U.S. Department of Transportation
Federal Highway Administration

Brent Spence Bridge
Replacement/Rehabilitation Project

Environmental Assessment

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

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PARSONS BRINCKERHOFF

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Executive Summary

Introduction
The 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. The bridge also facilitates local travel by providing access to downtown Cincinnati, Hamilton County, Ohio and Covington, Kenton County, 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, approximately 160,000 vehicles per day use the Brent Spence Bridge and traffic volumes are projected to increase to 233,000 vehicles per day in 2035.

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. These problems include, but are not limited to, growing demand and congestion, land use pressures, environmental concerns, inadequate safety margins, and maintaining linkage in key mobility, trade, and national defense highways.

The project corridor is located along a 7.8-mile segment of I-75 within the Commonwealth of Kentucky (state line mile 186.7) and the State of Ohio (state line mile 2.7). The southern limit of the project is 5,000 feet south of the midpoint of the Dixie Highway 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.

This Environmental Assessment (EA) compares two feasible Build Alternatives E and I and the No Build Alternative. In accordance with the National Environmental Policy Act (NEPA), this EA presents discussions of the project purpose and need; alternatives development process; impacts of each alternative; mitigation measures; public involvement and agency coordination; and recommendation of a Preferred Alternative.

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

- improve traffic flow and level of service,
- improve safety,
- correct geometric deficiencies, and
- maintain 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. Specific problems

of I-71 and I-75 within the study area include, but are not limited to, growing demand for capacity and congestion, inadequate safety margins, and design deficiencies.

Alternatives
The *Conceptual Alternatives Study* (April 2009) report recommended two feasible alternatives for further study in Steps 6 and 7 of the Ohio Department of Transportation's (ODOT's) Project Development Process (PDP). The two feasible alternatives consist of Alternative E and a combination of Alternatives C and D, identified as Alternative I, with certain design elements of Alternative G incorporated. Two major components of the feasible alternatives are a new bridge crossing over the Ohio River and a reconstruction of the interchange at the Western Hills Viaduct (WHV).

The existing WHV Interchange is a partial interchange with a left-hand exit allowing interstate access only to and from the west. Southbound I-75 traffic exits to the lower deck and enters from the lower deck while northbound I-75 traffic exits to the upper deck and enters from the upper deck. The WHV Interchange will be reconfigured to improve safety and traffic flow and increase capacity around the interchange. The interchange reconfiguration will also eliminate the left-hand exit from I-75 northbound. A single point urban interchange (SPUI) alternative and a tight urban diamond interchange (TUDI) alternative were developed for the WHV Interchange. The geometric layout of either interchange is compatible with Alternative E or Alternative I.

The Kentucky Transportation Cabinet's (KYTC) Bridge Type Selection Process was conducted for the new Ohio River Bridge to select the best design for the new Ohio River crossing. The Bridge Type Selection Process is a three step process, which involves developing and analyzing numerous bridge concepts leading to a recommendation of three final bridge type alternatives. Steps 1 and 2 have been completed to date for the project and resulted in the recommendation of three bridge type alternatives selected to proceed to preliminary design during Step 3. The three alternatives include an arch bridge and two cable-stayed bridges. All three bridges are compatible with Alternative E or Alternative I.

Costs
Alternative E or Alternative I with the SPUI at the Western Hills Viaduct and Alternative E with the TUDI would cost more than Alternative I with the TUDI at the Western Hills Viaduct. The total cost for Alternative E and Alternative I with the SPUI at the Western Hills Viaduct is $2,745.1 million and $2,611.4 million, respectively. The total cost for Alternative E and Alternative I with the TUDI design at the WHV is $2,617.3 million and $2,483.6 million, respectively.

Environmental Impacts
Alternatives E and I have similar impacts to ecological resources, community resources, land uses, hazardous material sites, and utilities. Both feasible alternatives would be compatible with existing land use plans, would support the Queensgate redevelopment plans; and would help Cincinnati facilitate its economic renewal goals. Alternatives E and I differ in their impacts to Section 4(f) resources. Both feasible alternatives impact the same number of Section 4(f) resources, but the degree of use is greater for Alternative E. The impacts of the feasible alternatives are summarized below:

- The total new right-of-way required is 36.90 acres for Alternative E and 31.37 acres for Alternative I.

- Alternative E would potentially have 109 displacements (92 residential and 17 commercial). Alternative I would potentially have 54 displacements (40 residential and 14 commercial).
- Goebel Park and Queensgate Playground and Ball Fields would be impacted by both feasible alternatives.
- Other community facilities will also have property only impacts from both feasible alternatives. These include the Notre Dame Academy property, the Beechwood Elementary and High schools, and Central Church of the Nazarene property.
- No disproportionately high and adverse impacts are expected to low-income populations by either of the feasible alternatives. Impacts to environmental justice communities would be mitigated. Impacts to low-income populations may occur as a result of the WHV SPUI alternative.
- Neither feasible alternative provides a significantly greater ecological impact over the other. Both feasible alternatives would impact approximately 3,340 linear feet of intermittent streams, 1.38 acres of wetlands, and habitat for the Indiana bat and running buffalo clover. No impacts to significant ecological resources are anticipated from this project.
- One site in Ohio is recommended for a Phase I Environmental Site Assessment with Alternative I. For Alternatives E and I, 11 sites are recommended for Phase II ESA investigations, including two sites in Kentucky and 9 sites in Ohio. Ten of these sites are within the right-of-way limits of Alternative E and 11 are within the right-of-way limits of Alternative I.
- Both feasible alternatives would adversely effect two National Register of Historic Places (NRHP) listed properties. These include the Lewisburg Historic District in Kentucky and Longworth Hall in Ohio. In addition, the SPUI Alternative at the WHV Interchange would adversely effect the West McMicken Avenue Historic District in Ohio which is eligible for the NRHP.
- The greatest amount of potential visual impact would be in the residential land uses to west of the Brent Spence Bridge on the south bank of the Ohio River. The area with the least amount of potential impact would be in the suburban residential areas south of Covington.
- Four Section 4(f) resources (parks and historic properties) would be impacted by both Alternatives E and I. In addition, the SPUI Alternative at the WHV Interchange would adversely effect the West McMicken Avenue Historic District in Ohio which is eligible for the NRHP.
- One Section 6(f) resource, Goebel Park will be impacted by both feasible alternatives. Alternative E will impact approximately 3.7 acres of the park while Alternative I will impact 1.9 acres.
- Both feasible alternatives will potentially impact 57 utilities, 46 below ground and 11 aboveground.

