivian Llambi	Vivian Llambi and Associates
Julie Walcoff	ODOT Central Office
Jeff Jasper	KYTC Central Office
John Schneider	Alliance for Regional Transit
Michael Moore, Chairman of Committee	City of Cincinnati, OH
Tom Logan	City of Covington, KY
Patricia Timm	The Ohio River Way, Inc.
Ruby Rogers	Cincinnati Historical Society Library
Tom Brueggeman	Cincinnati Railroad Club
Eric Avner	Cincinnati Business Committee
Steve Schuckman	Cincinnati Park Board
Sherry Carran	Northern Kentucky Urban & Community Forestry Council
Issam E. Harik	University of Kentucky Department of Engineering
Ralph Wolff	Kenton County Historical Society
Roxanne Qualls	Northern Kentucky University
Michael Schuster	Michael Schuster Associates
Kyle Jenkins, Student Member	American Society of Civil Engineers (UC)

1.4.4.1 Aesthetics Committee Meeting Number 1 (December 16, 2005)

The first Aesthetics Committee meeting was held on December 16, 2005. The purpose of the meeting was to introduce the committee members and agencies to the consultant team. The role of the Aesthetics Committee for the Brent Spence Bridge Replacement/Rehabilitation Project was defined and a charter provided. The Project Management Team (ODOT, KYTC, PB and associates) discussed the committee's charter and its key parts. The Aesthetics Committee Charter is presented in Appendix B.

2.0 PURPOSE AND NEED

The Brent Spence Bridge Replacement/Rehabilitation Project is intended to improve the operational characteristics within the I-71/I-75 corridor for both local and through traffic. In the Greater Cincinnati/Northern Kentucky region, the I-71/I-75 corridor suffers from congestion and safety–related issues as a result of inadequate capacity to accommodate current traffic demand. The purpose of this project is to:

- improve traffic flow and level of service,
- improve safety,

- correct geometric deficiencies, and
- enhance connections to key regional and national transportation corridors.

The I-75 corridor is a major north-south transportation corridor through the Midwestern United States and one of the busiest freight movement (trucking) routes. Traffic volumes have increased far beyond what was originally envisioned when it was constructed in the 1950s. As a result, the I-75 corridor is characterized by poor levels of service which threaten the overall efficiency of people and goods movement within the region. The design features of I-71 and I-75 within the study area do not meet current standards for an interstate highway facility. A recent inventory of I-71 and I-75 within the study area, including the Brent Spence Bridge, reports numerous design deficiencies associated with lane widths, shoulder widths, left-hand exits, horizontal and vertical alignments, and horizontal and vertical clearances. Increasing traffic volumes associated with the substandard design features result in deteriorated operations while affecting motorist's safety on the facility. Specific problems of I-71 and I-75 within the study area include, but are not limited to, growing traffic demand and congestion, inadequate safety margins, and design deficiencies. The complete *Brent Spence Bridge Replacement/Rehabilitation Project: Purpose and Need Statement* (May 2006) can be found in Appendix H.

2.1 Traffic Flow and Level of Service

The current and future levels of service (LOS) provided by the I-71/I-75 corridor range from LOS B to F (Exhibit 3). With the anticipated growth in traffic, the level of service through the entire corridor is expected to continue to degrade. During the next 20 years, much of the corridor will operate at LOS D, or worse (Exhibit 4). The major cause of congestion is the inability of the interstate facility to handle current and future travel demand. If capacity improvements are not made to the I-71/I-75 corridor, the existing problems will only worsen resulting in increased travel time delays and transportation costs for motorists traveling the corridor.

2.2 Safety

Accident rates for the corridor exceed the Kentucky and Ohio statewide averages in part because of congested traffic conditions as well as deficient and substandard roadway geometry (Exhibits 5 and 6). As the safety analyses show, the crash rates for some sections of I-71/I-75 significantly exceed the statewide rates. Within Kentucky, the section of I-71/I-75 between Kyles Lane and the State Line has a Critical Rate Factor more than seven times greater than the statewide average. Ohio Department of Transportation (ODOT) safety management databases indicate that the I-71/I-75 corridor has been designated as a corridor with safety concerns with five specific locations listed in ODOT's Highway Crash Location identification System (HCLIS). Both I-71 and I-75 in the study area are designated by ODOT as Safety Hot Spots.

The I-71/I-75 corridor within Kenton County, Kentucky has a crash rate higher than the Kentucky statewide average. The overall crash rate (accidents per 100 million vehicle miles traveled) for this section is 130.36, nearly 1.33 times higher than Kentucky's statewide average crash rate for interstate highways of 93 accidents per 100 million vehicle miles traveled. The overall crash rate for the Ohio section of I-71 in the study area is 5.26 accidents per million vehicle miles traveled, which is nearly four times the Ohio statewide average rate of 1.338 accidents per million vehicle miles traveled. The worst segment (located between SLM 0.22 and SLM 0.27) has a crash rate more than

19 times the statewide average. Overall, I-75 within the study area has a crash rate of 3.54, which is more than two times greater than the statewide average rate.

2.3 Geometric Deficiencies

Design deficiencies include substandard vertical alignments with limited stopping sight distances, acceleration and deceleration lanes of insufficient length for anticipated traffic volumes and movements, and narrow shoulders that present safety hazards, make maintenance of traffic difficult, and contribute to traffic delays when crashes, vehicle breakdowns, or scheduled roadwork result in lane restrictions. These problems will become more pervasive as traffic volumes grow. With higher traffic volumes, the potential for crashes and breakdowns (with associated lane blockages) increases. Higher volumes also increase the amount of delay experienced by drivers during any given period of lane blockage, particularly during rush hours. Traffic volumes will increase to 200,000 vehicles per day within the study area over the next 20 years. A complete list of existing geometric deficiencies is provided in the *Brent Spence Bridge Replacement/Rehabilitation Project Existing and Future Conditions Report* (February 2006).

2.4 National, Regional, and Local System Linkage

The I-71/I-75 corridor in the Greater Cincinnati/Northern Kentucky area is a significant transportation corridor, not only for local access and mobility needs, but also for regional, statewide and national access and mobility needs. This corridor is recognized in county and regional transportation plans, as are the recommendations for needed improvements. In addition, I-71 and I-75 are key links in the national transportation system in terms of people movement (mobility and economic development), freight movement (commerce, economic development and international trade), and national defense. However, transportation plans and recommendations at all levels (local, state and national) recognize that these facilities now operate at or beyond capacity and therefore, need to be upgraded to modern standards to enhance these important transportation links.

3.0 PUBLIC INVOLVEMENT PROCESS

3.1 Public Participation

Public participation for the Brent Spence Bridge Replacement/Rehabilitation Project will be in accordance with Ohio Department of Transportation's (ODOT) Major Project Development Process (PDP). Public involvement is initiated in Step 1 and continues through project development to Step 14 of the process. In Kentucky, public involvement will be in accordance with the Project Delivery Core Process. Public involvement is initiated during the Transportation Decision Making Process and continues through project development.

All public involvement activities will be communicated to, approved by, and coordinated through the project managers for ODOT and Kentucky Transportation Cabinet (KYTC). Table 3-1 presents a summary of the public participation throughout Steps 1 through 14 of ODOT's Major PDP.

Table 3-1. Public Involvement Activities

Project Development Process	Public Involvement Activities
Step 1 Work with Stakeholders to Understand Problems, Needs, and Goals	• Identify and contact stakeholders. • Involve appropriate stakeholders in an initial project meeting ("kick-off" meeting). • Work with stakeholders to develop Public Involvement Plan (PIP). • Work with stakeholders to develop goals and measures of project success.
Step 2 Conduct Research and Technical Studies	• Considering stakeholders definition of the project need, identify data needs. • Use stakeholder resources to help collect data and create base mapping. • Use stakeholder comments in the development of a draft Purpose and Need Statement.
Step 3 Identify and Evaluate Conceptual Alternative Solutions	• Include stakeholder ideas in the development of conceptual alternatives. • Use the stakeholders' measures of project success, the Purpose and Need Statement, and additional stakeholder involvement to establish alternative evaluation criteria.
Step 4 Develop Strategic Plan or Planning Study Report	• All activities in Step 4 include discussions and incremental agreements leading to consensus among and between the stakeholders by completion of Concurrence Point 1. • Involve stakeholders in the recommendation of a design concept and scope. • Involve stakeholders in the recommendation for funding, timetable, and delivery strategy. • Include stakeholder comments and concerns in revising the Purpose and Need Statement. • Inform stakeholders, through issuance of a Notice of Intent, of the level of environmental documentation that will be prepared for the project. • Document the stakeholder and public involvement in the Strategic Plan and in-depth in the Planning Study Report. • Concurrence Point 1, the Planning Study Report or Strategic Plan is made available for review and comment.

Table 3-1. Public Involvement Activities

Project Development Process	Public Involvement Activities
Step 5 Develop Conceptual Alternatives	• Incorporate stakeholder and public comments into Step 5 activities to further refine and analyze the alternatives. • Revise PIP for Steps 5-14. • Select corridors for further study based on stakeholder comments. • Document the corridors for further study in the Conceptual Alternatives Study and obtain stakeholder concurrence of the document during Concurrence Point 2. • Notify property owners, as needed, if field study activities require access to their property. • Work with stakeholders while developing the Relocation Assistance Program Conceptual Survey. • Identify and contact consulting parties in accordance with Section 106 of the National Historic Preservation Act (NHPA). • Notify utility companies to locate underground facilities.
Step 6 Develop Feasible Alternatives	• Use stakeholder and public comments, from Concurrence Point 2 at the end of Step 5, to allow for development of feasible alternatives in Step 6. • Notify property owners, as needed, if field study activities require access to their property. • If necessary, begin coordination with railroad companies. • Use stakeholder involvement and comments to assist with completion of the alternatives evaluation matrix. • Obtain stakeholder concurrence with Assessment of Feasible Alternatives during Concurrence Point 3.
Step 7 Develop Preferred Alternative	• Review stakeholder comments and officially recommend a preferred alternative that will be developed throughout Step 7. • Notify property owners, as needed, if field study activities require access to their property. • Make available the draft environmental document to stakeholders. • Present the recommended preferred alternative to the stakeholders and request comments and concurrence during Concurrence Point 4. • If the project involves an Environmental Impact Statement (EIS), hold a public hearing to solicit comments during Concurrence Point 4.

Table 3-1. Public Involvement Activities

Project Development Process	Public Involvement Activities
Step 8 Prepare Environmental Clearance and Develop Stage 1 Design	• Incorporate public comments into the final environmental document and obtain final approvals. • If the project involves an EIS, seek public concurrence on the Final EIS during Concurrence Point 5. • Address any public comments, as appropriate, in the Stage 1 Design. • Involve public, as necessary, in noise wall details/activities. • Coordinate with railroad companies to determine potential right-of-way acquisitions and complete the preliminary right-of-way plans. • Work with public, as necessary, to develop conceptual mitigation plans (i.e. cultural resources, streams and wetlands). • If there has been a change in the recommended preferred alternative since Step 7, notify the public and seek concurrence.
Step 9 Develop Stage 2 Detailed Design	• Incorporate stakeholder involvement and agreements into the Environmental Commitments Summary. • Work with the public on design aesthetics. • Begin preliminary right-of-way activities which may include, but are not limited to, developing affected property owners list, implementing tasks under 49 CFR 24.205(a), and notifying property owners through letters and meetings. • Continue to involve the public, as necessary, in noise wall details/activities and mitigation for cultural resources, stream and wetlands.
Step 10 Complete Right-of-Way Plan and Begin Acquisition	• Incorporate public comments into final right-of-way plans. • Begin right-of-way acquisition activities which may include, but are not limited to, performing title searches, confirming ownership, completing appraisals, and ultimately purchasing property. • Provide relocation assistance to residents and businesses. • Work with utility companies to prepare final plans to relocate facilities.
Step 11 Develop Stage 3 Design	• Work with the public to coordinate construction timing with other work at the same or an adjacent site. • Ensure public concerns are addressed in the Environmental Consultation Form.
Step 12 Prepare Final Plan Package	• Identify local businesses that might be impacted by construction. • Convey to the public the maintenance of traffic plans.
Step 13 Award Contract	• Work with appropriate stakeholders to advertise the project, respond to pre-bid questions and award the contract.
Step 14 Construct Project	• Prior to construction, publish public notifications. • Work with local governments, and adjacent property owners to implement maintenance of traffic plans. • Inform public throughout construction of activities and schedule.

3.2 Public Involvement Plan

A Public Involvement Plan (PIP) was prepared for the Brent Spence Bridge Replacement/Rehabilitation Project for Steps 1 through 4 of the PDP (Appendix I). ODOT and KYTC recognize that a proactive, effective communications effort will enhance the project's outcome. Soliciting ideas and input from stakeholders and residents will provide the constructive feedback necessary for the successful implementation of needed transportation improvements. A coordinated communications program will also educate the public on the long-term benefits of the infrastructure improvements under consideration, such as increased travel safety and improved mobility.

Currently the PIP addresses activities in Steps 1 through 4 of the PDP and will be updated as the project moves forward. Table 3-2 presents a summary of the public involvement activities that have taken place during Steps 1 through 4. All informational materials will be updated as new information becomes available to keep information accurate and up-to-date communication maintained. As the project progresses towards Steps 5 and beyond, this PIP will be updated to prepare for upcoming public outreach needs.

Table 3-2. Public Involvement Activities for Steps 1 through 4.

Activity	Implementation Details
Establish the Project Identity	To establish an identity for the project, a logo was created to be used throughout the course of the study. It will be used on all collateral materials for the project including letterhead, envelopes and other printed materials, as well as signage for public meetings, exhibits, maps, etc.
Establish an Advisory Committee	Identify individuals representing key local organizations and communities as members of an Advisory Committee. The Advisory Committee meets regularly to review and discuss project information and provide feedback from the community perspective. Committee members act as liaisons between the Project team and their respective organizations and community groups.
Establish an Aesthetic Committee	Identify individuals representing key local organizations and communities to be members of an Aesthetics Committee. The Aesthetics Committee will meet regularly to review and discuss project information and provide feedback from the community perspective. The Aesthetic Committee will provide its recommendations to the Advisory Committee which will review, approve, and disseminate its recommendations.
Advisory Committee Meetings	The Project team meets regularly with the Advisory Committee in an effort to keep them informed about the project, address their concerns and to obtain their input. Four meetings are anticipated. Meetings have occurred on August 19, 2005, October 13, 2005, and March 23, 2006.

Table 3-2. Public Involvement Activities for Steps 1 through 4.

Activity	Implementation Details
Advisory Committee Survey	Using a written survey, the Project team assessed Advisory Committee members' priorities and concerns about the project and identified important considerations. The data obtained was used to develop project goals and measures as well as to begin developing the criteria by which alternatives are evaluated.
Identify and Engage Environmental Justice Populations	The Project team identified and enlisted contacts representing the different organizations to act as liaisons between the Project team and Environmental Justice population members. These contacts received project information from Project team members (such as public meeting schedules, newsletters, etc.) and where asked to distribute information among their communities. A summary of Environmental Justice activities is in Appendix C.
Project Newsletters	The Project team issued the first in a series of project newsletters that summarized key project information (goals, issues, concerns, etc.), the decision-making and alternative evaluation processes, and progress being made. The newsletters highlight answers to frequently asked questions.
Web Site Coordination	The Project team developed an independently hosted project Web site. The Project team prepared content for the site and submitted to ODOT and KYTC for approval. Information will be updated regularly and includes a project summary, projected schedule/timeline, project updates, public meeting schedules, frequently asked questions, copies of fact sheets and newsletters, etc. To maximize awareness of the site, a link to the site has been posted on the ODOT and KYTC homepages and the Project team requested that Advisory Committee members place a link to the project page on each of their Web sites. Also, the Web site address will continue to be included on all collateral materials.
Media Relations	ODOT, KYTC, and the Project Team work together to keep the media well-informed about the project, project-related issues, and public information meeting schedules. ODOT and KYTC take the lead on media relations, the Project team is available to assist in any capacity needed including preparing media kits, writing and distributing news releases and alerts, coordinating interviews, preparing speaking points etc.
Project Fact Sheets	The Project team will create a series of fact sheets to be used throughout the project that explain the various steps of the study, decision-making process, alternatives under consideration, etc. The fact sheets will help to ensure that accurate, consistent information is being disseminated to the Advisory Committee, media and public. The fact sheets will be designed to stand alone, supplement press kits and informational packets, be distributed at public meetings and be posted on the project Web site. They will be updated regularly.

Table 3-2. Public Involvement Activities for Steps 1 through 4.

Activity	Implementation Details
Roving Information Display	The Project team developed a Roving Information Display which summarizes basic project information including the Project Development Process, Purpose and Need information, possible alternatives, and the project schedule. This display will be updated as needed to ensure information presented is current.

3.3 Public Involvement Plan Updates

As the project progresses towards Steps 5 and beyond, the PIP will be updated to prepare for upcoming public outreach needs. Since public involvement is a fluid process, all communication tools used in this plan must remain flexible to meet the changing needs of the Advisory Committee and the general public. Any changes to the PIP activities will be noted and the plan will be revised accordingly.

3.4 Public Involvement Meetings

A series of public involvement meetings for the Brent Spence Bridge Replacement/Rehabilitation Project were held for Concurrence Point #1 to present work completed in Steps 1 through 4 of the ODOT PDP. The purpose of the meetings was to inform the public about the project purpose and need, secondary source data collected, project goals and measures of success, conceptual alternatives recommended for dismissal, and conceptual alternatives recommended for further development and study.

The meetings were held on May 2, 2006 at the Cincinnati Museum Center (Losantiville Café), 1301 Western Avenue, Cincinnati, Ohio and on May 4, 2006 at the Gardens of Park Hills (Vista Room), 1622 Dixie Highway, Park Hills, Kentucky. Both meetings were held from 3:00 pm to 8:00 pm. Letters announcing the public meetings were sent via direct mail to every address in the study area and every address within 250 feet of the project limits. This mailing included approximately 8,000 pieces and reached every address including individual apartments regardless of ownership status. A notification flyer of the public meetings was posted on the project website. Local news programs and newspapers also announced the meetings.

The meetings were conducted in an open house format that allowed participants to review information at their own pace. No formal presentation was given. Project team representatives were available to answer questions and take comments. Approximately 100 people (excluding the project team) attended the first meeting held in Ohio. Approximately 220 people attended the second meeting held in Kentucky.

Exhibits displayed included project background; existing traffic data; environmental resources; the evaluation matrix for all alternatives considered; and conceptual alternative solutions considered and dismissed. Copies of technical studies completed to date (*Purpose and Need Statement, Red Flag Summary, Existing and Future Conditions Report and the Conceptual Alternatives Solutions Report*) were also available for review. Comment sheets, a project informational handout, and the current project newsletter were provided.

A two-week comment period followed the meetings. Comments were submitted either through the project website, electronic mail, in writing or on the project hotline. A total of 58 public comments were received during the comment period. A summary table of Concurrence Point #1 comments and responses is in Appendix C.

Based on the public comments received, there was a general consensus that improvements were needed in the I-71/I-75 corridor. The following summarizes primary public comments from Concurrence Point #1:

- It was suggested that transit alternatives be considered instead of only roadway solutions.
- The potential for displacements and affects on property were expressed concerns.
- The potential of increased traffic noise resulting from the addition of lanes was expressed as a concern.
- All of the alternatives were desirable for various reasons, none were recommended for elimination.
- The project team was praised for the information presented.
- Several questions were raised about the schedule for right-of-way acquisitions and construction.
- It was noted that Alternatives 1 and 2 would disturb several properties due to the new bridge being separate from the existing bridge, which would require more right-of-way (along Western Ave in Covington and the Queensgate community in Cincinnati).
- Alternatives 1 and 2 were preferred by several citizens because they separate through traffic from local traffic and would help solve problems of congestion.
- It was recommended that the project team keep design features in mind as the bridge is an aesthetic feature that has the potential to add benefit to the cities.
- Concern was expressed about the affect of the project on existing exits (i.e. KY 5th Street and KY 12th Street) due to the changes in access associated with Alternatives 1 and 2.
- Quality of life and viewshed issues were raised as the new structure could impact existing neighborhoods in Covington and change the view across the Ohio River from Kentucky.
- Residential and commercial property owners would like to be kept informed of study progress; several people requested that they be added to the mailing list.

4.0 COMPLETED PLANNING STUDIES

4.1 Existing and Future Conditions Report

The *Brent Spence Bridge Replacement/Rehabilitation Project: Existing and Future Conditions Report* (February 2006) provided detailed information related to the transportation system (including traffic analysis and crash analysis), natural environment, geotechnical conditions, social environment, cultural resources, hazardous materials, and air quality (Appendix J). Each topic is discussed as it exists currently (2005-2006) and in the future (2030).

An Origin Destination (OD) Study was completed during December 2005 to document and understand travel patterns and travel times of cars and trucks using the Brent

Spence Bridge during peak periods. Five sites along I-75 (including the Brent Spence Bridge), I-71, US 50, and I-471 were monitored to investigate travel patterns within the Greater Cincinnati area. The OD study determined that approximately 40 percent of the cars using the Brent Spence Bridge were expected to be going to or coming from the other four study sites. The percentage of trucks remaining on the interstate/freeway system was higher than that of passenger vehicles. At least 70 percent of trucks using the Brent Spence Bridge were going to or coming from the other four study sites. The OD study results compared favorably to the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) Travel Demand Forecasting Model.

Specific to the Existing and Future Conditions Report was a traffic analysis conducted for I-75, I-71, US 50, and local street intersections within the study area. In order to obtain a detailed understanding of traffic patterns within the study area, I-75, I-71, and US 50 were divided into mainline segments and interchange ramp merge and diverge points. A total of 47 signalized intersections and eight unsignalized intersections of the local roadway network were studied. The analysis determined AM and PM design hour volumes and levels of service (LOS) for existing (2005) and future conditions (2030).

Traffic counts were collected in the study area during September, October and November 2005. Traffic data for the at-grade intersections were collected using turning movement counts while ramp traffic was collected using portable machine counters. Mainline volumes were determined from the I-75 Thru the Valley study and the I-75 Mill Creek Expressway study and carried through the study area. Select spot counts on the I-75 mainline were also used as check counts. Levels of service were determined for freeway segments, interchange ramp merge and diverge points, 47 signalized intersections and eight unsignalized intersections within the study area using Highway Capacity Software (HCS) version, HCS2000™, version 4.1d.

4.1.1 Existing Traffic Conditions (2005)

4.1.1.1 Mainline Segment Analysis

The following tables present the results of the 2005 existing condition analyses performed on the mainline segments of I-75, I-71, and US 50 within the study area. Locations with a LOS D are likely to degrade to a LOS of E or F in the design year (2030).

The AM design hour traffic on all three freeways in the study area occurs during the 7:30 to 8:30 AM period. The northbound and southbound lanes of I-75 north of the Brent Spence Bridge accommodate the highest volumes of traffic during the AM peak period. The northbound and southbound lanes of I-75 south of the Brent Spence Bridge accommodate more traffic during the PM peak period, 4:30 to 5:30 PM. I-71 northbound and US 50 eastbound carry more traffic during the AM peak period, while I-71 southbound and US 50 westbound are more heavily traveled during the PM peak period. While no segments on I-71 or US 50 operate at LOS E or F, many segments on I-75 operate at LOS E or F, and several segments operate at LOS D.