Conclusions and Recommendations

Both Alternatives E and I would provide greater operational improvements over the No Build Alternative due to the operations provided by their design and the capacity expansion of the additional lanes for the freeway mainline. While both feasible alternatives are better operationally than the No Build Alternative, their design, connection points and operations are different from each other.

The design features of Alternative I would provide a better freeway system from the traffic operations perspective compared to Alternative E. Excluding the tie-in locations at the study

area limits, Alternative I has no freeway segments with LOS F as compared to one for Alternative E.

In Kentucky, Alternative I would provide a ramp connection from the southbound collector-distributor (C-D) roadway to KY 5th Street in Covington, which Alternative E would not. Alternative I would provide a direct ramp connection in Covington to northbound I-71. Alternate E would provide a direct ramp connection in Covington to northbound I-71 and I-75. Alternative E would provide a ramp connection from the northbound C-D roadway to KY 5th Street.

In Ohio, Alternative I's design is based on a C-D system, which provides free-flow movements. For example, Alternative I would provide a direct connection by way of a C-D system in Ohio to northbound I-75 and I-71, which is free-flow. Alternative E's design is based on a service road system, which provides interrupted flow due to four signalized intersections.

The primary differences between Alternatives E and I in Kentucky are that in the southbound direction, motorists in Alternative I can exit to KY 5th Street, but cannot in Alternative E. In the northbound direction motorists for Alternative E have a direct ramp access connection to I-71 and to I-75, but in Alternative I they only have direct access to I-71.

Alternatives E and I have similar impacts to ecological resources, community resources, hazardous material sites, and utilities. While the feasible alternatives have similar property impacts, Alternative I would require less impact to the human environment through fewer residential and business relocations and require less acreage for right-of-way. Both feasible alternatives would be compatible with existing land use plans, would support the Queensgate redevelopment plans, and help Cincinnati facilitate its economic renewal goals. Alternatives E and I differ in their level of impacts to Section 4(f) resources. In Kentucky, Alternative I would have a less direct physical impact to both Goebel Park and the Lewisburg Historic District than Alternative E. In Ohio, the feasible alternatives have similar impacts to three Section 4(f) resources. Overall, the impacts to Section 4(f) resources caused by Alternative E are more extensive than Alternative I.

Alternative I is recommended as the Preferred Alternative with the inclusion of the Western Hills Viaduct tight urban diamond interchange. This recommendation is based on the design features, local access features, traffic operations, estimated costs, and environmental impacts.

Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Brief Description of Alternative	The No Build Alternative maintains the existing configuration of the I-75 corridor and consists of minor, short-term safety and maintenance improvements to the interstate which would maintain its continuing operation	Alternative E utilizes the existing I-71/I-75 alignment from the southern study area to the Kyles Lane Interchange. A collector distributor (C-D) roadway will be constructed along both sides of I-71/I-75 between the two interchanges. A new double deck bridge will be build just west of the existing Brent Spence Bridge. The existing Brent Spence Bridge will be rehabilitated to carry two lanes southbound and three lanes northbound for local traffic. In Ohio, I-75 will be reconfigured through the I-71/I-75/US 50 interchange and some access points along I-75 will be eliminated. A local C-D roadway will provide local access in Ohio.	Alternative I utilizes the existing I-71/I-75 alignment from the southern study area to the Kyles Lane Interchange. A C-D roadway will be constructed along both sides of I-71/I-75 between the two interchanges. A new double deck bridge will be built just west of the existing Brent Spence Bridge. The existing Brent Spence Bridge will be rehabilitated to carry two lanes for northbound I-71 and three lanes for northbound local traffic. In Ohio, a local C-D roadway will be constructed along both sides of I-75.
Local access to/from the interstate	No changes to existing access	Provides indirect access to interstate by way of local C-D road • I-75 access between KY 12th Street and Ezzard Charles Drive Provides direct access to interstate • 1 direct access point to I-71 NB at KY 9th Street • 1 direct access point to I-75 NB in KY 9th Street • Direct access to I-71/I-75 SB at KY 12th Street • 1 direct access point to/from I-75 NB and SB at Freeman Avenue	Provides indirect access to interstate by way of local C-D road • I-75 access between KY 12th Street and Ezzard Charles Drive Provides direct access to interstate • 1 direct access point to I-71 NB in KY at Pike Street • Direct access to I-71/I-75 SB at KY 12th Street • 1 direct access point to/from I-75 NB and SB at Freeman Avenue

Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Access to Covington from I-75	No changes to existing access	Provides direct access to Covington • I-75 SB and I-71 SB access at KY 9th Street Provides indirect access to Covington by C-D road • NB access at KY 5th and 12th Street	Provides indirect access to Covington from I-75 by a C-D road • NB access at KY 12th Street SB access at KY 5th and 9th Street
Access to I-75 in Cincinnati	No changes to existing access	Alters existing access to I-75 • Existing I-75 NB and SB access eliminated or reconfigured between KY 9th Street to just north of Western Hills Viaduct • Existing direct access to/from I-75 will remain but reconfigured at US 50	Eliminates direct access to/from I-75; Access provided by C-D road • I-75 NB access eliminated between KY 12th Street to just south of Ezzard Charles Drive • I-75 SB access eliminated between KY 9th Street and the Western Hills Viaduct • Access provided by C-D road
Separates local and regional traffic	Does not separate local and regional traffic	• A new bridge just west of the existing Brent Spence Bridge will be constructed to carry I-75 and I-71 NB and SB traffic • The existing Brent Spence Bridge will be rehabilitated to carry local NB and SB traffic	• A new bridge just west of the existing Brent Spence Bridge will be constructed to carry I-75 NB and SB, I-71 SB, and local SB traffic • Existing Brent Spence Bridge will be rehabilitated to carry I-71 NB and local NB traffic
Design Exceptions	Not applicable	42 locations in total (5 in KY; 37 in OH)	43 locations in total (3 in KY; 40 in OH)
Existing (2005) levels of service and average daily traffic	Approximately 160,000 vehicles per day LOS C to F	Not applicable	Not applicable

Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Future (2035) levels of service along mainline segments (number refers to the segments for each level of service; i.e. 36 LOS D = 36 segments LOS D)	I-71/I-75: • 36 LOS D or better, 13 NB and 8 SB LOS E or worse I-75: • 62 LOS D or better, 8 NB and 8 SB LOS E or worse I-71: • 48 LOS D or better, 3 NB and 6 SB LOS E or worse	I-71/I-75: • 28 LOS D or better, 7 NB and 8 SB LOS E or worse I-75: • 50 LOS D or better, 1 NB and 0 SB LOS E or worse I-71: • 40 LOS D or better, 5 NB and 2 SB LOS E or worse	I-71/I-75: • 30 LOS D or better, 5 NB and 8 SB LOS E or worse I-75: • 42 LOS D or better, 2 NB and 3 SB LOS E or worse I-71: • 20 LOS D or better, 6 NB and 2 SB LOS E or worse
Future (2035) daily hourly volumes along mainline segments (NB = northbound; SB = southbound)	I-71/I-75: • NB ranges from 5,310 - 8,650 • SB ranges from 940 - 9,160 I-75: • NB ranges from 2,360 – 8,860 • SB ranges from 2,760 – 10,170 I-71: • NB ranges from 1,900 – 7,400 • SB ranges from 2,420 – 6,330	I-71/I-75: • NB ranges from 6,440 – 8,910 • SB ranges from 6,440 – 10,390 I-75: • NB ranges from 2,870 – 8,680 • SB ranges from 2,940 – 9,360 I-71: • NB ranges from 2,240 – 7,690 • SB ranges from 2,660 – 6,490	I-71/I-75: • NB ranges from 5,700 – 8,910 • SB ranges from 6,440 – 10,390 I-75: • NB ranges from 2,010 – 8,870 • SB ranges from 2,730 – 9,750 I-71: • NB ranges from 2,240 – 7,690 • SB ranges from 2,310 – 6,490
Right-of-way Impacts – (acres within construction limits)	No Impact	36.90 total acres KY – 24.45 acres OH – 12.45 acres	31.37 total acres KY – 21.76 acres OH – 9.61 acres
Parcels – (total estimated parcels impacted)	No Impact	KY – 162 parcels OH – 111 parcels	KY – 123 parcels OH – 68 parcels

Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Compatibility with existing community land use plans	• Not compatible with economic development plans • Does not preclude future light rail plans • No changes to existing land uses	Compatible with plans • Supports redevelopment and economic plans in Queensgate and Cincinnati • Keeps land uses conducive with Northern Kentucky comprehensive plans • Makes provisions for future light rail plans	Compatible with plans • Supports redevelopment and economic plans in Queensgate and Cincinnati • Keeps land uses conducive with Northern Kentucky comprehensive plans • Makes provisions for future light rail plans
Community Cohesion	No impact	Loss of residences in Lewisburg neighborhood and historic district • Resident concentration on Crescent Avenue between KY 5th and 9th streets • Loss of residences in West McMicken Avenue neighborhood by SPUI	Loss of residences in Lewisburg neighborhood and historic district • Resident concentration on Crescent Avenue south of KY 5th Street and Pike Street
Facilities and Services	No impacts	• Goebel Park (3.7 acres - parking lot, portion of walking trail, and basketball court) • Queensgate Playground and Ball Fields (strip take – 0.6 acres) • Notre Dame Academy School (1.34 acres - portion of parking lot and ball field) • Beechwood Schools (strip take) • Central Church of the Nazarene (KY) (0.44 acres – portion of parking lot)	• Goebel Park (1.9 acres – basketball court, and parking lot) • Queensgate Playground and Ball Fields (strip take – 0.9 acres) • Notre Dame Academy School (1.34 acres - portion of parking lot and ball field) • Beechwood Schools (strip take) • Central Church of the Nazarene (KY) (0.44 acres – portion of parking lot)
Residential – (total estimated structures and residences displaced)	No Impact	92 Total (92 – 356 persons) KY – 76 structures (76 – 296 persons) OH – 16 structures (16 – 60 persons)	40 Total (40 – 168 persons) KY – 40 structures (40–168 persons) OH – no residential displacements
Business – (total estimated businesses and employees displaced)	No Impact	17 Total (408 – 529 employees) KY – 8 businesses (100 – 130 employees) OH – 9 businesses (308 – 399 employees)	14 Total (341 – 382 employees) KY – 6 businesses (90 – 115 employees) OH – 8 business (251 – 267 employees)

Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Environmental Justice – (impacts to neighborhoods and Census tracts with high percentage of low income and minority populations)	No impact	• Minority population impacts in KY • Impact to low-income populations (residences displaced in Lewisburg) in KY • Impact to parking lot, basketball court, and portion of walking path in Goebel Park adjacent to environmental justice (EJ) areas • Impact to low-income population in Ohio (residences displaced on McMicken Avenue) • Strip taken of land in Queensgate Playground and Ball Fields in EJ target area • No disproportionate and adverse impacts to EJ populations	• Minority population impacts in KY • Impact to low-income populations (residences displaced in Lewisburg) in KY • Impact to parking lot and basketball court in Goebel Park adjacent to EJ target • Strip taken of land in Queensgate Playground and Ball Fields in EJ area • No disproportionate and adverse impacts to EJ populations
Intermittent Streams	No impact	3,335 linear feet	3,340 linear feet
Ephemeral Streams	No impact	0 linear feet	0 linear feet
Wetlands	No impact	1.38 acres	1.38 acres
Indiana bat habitat (Potential /Marginal)	No impact	28/27 acres	28/28 acres
Potential Running Buffalo Clover habitat	No impact	2 acres	2 acres
Floodplains	No impact	Piers for new Ohio River Bridge	Piers for new Ohio River Bridge
Farmland	No impact	No impact	No impact
Number of sites recommended for Phase II Environmental Site Assessment	No Impact	10 in total	11 in total
Number of sites recommended for Phase I Environmental Site Assessment at Western Hills Viaduct	No Impact	0	1

Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Individual properties eligible for listing or listed in the National Register of Historic Places (NRHP)	No impact	Longworth Hall Western Hills Viaduct	Longworth Hall Western Hills Viaduct
Historic Districts (HD) directly impacted	No impact	Lewisburg Historic District (53 contributing properties)	Lewisburg Historic District (28 contributing properties)
Potential Archaeological Sites requiring additional survey	No impact	2	1
Air Quality	Conforming	Conforming	Conforming
Number of impacted noise receptor sites in 2035 for Category B land use (residential)	1,180	1,343	1,402
Number of impacted noise receptor sites in 2035 for Category C land use (industrial/commercial)	113	106	122
Section 4(f) Resources	No Impact	• Goebel Park (3.7 acres – parking lot, basketball court and portion of walking trail) • Lewisburg Historic District (53 contributing properties) • Queensgate Playground and Ball Fields (0.6 acres) • Longworth Hall (204 feet of building) • Western Hills Viaduct (alterations and reconstruction of the east end of the viaduct)	• Goebel Park (1.9 acres – basketball court and parking lot) • Lewisburg Historic District (28 contributing properties to the district) • Queensgate Playground and Ball Fields (0.9 acres) • Longworth Hall (204 feet of building) • Western Hills Viaduct (reconstruction of 1,108 feet of the approach ramps of the WHV)
Section 6(f) Parks	No Impact	Goebel Park (3.7 acres)	Goebel Park (1.9 acres)
Maintenance of Traffic and Constructability	No impact	• The project will be constructed in five phases • Construction will last seven years. • I-71 will be re-shielded to I-471 • Access to the CBDs in Covington and Cincinnati will be maintained at all times	• The project will be constructed in five phases • Construction will last seven years. • I-71 will be re-shielded to I-471 • Access to the CBDs in Covington and Cincinnati will be maintained at all times

Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Utilities	No Impact	57	57
Cost Estimates (in millions)	Not applicable	Kentucky $700.2 Ohio $971.6 WHV with SPUI $269.6 Existing Bridge $73.5 New Bridge $730.2 Total $2,745.1	Kentucky $641.4 Ohio $896.7 WHV with TUDI $141.8 Existing Bridge $73.5 New Bridge $730.2 Total $2,483.6

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1.0 INTRODUCTION

1.1 Project Background

The Interstate 75 (I-75) corridor 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, approximately 160,000 vehicles per day use the Brent Spence Bridge and traffic volumes are projected to increase to approximately 233,000 vehicles per day in 2035 for the No Build Alternative.

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. These problems include, but are not limited to, growing demand and congestion, land use pressures, environmental concerns, inadequate 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 Kentucky Transportation Cabinet (KYTC) and the Ohio Department of Transportation (ODOT), in cooperation with the Federal Highway Administration (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

1.2.1 Federal Project Designations

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

Table 1. Interstates 71 and 75 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

Source: FHWA, 2005

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 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 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 Martin Luther King, Jr. Boulevard, Hopple Street, I-74, and Mitchell Avenue, Cincinnati	$2.4 million
3385	KY	Replace Brent Spence Bridge, Kenton County	$1.6 million
4217	KY	Transportation improvements to Brent Spence Bridge	$34 million
4621	OH	On I-75 toward Brent Spence Bridge, Cincinnati	$10 million
4623	OH	Reconstruction, widening, and interchange upgrades to I-75 between Cincinnati and Dayton	$5 million
4624	OH	Replace the Edward N. Waldvogel Viaduct, Cincinnati, (US Route 50)	$6 million

1.2.2 Kentucky Project Designations

In 1999, KYTC completed its current long-range multimodal transportation plan (Kentucky Transportation Cabinet, Statewide Transportation Plan FY 1999–2018, December 1999). The statewide long range transportation plan must include all modes of travel and plan investments over a period of at least twenty years. 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. The statewide plan was updated in 2006 in the 2006 Kentucky Long-Range Statewide Transportation Plan. The 2006 plan is a 25-year multimodal plan for the state of Kentucky. The current plan is a policy-only plan that identifies a vision and set of goals.

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 *Feasibility and Constructability Study of the Replacement/Rehabilitation of the Brent Spence Bridge* (May 2005). The study area for this analysis began south of Kyles Lane in Kentucky and extended to the Western Hills Viaduct in Ohio.

Kentucky's Recommended Six-Year Transportation Plan FY 2007-2012 lists six "Mega-Projects" that are expected to cost in excess of $1 billion. The I-71/I-75 Brent Spence Bridge Project Replacement/Rehabilitation is one of the six "Mega-Projects". The plan notes that the I-71/I-75 Brent Spence Bridge "is the focal point for some of the heaviest traffic volumes in Kentucky", which not only provides 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 Transportation Plan 2010-2013).

1.2.3 Ohio Project Designations

ODOT completed a statewide transportation study and strategic plan, *Access Ohio,* in 1993 and updated in 2004. *Access Ohio* 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-75 corridor is included in the list of macro corridors.

In 2000, the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) and the Miami Valley Regional Planning Commission (MVRPC) formed a partnership with ODOT and KYTC to undertake a large scale analysis of the I-75 corridor. The limits of this analysis stretched from the I-71/I-75 Interchange in northern Kentucky to Piqua, Ohio. Known as the *North-South Transportation Initiative* (February 2004), this traditional Major Investment Study (MIS) was 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 a consensus of the region's ambitions for the future.

The *North-South Transportation Initiative* recommended a number of capacity and safety improvements for the I-71/I-75 corridor in Kentucky and the I-75 corridor in Ohio. A number of major replacements and rehabilitations were recommended for advancement into the NEPA process. One key recommendation was 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.

Two projects north of the Brent Spence Bridge were also recommended by the *North-South Transportation Initiative*. These recommendations resulted in ODOT's 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. Primary goals of this program are preserving right-of-way and assuring that long-term improvements made to the corridor build on each other and provide improved capacity.

1.2.4 Metropolitan Planning Organization Project Designations

The OKI is the region's metropolitan planning organization (MPO) and is responsible for planning and programming the region's transportation improvements. The Brent Spence Bridge Replacement/Rehabilitation Project is included in OKI's 2030 Regional Transportation Plan which serves as the region's federally mandated Long-Range Transportation Plan (LRP). Due to the bi-state nature of the project, funding is divided between the two states in the LRP. The Ohio portion of the LRP includes a total of $1,063,750,000. The Kentucky portion of the LRP includes $1,202,869,820. A total of $2.27 billion is listed for the entire project. The next phases of work are listed and funded in the FY 2012 to FY2015 Transportation Improvement Program (TIP) for four projects (PIDs 89056, 89065, 89067, and 89069) in Hamilton County.

The OKI 2030 Regional Transportation Plan also indicates the results of its initial air quality analysis. The Brent Spence Bridge Replacement/Rehabilitation Project is included in the 2020 conformity analysis. In addition, several highway segments within the project study limits are identified in the OKI Congestion Management Process (CMP). The CMP assessed the region's transportation system performance through the collection of traffic data and an evaluation of congestion. The CMP also projected future travel conditions and developed a matrix of strategies to address future congestion levels.

Specific congestion "hot spot" segments in the study area that were identified in the CMP are:

- I-71/I-75 in Northern Kentucky from Dixie Highway to Kyles Lane,
- I-71/I-75 in Northern Kentucky from Kyles Lane to KY 12th Street in Covington, and
- I-71/I-75 in Northern Kentucky from KY 12th Street to KY 5th Street in Covington.

The CMP identified other "hot spot" highway segments in both states, but these three specific segments were among the most congested in the region.

1.3 Study Area

The overall project corridor (Exhibit 2) is located along a 7.8-mile segment of I-75 within the Commonwealth of Kentucky (state line mile 186.7) and the state of Ohio (state line mile 2.7). The southern limit of the project is 5,000 feet south of the midpoint of the Dixie Highway 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-71/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 KY 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.

2.0 PURPOSE AND NEED

The *Purpose and Need Statement* for the Brent Spence Bridge Replacement/Rehabilitation Project was completed in May 2006. The purpose and need was updated during Step 5 of the PDP process and reported in the Purpose and Need section of the *Conceptual Alternatives Study* (April 2009) (Appendix A).

The Brent Spence Bridge Replacement/Rehabilitation Project will improve the operational characteristics within the I-75 corridor for both local and through traffic. In the Greater Cincinnati/Northern Kentucky region, the 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
- maintain 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. Specific problems of I-71 and I-75 within the study area include, but are not limited to, growing demand for capacity and congestion, inadequate safety margins, and design deficiencies.