Table 4-1. 2005 I-75 Northbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
Kyles Lane Merge	West 12th Street Diverge	5806	E	37.5	5758	E	36.8
West KY 12th Street Diverge	West 5th Street Diverge	5576	D	34.6	5262	D	31.3
West KY 5th Street Diverge	Pike Street Merge	4964	D	28.6	4764	D	27.0
Pike Street Merge	West 4th Street Merge	5866	E	38.3	5130	D	30.0
Brent Spence Bridge South	Brent Spence Bridge North	6964	D	30.9	6074	C	25.5
I-71 Diverge	West 5th Street Diverge	3429	D	30.2	4282	F	*
West OH 5th Street Diverge	US 50 Diverge	2845	C	23.6	4066	E	42.0
US 50 Diverge	I-71 Merge	2182	B	17.9	3437	D	30.3
I-71 Merge	West 9th Street Merge	3862	B	15.9	5750	C	23.9
West OH 9th Street Merge	Freeman Avenue Merge	4046	B	16.6	6621	D	28.6
Freeman Avenue Merge	Ezzard Charles Merge	4599	C	18.9	7230	D	32.9
Ezzard Charles Merge	Western Hills Viaduct Diverge	4689	C	19.3	7550	E	35.6
Western Hills Diverge	Western Hills/ Bank St Merge	4316	B	17.7	6783	D	29.7
North of Western Hills Merge		5273	C	21.7	7611	E	36.2

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Capacity Exceeds HCS calculations

Table 4-2. 2005 I-75 Southbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
North of Western Hills Viaduct		8304	E	44.3	5846	C	24.4
Western Hills Viaduct Merge	Findlay Street Diverge	9007	D	32.7	5642	C	18.5
Findlay Street Diverge	Ezzard Charles Diverge	8372	F	*	5033	C	20.7
Ezzard Charles Diverge	Freeman Avenue	7871	E	38.9	4842	C	19.9
Ezzard Charles Merge	West OH 7th Street	7314	D	33.6	4660	C	19.1
I-71 Diverge	West OH 9th Street	2959	C	24.7	2115	B	17.4
West OH 9th Street Merge	US 50 Merge	3126	D	26.5	2569	C	21.1
US 50 Merge	I-71 Merge	3673	D	33.8	3230	D	27.7
Brent Spence Bridge North	Brent Spence Bridge	5280	C	21.8	7156	D	32.3
West OH 5th Street Diverge	Pike Street Diverge	4605	C	18.9	6429	D	27.5
Pike Street Diverge	West KY 4th Street	4324	B	17.8	5836	C	24.3
West KY 4th Street Merge	West KY 12th Street	4718	C	19.4	6739	D	29.4
West KY 12th Street Merge	Kyles Lane Diverge	5039	C	20.7	7277	D	33.3

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Capacity Exceeds HCS calculations

Table 4-3. 2005 I-71 Northbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
South of West OH 2nd Street		3535	D	31.4	1792	B	14.6
West OH 2nd Street Diverge	I-75 SB/US 50	2662	C	21.8	1498	B	12.2
East of I-75 SB/US 50 Merge		5855	C	24.3	4254	B	17.4

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

Table 4-4. 2005 I-71 Southbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
East of I-75 Northbound Diverge		3746	B	15.3	5566	C	22.9

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

Table 4-5. 2005 US 50 Westbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
I-75 Northbound	West OH 6th Street	1743	A	7.0	2656	A	10.7
Gest Street Diverge	Dalton Avenue Diverge	1249	A	5.0	2454	A	9.9
Dalton Avenue Diverge	Freeman Avenue	773	A	4.2	2246	B	12.1
West of Freeman Avenue		955	A	5.1	2794	B	15.0

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

Table 4-6. 2005 US 50 Eastbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
West of Freeman Ave		3544	C	19.0	1115	A	6.0
Freeman Avenue	Freeman Avenue Merge	2851	C	23.2	938	A	7.6
Freeman Avenue Merge	Linn Street Merge	2920	B	15.7	1299	A	7.0
Linn Street Merge	West OH 5th Street	3055	B	12.3	1935	A	7.8
West OH 5th Street	I-75 Southbound Diverge	2548	C	20.6	1815	B	14.6

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

4.1.1.2 Ramp-Freeway Junctions

Traffic congestion throughout the highway network is also due to the merge and diverge locations at interchanges along I-75, I-71, and US 50. The following tables present the results for the 2005 existing condition analyses performed on interchange ramps of I-75, I-71, and US 50 within the study area. Locations with a LOS D are likely to degrade to a LOS of E or F in the design year (2030).

Traffic analyses determined that numerous interchanges on I-75 in the northbound and southbound directions currently operate at LOS D, E, and F during both the AM and the PM peak hours. Additionally, I-71 interchange ramps in the study area operate at LOS D and E during the AM and PM peak hours. The majority of ramps along US 50 currently operate at LOS A, B, and C in both the AM and PM peak hours.

Table 4-7. 2005 I-75 Northbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
Kyles Lane Entrance Ramp	Merge	E	36.0	D	33.9
West KY 12th Street Exit Ramp	Diverge	E	36.5	E	36.6
West KY 5th Street Exit Ramp	Diverge	E	35.8	D	34.3
Pike Street Entrance Ramp	Merge	E	35.1	D	29.5
West KY 4th Street Entrance Ramp**	Add Lane	E	38.3 [U]	D	30.0 [U]
I-71 NB Exit Ramp**	Drop Lane	D	33.5 [R]	F	[D]
West OH 5th Street Exit Ramp	Diverge	E	35.4	F*	43.8
US 50 Exit Ramp	Diverge	E	35.6	F*	44.1
I-71 Entrance Ramp**	Add Lane	B	17.9 [U]	D	30.0 [U]
West OH 9th Street Entrance Ramp	Merge	B	14.4	C	20.4
Freeman Avenue Entrance Ramp	Merge	B	16.0	C	21.3
Ezzard Charles Entrance Ramp	Merge	B	16.0	C	23.0
Western Hills Viaduct Exit Ramp	Diverge	C	20.8	E	35.3
Bank Street Entrance Ramp	Merge	B	18.9	C	24.4

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Failed capacity check for ramp or freeway (implies that the density exceeds the capacity of the facility)
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-8. 2005 I-75 Southbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
Western Hills Viaduct Exit Ramp	Diverge	F*	37.3	D	28.6
Western Hills Entrance/ Findlay Street Exit	Weave	F*	44.4	C	25.3
Ezzard Charles Exit Ramp	Diverge	F*	38.1	C	22.0
Freeman Avenue Exit Ramp	Diverge	F*	36.9	C	22.6
Ezzard Charles Entrance/ W 7th Street Exit	Weave	E	35.5	B	19.3
I-71/ West OH 5th Street Exit Ramp**	Drop Lane	C	25.8 [R]	C	19.2 [R]
West OH 9th Street Entrance Ramp	Merge	D	30.4	C	25.2
US 50 Entrance Ramp	Merge	F*	35.9	D	31.8
I-71 Entrance Ramp**	Add Lane	D	33.8 [U]	E	39.1 [R]
West KY 5th Street Exit Ramp	Diverge	D	29.5	E	37.8
Pike Street Exit Ramp	Diverge	C	22.9	D	32.4
West KY 4th Street Entrance Ramp	Merge	B	15.8	B	19.5
West KY 12th Street Entrance Ramp	Merge	B	19.8	C	26.4
Kyles Lane Exit Ramp	Diverge	C	26.6	E	38.3

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Failed capacity check for ramp or freeway (implies that the density exceeds the capacity of the facility)
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-9. 2005 I-71 Northbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
West OH 2nd Street Exit Ramp	Diverge	E	35.2	B	18.1
I-75 SB Entrance Ramp**	Add Lane	D	26.7 [R]	C	22.4 [R]

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-10. 2005 I- 71 Southbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
West OH 3rd Street Entrance Ramp	Merge	B	16.1	E	36.4
I-75 Northbound/ US 50 Exit Ramp**	Drop Lane	C	18.6 [R]	D	26.9 [D]

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-11. 2005 US 50 Westbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
I-71/I-75 Entrance Ramp**	Add Lane	B	12.7 [R]	B	14.8 [R]
Gest Street Exit Ramp	Diverge	B	13.3	B	15.8
Dalton Avenue Exit Ramp**	Drop Lane	A	7.8 [R]	B	12.1 [D]
	Merge	A	6.0	B	16.8

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-12. 2005 US 50 Eastbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
Freeman Avenue Exit Ramp**	Drop Lane	C	23.2 [D]	A	7.6 [D]
Freeman Avenue Entrance Ramp**	Add Lane	C	23.2 [U]	A	7.6 [U]
West OH 6th Entrance/ West 5th Exit	Weave	B	16.2	B	10.7
I-75 Southbound Exit Ramp**	Drop Lane	D	29.3 [D]	B	17.0 [D]

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

4.1.1.3 Local Street At-Grade Intersections

Within the study area 47 signalized and eight unsignalized local street intersections were analyzed. Table 4-13 presents the intersections evaluated and the results obtained for each location. Locations with a LOS D are likely to degrade to a LOS of E or F in the design year (2030). The highlighting reflects the overall intersection level of service and not individual movements.

Table 4-13. 2005 Local Street Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
West KY 4th Street and Crescent Avenue (Stop Controlled)	AM	-	-	10.8	B	-	-	-	-	-	-
	PM	-	-	13.7	B	-	-	-	-	-	-
West KY 4th Street and Philadelphia Street	AM	-	-	36.8	D	9.5	A	35.5	D	30.6	C
	PM	-	-	40.4	D	18.7	B	42.3	D	36.5	D
West KY 4th Street and Bakewell Street	AM	-	-	14.1	B	14.3	B	14.4	B	14.2	B
	PM	-	-	16.1	B	15.9	B	15.7	B	16.1	B
West KY 4th Street and Main Street	AM	-	-	17.8	B	17.9	B	12.7	B	17.0	B
	PM	-	-	20.9	C	15.3	B	21.1	C	20.5	C
West KY 5th Street and Crescent (Stop Controlled)	AM	-	-	9.7	A	-	-	-	-	-	-
	PM	-	-	11.2	B	-	-	-	-	-	-
West KY 5th Street and Philadelphia Street	AM	18.4	B	-	-	17.8	B	18.3	B	18.3	B
	PM	18.8	B	-	-	16.6	B	18.1	B	18.4	B
West KY 5th Street and Bakewell Street (Stop Controlled)	AM	-	-	-	-	18.9	C	17.4	C	-	-
	PM	-	-	-	-	14.3	B	14.3	B	-	-
West KY 5th Street and Main Street	AM	18.7	B	-	-	18.2	B	18.4	B	18.5	B
	PM	18.9	B	-	-	14.0	B	19.1	B	18.3	B
Pike Street and Bullock Street	AM	35.4	D	9.9	A	-	-	36.5	D	32.0	C
	PM	32.5	C	35.0	C	-	-	34.5	C	34.4	C
Pike Street and Jillians Way	AM	44.1	D	7.5	A	42.9	D	-	-	39.5	D
	PM	21.9	C	21.7	C	21.7	C	-	-	21.8	C
West KY 12th Street and Bullock Street (Stop Controlled)	AM	10.6	B	11.2	B	-	-	10.7	B	10.8	B
	PM	9.6	A	13.0	B	-	-	11.5	B	11.8	B
West KY 12th Street and Jillians Way (Stop Controlled)	AM	20.7	C	25.3	D	13.2	B	-	-	21.4	C
	PM	20.9	C	39.9	E	33.7	D	-	-	32.9	D
Kyles Lane and Dixie Highway	AM	187.6	F	178.5	F	181.8	F	21.0	C	181.4	F
	PM	118.8	F	118.1	F	124.3	F	21.7	C	119.6	F

Table 4-13. 2005 Local Street Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
I-75 Southbound Ramps and Kyles Lane	AM	-	-	21.9	C	14.0	B	22.0	C	18.7	B
	PM	-	-	52.4	D	44.8	D	56.7	E	50.9	D
I-75 Northbound Ramps and Kyles Lane	AM	71.1	E	-	-	75.4	E	4.1	A	51.5	D
	PM	26.7	C	-	-	26.2	C	16.6	B	22.2	C
Highland Pike and Kyles Lane	AM	22.8	C	205.4	F	197.0	F	31.0	C	146.8	F
	PM	30.5	C	225.0	F	24.4	C	231.7	F	161.6	F
Bank Street and Dalton Avenue	AM	13.5	B	15.9	B	14.0	B	15.1	B	14.8	B
	PM	12.7	B	19.3	B	17.2	B	19.4	B	18.3	B
Bank Street and Winchell Avenue	AM	14.0	B	13.6	B	13.9	B	-	-	13.9	B
	PM	14.8	B	14.7	B	14.5	B	-	-	14.6	B
Central Avenue and Linn Street	AM	25.1	C	14.5	B	16.2	B	25.1	C	22.2	C
	PM	17.4	B	27.5	C	16.5	B	26.7	C	23.6	C
Bank Street and Linn Street (Stop Controlled)	AM	10.8	B	-	-	-	-	-	-	-	-
	PM	12.6	B	-	-	-	-	-	-	-	-
Findlay Street and Dalton Avenue	AM	16.5	B	19.4	B	19.0	B	11.4	B	15.6	B
	PM	19.5	B	21.0	C	20.0	C	10.9	B	16.1	B
Findlay Street and Western Avenue	AM	14.0	B	14.1	B	-	-	14.1	B	14.1	B
	PM	14.3	B	13.5	B	-	-	14.1	B	14.1	B
Findlay Street and Winchell Avenue	AM	14.1	B	13.2	B	13.9	B	-	-	13.9	B
	PM	14.2	B	13.6	B	14.3	B	-	-	14.2	B
West Liberty Street and Dalton Avenue	AM	13.8	B	14.9	B	13.9	B	15.4	B	14.9	B
	PM	14.6	B	16.3	B	14.7	B	16.6	B	15.9	B
West Liberty Street and Western Avenue	AM	14.3	B	14.5	B	-	-	14.2	B	14.3	B
	PM	13.9	B	14.3	B	-	-	14.5	B	14.3	B
West Liberty Street and Winchell Avenue	AM	14.9	B	13.8	B	14.8	B	-	-	14.6	B
	PM	14.0	B	15.3	B	15.0	B	-	-	14.9	B

Table 4-13. 2005 Local Street Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
West Liberty Street and Linn Street	AM	15.9	B	15.1	B	15.6	B	15.3	B	15.6	B
	PM	15.1	B	17.5	B	16.5	B	16.0	B	16.5	B
Ezzard Charles Drive Westbound and Western Avenue	AM	-	-	13.8	B	-	-	14.1	B	14.1	B
	PM	-	-	14.0	B	-	-	13.9	B	13.9	B
Ezzard Charles Drive Westbound and Winchell Avenue	AM	-	-	14.5	B	14.2	B	-	-	14.3	B
	PM	-	-	17.4	B	17.7	B	-	-	17.6	B
Ezzard Charles Drive Eastbound and Western Avenue	AM	15.7	B	-	-	-	-	15.6	B	15.6	B
	PM	13.9	B	-	-	-	-	14.1	B	14.1	B
Ezzard Charles Drive Eastbound and Winchell Avenue	AM	14.8	B	-	-	14.7	B	-	-	14.8	B
	PM	13.5	B	-	-	13.5	B	-	-	13.5	B
Ezzard Charles Drive and Linn Street	AM	13.6	B	11.8	B	13.3	B	12.9	B	13.2	B
	PM	12.7	B	13.7	B	13.4	B	12.9	B	13.3	B
Gest Street and Dalton Avenue	AM	15.9	B	15.8	B	16.1	B	16.0	B	16.0	B
	PM	17.7	B	17.5	B	13.5	B	17.8	B	17.0	B
Gest Street and Western Avenue	AM	15.0	B	14.9	B	-	-	15.1	B	15.0	B
	PM	15.4	B	14.5	B	-	-	15.0	B	15.1	B
Gest Street and Freeman Avenue	AM	17.5	B	27.6	C	26.9	C	27.0	C	25.8	C
	PM	16.7	B	28.3	C	26.1	C	26.3	C	24.1	C
Linn Street and Gest Street	AM	15.2	B	17.1	B	17.0	B	9.8	A	15.1	B
	PM	16.6	B	16.8	B	17.1	B	10.1	B	15.5	B
West Court Street and Linn Street (Stop Controlled)	AM	11.7	B	12.6	B	-	-	-	-	-	-
	PM	15.7	C	17.7	C	-	-	-	-	-	-
West OH 8th Street and Dalton Avenue	AM	13.9	B	20.5	C	17.8	B	20.2	C	17.2	B
	PM	16.2	B	27.0	C	14.5	B	28.8	C	24.4	C
West OH 8th Street and Freeman Avenue	AM	25.0	C	21.6	C	25.4	C	22.2	C	24.0	C
	PM	24.1	C	23.2	C	22.5	C	24.0	C	23.6	C
West OH 8th Street and Linn Street	AM	22.7	C	19.8	B	21.5	C	20.9	C	22.0	C
	PM	22.8	C	22.7	C	20.0	B	23.2	C	22.4	C

Table 4-13. 2005 Local Street Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
West OH 6th Street and Linn Street	AM	-	-	-	-	-	-	7.9	A	-	-
	PM	-	-	-	-	-	-	10.7	B	-	-
Dalton Avenue and Linn Street	AM	15.4	B	16.4	B	16.6	B	15.3	B	16.0	B
	PM	21.4	C	13.1	B	20.2	C	18.1	B	18.8	B
Central Avenue and West Court Street	AM	15.2	B	13.1	B	15.2	B	-	-	15.0	B
	PM	12.8	B	13.8	B	13.5	B	-	-	13.4	B
West OH 9th Street and Central Avenue	AM	-	-	13.4	B	13.3	B	12.3	B	13.3	B
	PM	-	-	17.9	B	17.8	B	14.0	B	17.7	B
West OH 7th Street and Central Avenue	AM	17.4	B	-	-	17.6	B	-	-	17.4	B
	PM	13.7	B	-	-	13.5	B	-	-	13.6	B
West OH 6th Street and Central Avenue	AM	-	-	14.3	B	14.1	B	-	-	14.2	B
	PM	-	-	15.2	B	15.5	B	-	-	15.2	B
West OH 5th Street and Central Avenue	AM	26.0	C	-	-	25.3	C	12.7	B	25.4	C
	PM	18.8	B	-	-	19.4	B	8.8	A	17.6	B
West OH 4th Street and Central Avenue	AM	-	-	16.6	B	15.6	B	16.5	B	16.1	B
	PM	-	-	30.0	C	30.4	C	25.6	C	29.9	C
West OH 3rd Street and Central Avenue	AM	37.2	D	38.0	D	30.5	C	36.9	D	37.2	D
	PM	35.4	D	37.4	D	36.5	D	35.4	D	36.6	D
West OH 4th Street and Plum Street	AM	-	-	12.7	B	-	-	12.8	B	12.7	B
	PM	-	-	14.0	B	-	-	14.3	B	14.0	B
West OH 3rd Street and Plum Street	AM	-	-	12.4	B	-	-	12.4	B	12.4	B
	PM	-	-	12.4	B	-	-	12.7	B	12.4	B
West OH 4th Street and Elm Street	AM	-	-	13.9	B	13.9	B	-	-	13.9	B
	PM	-	-	16.2	B	16.5	B	-	-	16.3	B
West OH 3rd Street and Elm Street	AM	-	-	14.1	B	14.2	B	-	-	14.1	B
	PM	-	-	14.4	B	14.5	B	-	-	14.4	B
West OH 2nd Street and Elm Street	AM	14.5	B	-	-	14.8	B	-	-	14.5	B
	PM	13.8	B	-	-	13.5	B	-	-	13.7	B
West OH 3rd Street and Clay Wade Bailey Bridge	AM	20.6	C	11.7	B	19.9	B	-	-	18.0	B
	PM	59.2	E	64.9	E	54.5	D	-	-	60.6	E

[1] LOS = Level of Service

Most of the intersections in the study area currently operate at a LOS B and C. However, intersections adjacent to the Kyles Lane Interchange at the southern end of the study area operate at a LOS F during both the AM and PM peak periods. Several intersections in Kentucky operate at a LOS D. The West 3rd Street and Central Avenue intersection in Cincinnati operates at a LOS D during both AM and PM peak periods. The West 3rd Street and Clay Wade Bailey Bridge intersection in Cincinnati operates at LOS E during the PM peak hour.

4.1.2 Future Traffic Conditions (2030)

Year 2030 volumes were obtained using the OKI regional travel demand model assignments as a basis for applying a hybrid mix of the ratio and additive methods. The 2005 design hour volumes were adjusted to reflect the design hour volumes in Year 2030. For at-grade intersections, these volumes were adjusted to maintain balanced flow through the respective corridors.

4.1.2.1 Mainline Segment Analysis

The following tables present the results of the 2030 future condition analyses performed on the mainline segments of I-75, I-71, and US 50 within the study area.