2.1 Traffic Flow and Level of Service

Traffic analyses completed for the *Existing and Future Conditions Report* (February 2006) (Appendix A) and conceptual alternatives determined that approximately 160,000 vehicles per day use the Brent Spence Bridge and traffic volumes are projected to increase to approximately 233,000 vehicles per day in 2035 for the No Build Alternative.

The current and future levels of service (LOS) within the I-75 corridor range from LOS B to F (Appendix B). LOS is an assessment of roadway and intersection performance, expressed LOS A to F. The desirable LOS on an urban interstate is LOS D.

In 2005, traffic data and the LOS on the I-75 freeway segment (I-71/I-75 in Kentucky and on I-75 in Ohio) for the No Build Alternative were analyzed. During the AM Peak, 19 percent of the freeway segments analyzed operated at LOS E or worse. During the PM Peak, 19 percent of the I-75 freeway segments analyzed were LOS E or worse. The 2035 traffic data and LOS for the No Build Alternative were also analyzed, for basic freeway segments on I-75. During the AM Peak, 36 percent of the freeway segments analyzed were estimated to be LOS E or worse. During the PM Peak, 57 percent of the freeway segments analyzed were estimated to be LOS E or worse. A comparison of the I-75 freeway segment traffic data showed significant problems for motorists, especially during the PM Peak, when over half of the freeway segments would operate at LOS E or worse in 2035.

Freeway segments on I-71 and US 50 were operating under desirable LOS D or better in 2005. However, many of the freeway segments will also experience conditions of LOS E or worse in 2035.

2.2 Safety

A discussion of crash rates and safety issues is detailed in the *Planning Study Report* (September 2006), *Purpose and Need Statement* (May 2006), and *Existing and Future Conditions Report* (February 2006). Crash rates for the I-71/I-75 corridor exceed the Kentucky and Ohio statewide averages. This is due in part to congested traffic conditions in addition to deficient and substandard roadway geometry.

Based on the most recently available crash reports in Kentucky (November 1, 2008 – November 1, 2011), the I-71/I-75 corridor within the project limits has a higher crash rate than the statewide average for urban interstates of 0.97 crashes per million vehicle miles traveled. The overall crash rate for this section is 1.17, which is nearly 1.21 times higher than the statewide average rate for similar sections of roadway.

Based on the most recently available crash reports (2008 - 2010), the overall crash rate for the Ohio section of I-71 (0.00 to 1.35) in the study area is 3.66 accidents per million vehicle miles traveled. This is approximately 5.3 times the Ohio statewide three year average crash for an eight lane urban interstate. Overall, I-75 (0.22-2.50) within the study area has a crash rate of 5.23, which is approximately 7.60 times higher than the three-year average statewide crash rate.

Ohio Department of Transportation's safety management databases indicate that the I-71 and I-75 corridor has several locations with safety concerns. The 2010 Highway Safety Program (HSP) for years 2008 - 2010 has identified several segments within the Ohio portion of the study area that are ranked in the top 100 interstate locations using the Highway Safety Analyst program. The identified sections on I-71 are mile post 0.1 to mile post 0.2 (ranked #73) and mile post 0.0 mile post 0.1 (ranked #99). The identified sections on I-75 are mile post 1.0 mile post 1.1 (ranked #48), mile post 0.44 mile post 0.5 (ranked #52) and mile post 1.95 mile post 2.5 (ranked #96).

2.3 Geometric Deficiencies

The geometric design features of I-71 and I-75 within the study area do not meet current standards for an interstate highway facility. Design deficiencies include:

- Substandard vertical alignments with limited stopping sight distances,
- Acceleration and deceleration lanes that are not of sufficient 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.

A complete list of existing geometric deficiencies is provided in the *Existing and Future Conditions Report* (February 2006) (Appendix A).

2.4 National, Regional, and Local System Linkage

The 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. 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 maintain these important transportation links.

3.0 ALTERNATIVES

3.1 Introduction

The Environmental Assessment compares two Build Alternatives and the No Build Alternative. The Build Alternatives were recommended for further evaluation in Step 5 of the Ohio Department of Transportation's (ODOT) Project Development Process (PDP). It was agreed at the onset of the project to use the ODOT PDP.

3.2 Development of Alternatives

3.2.1 Alternatives Considered and Dismissed

Development of conceptual alternatives for the Brent Spence Bridge was initiated in 2003 by the Kentucky Transportation Cabinet (KYTC). These initial alternatives were documented in the *Feasibility and Constructability Study of the Replacement/Rehabilitation of the Brent Spence Bridge* (May 2005). This report 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. Six conceptual alternatives were recommended for further study.

In 2006, 25 conceptual alternatives, including the No Build Alternative, were developed in Step 4 of the ODOT PDP. These 25 conceptual alternatives included the six alternatives from the *Feasibility and Constructability Study*. The 25 conceptual alternatives were evaluated using a two-phased screening process based on a comparative analysis. Phase one of the analysis was an evaluation of the conceptual alternatives based on the goals of the purpose and need and comments received from local governments. In phase two of the analysis, the conceptual alternatives that were not eliminated in phase one were evaluated using stakeholder goals and measures of success; design compatibility with the I-75 Mill Creek Expressway Project (HAM-75-2.30) to the north; and concurrence among government agencies obtained through a series of meetings. Some alternatives were combined into hybrid alternates and then evaluated in phase two of the analysis.

The two-phased comparative analysis eliminated 19 of the 25 conceptual alternatives from further study and evaluation These 19 conceptual alternatives failed to meet the purpose and need goals of the project and did not adequately address the stakeholder's goals and measures of success. Additionally, these alternatives would not be compatible with the I-75 Mill Creek Expressway Project (HAM-75-2.30) because five travel lanes were needed to provide a seamless connection between the two projects.

The *Planning Study Report* (September 2006) documented the 25 conceptual alternatives and the two-phased comparative analysis. The *Planning Study Report* is located in Appendix A.

At the end of Step 4 of the PDP, a total of six conceptual alternatives, the No Build and five mainline Build Alternatives were recommended for further study in Step 5 of the PDP (see *Planning Study Report* in Appendix A). The No Build Alternative was retained as a baseline for evaluation of the Build Alternatives. 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 five mainline Build Alternatives recommended for further study in the *Planning Study Report* were:

- Mainline Alternative 1 - Queensgate Alignment for I-75
- Mainline Alternative 2 - Queensgate Alignment for I-71/I-75
- Mainline Alternative 3 - New Bridge Just West for I-75
- Mainline Alternative 4 - New Bridge Just West for all Traffic
- Mainline Alternative 5 - Construct New Bridges for I-75

A variety of sub-alternatives were developed to provide options for key intersection and traffic flow areas within the project corridor. The various sub-alternatives accommodated the design requirements of the mainline Build Alternatives:

- I-75 Northbound at KY 12th Street Ramp Sub-Alternatives
- I-71/US 50 Interchange Sub-Alternatives (for I-75 Queensgate Alignment)
- I-71/I-75/US 50 Interchange Sub-Alternatives
- I-75 Ohio C-D Road/Arterial Improvement Sub-Alternatives
- Western Hills Viaduct (WHV) Interchange Sub-Alternatives

Detailed descriptions of the mainline Build Alternatives and the various sub-alternatives are presented in the *Planning Study Report* (Appendix A). These mainline Build Alternatives and sub-alternatives were carried forward into Step 5 of the PDP for further study and refinement.

The five mainline Build Alternatives and sub-alternatives were developed in more detail and refined during Step 5 of the PDP. These efforts included environmental studies, traffic analysis, refinement of horizontal and vertical alignments, cost estimates, utilities coordination, and stakeholder coordination. As a result, the mainline Build Alternatives and sub-alternatives from Step 4 as presented in the *Planning Study Report* evolved into eight conceptual alternatives. The eight conceptual alternatives were identified as Alternatives A through H:

- Alternative A (Alternative 1, I-71/US 50 Interchange Sub-Alternative 1, Hybrid of Collector-Distributor Roads Sub-Alternative 1 and Arterial Improvements Sub-Alternative 2 from the *Planning Study Report*)
- Alternative B (Alternative 2, I-71/US 50 Interchange Sub-Alternative 2, Hybrid of Collector-Distributor Roads Sub-Alternative 1 and Arterial Improvements Sub-Alternative 2 from the *Planning Study Report*)
- Alternative C (Variation of Alternative 3, I-71/I-75/US 50 Interchange Sub-Alternative, 1, Hybrid of Collector-Distributor Roads Sub-Alternative 1 and Arterial Improvements Sub-Alternative 2 from the *Planning Study Report*)
- Alternative D (Variation of Alternative 3, I-71/I-75/US 50 Interchange Sub-Alternative 3, Hybrid of Collector-Distributor Roads Sub-Alternative 1 and Arterial Improvements Sub-Alternative 2 from the *Planning Study Report*)
- Alternative E (Variation of Alternative 3, I-71/I-75/US 50 Interchange Sub-Alternative 3, Hybrid of Collector-Distributor Roads Sub-Alternative 1 and Arterial Improvements Sub-Alternative 2 from the *Planning Study Report*)
- Alternative F (Variation of Alternative 4, I-71/I-75/US 50 Interchange Sub-Alternative 2, Hybrid of Collector-Distributor Roads Sub-Alternative 1 and Arterial Improvements Sub-Alternative 2 from the *Planning Study Report*)

- Alternative G (Variation of Alternative 4, I-71/I-75/US 50 Interchange Sub-Alternative 3, Hybrid of Collector-Distributor Roads Sub-Alternative 1 and Arterial Improvements Sub-Alternative 2 from the *Planning Study Report*)
- Alternative H (Alternative 5 from the *Planning Study Report*)

3.2.2 Recommended Feasible Alternatives

The *Conceptual Alternatives Study* (April 2009) (Appendix A) from Step 5 of the PDP recommended feasible alternatives for further study in Steps 6 and 7.

Three of the mainline build Alternatives, Alternatives A, F, and H, were eliminated in the early stages of Step 5 of the PDP. Alternatives A and H were eliminated from further consideration due to fatal flaws, which were identified as the alternatives were developed in more detail. Alternative A was initially developed as an avoidance alternative for Longworth Hall, a historic resource. However, under further analysis, this was not possible while maintaining design standards for I-71 southbound. Alternative H was developed with new bridges along both sides of the existing Brent Spence Bridge. The connections to the eastern bridge were precluded in Ohio due to geometric design constraints. Alternative F was eliminated from further consideration because it was very similar to Alternative G and provided less access.

Alternative B was initially developed as an alternative to mitigate Section 4(f) impacts. However, based on the adverse impacts to communities and property acquisition associated with Alternative B, as well as the overall complexity, constructability, risk, and cost, it was eliminated from further consideration in Step 5 of the PDP.