Table 4-14. 2030 I-75 Northbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
Kyles Lane Merge	West KY 12th Street Diverge	7736	F	*	7100	F	*
West KY 12th Street Diverge	West KY 5th Street Diverge	7594	F	*	6677	F	*
West KY 5th Street Diverge	Pike Street Merge	7001	F	*	6276	F	*
Pike Street Merge	West KY 4th Street Merge	8008	F	*	6694	F	*
Brent Spence Bridge South	Brent Spence Bridge North	9253	F	*	7550	E	35.6
I-71 Diverge	West OH 5th Street Diverge	5348	F	*	5294	F	*
West OH 5th Street Diverge	US 50 Diverge	4460	F	*	5006	F	*
US 50 Diverge	I-71 Merge	3626	D	33.1	4403	F	*
I-71 Merge	West OH 9th Street Merge	5996	C	25.1	6971	D	30.9
West OH 9th Street Merge	Freeman Avenue Merge	6204	D	26.2	7610	E	36.2
Freeman Ave Merge	Ezzard Charles Merge	6612	D	28.6	8156	E	42.3
Ezzard Charles Merge	Western Hills Viaduct Diverge	6699	D	29.1	8,766	F	*
Western Hills Diverge	Western Hills/ Bank Street Merge	6236	D	26.4	8,134	E	42.0
North of Western Hills Merge		7104	D	31.9	8,850	F	*

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
*Capacity Exceeds HCS calculations

Table 4-15. 2030 I-75 Southbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
North of Western Hills Viaduct		9333	F	*	7688	E	36.9
Western Hills Viaduct Merge	Findlay Street Diverge	9985	E	40.2	7662	C	25.8
Findlay Street Diverge	Ezzard Charles Diverge	9345	F	*	7023	D	31.3
Ezzard Charles Diverge	Freeman Avenue Diverge	8934	F	*	6763	D	29.5
Ezzard Charles Merge	West OH 7th Street Diverge	8516	F	*	6750	D	29.5
I-71 Diverge	West OH 9th Street Merge	3951	E	39.2	3526	D	31.5
West OH 9th Street Merge	US 50 Merge	4228	F	*	4124	E	43.5
US 50 Merge	I-71 Merge	4781	F	*	4904	F	*
Brent Spence Bridge North	Brent Spence Bridge South	6636	D	28.7	9114	F	*
West KY 5th Street Diverge	Pike Street Diverge	6158	C	26.0	8641	F	*
Pike Street Diverge	West KY 4th Street Merge	5821	C	24.3	8034	E	40.8
West KY 4th Street Merge	West KY 12th Street Merge	6199	D	26.2	9125	F	*
West KY 12th Street Merge	Kyles Lane Diverge	6505	D	27.9	9671	F	*

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Capacity Exceeds (HCS) calculations

Table 4-16. 2030 I-71 Northbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
South of West OH 2nd		3905	E	37.8	2256	C	18.4
West OH 2nd Street Diverge	I-75 Southbound/US 50 Merge	3097	D	26.0	1866	B	15.3
East of I-75 Southbound/US 50 Merge		6290	D	26.5	4621	C	18.9

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

Table 4-17. 2030 I-71 Southbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
East of I-75 Northbound Diverge		4327	B	17.7	6086	C	25.4

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

Table 4-18. 2030 US 50 Westbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2]
I-75 Northbound	West OH 6th Street	1961	A	7.9	2816	B	11.3
Gest Street Diverge	Dalton Avenue Diverge	1258	A	5.1	2574	A	10.4
Dalton Avenue Diverge	Freeman Avenue	799	A	4.3	2302	B	12.4
West of Freeman		960	A	5.2	2730	B	14.7

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

Table 4-19. 2030 US 50 Eastbound Mainline Segments

Segment		AM			PM		
From	To	Volume	LOS[1]	Density (pc/mi/ln)[2]	Volume	LOS[1]	Density (pc/mi/ln)[2])
West of Freeman Ave		3462	C	18.6	1110	A	6.0
Freeman Avenue Diverge	Freeman Avenue	2906	C	23.7	972	A	7.8
Freeman Avenue Merge	Linn Street Merge	2965	B	15.9	1329	A	7.1
Linn Street Merge	West OH 5th Street	3112	B	12.5	2088	A	8.4
West OH 5th Street Diverge	I-75 Southbound	2563	C	20.7	1963	B	15.8

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane

It is projected that in 2030 almost all of I-75 within the study area will operate at a LOS D, E or F in the AM and PM peak hours. The northbound lanes of I-71 will operate at LOS D and E during the AM peak. The I-71 southbound lanes during the AM and PM peak hours and the northbound lanes during the PM peak hours will operate at LOS B and C. Design hour volumes estimated for US 50 indicate that it will continue to operate at LOS A, B, and C.

4.1.2.2 Ramp-Freeway Junctions

The following tables present the results for the 2030 future condition analyses performed on interchange ramps of I-75, I-71, and US 50 within the study area.

Table 4-20. 2030 I-75 Northbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
Kyles Lane Entrance Ramp	Merge	F*	45.9	F*	40.9
West KY 12th Street Exit Ramp	Diverge	F*	43.4	F*	41.6
West KY 5th Street Exit Ramp	Diverge	F*	43.1	F*	39.8
Pike Street Entrance Ramp	Merge	F*	46.9	F*	38.1
West KY 4th Street Entrance Ramp**	Add Lane	F*	[U]	F*	[U]
I-71 Northbound Exit Ramp**	Drop Lane	F*	[U]	F*	[D]
West OH 5th Street Exit Ramp	Diverge	F*	54.3	F*	53.8
US 50 Exit Ramp	Diverge	F*	45.8	F*	51.2
I-71 Entrance Ramp**	Add Lane	D	33.1 [U]	F*	[U]
West OH 9th Street Entrance Ramp	Merge	C	20.4	C	22.9
Freeman Avenue Entrance Ramp	Merge	C	20.4	F*	23.3
Ezzard Charles Entrance Ramp	Merge	C	21.5	F*	24.7
Western Hills Viaduct Exit Ramp	Diverge	D	30.0	F*	39.8
Bank Street Entrance Ramp	Merge	C	23.1	F*	27.9

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Failed capacity check for ramp or freeway (implies that the density exceeds the capacity of the facility)
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-21. 2030 I-75 Southbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
Western Hills Viaduct Exit Ramp	Diverge	F*	41.5	E	35.8
Western Hills Entrance/Findlay Street Exit	Weave	F*	51.2	E	36.1
Ezzard Charles Exit Ramp	Diverge	F*	41.8	D	31.0
Freeman Avenue Exit Ramp	Diverge	F*	40.8	D	30.4
Ezzard Charles Entrance/West OH 7th Street Exit	Weave	E	42.3	D	29.7
I-71/ West OH 5th Street Exit Ramp**	Drop Lane	E	39.2 [D]	D	31.5 [D]
West OH 9th Street Entrance Ramp	Merge	F*	40.2	F*	39.0
US 50 Entrance Ramp	Merge	F*	45.8	F*	46.8
I-71 Entrance Ramp**	Add Lane	F*	[D]	F*	[R]
West KY 5th Street Exit Ramp	Diverge	D	34.2	F*	44.9
Pike Street Exit Ramp	Diverge	D	29.9	F*	42.1
West KY 4th Street Entrance Ramp	Merge	B	19.0	F*	22.4
West KY 12th Street Entrance Ramp	Merge	C	24.7	F*	33.6
Kyles Lane Exit Ramp	Diverge	D	32.7	F*	48.6

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Failed capacity check for ramp or freeway (implies that the density exceeds the capacity of the facility)
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-22. 2030 I-71 Northbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
West OH 2nd Street Exit Ramp	Diverge	F*	38.9	C	22.6
I-75 Southbound Entrance Ramp**	Add Lane	D	26.7 [R]	C	22.4 [R]

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Failed capacity check for ramp or freeway (implies that the density exceeds the capacity of the facility)
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-23. 2030 I-71 Southbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
West OH 3rd Street Entrance Ramp	Merge	B	18.3	F*	39
I-75 Northbound/US 50 Exit Ramp**	Drop Lane	C	21.3 [R]	D	32.5 [D]

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
* Failed capacity check for ramp or freeway (implies that the density exceeds the capacity of the facility)
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-24. 2030 US 50 Westbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
I-71/I-75 Entrance Ramp	Add Lane	B	14.5	B	14.4 [R]
Gest Street Exit Ramp	Diverge	B	15.6	B	16.8
Dalton Avenue Exit Ramp**	Drop Lane	A	7.5 [R]	B	12.4 [D]
Freeman Avenue Entrance Ramp	Merge	A	6.0	B	16.1

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Table 4-25. 2030 US 50 Eastbound Ramps

Ramp	Junction	AM		PM	
		LOS[1]	Density (pc/mi/ln)[2]	LOS[1]	Density (pc/mi/ln)[2]
Freeman Avenue Exit Ramp	Drop Lane	C	23.7 [D]	A	7.8 [D]
Freeman Avenue Entrance Ramp	Add Lane	C	23.7 [U]	A	7.8 [U]
West OH 6th Entrance/West OH 5th Exit	Weave	B	16.7	B	12.0
I-75 Southbound Exit Ramp	Drop Lane	D	29.3 [D]	B	17.0 [D]

[1] LOS = Level of Service
[2] pc/mi/ln = passenger car per mile per lane
** Values represent the result for the worst operating component of the ramp junction
[R] – Ramp operates the worst
[U] – Upstream freeway operates the worst
[D] – Downstream freeway operates the worst

Traffic analyses indicate that most of the ramp junctions on I-75 will degraded to a LOS F in 2030 during both the AM and PM peak hours. The I-71 northbound ramps during the AM peak and southbound ramps during the PM peak will operate at LOS D and F. The majority of design hour volumes estimated for US 50 westbound and eastbound ramps indicate that they will continue to operate at LOS A, B, and C.

4.1.2.3 Local Street At-Grade Intersections

Table 4-26 presents the future 2030 results obtained for each intersection location. Seven intersections in Kentucky will operate at a LOS F in 2030. One intersection in Ohio will operate at a LOS E in 2030.

Table 4-26. 2030 Brent Spence Bridge Study Area Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
West KY 4th Street and Crescent Avenue (Stop Controlled)	AM	-	-	12.5	B	-	-	-	-	-	-
	PM	-	-	12.9	B	-	-	-	-	-	-
West KY 4th Street and Philadelphia Street	AM	-	-	63.2	E	10.1	B	59.4	E	52.6	D
	PM	-	-	59.0	E	22.4	C	60.1	E	52.4	D
West KY 4th Street and Bakewell Street	AM	-	-	15.5	B	15.6	B	15.7	B	15.5	B
	PM	-	-	17.5	B	17.2	B	17.0	B	17.4	B
West KY 4th Street and Main Street	AM	-	-	134.6	F	129.8	F	27.2	C	111.7	F
	PM	-	-	124.1	F	10.1	B	127.0	F	117.8	F
West KY 5th Street and Crescent Avenue (Stop Controlled)	AM	-	-	9.5	A	-	-	-	-	-	-
	PM	-	-	11.0	B	-	-	-	-	-	-
West KY 5th Street and Philadelphia Street	AM	18.4	B	-	-	18.3	B	19.1	B	18.5	B
	PM	17.5	B	-	-	15.0	B	17.3	B	17.0	B
West KY 5th Street and Bakewell Street (Stop Controlled)	AM	-	-	-	-	22.5	C	34.5	D	-	-
	PM	-	-	-	-	12.6	B	13.4	B	-	-

Table 4-26. 2030 Brent Spence Bridge Study Area Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
West KY 5th Street and Main Street	AM	32.8	C	-	-	19.2	B	33.7	C	28.1	C
	PM	44.6	D	-	-	5.9	A	44.6	D	39.9	D
Pike Street and Bullock Street	AM	42.5	D	10.1	B	-	-	42.8	D	39.1	D
	PM	54.4	D	54.0	D	-	-	56.2	E	54.9	D
Pike Street and Jillians Way	AM	44.3	D	8.9	A	44.0	D	-	-	41.3	D
	PM	25.0	C	22.1	C	25.0	C	-	-	23.6	C
West KY 12th Street and Bullock Street (Stop Controlled)	AM	125.0	F	18.5	C	-	-	20.3	C	70.0	F
	PM	12.6	B	14.8	B	-	-	16.1	C	15.2	C
West KY 12th Street and Jillians Way (Stop Controlled)	AM	252.0	F	21.5	C	12.0	B	-	-	161.5	F
	PM	66.1	F	74.6	F	31.6	D	-	-	60.0	F
Kyles Lane and Dixie Highway	AM	340.5	F	241.7	F	344.3	F	25.4	C	316.9	F
	PM	214.4	F	215.6	F	212.5	F	24.9	C	212.3	F
I-75 Southbound Ramps and Kyles Lane	AM	-	-	22.1	C	14.2	B	21.8	C	18.6	B
	PM	-	-	62.8	E	38.4	D	57.8	E	52.2	D
I-75 Northbound Ramps and Kyles Lane	AM	65.8	E	-	-	62.2	E	4.3	A	43.2	D
	PM	24.6	C	-	-	25.4	C	17.3	B	21.6	C
Highland Pike and Kyles Lane	AM	24.0	C	208.5	F	207.2	F	85.7	F	163.4	F
	PM	273.0	F	237.9	F	17.7	B	270.0	F	188.3	F
Bank Street and Dalton Avenue	AM	13.5	B	16.1	B	14.0	B	15.9	B	15.3	B
	PM	10.3	B	24.3	C	21.1	C	24.0	C	22.6	C
Bank Street and Winchell Avenue	AM	13.9	B	13.6	B	14.0	B	-	-	13.9	B
	PM	15.0	B	15.1	B	15.1	B	-	-	15.1	B
Central Avenue and Linn Street	AM	28.4	C	13.3	B	20.2	C	27.7	C	24.1	C
	PM	15.7	B	29.7	C	18.8	B	29.9	C	24.9	C
Bank Street and Linn Street (Stop Controlled)	AM	11.8	B	-	-	-	-	-	-	-	-
	PM	14.0	B	-	-	-	-	-	-	-	-
Findlay Street and Dalton Avenue	AM	17.3	B	20.6	C	18.4	B	11.3	B	15.2	B
	PM	19.3	B	20.7	C	20.4	C	11.2	B	16.4	B
Findlay Street and Western Avenue	AM	14.0	B	14.2	B	-	-	13.9	B	14.0	B
	PM	14.4	B	13.5	B	-	-	14.1	B	14.1	B
Findlay Street and Winchell Avenue	AM	14.2	B	13.3	B	14.0	B	-	-	14.0	B
	PM	14.6	B	13.9	B	14.7	B	-	-	14.6	B
West Liberty Street and Dalton Avenue	AM	14.9	B	15.7	B	13.3	B	16.0	B	15.1	B
	PM	14.3	B	16.6	B	14.6	B	16.6	B	15.9	B
West Liberty Street and Western Avenue	AM	14.8	B	14.5	B	-	-	14.7	B	14.7	B
	PM	13.6	B	14.6	B	-	-	14.9	B	14.6	B
West Liberty Street and Winchell Avenue	AM	15.3	B	13.6	B	15.1	B	-	-	14.8	B
	PM	13.3	B	16.4	B	16.0	B	-	-	15.6	B

Table 4-26. 2030 Brent Spence Bridge Study Area Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
West Liberty Street and Linn Street	AM	16.3	B	15.2	B	16.3	B	15.7	B	16.0	B
	PM	14.5	B	17.6	B	17.4	B	17.3	B	17.0	B
Ezzard Charles Avenue Westbound and Western	AM	-	-	14.0	B	-	-	13.8	B	13.8	B
	PM	-	-	14.4	B	-	-	14.3	B	14.3	B
Ezzard Charles Avenue Westbound and Winchell Avenue	AM	-	-	15.9	B	15.6	B	-	-	15.7	B
	PM	-	-	20.7	C	20.0	B	-	-	20.5	C
Ezzard Charles Avenue Eastbound and Western Avenue	AM	14.6	B	-	-	-	-	14.1	B	14.2	B
	PM	14.4	B	-	-	-	-	14.6	B	14.6	B
Ezzard Charles Avenue Eastbound and Winchell Avenue	AM	14.3	B	-	-	14.6	B	-	-	14.4	B
	PM	13.6	B	-	-	13.8	B	-	-	13.7	B
Ezzard Charles Avenue and Linn Street	AM	13.3	B	12.2	B	13.8	B	12.7	B	13.2	B
	PM	12.8	B	14.4	B	14.7	B	13.2	B	14.0	B
Gest Street and Dalton Avenue	AM	16.8	B	16.4	B	16.3	B	16.3	B	16.4	B
	PM	17.5	B	17.3	B	13.8	B	17.8	B	17.0	B
Gest Street and Western Avenue	AM	15.4	B	15.4	B	-	-	15.3	B	15.3	B
	PM	15.2	B	14.3	B	-	-	15.3	B	15.0	B
Gest Street and Freeman Avenue	AM	23.3	C	40.2	D	36.0	D	40.0	D	37.4	D
	PM	15.3	B	26.6	C	26.5	C	26.2	C	23.2	C
Linn Street and Gest Street	AM	14.5	B	18.3	B	17.9	B	10.7	B	15.7	B
	PM	17.3	B	18.0	B	17.9	B	10.6	B	16.3	B
West Court Street and Linn Street (Stop Controlled)	AM	11.8	B	14.5	B	-	-	-	-	-	-
	PM	17.6	C	19.7	C	-	-	-	-	-	-
West OH 8th Street and Dalton Avenue	AM	15.2	B	21.1	C	17.9	B	20.6	C	17.7	B
	PM	17.3	B	28.0	C	13.6	B	28.0	C	24.3	C
West OH 8th Street and Freeman Avenue	AM	26.1	C	21.3	C	25.2	C	22.6	C	24.4	C
	PM	24.0	C	22.5	C	22.2	C	23.2	C	23.1	C
West OH 8th Street and Linn Street	AM	25.9	C	17.0	B	26.1	C	24.4	C	24.4	C
	PM	22.0	C	22.9	C	21.5	C	22.8	C	22.5	C
West OH 6th Street and Linn Street (Stop Controlled)	AM	-	-	-	-	-	-	8.2	A	-	-
	PM	-	-	-	-	-	-	12.3	B	-	-
Dalton Avenue and Linn Street	AM	16.4	B	17.2	B	17.5	B	14.4	B	16.5	B
	PM	23.4	C	13.9	B	24.0	C	17.9	B	19.8	B
Central Avenue and West Court Street	AM	16.0	B	13.6	B	16.1	B	-	-	15.8	B
	PM	12.9	B	13.7	B	13.7	B	-	-	13.5	B
West OH 9th Street and Central Avenue	AM	-	-	13.9	B	14.1	B	12.3	B	14.0	B
	PM	-	-	18.9	B	18.8	B	14.2	B	18.7	B
West OH 7th Street and Central Avenue	AM	18.4	B	-	-	18.5	B	-	-	18.4	B
	PM	14.5	B	-	-	14.5	B	-	-	14.5	B
West OH 6th Street and Central Avenue	AM	-	-	16.0	B	15.7	B	-	-	15.9	B
	PM	-	-	19.6	B	19.6	B	-	-	19.6	B
West OH 5th Street and Central Avenue	AM	28.9	C	-	-	27.7	C	14.9	B	28.2	C
	PM	25.1	C	-	-	24.3	C	7.1	A	22.5	C

Table 4-26. 2030 Brent Spence Bridge Study Area Intersections

Intersection	Time Period	Eastbound		Westbound		Northbound		Southbound		Overall	
		Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]	Delay	LOS[1]
West OH 4th Street and Central Avenue	AM	-	-	21.0	C	20.8	C	20.7	C	20.9	C
	PM	-	-	33.9	C	36.6	D	35.9	D	35.2	D
West OH 3rd Street and Central Avenue	AM	38.7	D	37.2	D	37.4	D	37.6	D	37.7	D
	PM	68.8	E	67.3	E	62.6	E	68.5	E	66.3	E
West OH 4th Street and Plum Street	AM	-	-	13.1	B	-	-	13.1	B	13.1	B
	PM	-	-	15.2	B	-	-	15.5	B	15.2	B
West OH 3rd Street and Plum Street	AM	-	-	12.6	B	-	-	12.4	B	12.6	B
	PM	-	-	13.6	B	-	-	13.3	B	13.6	B
West OH 4th Street and Elm Street	AM	-	-	15.0	B	15.2	B	-	-	15.2	B
	PM	-	-	15.6	B	15.8	B	-	-	15.7	B
West OH 3rd Street and Elm Street	AM	-	-	15.2	B	14.9	B	-	-	15.1	B
	PM	-	-	17.3	B	17.8	B	-	-	17.4	B
West OH 2nd Street and Elm Street	AM	15.7	B	-	-	15.5	B	-	-	15.7	B
	PM	14.7	B	-	-	14.8	B	-	-	14.7	B
West OH 3rd Street and Clay Wade Bailey Bridge	AM	23.1	C	16.7	B	23.0	C	-	-	21.0	C
	PM	431.5	F	441.6	F	184.2	F	-	-	396.8	F

[1] LOS = Level of Service

4.2 Red Flag Summary Report

The *Brent Spence Bridge Replacement/Rehabilitation Project: Red Flag Summary Report* was prepared in December 2005 (Appendix K). This document identified "Red Flags" within the project study area. Red flags identify locations that may entail further study, creative management or design, or increased costs. Red flags may also affect the anticipated project design, estimated project budget, construction schedule or scope of work for any proposed transportation project associated with this study. In development of the Red Flag Summary Report, two separate project study area site visits were conducted on August 3 and 11, 2005. Project managers from both Ohio Department of Transportation (ODOT) and Kentucky Transportation Cabinet (KYTC) were present, representatives from cities of Covington, Kentucky and Cincinnati, Ohio were also present, as well as members of the project consultant team. The Red Flag Summary Report summarizes geotechnical, environmental, geometric design, hydraulic, pavement, structural, traffic, right-of-way, utility, and permit issues.

4.2.1 Geotechnical Information

A detailed geotechnical report of the study area is included in an appendix of the Red Flag Summary Report. The report summarizes the following information:

- Site topography,
- Geology within the Kentucky corridor,
- Geology within the Ohio corridor,
- United States Department of Agriculture soil survey review,
- Review of soil test borings,
- Geologic/Geotechnical considerations,
  - Bridge structure foundations,

  - Roadway considerations,
  - Excavations,
- Seismic Considerations, and
- Landslide issues.

This report is general in nature and no field exploration, laboratory testing, or analyses were performed. Based on existing published data reviewed, there are seven geotechnical red flag issues, most of which are in regard to soils (Exhibit 7) and the variable and complex geology. Those red flags include soil (composition, drainage, land slides including beneath the Ohio River), construction fill within the roadway bed, and shallow shale along road cuts. Additionally, regional seismology should be considered during design.

4.2.2 Environmental Resources

Environmental Red Flags represent specific community resources that could be affected by any transportation project within the study corridor. A literature and data base review of existing information was performed to identify specific ecological, historic, archaeological, and community resources as well as potential hazardous material locations.

Various agencies were contacted to acquire data pertaining to the human and natural environment of the study area. These data sources are listed below.

- United States Environmental Protection Agency (EPA)
- United States Fish and Wildlife Service (USFWS) Region 3
- United States Army Corps of Engineers (USACE)
- Ohio Environmental Protection Agency (OEPA)
- Ohio Department of Natural Resources (ODNR)
- Ohio Bureau of Underground Storage Tank Regulations (BUSTR)
- Kentucky Department of Fish and Wildlife Resources (KDFWR)
- Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC)
- Kentucky Division of Waste Management (KDWM)

The Red Flag Summary Report provides an overview of this information as it specifically relates to hazardous materials, ecological resources, historic resources, archaeological sites, community impacts, environmental justice, noise impacts and air quality.

4.2.2.1 Hazardous Materials

Results from federal, state, and local agency databases provided the following information regarding hazardous materials:

- EPA Envirofacts Data Warehouse indicated 25 records for hazardous waste generators located in the study area and two sources for Underground Storage Tanks (UST).
- BUSTR identified 121 USTs within the study area (91 in Kentucky and 30 in Ohio).

Hazardous material red flags include dry cleaners, body shops, gas stations, printing and sign companies and an electric sub-station within the study area (Exhibit 8). The study area encompasses a historically industrialized area, therefore hazardous materials are expected.

4.2.2.2 Ecological Resources

Results from federal, state, and local agency databases provided the following information regarding ecological resources (Exhibit 9).

- The majority of wetlands identified on National Wetland Inventory mapping and Ohio Wetland Inventory mapping indicated that wetlands are scattered throughout the Ohio portion of the study area and are classified as open water bodies (i.e. ponds) and palustrine emergent (i.e. shallow marsh wetlands). A preliminary review of aerial mapping and site visits indicate that wetlands are located along the banks of the Ohio River.
- The Ohio River is the major water resource within the study area. Other low-quality streams are likely non-jurisdictional according to agency guidance.
- Approximately 168 acres of the 100-year floodplain are on the north side of the river and 12.5 acres of the 100-year floodplain are on the south side of the river.
- In Ohio, 13 plant and animal species are listed as state endangered (5), threatened or potentially threatened (6), and special interest (2). Three species also receive federal protection.
- In Kentucky, 32 plant and animal species are listed as state endangered (17), threatened (8), and special concern (7). Nine species also receive federal protection.
- Ten federally endangered species, one federally threatened and one federal candidate species have ranges that include the study area.
- Nine of the federally endangered species are mussels whose ranges include the Ohio River and its tributaries in Kentucky.
- There are no documented populations of threatened and endangered species or critical habitat within the study area. However, potential habitat characteristics for the Indiana bat, running buffalo clover, and freshwater mussels may exist within the study area.

4.2.3 Cultural Resources

Historic resources within the study area include individual residential, commercial, institutional, religious, and industrial buildings and districts (Exhibit 10). Results from federal, state, and local agency databases provided the following information regarding cultural resources.

<u>Kentucky</u>

- Two National Register of Historic Places (NRHP) individual properties are within the study area, the Bavarian Brewing Company and Kenny's Crossing.
- Portions of six NRHP districts are located within the study area.
- One recorded archaeological site is listed in Kentucky's Office of State Archaeologist file (15Ke122) as a historic scatter with associated features.

Ohio

- Fifteen individual properties are listed on the NRHP within the study area.
- Two properties, Union Terminal and Plum Street Temple, are also designated National Historic Landmarks.
- The Court Street Firehouse, Saint Peter-in-Chains Cathedral, Plum Street Temple and Cincinnati City Hall are also listed as local landmarks.
- Nine NRHP districts are entirely or partially within the study area.
- Five archaeological sites are listed in the Ohio Archaeological Inventory within the study area. Four of the sites are prehistoric and were disturbed in the historic period. The sites are 33Ha1 Cincinnati Tablet Mound, 33Ha113, 33Ha311 Seventh Street Mound, and 33Ha312 Richmond Street Mound. All of the sites yielded lithics, ceramics, floral and faunal remains.

4.2.4 Community Resources

Many Covington and Cincinnati neighborhoods are cohesive communities with significant history and community infrastructure. There are several residential communities along the interstate corridor in the city of Covington. These include Kenton Hills, Lewisburg, and West Covington located west of I-71/I-75 and Peaselburg, West Side, and Mainstrasse located east of I-71/I-75. In Cincinnati, these neighborhoods include Queensgate, West End, Fairview-Clifton Heights, and Camp Washington. With the exception of the I-71/I-75 Interstate itself and the Ohio River, no physical barriers exist between neighborhoods and the Central Business Districts within Cincinnati and Covington.

The Queensgate neighborhood is not a typical residential community within the study area. Although, the city of Cincinnati recognizes Queensgate as a 'neighborhood,' this designation does not necessarily represent a 'neighborhood' in terms of a cohesive, residential community. The southern portion of Queensgate is sparsely populated, with a density less than 1,000 people per square mile. It is heavily dominated by commercial buildings. The neighborhood of Queensgate is roughly bound by I-75 to the east, the Ohio River to the south, Western Hills Viaduct to the north, and Mill Creek to the west. Queensgate is labeled on exhibits throughout the document.

Community services and facilities within the study area include parks, schools, hospitals, police stations, fire stations, libraries, cemeteries, government buildings, entertainment and religious institutions. These resources are presented and summarized in Table 4-27 and shown on Exhibit 11.

Table 4-27. Community Facilities Within the Study Area

Kentucky		
Attraction	**Location**	**Description**
1. Garden of Hope	699 Edgecliff Road, Covington	Recreation of the Garden Tomb in Jerusalem
Churches/Religious	**Location**	**Description**
2. St. John's Catholic Church	627 Pike Street, Covington	Catholic Church
Nursing Home	**Location**	**Description**
3. Baptist Life Communities	800 Highland Avenue, Covington	Nursing Home
Recreation	**Location**	**Description**
4. Kenney Shields Park	West KY 9th and Philadelphia, Covington	Small neighborhood corner lot with playground equipment - Owned by the city of Covington
5. Neighborhood Pool	West KY 8th and Dalton Avenue, Covington	Neighborhood pool - Owned by the city of Covington
6. Devou Park/Golf Course/Overlook	1344 Audubon Road, Covington	700-acre park and golf course - Owned by the city of Covington
7. Goebel Park/Mainstrasse Village District	KY 6th Street Area of Covington	Park area and surrounding retail and restaurants - Owned by city of Covington
8. Neighborhood Park	West KY 11th and Hermes Avenue, Covington	Owned by the city of Covington
School	**Location**	**Description**
9. Notre Dame Academy	1699 Hilton Drive, Park Hills	Parochial College Prep High School - 594 female students
10. Prince of Peace Catholic School	625 Pike Street, Covington	Parochial Grade School – Grades K - 8
Ohio		
Attraction	**Location**	**Description**
11. Paul Brown Stadium	One Paul Brown Stadium	Pro Football Facility – Home of NFL Cincinnati Bengals
12. National Underground Railroad Freedom Center	50 East Freedom Way, Cincinnati	Museum
13. Great American Ball Park	100 Main Street, Cincinnati	Pro Baseball Facility – Home of Major League Baseball's Cincinnati Reds
14. US Bank Arena	100 Broadway, Cincinnati	Multi-purpose facility
15. Duke Energy Center (formerly Cinergy Center)	525 Elm Street, Cincinnati	Convention and Exhibition Facility
16. Cincinnati Fire Museum	315 West Court Street, Cincinnati	Museum
17. Geier Research and Collections Museum	760 West OH 5th Street, Cincinnati	Museum

Table 4-27. Community Facilities Within the Study Area

Ohio		
18. Union Terminal *	1301 Western Avenue, Cincinnati	Omnimax Theatre, Museum Center, Children's Museum, Natural History Museum, Amtrak
Churches/Religious	**Location**	**Description**
19. York Street United Methodist	816 York Street, Cincinnati	Methodist Church
20. Plum Street Temple*	726 Plum Street, Cincinnati	Jewish Temple
St. Peter in Chains Cathedral *	325 West OH 8th Street, Cincinnati	Catholic Church
22. Jarriel Baptist Church	Wesley and Court Street, Cincinnati	Baptist Church
Fire Station	**Location**	**Description**
23. Fire House - Company 14	OH 5th and Central, Cincinnati	Fire House
24. Fire House - Company 29, Ladder 29	564 West Liberty at Linn Street Cincinnati	Fire House
Government Building	**Location**	**Description**
25. City Hall *	801 Plum Street, Cincinnati	Offices of Mayor, City Manager, City Council, etc.
26. Jail - Hamilton County Queensgate Facility	516 Linn Street, Cincinnati	Correctional Facility
Library	**Location**	**Description**
27. Public Library of Cincinnati and Hamilton County	805 Ezzard Charles Drive, Cincinnati	Public Library
28. Lloyd Library and Museum	917 Plum Street, Cincinnati	Botanical, Medical, Pharmacutical and Scientific books
Utilities	**Location**	**Description**
29. Duke Energy Substation	West Pete Rose Way at Mehring Way, Cincinnati	Utility Station
Public Agency	**Location**	**Description**
30. Cincinnati Job Corp Center	1409 Western Avenue, Cincinnati	Training Facility and Dorms
Post Office	**Location**	**Description**
31. Main Post Office - Dalton Avenue	1623 Dalton Avenue, Cincinnati	Post Office Facility
32. Post Office Branch	Dalton Avenue and Gest Street, Cincinnati	Post Office Facility-Mid City Carrier Unit
Recreation	**Location**	
33. Lincoln Park - Union Terminal	Freeman Avenue and Ezzard Charles Drive, Cincinnati	Owned by the city of Cincinnati - Operated by Cincinnati Park Board - Greenspace
34. Park at Derrick Turnbow and Linn Street	1525 Linn Street, Cincinnati	Behind apartment buildings and a strip shopping center - Owned by the city of Cincinnati

Table 4-27. Community Facilities Within the Study Area

Ohio		
35. Dyer Park	Baymiller Street and Bank Street, Cincinnati	Ball Field, Pool and Playground - Owned by the city of Cincinnati - Operated by Cincinnati Recreation Commission
36. Lincoln Community Center	1027 Linn Street, Cincinnati	Pool, playground, tennis court, basketball courts -Owned by the city of Cincinnati - Operated by Cincinnati Recreation Commission
37. Queensgate Playground and Ballfields	707 West Court Street, Cincinnati	Playground and ballfields – Owned by the city of Cincinnati - Operated by Cincinnati Recreation Commission
School	**Location**	**Description**
38. St. Joseph's Catholic School	805 Ezzard Charles Drive, Cincinnati	Parochial Elementary School
39. Cincinnati Hamilton County Community Action Agency	880 West Court Street, Cincinnati	Theodore M. Berry Head Start Program
40. Lafayette Bloom B-O-T Accelerated Middle	1941 Baymiller Street, Cincinnati	Cincinnati Public School - Grades 6-8
41. Heberle Elementary	2015 Freeman Avenue, Cincinnati	Cincinnati Public School - Preschool - 8
TV/Radio Station	**Location**	**Description**
42. WXIX - TV	635 West 7th Street, Cincinnati	Network TV Station

*Listed on the National Register of Historic Places

4.2.5 Environmental Justice

Low-income and minority populations are found within the study area in both Covington and Cincinnati (Exhibits 12-14). The Kentucky portion of the study area has moderate levels of low-income and minority populations. In general, the population is predominately white, approximately 85 percent, with a median household income range of $19,000 to $47,000. One Census tract 065100, which includes Peaselburg has the largest minority population in this portion of the study area. Census tracts 065100 (Peaselburg) and 060300 (Mainstrasse) have the largest low income populations in the Kentucky portion of the study area.

The city of Cincinnati has several Census tracts of densely populated minority and low-income areas. The areas east of the existing interstate corridor in Cincinnati are diverse relative to both income and ethnicity. Some Census tracts represent poverty levels as high as 70 percent. These areas are located east of the northern part of the study area. Similarly, some tracts in the northeast part of the study area represent minority levels of 90-100 percent. Large minority areas are located immediately adjacent to the existing I-75 corridor in the West End neighborhood of Cincinnati.

Several significant federally assisted Housing and Urban Development (HUD) projects exist in the study area, including the multi-million dollar redevelopment initiative known as HOPE VI located in the West End neighborhood of Cincinnati.

4.2.6 Geometric Design Issues

A number of geometric design issues were identified through a review of existing studies in the area. Additional issues were also identified on field reviews conducted on August 3 and August 17, 2005. These issues include:

- Insufficient roadway lane, bridge and shoulder widths.
- Existing horizontal and vertical curves on mainline ramps do not meet current ODOT *Location and Design Manual* and KYTC *Design Policy* requirements.
- Grade and clearance issues on the existing facility.

Both the Existing and Future Conditions Report and Red Flag Summary Report provide more detailed information, including specific locations, on the geometric design.

4.2.7 Hydraulic Issues

It is anticipated that some additional review and analysis of existing drainage structures will be required if any are to be re-used. At this time, it is anticipated that most of these structures will be replaced by the project. This includes overland flow, curb/gutter, under-drains and culvert structures both on the mainline and existing crossroads. In addition, the age of the current facility suggests that drainage problems could exist with under-drain outlets. Curb heights on many side streets were observed to be inadequate.

4.2.8 Pavement Issues

Existing pavement on I-71/I-75 mainline and ramps is concrete with asphalt overlay. Crossroads within the study area are largely paved with concrete. Joint repairs, pavement repairs and new pressure relief joints will be needed for sections that will remain in the new project. Maintenance of Traffic (MOT) plans will require temporary pavement in various sections in the study corridor.

4.2.9 Structural Issues

Within the Ohio portion of the study area, it is likely that structures in Ohio will need superstructure replacement. Any re-use of substructures will be evaluated on a site-specific basis.

Within the Kentucky portion of the study area, a fatigue analysis on the Brent Spence Bridge structure was conducted as part of the Engineering Feasibility Study. The results of this analysis were that primary truss members have an infinite fatigue life.

4.2.10 Traffic Control Issues/Maintenance of Traffic

Several sections within the project area have no shoulders or very narrow shoulders. Considering the potential for traffic impact during construction, a detailed and thorough MOT Plan will be necessary in order to maintain interstate and local traffic during construction.

Road closures will be necessary for crossroads and mainline traffic. Short durations will need to be specified for any mainline activities. Considerations of local access for business, pedestrians and commuters will be included in MOT plans. Design concepts will also consider MOT and constructability.

4.2.11 Right-of-Way/Survey Issues

Due to the size, scope and urban setting of this project, a significant amount of work beyond the existing right-of-way limits is expected. This may require the acquisition of additional property for the alternatives that go through the Queensgate area.

The need for easements or acquisition of property from business and/or residential property will depend on the preliminary project design. Potential areas of consideration for acquisition activity include those directly adjacent to the structure and approaches on the western portions of downtown Covington, south of KY 12th Street and the southwestern portion of downtown Cincinnati, west of the Clay Wade Bailey Bridge and east of Gest Street.

4.2.12 Utility Issues

The most visible utility issue in the Kentucky portion of the study area is the Willow Run Sewer line, which runs parallel to I-75 on the east between the Cut-in-the-Hill and Covington.

The Ohio portion of the study area contains major utility issues. The most visible of these is the Duke Energy sub-station located south of Pete Rose Way and west of the existing Brent Spence Bridge structure. Duke Energy also operates high pressure gas mains beneath the sub-station and east of the Brent Spence Bridge. An oil-jacketed high voltage electric main that serves both the Queensgate and Uptown areas of Cincinnati, via Central Avenue is in the study area.

Other major utilities include a Combined Sewer Interceptor facility directly beneath the bridge on the Ohio side of OH 3rd Street. This facility is operated by the Metropolitan Sewer District of Greater Cincinnati. Also in the area is a distribution water main operated by Cincinnati Water Works and serving Northern Kentucky exists on Merhing Way. Subway tunnels located just east of I-75 near the Western Hills Viaduct also contain utilities (fiber-optic cables). More investigation will be necessary to determine the impact of any alternatives developed in that specific location.

A utility coordination meeting was held on March 16, 2006. The purpose of the meeting was to coordinate information between the project team and utility companies and to request feedback on security issues related to utility information. A utility coordination team was assembled to give all utilities advanced notice of the project and to request updated utility information.

4.2.13 Railroad Coordination

Rail transportation is an important component to the multimodal transportation system in the study area. Several of the existing rail lines parallel I-75. The existing rail lines in the study area include:

- CSX Transportation

- Norfolk Southern
- Indiana and Ohio (I&O)
- Amtrak (passenger rail)

According to the Ohio Rail Development Commission, more than 250 freight trains per day pass through or have destinations within the study area.

CSX Transportation and Norfolk Southern have classification and intermodal yards in the Queensgate area of Cincinnati. CSX Transportation's Queensgate Yard has the capacity for 4,000 rail cars, and is one of the busiest freight rail yards in the Midwest.

CSX Transportation and Norfolk Southern have lines that parallel I-75. Two other railroads, Amtrak and Indiana and Ohio have "trackage rights" over these rail lines. More than 90 trains per day use the tracks in this corridor. Even though the two major railroads are competitors, they have a special operating agreement that allows each railroad to use the other's tracks due the rail congestion issues in this corridor.

Upon initial contact with railroad companies operating within the study area, the following clearance information was obtained:

- The required minimum overhead clearance is 23 feet.
- The required minimum lateral clearance (from centerline of track) is 25 feet, less would require crash walls.

4.2.14 Permit Issues

A Section 9 permit will be required from the United States Coast Guard (USCG). Coordination with the USCG indicated that greater horizontal clearance may be needed for skewed crossings.

The USACE Section 404 Permit process will also be required for the Ohio River and its associated tributaries and wetlands. Similarly, a state 401 Water Quality Certification will also be required by Ohio and Kentucky. A completed 401 Water Quality Certification is required by the USCG for a Section 9 permit.

4.3 Other Reports Consulted

A number of recently completed study efforts were undertaken within all or portions of the study area for the Brent Spence Bridge Rehabilitation/Reconstruction Project. The following are summaries of these studies.

- *North South Transportation Initiative (2004)*
  In 2000, the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) and the Miami Valley Regional Planning Commission (MVRPC) under took a major planning effort, known as the *North South Transportation Initiative* (2004), to study the multi-modal transportation system of their regions. The Initiative evaluated the transportation system along a 125-mile stretch of I-75 and the surrounding area spanning from Northern Kentucky, through Cincinnati and Dayton to Piqua, Ohio.

  The result of this process is a preferred program of transportation projects to be considered for inclusion in the long-range planning efforts of the ODOT, KYTC,

MVRPC and OKI. Some of the preferred projects from this study are already underway including the Brent Spence Bridge Rehabilitation/Replacement Study (HAM-71/75 0.00/0.22 – KYTC Project Item Number 6-17), Mill Creek Expressway (HAM-75-2.30) and Thru the Valley (HAM-75-10.10) projects.

- *The Feasibility and Constructability Study of the Replacement/Rehabilitation of the Brent Spence Bridge (2005)*
  This study was contracted in 2003 by KYTC and overseen by a Bi-State Management Team that included ODOT, and the Federal Highway Administration (FHWA) offices from both states. The scope of this study included an analysis of restricting trucks on the bridge, analysis of constructing a new crossing near Anderson Ferry, field testing critical truss members to determine fatigue life and developing concepts for five and seven lane Ohio River crossings in the immediate vicinity of the current structure.

  This study recommended a series of potential feasible build alternatives for replacement and/or rehabilitation of the Brent Spence Bridge structure and improvement to its approaches and surrounding transportation system. Neighborhood and environmental impacts, geotechnical reviews and traffic data were all considered in the development of the recommended alternatives.

- *The Mill Creek Expressway Project (current study)*
  ODOT is currently examining transportation options for the improvement of I-75 and its surrounding transportation system north of the Brent Spence Bridge Rehabilitation/Replacement study area.

  The study area for this project includes I-75 interchanges at Hopple Street, I-74, Mitchell Avenue, State Route 562 (The Norwood Lateral) and Towne Street as well as the I-74 Interchange at Colerain Avenue.

  The Mill Creek Expressway project was initiated to evaluate alternatives that will improve traffic flow, enhance safety and minimize impacts to adjacent property owners and communities within the study area.

- *The Central Area Loop Study (1999)*
  The *Central Area Loop Study* was commissioned by OKI in 1999. The study area included the downtown Central Business Districts for the cities of Cincinnati, Covington and Newport. The purpose of this study was to investigate the feasibility of providing a connection between the three cities and to improve the east/west flow of traffic in the KY 4th and KY 5th street corridor between I-71/I-75 and I-471 in Kentucky.

- *The I-71 Corridor Transportation Study (1997)*
  This was a Major Investment Study for the I-71 Corridor Study, which was commissioned by OKI in 1997. As part of this project, a Technical Memorandum was developed (The I-71/I-75 Brent Spence Bridge Traffic Management Plan). This effort identified a series of recommended existing alternate routes for Brent Spence Bridge traffic.

- *The I-71/I-75 Brent Spence Bridge Scoping Study (1998)*
  In 1998, OKI developed the *I-71/I-75 Brent Spence Bridge Scoping Study* as part of the larger I-71/I-75 Corridor Transportation Study. This study looked at several conceptual alternatives, including five build and one no-build alternative for the replacement and rehabilitation of the Brent Spence Bridge structure.

- *MetroMoves Regional Transit Plan/Regional Light Rail Plan (2002)*
  The Regional Light Rail Plan includes several proposed local and commuter passenger corridors within southwestern Ohio and northern Kentucky, including the Brent Spence Bridge Rehabilitation/Replacement study area. Construction of the first operable segment is estimated at approximately $800 million. This plan was completed for $8 million at approximately 30 percent design. It was not completed due to a lack of funding.

- *OKI 2030 Regional Transportation Plan 2004 Update (2004)*
  The *OKI Regional Transportation Plan* is updated approximately every four years. The latest update was completed in 2004. The plan addresses current and future transportation needs through the year 2030. It was developed in response to FHWA and Clean Air Act requirements to mitigate congestion, address air quality, and other environmental, social and financial issues. It is the outline for the region's transportation projects for the next 25 years.

- *Western Hamilton County Corridor Study (current study)*
  This is a Major Investment Study, which shares a border with the Brent Spence Bridge Rehabilitation/Replacement Study. It includes nearly all of Hamilton County west of I-75, and east of the Indiana border. The study will focus on improving mobility and safety for residents, commuters and freight traffic. The study area is purposefully large and will assess many individual corridors.

- *Uptown Transportation Study (current study)*
  This study is examining transportation infrastructure needs within the Cincinnati neighborhoods of Avondale, Clifton, Clifton Heights, Corryville, East Walnut Hills, Evanston, Fairview/University Heights, Mt. Auburn, North Avondale and Walnut Hills. The Uptown area includes the University of Cincinnati, the Cincinnati Zoo and Botanical Garden, USEPA offices and a number of major hospital and medical facilities in the region. A major component of this study is examining access to I-71 and other major roadways within the area.

5.0 ALTERNATIVES ANALYSIS

Twenty five conceptual alternatives, including the No Build alternative were developed for replacement/rehabilitation of the Brent Spence Bridge. The Build alternatives included five lanes, seven lanes, existing alignment, new alignment through Queensgate, and a tunnel. These alternatives included mainline alternatives with sub-alternatives that further examined segments within the mainline corridor. Mainline alternatives were studied and evaluated as a whole and as four separate segments within the corridor. The four segments of the mainline are:

- Segment 1: Kyles Lane to KY 5th Street, Kentucky
- Segment 2: KY 5th Street to OH 3rd Street, Kentucky and Ohio

- Segment 3: OH 3rd Street to north of Ezzard Charles Drive, Ohio
- Segment 4: Ezzard Charles Drive to Western Hills Viaduct, Ohio

The sub-alternatives were developed for five specific locations along the mainline.

- I-75 Northbound at KY 12th Street Ramp
- I-71/US 50 Interchange
- I-71/I-75/US 50 Interchange
- I-75 between Ezzard Charles Drive and Western Hills Viaduct
- Western Hills Viaduct Interchange

A description of the 25 conceptual build alternatives can be found in the Alternatives Comparison Matrix located in Appendix D.

5.1 Alternatives Considered and Dismissed

The 25 conceptual alternatives were evaluated using a two-step screening process based on a comparative analysis. Step one of the analysis was an evaluation of the conceptual alternatives based on the goals of the Purpose and Need and documentation received from ODOT, KYTC, and affected local governments. In step two of the analysis, the conceptual alternatives that were not eliminated in step one were evaluated using stakeholder goals and measures of success and concurrence among government agencies obtained through a series of meetings. Some alternatives were combined into hybrids and then evaluated in step two of the analysis.

The evaluation process is summarized in the Alternatives Comparison Matrix with evaluations performed, comments and recommendations. See Appendix D for a descriptive table and the full evaluation of all 25 conceptual alternatives and additional sub-alternatives. The seven primary areas for evaluation criteria and detailed components are listed in Table 5-1.

Table 5-1. Evaluation Criteria

Primary Area	Detailed Components
Congestion Mitigation	None
Safety	• Geometric Improvement • Separation of Regional and Local Traffic • Simplification of Roadway Rework
Engineering	• Meets Current Design Standards • Sustainability/Flexibility
Environmental Resource Impacts	• Hazardous Materials • Ecological • Historical • Archaeological • Community • Environmental Justice
Access/Accessibility	• Interstate/US routes • Local Roads • Overall
Construction Cost	None
Constructability	None

The evaluation process used ratings of "Good," "Average" and "Poor" which were defined for each criteria component. The criteria definitions are provided in Appendix D. Aesthetics of conceptual alternatives carried forward for further study will be considered by the Aesthetics Committee at a future date.

Brief descriptions of all 25 conceptual alternatives and their sub-alternatives, both considered and dismissed, are provided in the Alternatives Comparison Matrix (Appendix D) and the Alternatives Description Table (Appendix E). The No Build, conceptual alternatives and sub-alternatives were evaluated by six segments:

- I-75 Mainline
- I-75 Northbound at KY 12th Street Ramp
- I-71/US 50 Interchange
- I-71/I-75/US 50 Interchange
- I-75 between Ezzard Charles Drive and Western Hills Viaduct
- Western Hills Viaduct Interchange

Throughout development and evaluation of the conceptual alternatives there was continuous coordination among the project team through a series of project meetings. Stakeholders were given the opportunity to review, evaluate and provide input for the conceptual alternatives. The results of the meetings identified which alternatives best meet the Purpose and Need and the stakeholders' goals and measures of success for the project. The results of the meetings also determined which alternatives would be dismissed from further study. A brief summary of the meetings follows:

- January 30, 2006 – Conceptual Alternative Analysis Review Meeting #1 with ODOT District 8, and KYTC District 6. This meeting addressed step one of the analysis which evaluated the preliminary Conceptual Alternatives.

- February 14, 2006 – Conceptual Alternative Analysis Review Meeting #2 with ODOT District 8, and KYTC District 6. This meeting addressed step two of the analysis which evaluated the Conceptual Alternatives that were not eliminated in step one.

- February 17, 2006 – Initial presentation of Conceptual Alternatives with FHWA, ODOT Central Office and District 8, and KYTC Central Office and District 6. This meeting addressed step two of the analysis which evaluated the Conceptual Alternatives that were not eliminated in step one. A formal review of the received Conceptual Alternatives by FHWA followed this meeting.

- February 27, 2006 – Review of Conceptual Alternatives with Kenton County, City of Covington, ODOT District 8, and KYTC District 6. This meeting addressed step two of the analysis which evaluated the Conceptual Alternatives that were not eliminated in step one.

- March 1, 2006 – Review of Conceptual Alternatives with City of Cincinnati, ODOT District 8, and KYTC District 6. This meeting addressed step two of the analysis which evaluated the Conceptual Alternatives that were not eliminated in step one.

Nineteen of the 25 conceptual alternatives were dismissed from further study and evaluation (Appendices D and E). These 19 conceptual alternatives failed to meet the Purpose and Need of the project and did not adequately address the stakeholder's goals and measures of success. Based on the Joint Technical Memorandum (Appendix D) prepared during the I-75 Mill Creek Expressway project (HAM-75-2.30), a 5-lane configuration was used to eliminate similar alternatives where number of lanes was the basis of difference. Once design year projected traffic and certified traffic has been approved re-evaluation of the total lane configuration will be completed. The following sections summarize the alternatives that were eliminated from further study.

5.1.1 I-75 Mainline Alternatives

Alternatives 6 through 24 were eliminated from further study because they did not meet the Purpose and Need or the evaluation criteria for the stakeholder's goals of success. Several of the alternatives eliminated are the same as those being carried forward with the exception of the number of lanes. Alternatives were eliminated from further study if they did not meet the minimum requirement of five lanes for I-75; and two lanes for I-71 and local traffic through the corridor. The minimum lane requirements stem from I-71 currently having two lanes coming out of the recently reconstructed Fort Washington Way into the corridor. On I-75, the Mill Creek Expressway project to the north established a minimum five lane section entering into the study area for the Brent Spence Bridge Replacement/Rehabilitation Project. Alternatives that did not meet the lane requirements are 6, 7, 9, 11, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24. Alternatives proposed east of the existing bridge were eliminated from further study since they did not meet the Purpose and Need of improved safety and improvement of geometric deficiencies. Alternatives proposed east of the existing bridge are 8, 12 and

14. Alternative 10 was eliminated due to additional impacts that would be incurred to the study area.

5.1.2 I-71/US 50 Interchange Sub-Alternatives (for I-75 Queensgate Alignment)

Sub-alternative 3 was eliminated from further study because it did not meet the Purpose and Need of the project. The left entrances and exits would remain in place; therefore this sub-alternative did not improve safety or correct geometric deficiencies.

5.1.3 I-71/I-75/US 50 Interchange Sub-Alternatives

Sub-alternatives 4, 5, 6, 7 and 8 for the I-71/I-75/US 50 Interchange were dismissed from further consideration. Sub-alternatives 4 and 5 proposed left exits which do not meet the safety and geometry criteria of the purpose and need. These two sub-alternatives also reduced the number of access points to local roads. Sub-alternatives 6 and 7 do not meet the safety and geometry criteria of the Purpose and Need and limit the possibility of restoring connectivity to I-75. Sub-alternative 8 was developed with an alignment adjustment to minimize impacts to the Longworth Hall, a historic structure. This alignment adjustment was incorporated into the other alternatives for the interchange, which were better design options than sub-alternative 8. Therefore sub-alternative 8 was eliminated from further consideration.

5.1.4 Western Hills Viaduct Interchange Sub-Alternatives

Seven of the 11 sub-alternatives (including the No Build alternative) developed for the Western Hills Viaduct did not provide a full-movement interchange which is necessary for system linkage and local access in this area. Sub-alternatives WHV-4 through WHV-10 were eliminated from further study because they did not meet the Purpose and Need goal of maintaining links in key mobility corridors.

5.2 Alternatives Considered for Further Study

5.2.1 No Build Alternative

The No Build Alternative consists of minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor, which would maintain continuing operations. The No Build Alternative does not meet the Purpose and Need goals; however, this alternative will be carried forward as a baseline for evaluation of the conceptual alternatives.

5.2.2 I-75 Mainline Alternatives

Five mainline alternatives meet the Purpose and Need and evaluation criteria. Alternatives 1 through 5 are being carried forward for further development.

Alternatives 1 and 2 were selected to be carried forward during the Engineering Feasibility Study. Alternatives 3 and 5 utilize existing right of way and the existing bridge. Alternative 4 utilizes existing right of way, proposes new structures and improves horizontal geometry.

5.2.3 I-75 Northbound at KY 12th Street Ramp Sub-Alternatives

Two ramp relocation sub-alternatives from northbound I-75 to Covington were developed and will be carried forward for further study. Both alternatives meet the Purpose and Need for the project.

Sub-alternative 1 maintains ramp access separate from the local street access to Hewson Street. Sub-alternative 2 combines Hewson Street access with the interstate and downtown access and minimizes property impacts.

5.2.4 I-71/US 50 Interchange Sub-Alternatives (for I-75 Queensgate Alignment)

Two of the three sub-alternatives meet the Purpose and Need. Sub-alternatives 1 and 2 will be carried forward for further study.

Sub-alternative 1 minimizes left entrances and exits and improves safety by realigning US 50 to be a parallel roadway. Sub-alternative 2 improves through traffic flow and restores connectivity to the interstate system. This alternative also realigns US 50 to be a parallel roadway with direct access ramps between I-71 and I-75.

5.2.5 I-71/I-75/US 50 Interchange Sub-Alternatives

Eight I-71/I-75/US 50 interchange sub-alternatives were developed where I-75 is proposed to remain along the existing corridor in Ohio. Three of the eight interchange sub-alternatives meet Purpose and Need and will be carried forward for further study.

Sub-alternatives 1 through 3 propose that I-75 northbound and southbound lanes would be parallel roadways and aligned on the west side of the corridor. Sub-alternative 1 improves traffic flow, safety, connectivity, and maintains the flexibility of developing I-75 above or below other roadways. This alternative uses a collector-distributor system for connectivity between the interstate, highway and local roadways. Sub-alternative 2 maintains direct access to and from I-75 with the addition of a collector-distributor roadway system. Sub-alternative 3 consolidates access between the Cincinnati downtown area and interstate/US route systems, thus improving safety and restoring connectivity.

5.2.6 I-75 Ohio C-D Road/Arterial Improvement Sub-Alternatives

Sub-alternatives 1 and 2 meet the Purpose and Need and will be carried forward for further study. Sub-alternative 1 improves safety and traffic flow through improvements to existing I-75 and widening of bridges over local roadways. Improved connectivity to I-75 and local roadways would be provided through a collector-distributor system. Geometric and safety improvements are incorporated in sub-alternative 2 through the elimination of the Ezzard Charles Drive ramp access to I-75. Sub-alternative 2 also improves existing I-75 and local roadways.

5.2.7 Western Hills Viaduct Interchange Sub-Alternatives

Eleven alternatives were developed for the Western Hills Viaduct including a No Build alternative. Evaluation criteria for this interchange include Purpose and Need goals, elimination of the left exit from I-75, compliment other studies completed in the Uptown area and provide the opportunity for a full-movement interchange. Alternatives WHV-1, WHV-2 and WHV-3 meet the evaluation criteria and will be carried forward for further study. These alternatives improve safety and roadway geometry. Also, they reduce the right of way required for the interchange.

The No Build Alternative for the Western Hill Viaduct Interchange does not meet the Purpose and Need goals; however, this alternative will be carried forward as a baseline for evaluation of the conceptual alternatives.

5.3 Conceptual Alternatives

A total of six conceptual alternatives, the No Build and five build alternatives, are being carried forward for further study. The five conceptual build alternatives meet the evaluation criteria of the purpose and need; and stakeholder's goals and measures of success; and have the least amount of impacts as detailed in the Alternatives Comparison Matrix (Appendix D).

Descriptions of the six conceptual Build alternatives retained for further study are discussed in the following sections (Appendix E). Each mainline conceptual alternative is discussed in general followed by discussion of the four segments of the mainline.

5.3.1 Mainline Alternative 1 – Queensgate Alignment for I-75

Mainline Alternative 1 (Appendix E, pages E1 – E4) is a new alignment for I-75 traffic only. A new single-deck bridge or twin bridges with five lanes in each direction (northbound and southbound) would be constructed approximately 800 to 1,000 feet west of the existing bridge for I-75 traffic. North of the Brent Spence Bridge a new alignment for I-75 would be constructed through the Queensgate area of Cincinnati, Ohio. The existing Brent Spence Bridge would be rehabilitated to provide two lanes of traffic in each direction with full shoulders for I-71 and local traffic.

Alternative 1 would separate I-75 traffic from I-71 and local traffic from just south of KY 12th Street in Covington to Ezzard Charles Drive in Ohio. No direct access ramps to and from I-75 would be constructed between these points. All downtown Covington and Cincinnati traffic would be required to use the existing Brent Spence Bridge to gain access to I-75 northbound and southbound in either direction.

5.3.1.1 Segment 1 – Kyles Lane to KY 5th Street, Kentucky (Page E1)

Seven lanes are proposed in each direction between the Kyles Lane Interchange to just south of the access ramps into and out of downtown Covington. I-75 currently has three lanes northbound and four lanes southbound, requiring an additional four lanes northbound and three lanes southbound.

In the northbound direction, four lanes would be added prior to the split of I-75 and I-71/local traffic. At this point, five lanes of I-75 would separate from the existing alignment on the east side and parallel the existing alignment to just north of KY 9th Street, while allowing adequate space for access ramps on and off the existing alignment. I-75 northbound would cross over the existing interstate to align with a new Queensgate bridge(s).

In the southbound direction, five lanes of I-75 would merge with two lanes of I-71/local traffic south of KY 5th Street. Three lanes would be dropped south of the access ramps into and out of downtown Covington. Southbound truck traffic typically uses the outermost lanes, therefore it would be undesirable to drop lanes between Kyles Lane and KY 12th Street in Covington due to the steep uphill grade which is approximately five percent approaching Kyles Lane. During the next phase of the project, the project team

will study additional options that carry seven lanes southbound to Kyles Lane and drop three lanes south of Kyles Lane.

I-71 and local traffic will remain on the existing alignment and use the existing Brent Spence Bridge to cross the Ohio River into downtown Cincinnati. Existing access ramps to and from downtown Covington to the existing alignment will be reconstructed as necessary and improved as required to connect to the existing alignment. No direct access to I-75 northbound will be provided in Kentucky north of Kyles Lane. Motorists leaving downtown Covington with destinations north of Cincinnati will cross the existing Brent Spence Bridge, travel through the I-71/US 50 Interchange, and merge onto I-75 near Ezzard Charles Drive in Cincinnati.

5.3.1.2 Segment 2 – KY 5th Street to OH 3rd Street, Kentucky and Ohio (Page E2)

A new bridge over the Ohio River would be constructed approximately 800 to 1,000 feet west of the existing Brent Spence Bridge for I-75 traffic. I-71 and local traffic would remain on the existing bridge. All traffic with destinations to downtown Covington or Cincinnati, I-71 northbound and southbound, and US 50 eastbound and westbound, would be required to use the existing Brent Spence Bridge. No access to Covington, Cincinnati, or highway facilities would be provided from I-75.

There are two issues regarding the use of the existing Brent Spence Bridge for I-71 and local traffic. Rehabilitation of the bridge to provide full shoulders, only allows two lanes of traffic in each direction. It has not been determined whether or not two lanes would provide adequate capacity for both I-71 and local traffic. This issue will be resolved in the next phase of the project during traffic operations analyses.

The second issue pertains to the northbound KY 4th Street entrance ramp from Covington onto the existing bridge. Currently, this ramp adds a fourth northbound lane that extends across the bridge. With the proposed configuration, the ramp lane would need to drop prior to the existing bridge while allowing an adequate acceleration/merge distance. Additional study in the next phase of the project will be needed to resolve this issue.

The existing ramps to north I-71/east US 50 (Fort Washington Way) would remain with minimal change. It has been discussed that some of the ramp reconstruction that occurred with the construction of Fort Washington Way required design exceptions. It is the intent of the project team that any design to be carried forward will not require further design exceptions. The proposed project will not worsen the situation when a design exception was previously required.

5.3.1.3 Segment 3 – OH 3rd Street to Ezzard Charles Drive, Ohio (Page E3)

A new alignment for I-75 would be constructed to the west of its current location through the Queensgate area of Cincinnati. I-75 would connect to the existing alignment just south of Ezzard Charles Drive. I-75 would be elevated between the new bridge and Ezzard Charles Drive, allowing the existing street grid and roadways to remain as they currently exist underneath the proposed structure. The existing ramps from Gest Street to I-75 northbound and from I-75 southbound to Gest Street would be removed due to conflicts with the vertical alignment of I-75. These ramps currently provide the primary access point for US 50 eastbound to I-75 northbound and I-75 southbound to US 50 westbound. No direct access would be provided to I-75 from the north end of the new

Brent Spence Bridge to just north of Ezzard Charles Drive. Local traffic would use the existing Brent Spence Bridge to access I-75 and I-71.

Construction within the I-71/US 50 Interchange would be minimized to allow for the proposed reconfiguration of the roadway network. Between the I-71 ramps and Ezzard Charles Drive, the mainline would become a local traffic distributor that would provide access to and from the city's street grid and US 50. With this mainline alternative, the number of mainline lanes would be decreased between the diverge of the I-71 ramps and the merge with I-75 near Ezzard Charles Drive. All ramps and existing connections to US 50 and the local city street grid would remain, except for the Gest Street ramps noted above.

In general, the Mainline Alternative 1 identifies the No Build option for the I-71/US 50 Interchange. The presence of left-hand entrances and exits and closely spaced decision points within the interchange justify further study to minimize motorist confusion and provide a system that is easier and safer to navigate and meets driver expectations. Therefore, additional alternatives for the reconstruction of the I-71/US 50 Interchange were developed and are included Section 5.3.7.

5.3.1.4 Segment 4 - Ezzard Charles Drive to Western Hills Viaduct, Ohio (Page E4)

I-75 would merge with the local traffic distributor just south of Ezzard Charles Drive. At this point, seven lanes would be required. In the northbound direction, two lanes would be dropped between Ezzard Charles Drive and the I-75/Western Hills Viaduct Interchange to connect to the proposed five lane section of the Mill Creek Expressway Project.

In the southbound direction, two lanes would be added between the I-75/Western Hills Viaduct Interchange and Ezzard Charles Drive. Five lanes of I-75 and two lanes of the local traffic distributor would diverge just south of Ezzard Charles Drive.

The existing ramps and crossroads would remain with minimal reconstruction.

Alternatives were developed for collector-distributor roads along I-75 and for improvements to the arterial system that parallels I-75 on both sides between Ezzard Charles Drive and Western Hills Viaduct. These alternatives are discussed in Section 5.3.9.

Alternatives were developed for the reconstruction of the I-75/Western Hills Viaduct Interchange and are discussed in Section 5.3.10.

5.3.2 Mainline Alternative 2 – Queensgate Alignment for I-71/I-75

Mainline Alternative 2 (Appendix E, pages E5 – E8) is a new alignment for I-75 and I-71 traffic through the Queensgate community of Cincinnati. A new single-deck bridge or twin bridges with seven lanes in the northbound and southbound directions would be constructed approximately 800 to 1,000 feet west of the existing bridge for I-75 and I-71 traffic. The existing Brent Spence Bridge would be rehabilitated to provide two lanes of traffic in each direction with full shoulders for local traffic only.

I-75 and I-71 traffic would be separated from local traffic from just south of KY 12th Street in Covington to Ezzard Charles Drive in Ohio. No direct access ramps to and from I-75

and I-71 would be constructed between these points. All downtown Covington and Cincinnati traffic would be required to use the existing bridge to gain access to I-75 or I-71 in either direction.

5.3.2.1 Segment 1 – Kyles Lane to KY 5th Street, Kentucky (Page E5)

Nine lanes are proposed in each direction from the Kyles Lane Interchange to just south of the access ramps into and out of downtown Covington. I-75 currently has three lanes northbound and four lanes southbound, requiring an additional six lanes northbound and five lanes southbound. It is anticipated that the number of lanes required between Kyles Lane and KY 12th Street would be similar to those shown and discussed on Mainline Alternative 1 with the two additional lanes being added and/or dropped with ramps into and out of downtown Covington. Further analysis in the next phase of the project will more accurately determine the lane configurations of this alternative in northern Kentucky.

In the northbound direction, five lanes would be added prior to the split of I-71/I-75 and the local traffic roadway. At this point, seven lanes of I-71/I-75 would separate from the existing alignment on the east side and parallel the existing alignment to just north of KY 9th Street. Adequate space for access ramps on and off the existing alignment. I-71/I-75 northbound would cross over the existing interstate to align with a new Queensgate bridge(s).

In the southbound direction, seven lanes of I-71/I-75 would merge with two lanes of local traffic south of KY 5th Street. A minimum of three lanes would be dropped south of the access ramps into and out of downtown Covington. Since southbound truck traffic typically uses the outermost lanes, it would be undesirable to drop lanes between Kyles Lane and KY 12th Street in Covington due to the steep uphill grade which is approximately 5 percent approaching Kyles Lane. During the next phase of the project, the project team will study additional options that carry seven lanes southbound to Kyles Lane and drop three lanes south of Kyles Lane.

Local traffic would remain on the existing interstate alignment and use the existing Brent Spence Bridge to cross the Ohio River into downtown Cincinnati. Existing access ramps to and from downtown Covington to the existing alignment would be reconstructed as necessary and improved as required to connect the existing alignment. No direct access to I-71/I-75 would be provided in Kentucky north of Kyles Lane. Motorists leaving downtown Covington with destinations north of Cincinnati would cross the existing Brent Spence Bridge, travel through the I-71/US 50 Interchange, and merge onto I-75 near Ezzard Charles Drive in Cincinnati.

5.3.2.2 Segment 2 – KY 5th Street to OH 3rd Street, Kentucky and Ohio (Page E6)

A new bridge over the Ohio River would be constructed approximately 800 to 1,000 feet west of the existing Brent Spence Bridge for I-71/I-75 traffic. Local traffic would remain on the existing bridge. All traffic with destinations to downtown Covington or Cincinnati, and US 50 eastbound and westbound would be required to use the existing Brent Spence Bridge. No access to these areas and facilities would be provided from I-71/I-75. Access to I-71 would be available from either bridge.

One issue that exists pertains to the northbound KY 4th Street entrance ramp from Covington onto the existing Brent Spence Bridge. Currently, this ramp adds a

northbound lane that extends across the bridge. With the proposed configuration, the ramp lane would need to drop prior to the existing bridge while allowing an adequate acceleration/merge distance. Additional study in the next phase of the project will resolve this issue.

The existing ramps to Fort Washington Way would be reconstructed to allow I-71 through traffic to cross the new bridge. I-71 southbound traffic going to downtown Covington would have access to the existing bridge. It has been discussed that some of the ramp reconstruction that occurred with the construction of Fort Washington Way required design exceptions. It is the intent of the project team that any design to be carried forward will not require further design exceptions. The proposed project will not worsen the situation when a design exception was previously required.

5.3.2.3 Segment 3 – OH 3rd Street to Ezzard Charles Drive, Ohio (Page E7)

A new alignment for I-71/I-75 would be constructed to the west of its current locations through the Queensgate community of Cincinnati. The new alignment would connect the existing interstate just north of Ezzard Charles Drive. I-71/I-75 would be elevated between the new Brent Spence Bridge and Ezzard Charles Drive, allowing the existing street grid and roadways to remain as they currently exist underneath the proposed structure. The existing ramps from Gest Street to I-75 northbound and from I-75 southbound to Gest Street would remain as they currently exist. No direct access would be provided to I-71/I-75 from the north end of the new Brent Spence Bridge to just north of Ezzard Charles Drive. Local traffic would use the existing Brent Spence Bridge to access I-75 and I-71.

Through the existing I-75 corridor, construction within the I-71/US 50 Interchange would be minimized to allow for the proposed reconfiguration of the roadway network. Between the end of the existing bridge and Ezzard Charles Drive, the mainline would become a local traffic distributor that would provide access to and from the city's street grid and US 50. With this mainline alternative, the number of mainline lanes would be decreased between the end of the existing bridge and the merge with I-75 near Ezzard Charles Drive. All ramps and existing connections to US 50 and the local city street grid would remain.

In general, the Mainline Alternative 2 identifies the No Build option for the I-71/US 50 Interchange. The presence of left-hand entrances and exits and closely spaced decision points within the interchange justify further study to minimize motorist confusion and provide a system that is easier and safer to navigate and meets driver expectations. Therefore, additional alternatives for the reconstruction of the I-71/US 50 Interchange were developed and are discussed in Section 5.3.7.

5.3.2.4 Segment 4 - Ezzard Charles Drive to Western Hills Viaduct, Ohio (Page E8)

I-71/I-75 would merge with the local traffic distributor just north of Ezzard Charles Drive. At this point, seven lanes would be required. In the northbound direction, two lanes would be dropped between Ezzard Charles Drive and the I-75/Western Hills Viaduct Interchange to connect to the proposed five lane section of the Mill Creek Expressway Project.

In the southbound direction, two lanes would be added between the I-75/Western Hills Viaduct Interchange and Ezzard Charles Drive. Five lanes of I-75 and two lanes of the local traffic distributor would diverge just south of Ezzard Charles Drive.

The existing ramps and crossroads would remain with minimal construction.

Alternatives were developed for collector-distributor roads along I-75 and for improvements to the arterial system that parallels I-75 between Ezzard Charles Drive and Western Hills Viaduct. These alternatives are discussed in Section 5.3.9.

Alternatives were developed for the reconstruction of the I-75/Western Hills Viaduct Interchange and are discussed in Section 5.3.10.

5.3.3 Mainline Alternative 3 – New Bridge Just West for I-75

Mainline Alternative 3 (Appendix E, pages E9 – E12) consists of the construction of a new double-deck bridge just to the west of the existing bridge for I-75 traffic only. The existing Brent Spence Bridge would be rehabilitated to provide two lanes of traffic in each direction with full shoulders for I-71 and local traffic.

I-75 traffic would be separated from I-71 and local traffic from just south of KY 12th Street in Covington to Ezzard Charles Drive in Ohio. No direct access ramps to and from I-75 would be constructed between these points. All downtown Covington and Cincinnati traffic would be required to use the existing Brent Spence Bridge to gain access to I-75 northbound and southbound.

5.3.3.1 Segment 1 – Kyles Lane to KY 5th Street, Kentucky (Page E9)

Seven lanes are proposed in each direction from the Kyles Lane Interchange to just south of the access ramps into and out of downtown Covington. I-75 currently has three lanes northbound and four lanes southbound, requiring an additional four lanes northbound and three lanes southbound.

In the northbound direction, four lanes would be added prior to the split of I-75 and I-71/local traffic. At this point, five lanes of I-75 would separate from the existing alignment on the east side and parallel the existing alignment to just north of KY 9th Street while allowing adequate space for access ramps on and off the existing alignment. I-75 northbound would cross over the existing alignment to align with a new double-deck bridge just to the west of the existing Brent Spence Bridge.

In the southbound direction, five lanes of I-75 would merge with two lanes of I-71/local traffic south of KY 5th Street. Three lanes would be dropped south of the access ramps into and out of downtown Covington. Southbound truck traffic typically uses the outermost lanes, therefore it would be undesirable to drop lanes between Kyles Lane and KY 12th Street in Covington due to the steep uphill grade which is approximately five percent approaching Kyles Lane. During the next phase of the project, the Project Team will study additional options that carry seven lanes southbound to Kyles Lane and drop three lanes south of Kyles Lane.

I-71 and local traffic would remain on the existing interstate alignment and use the existing Brent Spence Bridge to cross the Ohio River into downtown Cincinnati. Existing access ramps to and from downtown Covington to the existing alignment would be

reconstructed as necessary and improved as required to tie back to the existing alignment. No direct access to I-75 would be provided in Kentucky north of Kyles Lane. Motorists leaving downtown Covington with destinations north of Cincinnati would cross the existing Brent Spence Bridge, travel through the I-71/I-75/US 50 Interchange, and merge onto I-75 in the vicinity of Ezzard Charles Drive in Cincinnati.

5.3.3.2 Segment 2 – KY 5th Street to OH 3rd Street, Kentucky and Ohio (Page E10)

A new bridge over the Ohio River would be constructed just to the west of the existing Brent Spence Bridge for I-75 traffic. I-71 and local traffic would remain on the existing bridge. All traffic with destinations of downtown Covington or Cincinnati, I-71 northbound and southbound, and US 50 eastbound and westbound would be required to use the existing Brent Spence Bridge. No access to these areas and facilities would be provided from I-75.

There are two issues regarding the use of the existing bridge for I-71 and local traffic. Rehabilitation of the bridge to provide full shoulders only allows two lanes of traffic in each direction. It has not been determined whether or not two lanes would provide adequate capacity for both I-71 and local traffic. This issue will be resolved in the next phase of the project during traffic operations analysis.

The second issue pertains to the northbound KY 4th Street entrance ramp onto the existing bridge. Currently, this ramp adds a fourth northbound lane that extends across the bridge. With the proposed configuration, the ramp lane would be dropped prior to the existing bridge, while allowing an adequate acceleration/merge distance. Additional study in the next phase of the project is necessary to resolve this issue.

The existing ramps to Fort Washington Way would remain with minimal construction. It has been discussed that some of the ramp reconstruction that took place with the construction of Fort Washington Way required design exceptions. It is the intent of the Project Team that any design to be carried forward will not require further design exceptions. The proposed project will not worsen the situation when a design exception was previously required.

The presence of two bridges adjacent to each other complicates the vertical geometry of the bridge approaches on the Ohio side of the river. With this alternative, the alignments of I-75 northbound from the new bridge and I-71/local southbound to the existing bridge cross less than 1,000 feet north of the main span across the Ohio River. Due to the presence of other limiting factors such as clearance over the railroad between Mehring Way, OH 3rd Street and Longworth Hall, it would be difficult to provide an appropriate vertical alignment for I-75 without requiring at least partial reconstruction of the Ohio side approach structure to the existing bridge, resulting in increased construction costs. Vertical alignment issues will be further analyzed in the next phase of the project.

5.3.3.3 Segment 3 – OH 3rd Street to Ezzard Charles Drive, Ohio (Page E11)

I-75 would follow the existing interstate alignment and widen to five lanes in each direction through the I-71/I-75/US 50 Interchange. Construction within the I-75, I-71, US 50 Interchange would be minimized to allow for the proposed reconfiguration of the roadway network. All ramps and existing connections to US 50 and the local city street grid would remain with only minimal reconstruction to connect to the widened mainline alignments.

In general, the Mainline Alternative 3 identifies the No Build option for the I-71/I-75/US 50 Interchange. The presence of left-hand entrances and exits and closely spaced decision points within the interchange justify further study to minimize motorist confusion and provide a system that is easier and safer to navigate and meets driver expectations. Therefore, additional alternatives for the reconstruction of the I-71/I-75/US 50 Interchange were developed and are discussed in Section 5.3.8.

5.3.3.4 Segment 4 - Ezzard Charles Drive to Western Hills Viaduct, Ohio (Page E12)

Five lanes of I-75 in each direction would be carried from Ezzard Charles Drive to the Western Hills Viaduct to tie to the proposed five lane section of the Mill Creek Expressway Project. The existing ramps and crossroads would remain with minimal reconstruction.

Alternatives were developed for collector-distributor roads along I-75 and for improvements to the arterial system that parallels I-75 on both sides between Ezzard Charles Drive and Western Hills Viaduct. These alternatives are discussed in Section 5.3.9.

Alternatives were developed for the reconstruction of the I-75/Western Hills Viaduct Interchange and are discussed in Section 5.3.10.

5.3.4 Mainline Alternative 4 – New Bridge Just West for all Traffic

Mainline Alternative 4 (Appendix E, pages E13 – E16) consists of the construction of a new double-deck bridge just to the west of the existing Brent Spence Bridge. The upper deck of the new bridge would carry I-75 traffic and the lower deck would carry I-71 and local traffic. The existing Brent Spence Bridge would be removed.

I-75 traffic would be separated from I-71 and local traffic from just south of KY 12th Street in Covington to Ezzard Charles Drive in Ohio. No direct access ramps to and from I-75 would be constructed between these points. All downtown Covington and Cincinnati traffic would be required to use the lower deck of the new Brent Spence Bridge to gain access to I-75 northbound and southbound.

5.3.4.1 Segment 1 – Kyles Lane to KY 5th Street, Kentucky (Page E13)

Seven lanes are proposed in each direction from the Kyles Lane Interchange to just south of the access ramps into and out of downtown Covington. I-75 currently has three lanes northbound and four lanes southbound, requiring an additional four lanes northbound and three lanes southbound.

In the northbound direction, four lanes would need to be added prior to the split of I-75 and I-71/local traffic. At this point, three lanes of I-71/local traffic would separate from the existing interstate alignment on the east side and parallel the existing interstate alignment to just north of KY 9th Street. I-71/local traffic would cross under the new I-75 alignment to align with a new double-deck bridge just to the west of the existing Brent Spence Bridge. Three lanes of I-71 and local traffic would cross the Ohio River on the lower deck of the new Brent Spence Bridge and five lanes of I-75 would cross on the upper deck.

In the southbound direction, five lanes of I-75 would merge with three lanes of I-71/local traffic south of KY 5th Street. Four lanes would be dropped south of the access ramps into and out of downtown Covington. Since southbound truck traffic typically uses the outermost lanes, it would be undesirable to drop lanes between Kyles Lane and KY 12th Street in Covington due to the steep uphill grade which is approximately five percent approaching Kyles Lane. During the next phase of the project, the project team will study additional options that carry seven lanes southbound to Kyles Lane and drop three lanes south of Kyles Lane.

Existing access ramps to and from downtown Covington to the existing alignment would be reconstructed as necessary and improved as required to connect to the I-71/local traffic roadway. No direct access to I-75 would be provided in Kentucky north of Kyles Lane. Motorists leaving downtown Covington with destinations north of Cincinnati would cross the new bridge on the lower deck, travel through the I-71/I-75/US 50 Interchange, and merge onto I-75 in the vicinity of Ezzard Charles Drive in Cincinnati.

5.3.4.2 Segment 2 – KY 5th Street to OH 3rd Street, Kentucky and Ohio (Page E14)

A new double-deck bridge would be constructed to the west of the existing Brent Spence Bridge with I-75 traffic on the upper deck and I-71 and local traffic on the lower deck. All traffic with destinations of downtown Covington or Cincinnati, I-71 northbound and southbound, and US 50 eastbound and westbound, would be required to use the lower deck of the new Brent Spence Bridge. No access to these areas and facilities would be provided from I-75.

The existing ramps to Fort Washington Way would remain with minimal construction. It has been discussed that some of the ramp reconstruction that took place with the construction of Fort Washington Way required design exceptions. It is the intent of the project team that any design to be carried forward would not require further design exceptions. The proposed project will not worsen the situation when a design exception was previously required.

5.3.4.3 Segment 3 – OH 3rd Street to Ezzard Charles Drive, Ohio (Page E15)

I-75 would follow the existing interstate alignment and be widened to five lanes in each direction through the I-71/I-75/US 50 Interchange. Construction within the I-71/I-75/US 50 Interchange would be minimized to allow for the proposed reconfiguration of the roadway network. All ramps and existing connections to US 50 and the local city street grid would remain with only minimal reconstruction to connect to the widened mainline alignments.

In general, the Mainline Alternative 4 identifies the No Build option for the I-71/I-75/US 50 Interchange. The presence of left-hand entrances and exits and closely spaced

decision points within the interchange justify further study to minimize motorist confusion and provide a system that is easier and safer to navigate and meets driver expectations. Therefore, additional alternatives for the reconstruction of the I-71/I-75/US 50 Interchange were developed and are discussed in Section 5.3.8.

5.3.4.4 Segment 4 - Ezzard Charles Drive to Western Hills Viaduct, Ohio (Page E16)

Five lanes of I-75 in each direction would be carried from Ezzard Charles Drive to the Western Hills Viaduct to connect to the proposed five lane section of the Mill Creek Expressway Project. The existing ramps and crossroads would remain with minimal reconstruction.

Alternatives were developed for collector-distributor roads along I-75 and for improvements to the arterial system that parallels I-75 on both sides between Ezzard Charles Drive and Western Hills Viaduct. These alternatives are discussed in Section 5.3.9.

Alternatives were developed for the reconstruction of the I-75/Western Hills Viaduct Interchange and are discussed in Section 5.3.10.

5.3.5 Mainline Alternative 5 – Construct New Bridges for I-75

Mainline Alternative 5 (Appendix E, pages E17 – E20) consists of the construction of two new single-deck bridges, one on each side of the existing bridge, for I-75 traffic only. The existing Brent Spence Bridge would be rehabilitated to two lanes in each direction with full shoulders for I-71 and local traffic.

I-75 traffic would be separated from I-71 and local traffic from just south of KY 12th Street in Covington to Ezzard Charles Drive in Ohio. No direct access ramps to and from I-75 would be constructed between these points. All downtown Covington and Cincinnati traffic would be required to use the existing bridge to gain access to I-75 northbound and southbound.

5.3.5.1 Segment 1 – Kyles Lane to KY 5th Street, Kentucky (Page E17)

Seven lanes are proposed in each direction from the Kyles Lane Interchange to just south of the access ramps into and out of downtown Covington. I-75 currently has three lanes northbound and four lanes southbound, requiring an additional four lanes northbound and three lanes southbound.

In the northbound direction, four lanes would need to be added prior to the interchange of I-75 and I-71/local traffic. At this point, five lanes of I-75 traffic would separate from the existing alignment on the east side and parallel the existing alignment all the way to the Ohio River. I-75 northbound would cross the river on a new single-deck bridge just to the east of the existing Brent Spence Bridge. Two lanes of I-71 and local traffic will cross the Ohio River on the lower deck of the existing Brent Spence Bridge.

In the southbound direction, five lanes of I-75 would merge with two lanes of I-71/local traffic south of KY 5th Street. Four lanes would be dropped south of the access ramps into and out of downtown Covington. Since southbound truck traffic typically uses the outermost lanes, it would be undesirable to drop lanes between Kyles Lane and KY 12th Street in Covington due to the steep uphill grade which is approximately five percent

approaching Kyles Lane. During the next phase of the project, the Project Team will study additional options that carry seven lanes southbound to Kyles Lane and drop three lanes south of Kyles Lane.

Existing access ramps to and from downtown Covington to the existing alignment would be reconstructed as necessary and improved as required to connect back to the existing interstate alignment. No direct access to I-75 would be provided in Kentucky north of Kyles Lane. Motorists leaving downtown Covington with destinations north of Cincinnati will cross the existing bridge on the lower deck, travel through the I-71/I-75/US 50 Interchange, and merge onto I-75 in the vicinity of Ezzard Charles Drive in Cincinnati.

5.3.5.2 Segment 2 – KY 5th Street to OH 3rd Street, Kentucky and Ohio (Page E18)

Two new single-deck bridges would be constructed on either side of the existing Brent Spence Bridge with I-75 northbound traffic on the new bridge to the east, I-75 southbound traffic on the new bridge to the west, and I-71 and local traffic on the existing bridge. All traffic with destinations of downtown Covington or Cincinnati, I-71 northbound and southbound, and US 50 eastbound and westbound would be required to use the new Brent Spence Bridge. No access to these areas and facilities would be provided from I-75.

There are two issues regarding the use of the existing bridge for I-71 and local traffic. Rehabilitation of the new bridge providing full shoulders only allows two lanes of traffic in each direction. It has been questioned whether two lanes provide adequate capacity for both I-71 and local traffic. This issue will be resolved in the next phase of the project during traffic operations analyses.

The second issue pertains to the northbound KY 4th Street entrance ramp onto the existing bridge. Currently, this ramp adds a fourth northbound lane that extends across the bridge. With the proposed configuration, the ramp lane would be dropped prior to the existing bridge while allowing an adequate acceleration/merge distance. Additional study in the next phase of the project is necessary to resolve this issue.

The existing ramps to Fort Washington Way would remain with minimal construction. It has been discussed that some of the ramp reconstruction that took place with the construction of Fort Washington Way required design exceptions. It is the intent of the project team that any design to be carried forward will not require further design exceptions. The proposed project will not worsen the situation when a design exception has been previously required.

The presence of three bridges adjacent to each other complicates the vertical geometry of the bridge approaches on the Ohio side of the river. With this alternate, the alignments of I-75 northbound from the new bridge to the east and I-71/local northbound to the existing bridge cross less than 1,000 feet north of the main span across the Ohio River. Due to the presence of other limiting factors such as clearance over the railroad between Mehring Way and OH 3rd Street and Longworth Hall, it would be difficult to provide an appropriate vertical alignment for I-75 without requiring at least partial reconstruction of the Ohio side approach structure to the existing bridge, resulting in increased construction costs. Vertical alignment issues will be further analyzed in the next phase of the project.

5.3.5.3 Segment 3 – OH 3rd Street to Ezzard Charles Drive, Ohio (Page E19)

I-75 would follow the existing alignment and widen to five lanes in each direction through the I-71/I-75/US 50 Interchange. Construction within the I-71/I-75/US 50 Interchange would be minimized to allow for the proposed reconfiguration of the roadway network. All ramps and existing connections to US 50 and the local city street grid would remain with only minimal reconstruction to connect to the widened mainline alignments.

In general, the Mainline Alternative 5 identifies the No Build option for the I-71/I-75/US 50 Interchange. The presence of left-hand entrances and exits and closely spaced decision points within the interchange justify further study to minimize motorist confusion and provide a system that is easier and safer to navigate and meets driver expectations. Therefore, additional alternatives for the reconstruction of the I-71/I-75/US 50 Interchange were developed and are discussed in Section 5.3.8.

5.3.5.4 Segment 4 - Ezzard Charles Drive to Western Hills Viaduct, Ohio (Page E20)

Five lanes of I-75 in each direction would be constructed from Ezzard Charles Drive to the Western Hills Viaduct to connect to the proposed five lane section of the Mill Creek Expressway Project. The existing ramps and crossroads would remain with minimal reconstruction.

Alternatives were developed for collector-distributor roads along I-75 and for improvements to the arterial system that parallels I-75 on both sides between Ezzard Charles Drive and Western Hills Viaduct. These alternatives are discussed in Section 5.3.9.

Alternatives were developed for the reconstruction of the I-75/Western Hills Viaduct Interchange and are discussed in Section 5.3.10.

5.3.6 I-75 Northbound at KY 12th Street Ramp Sub-Alternatives

5.3.6.1 Sub-Alternative 1 (Page E21)

Sub-alternative 1 replaces the proposed access to the future development site located east of I-71/I-75 in the vicinity of Monterey Road and KY 16th Street with a relocated connector street between KY 12th Street and the development site. In the next phase of this project, the project team will further analyze and define the horizontal and vertical geometries of the mainline and ramps, including development of preliminary construction limits. At this time, actual geometrics of the proposed connector street will be developed such that impacts to the residential neighborhood and historic district are minimized.

5.3.6.2 Sub-Alternative 2 (Page E22)

Sub-alternative 2 relocates the terminal of the I-75 northbound ramp to KY 12th Street further south along I-75. Access to the proposed development site located east of I-71/I-75 in the vicinity of Monterey Road and KY 16th Street would be allowed at this point with a three-leg intersection. A two-way street would be provided between the ramp terminal and KY 12th Street to allow access to the development from KY 12th Street and northbound interstate access to KY 12th Street. This sub-alternative could minimize impacts to the residential neighborhood and historic district by reducing the required width of the roadway footprint.

5.3.7 I-71/US 50 Interchange Sub-Alternatives (for I-75 Queensgate Alignment)

5.3.7.1 I-71/US 50 Interchange Sub-Alternative 1 (Page E23)

Sub-alternative 1 proposes to remove I-75 from the existing corridor. Therefore, this sub-alternative is applicable to the Queensgate alignments, Mainline Alternatives 1 and 2.

Sub-alternative 1 would realign the mainline through the interchange and realign US 50 to provide parallel roadways to eliminate left-hand entrances and exits. The proposed alignments of the ramps from the existing bridge to and from I-71/Fort Washington Way would remain similar to the existing alignments. North of the divergence of the I-71 ramps, the mainline local traffic distributor road would progress through the interchange prior to merging with I-75 near Ezzard Charles Drive.

This sub-alternative maintains all existing ramps to I-71, US 50, and downtown Cincinnati. Additional optional ramps are shown for southbound traffic from I-75 to US 50 westbound and for US 50 eastbound to I-75 northbound.

5.3.7.2 I-71/US 50 Interchange Sub-Alternative 2 (Page E24)

Sub-alternative 2 proposes to remove I-75 from the existing corridor. Therefore, this sub-alternative is applicable to the Queensgate alignment, Mainline Alternatives 1 and 2.

Sub-alternative 2 would realign the mainline through the interchange of US 50 to provide parallel roadways to eliminate left-hand entrances and exits. Ramps from the new bridge to and from I-71/Fort Washington Way are required with both I-75 and I-71 relocated on the new alignment and only local traffic remaining on the existing bridge. Ramps from I-71 to the existing bridge are also required to allow traffic to and from downtown Covington access to I-71. The mainline local traffic distributor road would progress through the interchange prior to merging with I-75 near Ezzard Charles Drive.

This sub-alternative maintains all existing ramps to I-71, US 50, and downtown Cincinnati. Additional optional ramps are shown for southbound traffic from I-75 to US 50 westbound and for US 50 eastbound to I-75 northbound.

5.3.8 I-71/I-75/US 50 Interchange Sub-Alternatives

5.3.8.1 I-71/I-75/US 50 Interchange Sub-Alternative 1 (Page E25)

Sub-alternative 1 consists of realignment of I-75 through the interchange and elimination of all access to and from I-75 from the Ohio River to just south of Ezzard Charles Drive. US 50 would also be realigned to provide a parallel roadway to facilitate the elimination of left-hand entrances and exits. A local traffic distributor road would be constructed that would carry local traffic from the existing bridge and provide access ramps to US 50 and local city streets before tying back to I-75 just south of Ezzard Charles Drive.

This sub-alternative maintains all existing ramps to I-71, US 50, and downtown Cincinnati except for the southbound I-75 connection to OH 7th Street. The existing OH 7th Street bridge over I-75 would be utilized to carry the southbound local traffic distributor road over I-75 so that it could be tied to the existing Brent Spence Bridge. The OH 8th-7th Street connection would be replaced with a new bridge over I-75 parallel to the existing OH 9th Street bridge. Additional optional ramps are shown for direct

connections for southbound traffic from I-75 to US 50 westbound and for US 50 eastbound to I-75 northbound.

This sub-alternative provides an I-75 at-grade facility with all crossroads and ramps over I-75. An additional variation to be studied further in the next phase of the project, to determine if it allows any cost savings, will be to elevate I-75 through the interchange and provide at-grade crossroads and ramps under I-75.

5.3.8.2 I-71/I-75/US 50 Interchange Sub-Alternative 2 (Page E26)

Sub-alternative 2 consists of realigning I-75 through the interchange and eliminating all access to and from I-75 from the Ohio River to just south of Ezzard Charles Drive. US 50 would also be realigned to provide a parallel roadway to facilitate the elimination of left-hand entrances and exits. A local traffic distributor road would be constructed to carry local traffic from the existing bridge and provide access ramps to US 50 and local city streets before tying back to I-75 just south of Ezzard Charles Drive.

This sub-alternative provides an extension of the city street grid through the interchange. All existing ramp connections are maintained in addition to a northbound connection to OH 7th Street. Additional optional ramps are shown for direct connection for southbound traffic from I-75 to US 50 westbound and for US 50 eastbound to I-75 northbound. The most significant change is the southbound route to OH 2nd Street. The direct connection would be removed and southbound traffic would exit just north of OH 9th Street and follow the ramp to a new four-leg intersection at OH 3rd Street. Vehicles going to OH 2nd Street would travel through the intersection and turn left onto OH 2nd Street.

This sub-alternative provides an elevated I-75 facility with all crossroads and ramps under I-75. At this time, I-75 elevated appears to be favorable to I-75 at-grade with the layout of this alternative. If the study of Sub-alternative 1 results in an I-75 at-grade facility being less expensive than I-75 elevated, further study of this sub-alternative may be pursued to determine if an I-75 at-grade facility could be constructed while achieving the same goals.

5.3.8.3 I-71/I-75/US 50 Interchange Sub-Alternative 3 (Page E27)

Sub-alternative 3 consists of realigning I-75 through the interchange and eliminating all access to and from I-75 from the Ohio River to just south of Ezzard Charles Drive. US 50 would also be realigned to provide a parallel roadway to facilitate the elimination of left-hand entrances and exits. A local traffic distributor road would be constructed that would carry local traffic from the existing bridge and provide access ramps to US 50 and local city streets before tying back to I-75 just south of Ezzard Charles Drive.

This sub-alternative provides a more-defined extension of the city street grid through the interchange as well as reconfiguration of the provision of access. All existing connections are maintained. Additional optional ramps are shown for direct connection for southbound traffic from I-75 to US 50 westbound and for US 50 eastbound to I-75 northbound. Southbound traffic going to OH 2nd Street would no longer have a direct connection as with Sub-alternative 2. The extension of John Street north to OH 6th Street provides an additional route for OH 3rd Street traffic traveling to I-75 northbound or US 50 westbound.

This sub-alternative provides an elevated I-75 facility with all crossroads and ramps under I-75. At this time, I-75 elevated appears to be favorable to I-75 at-grade with the layout of this sub-alternative. If the study of Sub-alternative 1 results in an I-75 at-grade facility being less expensive than I-75 elevated, further study of this sub-alternative may be pursued to determine if an I-75 at-grade facility could be constructed while achieving the same goals.

5.3.9 I-75 Ohio C-D Road/Arterial Improvement Sub-Alternatives

5.3.9.1 Sub-Alternative 1 (Page E28)

Sub-alternative 1 provides for the construction of collector-distributor (C-D) roads along I-75 from near Ezzard Charles Drive to south of Western Hills Viaduct. On the south end, the C-D roads would become the local traffic distributor route for the I-71/I-75/US 50 Interchange sub-alternative chosen. On the north end, the northbound C-D road could extend through the Western Hills Viaduct Interchange. In the southbound direction, the C-D road could begin at the southbound I-75 ramp from the Western Hills Viaduct.

5.3.9.2 Sub-Alternative 2 (Page E29)

Sub-alternative 2 would improve Western Avenue and Winchell Avenue to improve traffic flow and increase capacity. The ramps to Western Avenue and from Winchell Avenue just north of Ezzard Charles Drive are in close proximity to the Gest Street ramps just south of Ezzard Charles Drive. The ramps just north of Ezzard Charles Drive would be removed. Improvements to Winchell Avenue and Western Avenue to improve the flow of traffic and increase capacity are being considered to mitigate the impacts of removing the ramps.

5.3.10 Western Hills Viaduct Interchange Sub-Alternatives

5.3.10.1 Sub-Alternative WHV-1 (Page E30)

Sub-alternative WHV-1 proposes to construct a modern roundabout intersection on the east side of I-75. The modern roundabout would be located beyond the eastern end of the existing Viaduct bridge and form a single intersection with Central Parkway, McMillan Street, Western Hills Viaduct and the freeway ramps. Southbound I-75 ramps would fly over the freeway to the east side intersecting with the modern roundabout.

5.3.10.2 Sub-Alternative WHV-2 (Page E31)

Sub-alternative WHV-2 is a single roundabout diamond interchange (SRDI). A modern roundabout would be constructed on Western Hills Viaduct over the interstate and straight ramps (as with a standard diamond interchange) would intersect the modern roundabout on either side of the freeway.

5.3.10.3 Sub-Alternative WHV-3 (Page E32)

Sub-alternative WHV-3 proposes a single point urban interchange (SPUI). The basic layout of the SPUI is a diamond-type interchange in which a single intersection is formed with the arterial street and ramps over or under the freeway. The SPUI bridge would be built on the Western Hills Viaduct over I-75. This sub-alternative would require widening on the viaduct for the purpose of adding center left turn lanes thus potentially impacting the historic portion of the viaduct bridge.

6.0 RECOMMENDED DESIGN CONCEPT AND SCOPE

The Ohio Department of Transportation (ODOT), Kentucky Transportation Cabinet (KYTC), and Federal Highway Administration (FHWA) have agreed that five lanes, with appropriate congestion mitigation enhancements in each direction are anticipated for I-75 traffic crossing the Ohio River. Two, three, or four lanes in each direction are anticipated for I-71 and local traffic, for a total of seven, eight, or nine lanes in each direction crossing the Ohio River. In Ohio, the 10 lanes (five lanes in each direction) of I-75 will be carried northward through the Mill Creek Expressway project. In Kentucky, the additional lanes will be dropped as efficiently and safely as possible in the southbound direction and lanes added in the northbound direction as required to tie to the proposed number of lanes.

Additional design objectives for the Brent Spence Bridge Replacement/Rehabilitation Project include:

- Elimination of left exits and entrances,
- Enhance existing connections from interstate and US routes to local roadways,
- Add missing connections from US 50 eastbound to northbound I-75 and southbound I-75 to westbound US 50, and
- No restrictions by proposed access to a proposed development on the empty parcel just south of Linden Grove Cemetery on the east side of and adjacent to I-75 in Covington.

Proposed interchange modification sub-alternatives of the Western Hills Viaduct were developed to accomplish the following design objectives:

- Eliminate left-hand exit ramp in I-75 northbound direction,
- Improve accessibility to/from I-75 from the Uptown area,
- Avoid impacts to the subway tunnels, and
- Provide for a full movement interchange with I-75.

Each of the full movement interchange alternatives for Western Hills Viaduct would require I-75 traffic to use the top level of the Viaduct structure in addition to traffic destined for Central Parkway and the Uptown area. The lower level would continue to provide a connection to Spring Grove Avenue. Additional analysis of the traffic patterns on the west end of the viaduct will be undertaken in subsequent steps of the project development.

Alternatives recommended for further consideration meet the components of the Recommended Design Concept and Scope. Exhibits in Appendix E show mapping of the recommended conceptual alternatives and sub-alternatives. These alternatives will be carried forward for further study with a refined set of criteria.

7.0 STRATEGIC PLAN

7.1 Project Phasing and Funding Recommendation

7.1.1 Project Development Process

The Brent Spence Bridge Replacement/Rehabilitation Project is being implemented using the Ohio Department of Transportation's (ODOT) Project Development Process (PDP). Steps 1 through 4 comprise the planning process. The results of Steps 1 through 4 are described in this Planning Study Report. This report recommends several alternatives for further evaluation. The Strategic Plan describes the implementation plan for the project after Steps 1 through 4, and will be updated following the completion of each subsequent step of the process.

Table 7-1 summarizes ODOT's major PDP steps 5 through14. Steps 5 through 8 develop conceptual alternatives through Stage I design and assess the environmental impact of the alternatives. Environment documentation is completed and a Preferred Alterative is selected during these steps. Steps 9 through 12 include right of way acquisition and final design. Steps 13 and 14 are project construction. The Kentucky Transportation Cabinet (KYTC) will assume management of the Kentucky portion of the Brent Spence Bridge project after completion of Step 8. This includes all improvements from Kyles Lane, the collector-distributor and climbing lanes south of the Brent Spence Bridge, the southern approaches to the Bridge, and the main span of the Bridge. ODOT will follow Steps 9 through 14 for the Ohio approaches, the connections to US 50, the I-71/I-75/US 50 Interchange, the I-75 mainline, and the Western Hills Viaduct. ODOT's and KYTC's responsibilities are defined at approximately N39°05.516'/W85°31.324'.

Table 7-1. ODOT's Major PDP Steps 5 through 14.

PDP Step and Key Engineering Components	Activities Performed During Step
Step 5	
Develop Conceptual Alternatives	• Address Public Involvement issues • Select corridors for further study • Develop preliminary Engineering/Environmental Scope of Services • Perform environmental field studies • Submit Conceptual Alternatives Study • Update cost estimates.
Step 6	
Develop Feasible Alternatives	• Develop feasible alternatives and preliminary construction limits • Perform field refinement environmental studies • Prepare Assessment of Feasible Alternatives • Conduct first Value Engineering Study • Conduct first Constructability Review • Update cost estimates.
Step 7	
Develop Preferred Alternative	• Recommend preferred alternative

Table 7-1. ODOT's Major PDP Steps 5 through 14.

PDP Step and Key Engineering Components	Activities Performed During Step
	• Refine design plans for preferred alternatives • Submit Preferred Alternative Verification • Perform environmental field study/refine impacts • Prepare Waterway Permit Determination • Prepare and Submit Categorical Exclusion, Environmental Assessment or Draft Environmental Impact Statement • Develop Detailed Design Scope of Services • Update cost estimates and milestone dates.
Step 8	
Prepare Environmental Clearance/Develop Stage 1 Design	• Finalize environmental document (CE, EA or EIS) • Request Finding of No Significant Impact/Record of Decision/Categorical Exclusion approval • Develop and Submit Stage 1 Detailed Design • Establish proposed R/W limits • Conduct Second Value Engineering Study • Prepare Final Waterway Permit applications and conceptual Mitigation Plans • Update cost estimates.
Step 9	
Develop Stage 2 Design	• Summarize environmental commitments and prepare necessary environmental plan notes • Prepare Final Mitigation Plans • Develop and Submit Preliminary R/W plans • Develop and Submit Stage 2 Detailed Design • Conduct second Constructability Review • Update cost estimates.
Step 11	
Develop Stage 3 Design	• Develop and Submit State 3 Detailed Design • Prepare Environmental Consultation Form • Update construction cost estimate.
Step 12	
Prepare Final Plan Package	• Prepare and Submit Final Tracings • Prepare and Submit Final Plan Package • Update construction cost estimate.

7.1.2 Project Phasing

7.1.2.1 Alternatives Description

Two primary alignment concepts for the Brent Spence Bridge Replacement/Rehabilitation Project were developed. Both concepts use existing right of way from Kyles Lane to KY 12th Street in Covington, Kentucky and from Ezzard Charles Drive in Cincinnati to the Western Hills Viaduct in Cincinnati, Ohio.

The first concept (Alternatives 1 and 2) requires new right of way for the alignments in Covington and through Queensgate in Cincinnati. The new alignment begins just north of KY 9th Street in Covington and ends at Ezzard Charles Drive in Cincinnati. The Queensgate alignments veer northwest in a straight line from just south of the Brent Spence Bridge approaches to the Union Terminal at Ezzard Charles Drive. They rejoin the existing alignment of I-75 north of Union Terminal.

The second concept (Alternatives 3, 4, and 5) is primarily located within the existing right of way throughout the current I-71/I-75 corridor from Kyles Lane to the Western Hills Viaduct. These alternatives extend through the southern terminus of the Bridge through southwestern Cincinnati connecting to the existing alignment of I-75 and with Fort Washington Way (I-71).

These two primary alignments are divided into four separate segments which contain sub-alternatives. Section 5.0 provides a discussion of the conceptual alternatives and sub-alternatives. Exhibits of the alternatives and sub-alternatives are located in Appendix E. Table 7-2 summarizes the components of the conceptual alternatives.

Table 7-2. Alternatives Recommended for Step 5, and Phasing Strategy as Shown in Appendix F

Alternative	Description	Phase	Proposed Phasing Strategy (Appendix F)
1	New Queensgate Bridge (2x5 Lanes) for I-75 and Rehab Existing Bridge (2x2 Lanes) for I-71 and Local Traffic	Phase I	Sheet Number 1
		Phase II	Sheet Number 2
		Phase III	Sheet Number 3
2	New Queensgate Bridge (2x7 Lanes) for I-71/I-75 and Rehab Existing Bridge (2x2 Lanes) for Local Traffic	Phase I	Sheet Number 4
		Phase II	Sheet Number 5
		Phase III	Sheet Number 6
3	New Double-Deck Bridge (2x5 Lanes) on West Side of the Existing Bridge for I-75 and New/Rehab Double-Deck Bridge (2x2 Lanes) at Existing Bridge for I-71 and Local Traffic	Phase I	Sheet Number 7
		Phase II	Sheet Number 8
		Phase III	Sheet Number 9
4	New Double-Deck Bridge (2x5 Lanes Each Direction on Top)	Phase I	Sheet Number 10

Table 7-2. Alternatives Recommended for Step 5, and Phasing Strategy as Shown in Appendix F

Alternative	Description	Phase	Proposed Phasing Strategy (Appendix F)
	for I-75 and (2x3 Lanes Each Direction on Bottom) for I-71 and Local on West Side of the Existing Bridge and Remove Existing Bridge	Phase II	Sheet Number 11
		Phase III	Sheet Number 12
5	New Single-Deck Bridges (2x5 Lanes) on each side of the Existing Bridge for I-75 and Rehab Existing Bridge(2x2 Lanes) for I-71 and Local Traffic	Phase I	Sheet Number 13
		Phase II	Sheet Number 14
		Phase III	Sheet Number 15

Segment 1 is similar in concept and implementation approach for the conceptual alternatives. Access to Covington and the replacement or rehabilitation of the main spans and approaches of the Brent Spence Bridge constitute Segment 2 of the conceptual alternatives. These vary according to the Queensgate or existing alignment. Segment 3 of the conceptual alternatives includes the I-71/I-75/US 50 Interchange, Cincinnati Central Business District access, and Queensgate access. Segment 4 includes the mainline and collector-distributor north of the I-71/I-75/US 50 Interchange and the Western Hills Viaduct Interchange.

Within each of the four segments, sub-alternatives were developed at specific locations. These sub-alternatives have been evaluated for conceptual sequencing and construction phasing. Maintenance of traffic, constructability, early congestion relief, and funding profiles consistent with available funds and priorities are the basis of these preliminary recommendations. Specific sequencing for these sub-alternatives has not been developed yet, but will be included in future updates to the Strategic Plan.

7.2 Project Phasing Construction Sequencing

The Brent Spence Bridge is part of the larger I-75 Improvement Program which extends from south of Kyles Lane in Kentucky to I-275 in Ohio. This program is subdivided into three major projects; the Brent Spence Bridge corridor, the Mill Creek Expressway corridor, and the Thru the Valley corridor. These Ohio projects are being developed under ODOT's Major PDP and will utilize phased construction. The Thru the Valley project will be constructed first, the Mill Creek Expressway is second, and the Ohio portion of the Brent Spence Bridge project is third. Kentucky may begin its portion of the Brent Spence Bridge corridor earlier, recognizing that connections of the main span with the Kentucky and Ohio approaches must be coordinated between the two states.

The Brent Spence Bridge corridor improvements will be implemented as independent projects as part of a larger, phased program (Appendix F). Creative phasing allows for less complicated maintenance of traffic plans, while improving the interim performance and operational nature of the I-71/I-75 corridor. Building the entire Brent Spence Bridge corridor program in one phase would shorten the amount of time the public is affected;

however, available funds may not permit this approach. Future evaluation will refine the staging of the work and develop details of the phasing and funding plans.

7.2.1 Construction Approach

This section describes potential phasing strategies. These recommendations can be implemented in phases over an extended construction program, or built as part of a continuous construction process. The same general order is recommended irrespective of the extended construction or accelerated construction approach. Continuous operation of the interstate is assumed to be crucial with only short, non-peak hour closures for overpass construction or demolition. These improvements are divided into near term Improvements, and main line/main span Improvements.

7.2.1.1 Near Term Improvements

Near term improvements include:

- Construction of additional southbound truck lanes between KY 12th Street and Kyles Lane in Kentucky.
- Construction of the collector-distributor/local ramp system in Kentucky from Kyles Lane to KY 4th and KY 5th Streets in Covington.
- Construction of the collector-distributor north of the I-71/I-75/US 50 Interchange to Western Hills Viaduct Interchange.
- Construction of the Western Hills Viaduct Interchange.

Near term improvements will provide interim congestion relief, improve safety, and enhance operational performance by removing deficiencies, which cause congestion in the corridor. The construction of the collector-distributors also allows for their use as detours and controlled access points during other main line/main span Improvements or related major mainline components of the work. They are also the least expensive of the components of the improvements, still required as part of the larger program, but provide intermediate improvements to congestion and safety at a lower initial cost. These can be completed while deferring the construction of the approaches and main span of the Brent Spence Bridge until funds become available.

7.2.1.2 Main Line/Main Span Improvements

Main line/main span improvements include all of the main line improvements to the interstate and the overpasses associated with the I-71/I-75/US 50 Interchange. They also include any new main spans over the Ohio River, whether along the Queensgate alignment or the existing corridor alignment.

7.2.1.3 Kentucky Collector-Distributor and Climbing Lanes

The alternatives from Kyles Lane to the south end of the Brent Spence Bridge include a collector-distributor/local ramp system between KY 12th Street and KY 4th and KY 5th Streets and southbound climbing lanes between KY 12th Street to Kyles Lane. Additional climbing lanes on the southbound lanes of I-75, between KY 12th Street and Kyles Lane are recommended to allow for additional truck climbing capacity. Construction of the Kentucky collector-distributor and climbing lanes will reduce congestion on the Brent Spence Bridge and on I-71/I-75 in the near term. The collector-distributor utilizes existing right of way on the east and west of I-75. It provides access to the future development site located east of I-71/I-75 in the vicinity of Monterey Road

and KY 16th Street. The collector-distributor would combine the existing frontage roads that parallel I-75 northbound and southbound between KY 4th and KY 5th Streets and Kyles Lane.

Trucks often occupy three of the four I-71/I-75 southbound lanes between KY 12th Street and Kyles Lane in Kentucky creating a rolling roadblock even during non-rush hour periods. Additional southbound climbing lanes between KY 12th Street and Kyles Lane would ease the rush-hour congestion across the Brent Spence Bridge to the Western Hills Viaduct.

7.2.1.4 Ohio Collector-Distributor and Western Hills Viaduct

The collector-distributor, Western Hills Viaduct, and mainline improvements north of the I-71/I-75/US 50 Interchange to the Western Hills Viaduct should be constructed first in Ohio. The collector-distributor should be constructed first which allows the elimination and consolidation of certain ramps along I-75 between the I-75/US 50 Interchange and the Western Hills Viaduct. The collector-distributor will utilize existing interstate right of way and excess Western and Winchell Avenues rights of way east and west of the I-75 mainline. Widening of I-75 would be feasible by constructing retaining walls at the toe of the existing sloped embankments and the area filled for additional lanes.

The construction of the Western Hills Viaduct improvements should be the second phase of construction. This should occur before the mainline construction of the I-75 improvements at the north end of the Brent Spence Bridge project and the south end of the Mill Creek Expressway project. Bridge piers supporting the Western Hills Viaduct overpass are in the median of the existing alignment and conflict with the proposed new mainline alignment. The existing piers must be removed before the proposed mainline improvements can be made. The left hand exit in this area must be removed to improve safety and ease congestion prior to mainline construction. Detours for short term closures of the mainline will be able to use the collector-distributor.

The interchanges at Western Hills Viaduct, Hopple Street and I-74/I-75 will require a coordinated phasing plan. These deficiencies can be corrected in early phases to provide improved access to Uptown and Western Hills and eliminate congestion related to geometric deficiencies.

7.2.1.5 I-75 Mainline North of the I-71/I-75/US 50 Interchange

The re-alignment and widening of the mainline of I-75 from north of the I-71/I-75/US 50 Interchange to the Western Hills Viaduct can occur any time after the collector-distributor and the Western Hills Viaduct Interchange are constructed. The widened mainline can be constructed in areas vacated by the ramps and in the right of way currently occupied by the sloped embankments east and west of the I-75 mainline. Detours for short term closures of the mainline will utilize the collector-distributor during placement of structural components.

7.2.1.6 I-71/I-75/US 50 Interchange

Construction of the I-71/I-75/US 50 Interchange and local access to downtown Cincinnati should be conducted in a phased approach. Construction of the I-75 mainline in Ohio requires coordination with construction of the main span of the new Ohio River Bridge. This requires that some overpasses and the ramps between US 50 and I-71/I-75 be completed prior to the mainline construction to allow removal of bridge piers out of the

construction zone of the mainline. Due to the complexity of this interchange, phasing must be included in the design of all components. This will ensure that bridge spans and piers for the mainline, interchange ramps, and local access work at each stage of construction.

7.2.1.7 Queensgate Alignments

For the Queensgate alignments, I-71/I-75 mainline and collector-distributor improvements in Kentucky south of the south abutment of the Brent Spence Bridge are similar to those for other alternatives. Improvement to the I-71/I-75/US 50 Interchange would proceed as previously described. Construction of the collector-distributor along I-75 to Western Hills Viaduct could proceed as described previously. Since the Queensgate alignments diverge from existing I-71/I-75 right of way, construction of the mainline through Queensgate would occur without significant interruption to interstate traffic, except where the interchanges and mainline connect.

Construction of the Queensgate alternatives would begin with right-of-way acquisition during design of the mainline improvements. This would include aerial easements because much of this alignment would be on structure. Coordination with the railroad regarding the rail crossings is required for the Queensgate alternatives and would occur before the Record of Decision is signed. Construction of the interstate would begin after design and right of way acquisitions are fully complete. Once required right of way and easements are acquired, demolition of the buildings in the Queensgate alignment would occur, including all utility relocations. Maintenance of traffic will be required at each City street intersection and at the mainline connections south of Brent Spence Bridge and at Ezzard Charles Drive.

7.2.1.8 I-75 Mainline

Construction of the I-75 mainline would proceed in segments once the collector-distributor systems in Kentucky and Ohio are constructed and most of the overpasses' bridge piers have been relocated. The mainline construction near the new main span should be built with the main span as the grades and alignments must meet. While this is a substantial portion of the work, the right of way is wide in most places and provides for ample space for detours, temporary pavements, and lane capacity during construction.

7.2.1.9 Main Span Construction

The construction of the main span of the new Ohio River Bridge a challenging component of the I-75 program, irrespective of which alignment (Queensgate or existing) is chosen. The existing alignment of the Brent Spence Bridge has right of way constraints associated with the Duke Energy power station, utilities under the river, historic structures, and businesses. Maintenance of traffic during the construction of supplemental structures will be complex. The constructability program for the bridge replacement must assume that the existing Brent Spence Bridge will remain operational before, during, and for a short time after, the supplemental replacement capacity is put into service. Alternatives which include rehabilitation of the existing bridge are also complex as the existing bridge must be kept in service during any rehabilitation. The Queensgate main span alignments would provide for easier maintenance of traffic during construction because the new main span will be constructed on a new alignment. Existing capacity would not be impaired.

The Queensgate main span concepts have the complication of skewed alignments across the Ohio River. These create sailing line impacts, sight distance for river traffic, and increased span lengths. The proposed Queensgate alignments are skewed 30 degrees from the sailing axis of the river. The alignments also cross the river at a point where it bends to the north. This further complicates sight distance compliance on the river for commercial traffic. In order to provide for safe commercial shipping through the seven bridge system connecting southwest Ohio with Northern Kentucky, bridge piers will be recommended to be on or near shore. This creates a longer span length for a skewed bridge, increasing its cost and limiting the number of bridge types. These issues are not insurmountable, but simply add cost to the main span of the bridge.

The alignments that utilize all or part of the existing I-71/I-75 Brent Spence Bridge main span corridor have complexities as well. These are related to right of way, maintenance of traffic, and constructability. They arise from construction of major improvements in existing right of way while keeping portions of the interstate operational. The rehabilitation of the existing structure would be retained in some of the alternatives as part of a final build solution. A maintenance of traffic and construction plan that includes a rehabilitated Brent Spence Bridge with new structures or structures with the existing system is complicated by the double decked nature of the existing span. Removal or realignment of existing approaches in Kentucky and in Ohio depending upon the use and lane assignment of the existing bridge has constructability complications.

Bridge alternatives requiring the demolition of the Brent Spence Bridge, have constructability and demolition complexities, river operation constraints, as well as those associated with maintenance of vehicular traffic. If a replacement structure is built close to or within the existing alignment, more complicated staged construction requirements must be met. These include building a portion of the new replacement span; relocating existing traffic onto that replacement span; demolishing the existing Brent Spence Bridge; and construction of that remaining part of the bridge alternative, all within the existing footprint of the existing bridge.

7.2.1.10 Continuous Design Constructability Interface

The development of the alternatives proposed for either the Queensgate alignments or the existing corridor alignments, and their sub-alternatives should incorporate a continuous design constructability plan. This means that the corridor design and bridge types selection (main, approach and interchange spans) are developed with the important consideration for maintenance of traffic and constructability. Construction phasing, technique, and capacity will pose significant constraints on how the program is implemented. Therefore, the construction delivery plan should be integrated continuously into the design. This extends beyond the value engineering process conducted at the 30/60/90 percent design phase.

7.3 Financial Strategy

Funding for the Brent Spence Bridge Replacement/Rehabilitation Project will be provided from federal and state sources. Funding for each phase will use the appropriate Federal Fund Types at 80/20 percent. This project will be subject to FHWA's Mega Project requirements.

The Financial Plan for Brent Spence Bridge Replacement/Rehabilitation Project answers the following questions:

- What funds are realistically available?
- What timeframe restrictions apply?
- What approval process is required?
- What other restrictions apply?

7.3.1 National High Priority Corridor Financial Listings

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) identified High Priority Corridors on the National Highway System (NHS). Among these corridors are I-75 from Toledo to Cincinnati and I-71 between Columbus and Cincinnati. More recent federal surface transportation legislation (the 1998 Transportation Equity Act for the 21st Century [TEA-21] and the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users [SAFETEA-LU]), continued funding for the High Priority Corridors. The Brent Spence Bridge Replacement/Rehabilitation Project is part of several of these corridors, including I-71, I-75, and the new I-74 corridor. It also connects to the Waldvogel Viaduct in Queensgate. Table 7-3 summarizes federal funding identified in SAFETEA-LU for High Priority Corridors in Ohio.

Table 7-3. High Priority Projects in Ohio listed in SAFETEA-LU.

Item Number	State	Project Description	Amount
685	OH	Study and design of modifications to I-75 interchanges at M.L. King, Jr. Boulevard, Hopple Street, I-74, and Mitchell Avenue in Cincinnati, Ohio	$2.4 million
3385	KY	Replace Brent Spence Bridge, Kenton County, Kentucky	$1.6 million
4217	KY	Transportation improvements to Brent Spence Bridge	$34 million
4621	OH	On I-75 toward Brent Spence Bridge, Cincinnati, OH	$10 million
4623	OH	Reconstruction, widening, and interchange upgrades to I-75 between Cincinnati and Dayton, Ohio	$5 million
4624	OH	Replace the Edward N. Waldvogel Viaduct, Cincinnati, Ohio	$6 million

7.3.2 Financial Plan

The Commonwealth of Kentucky and State of Ohio have appropriated money for the preliminary engineering and environmental documentation for the Brent Spence Bridge. Each State is responsible for their portion of the project separated by the State Line (N39° 05.516'/W84° 31.324 +/-). The obligation to pay for the improvements to the Brent Spence Bridge to (N39° 05.516'/W84° 31.324 +/-) is well established. Financial obligations are defined in the Bi-state Agreement authorizing this work (Appendix A). The Bi-state Agreement estimated that the cost of the environmental and preliminary design phase of the project would be $18 million. Additionally, the agreement states that ODOT will pay 54.5 percent of the cost (not to exceed $9.8 million) based on ownership of the project as defined by state lane miles. KYTC has agreed to pay 45.5 percent of the estimated cost (not to exceed $8.18 million). Additional phases of work required during or after the environmental and preliminary design phase, including but not limited to, preliminary design, detailed design, right-of-way acquisition, utility relocation, and construction will be covered under future supplements to the agreement (Appendix A). The Financial Plan for Kentucky and Ohio is presented in the responses to following four questions.

What funds are realistically available?

Kentucky: Kentucky received federal fund earmarks totaling $35.6 million through SAFETEA-LU. These earmarks flow to the Commonwealth in a formula as prescribed by SAFETEA-LU. The rate currently in effect is 20 percent per year from fiscal year (FY)-2005 through FY-2009. According to this formula, 40 percent of the SAFETEA-LU funding (FY 2005/FY 2006) should be available. Prior year, federally earmarked funds are already authorized in the amount of $1.16 million. Supplemental funding authorization in progress added $2.64 million of federally earmarked money. The total amount currently available from Kentucky is $39.4 million. Toll revenue credits will be

used to match these federal funds. The federal appropriation will constitute immediate, short-range commitment to the project for design and acquisition of required right of way in Kentucky.

Ohio: ODOT has been authorized to spend $18 million for preliminary engineering. The funds were made available in January 2005. These funds are already programmed and available.

What time frame restrictions apply?

Kentucky: The available federal funds will be applied to design, right of way acquisition, and utility relocation efforts. Coordination with Ohio's plan to begin design, right of way acquisition, and any near term improvements will be required.

Ohio: TRAC schedules the availability of preliminary development and detailed design funds. Construction is expected to begin after the completion of I-75 construction north of the project area. ODOT has established a plan for upgrading I-75 from the north abutment of the Brent Spence Bridge to north of I-275. This plan has three major components: first, Thru the Valley; second, the Mill Creek Expressway; and third, the Brent Spence Bridge. The schedule for this program of projects identifies 2015 as the start date for construction of Ohio's part of the Brent Spence Bridge.

The Transportation Bill Reauthorization will determine the availability of high priority federal-aid funds for construction. Ohio has appropriated $18 million for preliminary engineering and environmental documentation. These funds are available to the project in 2005 and are intended to be used by 2010.

What approval process is required?

Kentucky: Any funding authorizations, scope changes, change orders, or other cost or schedule adjustments must be approved by the Secretary of Transportation and Commissioner of Highways. Additional state appropriation will require legislative action.

Ohio: TRAC will need to approve all additional Major New commitments.

What other restrictions apply?

Kentucky: Funding availability for KYTC is a function of a legislatively approved Six-Year Transportation Plan. Each even-numbered calendar year, the Kentucky General Assembly approves the upcoming biennial element of the Six-Year Transportation Plan. Kentucky's ability to advance funding from future years to the new biennium is limited. Appropriately timed funding for the Brent Spence Bridge Replacement/Rehabilitation Project will require close coordination with KYTC and may require the use of Grant Anticipation Revenue Bonds (GARVEE) to match the funding stream with right of way and construction schedules. Biennial Six-Year Transportation Plan updates are developed late in odd-numbered years preceding legislative sessions. Coordination requirements with the Metropolitan Planning Organization's Transportation Improvement Programs (TIP) and Long Range Transportation Plan, as well as the Kentucky and ODOT State Transportation Improvement Programs (STIPs) will be required.

Ohio: Following Step 8 of the Major PDP, the administration of design development contracts, acquisition of rights of way, and construction contracts may be held separately by the states. Ohio will complete sections north of (N39° 05.516'/W84° 31.324 +/-). Kentucky will complete sections south of (N39° 05.516'/W84° 31.324 +/-). The programs will be coordinated.

The Financial Plan for Brent Spence Bridge Replacement/Rehabilitation Project is summarized in Table 7-4.

Table 7-4. Financial Plan for Brent Spence Bridge Replacement/Rehabilitation Project.

Project Phase	Funding Source	2005	2006	2007	2008	2009	2010
Ohio							
Preliminary Engineering	TRAC		$1.5 million		$1.9 million		
	SAFETEA-LU $9.1 million	20%	20%	20%	20%	20%	
Final Design	TRAC						$25 million
Right of Way*						Unfunded	Unfunded
Construction**						Unfunded	Unfunded
Kentucky							
Preliminary Engineering	Earmarks $1.16 million $2.64 million SAFETEA-LU $35.6 million	20%	20%	20%	20%	20%	
Final Design		20%	20%	20%	20%	20%	
Right of Way*		20%	20%	20%	20%	20%	Unfunded
Construction**							Unfunded

Notes:
*Right of Way acquisition is currently estimated at $100 million. It is outside of the six year horizon for TRAC commitments. It is assumed that right of way would be funded with a combination of federal earmarks, federal and state funds, following TRAC approval. Acquisition will occur over a two to three year period.
**Construction funds would be necessary 2015 at the earliest. It is assumed that construction would be funded with a combination of federal earmarks, federal and state funds.

7.3.3 Estimated Costs for Conceptual Alternatives

The 2006 construction cost estimates were prepared as outlined by ODOT's Procedure for Construction Budget Estimating, (April 6, 2006) and by use of the Transport Estimator, Version 2.3a, March, 25, 2006 catalogs. Quantities were calculated by performing manual take-off for the various alternatives. Each alternative was reduced into the item numbers and cost item descriptions from the current ODOT Construction Estimator data base. Preliminary quantities or allowances were used to develop the

conceptual cost estimates. The unit prices and quantities for each alternative are shown in Appendix E.

Unit prices in the current ODOT estimating software data base were recently updated (March 2006) based on final bid prices received by ODOT on work completed since the end of the 2004 calendar year. These quantities are based upon a broad average of complex highway projects and use current market unit prices. It should be noted that a substantial rise in the cost of concrete and steel has occurred since the year 2004. Therefore, the costs presented reflect the significant prices seen in the 2005 marketplace. These prices are expected to remain constant in 2006 and 2007.

The estimated quantities were prepared by direct measurement from the 1" = 300' plans and the associated cross sections of each alternative. The number of new lanes and shoulders determined the proposed work limits. In transition areas where the number of lanes changes, the cross sections were averaged and multiplied by the distance between the stations where the cross sections begin and end. The numbers of existing lanes and shoulders were counted to determine the demolition quantities.

7.3.3.1 Real Estate and Relocation Cost Development

Real property values utilized for this cost estimate are those derived using similar methodologies employed during the *Feasibility and Constructability Study of the Replacement/Rehabilitation of the Brent Spence Bridge (EFS) (2005)*. These costs were developed based upon appraised value indications from the Auditor's (Ohio) and Property Valuation Administrator's (Kentucky) records in the appropriate jurisdictions (Appendix E). The procedures utilized by the appraisers in the development of these values are considerably less detailed than those prescribed for appraisals utilized for acquisition by a public agency. Absent the detail and the lack of multiple approaches to valuation found in a tax appraisal, one could logically conclude that the values derived from auditors' records are not reflective of market value. This is particularly true of specialty use properties. These are not detailed cost estimates and should not be used for anything but comparison purposes. They are not of sufficient detail to be used for acquisition estimates, but are simply used as a benchmark to prepare the relative real estate costs between the alternatives. No actual appraisals were conducted and an inflation factor was applied to the EFS estimate. The estimates assume that there is relocation assistance available for residential properties and for relocation of any office buildings or other commercial enterprises. All valuations were created using the external view of the building and readily available tax records. No entry to the property was allowed.

Table 7-5 gives the range of right of way and relocation costs for the areas that are believed to be affected based on the alternatives that are currently generated and being carried forward. These estimated costs are derived from the EFS. Detailed right of way cost estimates have not yet been developed for the current conceptual alternatives; however, the alternatives from the EFS are comparable and are utilized here (Appendix E). They have similar right of way footprints and affect many of the same parcels and structures. However, a parcel by parcel review of the properties affected by the alternatives in this report revealed that several large acquisitions, required by the EFS alternatives, would not be required for the new alternatives. This resulted in a significant decrease in right of way costs from the EFS estimates.

The real estate and relocation costs are assumed to be similar to the related alternatives from the EFS based on the alternative alignments for the bridge. A 10 percent increase has been applied to the estimated costs from the EFS to account for appreciation. This number was recommended by real estate professionals consulted during the study. A five percent yearly increase is also applied to the real estate and relocation costs to obtain a projected cost for when acquisition is to take place in the year 2012.

Table 7-5. Real Estate and Relocation Costs (2012) (in millions)

Mainline Alternative	Ohio	Kentucky
	Valuation with CPI[1]	Valuation with CPI[1]
Alternative 1	$20.05 – 23.05	$11.97 – 13.76
Alternative 2	$14.55 – 16.73	$11.97 – 13.76
Alternative 3	$1.17 – 1.34	$25.85 – 29.72
Alternative 4	$1.17 – 1.34	$25.85 – 29.72
Alternative 5	$1.17 – 1.34	$25.85 – 29.72

1- Consumer Price Index (CPI) factor of 12.9%

7.3.3.2 Project Development Costs

In order to completely include all project costs in the estimates, project development costs which consist of preliminary engineering and environmental documentation, detailed design, and construction management, are included. A 3 percent increase is applied to the project development cost for inflation to obtain an estimate for the year 2010. Table 7-6 below summarizes the project development costs.

Table 7-6. Project Development Costs (in millions)

Mainline Alternative	Preliminary Engineering/ Environmental Documentation	Detailed Design (8% of construction cost)	Construction Management (3% of construction cost)	Total Project Development Costs[1]
Alternative 1	$18.0	$106.70	$62.56	$230.34
Alternative 2	$18.0	$118.06	$69.23	$252.51
Alternative 3	$18.0	$137.70	$80.72	$290.76
Alternative 4	$18.0	$155.18	$90.99	$324.93
Alternative 5	$18.0	$125.27	$73.45	$266.57

1- Includes 3% inflation for the year 2010

7.3.3.3 Contingencies and Reserves

ODOT guidelines require the use of a contingency on construction cost estimates. A contingency of 25 percent was added to the construction costs to reflect the preliminary nature of engineering. The design contingency for each mainline alternative is shown in Tables 7-7 and 7-8. A constructible risk contingency is also placed on individual items of work based on engineering judgment. This risk contingency is included within the construction costs.

7.3.3.4 Complete Project Costs

Included in the total estimated project costs are construction costs, an inflation factor, design contingency, right of way and total project development costs. Tables 7-7, 7-8, and 7-9 below summarize total estimated project costs of mainline and sub-alternatives for Kentucky and Ohio. The sub-alternative costs are additional costs to the mainline alternatives. The sub-alternative costs should be added to the total estimated cost for the mainline alternative as needed.

Table 7-7. Total Cost Estimates for Mainline Alternatives (Ohio) in 2017 dollars

Mainline Alternative	Construction Costs (millions)	Real Estate and Relocation (millions)	Inflation (82.0%) (millions)	Design Contingency (25.0%) (millions)	Project Development Costs (54.5%) (millions)	Total Estimated Cost (billions)
Alternative 1	$257.24	$20.05 – 23.05	$210.94	$117.04	$125.53	$1.26
Alternative 2	$289.76	$14.55 – 16.73	$237.60	$131.84	$137.62	$1.40
Alternative 3	$556.14	$1.17 – 1.34	$456.03	$253.04	$158.46	$1.62
Alternative 4	$483.94	$1.17 – 1.34	$396.83	$220.19	$177.09	$1.83
Alternative 5	$414.21	$1.17 – 1.34	$339.65	$188.47	$145.28	$1.48

Table 7-8. Total Cost Estimates for Mainline Alternatives (Kentucky) in 2017 dollars

Mainline Alternative	Construction Costs (millions)	Real Estate and Relocation (millions)	Inflation (82.0%) (millions)	Design Contingency (25.0%) (millions)	Project Development Costs (45.5%) (millions)	Total Estimated Cost (billions)
Alternative 1	$659.45	$11.97 – 13.76	$540.75	$300.05	$104.80	$1.05
Alternative 2	$742.54	$11.97 – 13.76	$594.12	$329.66	$114.89	$1.16
Alternative 3	$626.59	$25.85 – 29.72	$513.80	$285.10	$132.30	$1.36
Alternative 4	$849.25	$25.85 – 29.72	$696.38	$386.41	$147.84	$1.53
Alternative 5	$661.99	$25.85 – 29.72	$542.83	$301.21	$121.29	$1.24

Table 7-9. Total Cost Estimates for Sub-Alternatives in 2017 dollars (in millions)

Sub-Alternative	Construction Cost		Inflation (82.0%)	Design Contingency (25.0%)	Total Estimated Cost
	Kentucky	Ohio			
I-75 Northbound KY Ramp Alternative 1	$0.88	NA	$0.72	$0.40	$2.00
I-75 Northbound KY Ramp Alternative 2	$0.74	NA	$0.61	$0.38	$1.69
I-71/US 50 Interchange Alternative 1	NA	$242.17	$198.58	$110.19	$550.93
I-71/US 50 Interchange Alternative 2	NA	$242.17	$198.58	$110.19	$550.93
I-71/I-75/US 50 Interchange Alternative 1	NA	$40.15	$32.92	$18.27	$91.33
I-71/I-75/US 50 Interchange Alternative 2	NA	$250.65	$205.53	$114.04	$570.22
I-71/I-75/US 50 Interchange Alternative 3	NA	$249.77	$204.81	$113.64	$568.22
I-75 Northbound/ Southbound OH Alternative 1 (CD system)	NA	$68.62	$56.27	$31.22	$156.10
I-75 Northbound/ Southbound OH Alternative 2 (CD system)	NA	$28.49	$23.36	$12.96	$64.80
Western Hills Viaduct Alternative 1	NA	$39.41	$32.32	$17.93	$89.66
Western Hills Viaduct Alternative 2	NA	$29.21	$23.95	$13.29	$66.44
Western Hills Viaduct Alternative 3	NA	$45.36	$37.20	$20.64	$103.20

7.4 Actions and Next Steps

ODOT and KYTC have entered into a Bi-state Agreement to plan and design the replacement of the Brent Spence Bridge. Due to the complexity of this project, it is recommended that this Bi-state Agreement be extended and modified to include responsibilities of the cities of Covington and Cincinnati, as well as utilities affected by the program. Cooperation between all affected governments and businesses during design and construction is essential. Phasing and sequencing requires coordination between the two states for funding, maintenance of traffic, and construction sequencing. Similarly, coordination with the cities and communities along the interstate will be important. Several of the proposed alternatives will have impacts to city streets in Covington, Cincinnati, and in the smaller communities that abut the right of way. Since the construction of this project may exceed the current right of way limits of I-71/I-75, it is recommended that agreements with the surrounding communities be implemented. Coordination of maintenance of traffic, utility relocations, construction, signal and intersection control, and other interfaces between the city and state system can be

coordinated by this means. These actions will insure that the interstate and local facilities remain integrated as a regional transportation network. It is recommended that an interagency coordination team be created when the project enters final design and construction.

7.4.1 Implementation Team

During Part I of the project, ODOT and KYTC instituted two committees which help provide guidance to the project team. One committee, called the "Advisory Committee," provides input from local community and political leaders in order that the project can provide and have some local community input. This also provides an opportunity for important issues brought up to the Advisory Committee to be communicated back to the contingencies represented by the members of the Advisory Committee. It is recommended that this committee remain active during subsequent phases of the work.

The second committee, a sub-committee of the Advisory Committee, is the Aesthetics Committee. This sub-committee provides local input on the design and aesthetic appearance of the corridor and the main span of the Brent Spence Bridge. As the project evolves, more detail is being provided to and from this Committee in order to give some input on community values with respect to the aesthetics of the bridge. The Charter of this committee is in Appendix B. It is recommended that this committee remain active during subsequent phases of the work.

7.4.2 Public Involvement

Public involvement is a key component of this project. This ensures that the public is aware of the alternatives that may be recommended and has an opportunity to provide input as users of the facility during the design development and environmental process. This project will have an impact on the community in terms of construction as well as economic development and socio-economic impacts. Because of the nature and magnitude of the project, these impacts should afford communities the right to comment and provide input on final implementation strategies and construction impacts.

The public involvement and public education process must provide an effective and efficient means of communicating to the public. Conversely, by giving the public an opportunity to communicate with the transportation agencies, public support will follow. The public involvement process is a requirement of the National Environmental Protection Act (NEPA) and of SAFETEA-LU. Addressing community concerns and incorporating community input into the design and construction of the project is critical. This includes everyone from local residents to the governing councils of the various cities associated and affected by the project. These individuals have a requirement to communicate to the project team as well as to communicate project team information back to the contingencies that they represent.

7.4.2.1 Public Meetings

It is anticipated that a number of public meetings and workshops will be held to give the community an input and understanding about alternatives that are being evaluated. These workshops will be in convenient locations and will be led by the project team. These meetings will be advertised in a variety of ways, including media participation, web site announcements, and direct mail to affected parties in the study area.

7.4.2.2 Project Web Site

A web site has been established for the Brent Spence Bridge Replacement/Rehabilitation Project, www.brentspencebridgecorridor.com. This web site has received a large amount of public notoriety because of the scale and magnitude of the project. The web site has been active and media coverage of alternatives and other elements of the project has generated an increase in web site visits and web comments.

7.4.2.3 Project Newsletters

The project team will continue to provide newsletters to the community. There are several thousand residents within the study area who may be affected by the project, as well as hundreds of thousands of commuters who travel the interstate corridor. The newsletters will continue to keep the public informed about project activities.

7.4.2.4 Media Relations

The media has provided positive support and accurate communication about the Brent Spence Bridge Replacement/Rehabilitation Project. It has been front page news a number of times primarily because of the scale and magnitude of the project. The coverage of the conceptual alternatives and potential design concepts for the project has been moderate. However, the announcement of the recommended conceptual alternatives for the project generated a significant amount of media interest. It is anticipated that when the next phase of the project begins, media relations will be maintained in order to provide information to the media so they can help communicate any messages that are important in eliciting community response. It is recommended that editorial briefings for important media and newspaper outlets in the two states be an important part of the media communications. Daily contact with reporters asking questions can be maintained by ODOT and the Project Team.

7.5 Schedule

The schedule for the Brent Spence Bridge Replacement/Rehabilitation Project was developed. Construction is anticipated to begin in 2015. The schedule through Step 8 of the PDP is provided in Appendix G. This follows construction of the Thru the Valley and Mill Creek Expressway projects.

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