A combination of Alternatives C and D was recommended as a feasible alternative. Alternative E was also recommended to be developed for further study in Step 6 as a feasible alternative.

Alternatives C and D are very similar in overall design. Based on the comparative analysis in Step 5, with respect to horizontal and vertical alignments, impacts, and the flow of traffic of Alternatives C and D, it was determined that a hybrid alternative of the northbound portion of Alternative C and the southbound portion of Alternative D be advanced for further consideration. It was recommended to increase the number of lanes for I-75 to three lanes in each direction between the approximate limits of Pike Street in Kentucky to the Ezzard Charles Drive overpass in Ohio to support the improved LOS this alternative would provide.

The Alternative E recommendation was based on the access provided to Covington and Cincinnati and the minimal amount of community impacts in comparison to the other alternatives. It was also recommended to maintain the number of lanes for I-75 as three lanes in each direction to support the improved LOS Alternative E would provide.

Alternative G was recommended to be eliminated from further consideration due to the high costs, and residential and business displacements associated with this alternative. However, based on the analyses completed and feedback as part of community input, the following beneficial design features of Alternative G were carried forward for further analysis and incorporated into the feasible alternatives:

- access to north end of Clay Wade Bailey Bridge from I-75 southbound using a collector-distributor (C-D) roadway and US 50 eastbound,

- two access points into Covington,
- access from a northbound C-D roadway from KY to I-71 northbound in Ohio, and
- access ramp just north of Ezzard Charles Drive for Freeman Avenue and local traffic to I-75 northbound.

3.3 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 all within existing right-of-way.

The No Build Alternative does not meet the purpose and need for this project. This alternative does not improve traffic flow and existing congestion will worsen. Aside from short term maintenance, the No Build Alternative does not provide improvements for safety. Lane widths would remain deficient and the lack of proper shoulders on the Brent Spence Bridge would remain. Geometric deficiencies would not be corrected. The No Build Alternative would maintain existing connections to local, regional, and national transportation corridors but does not improve these connections.

The No Build Alternative is retained as a baseline alternative to compare with the feasible Build Alternatives.

3.4 Build Alternatives

The *Conceptual Alternatives Study (April 2009)* (Appendix A) recommended two feasible alternatives for further study in Steps 6 and 7 of the Project Development Process. The two feasible alternatives consist of Alternative E and of a combination of Alternatives C and D, identified as Alternative I, with certain design elements of Alternative G incorporated (listed in Section 3.2.2).

3.4.1 Alternative E

Alternative E utilizes the existing I-71/I-75 alignment from the southern project limits to the Kyles Lane Interchange (Exhibits 3A, 3B, 3C and Appendix C). The Dixie Highway and Kyles Lane interchanges will be modified slightly to accommodate a collector-distributor (C-D) roadway, which will be constructed along both sides of I-71/I-75 between the two interchanges. North of the Kyles Lane Interchange, the alignment shifts to the west to accommodate additional I-71/I-75 travel lanes. Between Kyles Lane and KY 12th Street, six lanes will be provided in each direction for a total of 12 travel lanes.

Near KY 12th Street, the northbound alignment separates into two routes; one for interstate traffic and one for a local C-D roadway. Between Pike Street and KY 9th Street, the interstate separates into I-71 and I-75 only routes. The C-D roadway will carry local traffic northbound and provide access to Covington at KY 12th and 5th streets and access from KY 9th and 4th streets. The southbound C-D roadway will carry traffic from Ohio and cross over I-71 and I-75 and provide access to both the interstate and into Covington at KY 9th Street.

A portion of Crescent Avenue will be closed with a new connection to Bullock Street. Access from Covington for southbound interstate traffic is located at KY 12th Street. Bullock Street will be extended north from Pike Street to KY 9th, 5th, and 4th streets and Jillians Way will be extended north from Pike Street to KY 9th, 5th, and 4th streets. Bullock Street and Jillians Way will function as one-way paired access controlled local frontage roadways.

A new double deck bridge, the new Ohio River Bridge, will be built just west of the existing Brent Spence Bridge to carry northbound and southbound I-71 and I-75 traffic (Exhibit 3D). The width of the upper and lower decks will be the same on the new Ohio River Bridge. The upper deck will be striped so that I-71 southbound will have three lanes and I-71 northbound will have two lanes. The lower deck will be striped so that I-75 will have three northbound and three southbound lanes. The existing Brent Spence Bridge will be rehabilitated to carry northbound and southbound local traffic with two lanes striped in the southbound direction and three lanes in the northbound direction.

In Ohio, Alternative E reconfigures I-75 through the I-71/I-75/US 50 Interchange and eliminates some of the existing access points along I-75. Existing ramps to I-71, US 50 and downtown Cincinnati will be reconfigured. The existing direct connections between I-75 to westbound and from eastbound US 50 will be maintained in Alternative E. US 50 will be reconfigured to eliminate left-hand entrances and exits. The OH 5th Street overpass will be eliminated and the OH 6th Street Expressway will be reconfigured as a two-way, six-lane elevated roadway with a new signalized intersection for US 50 access and egress. Access between southbound I-71 (Fort Washington Way) and northbound I-75 will be provided near OH 9th Street as a direct connection. Both I-75 southbound and US 50 (OH 6th Street Expressway) will have access to northbound I-71 (Fort Washington Way).

A local C-D roadway will carry local traffic northbound from the existing Brent Spence Bridge and provide access to OH 2nd, 5th, and 9th streets, Winchell Avenue and access from OH 4th Street before reconnecting to I-75 just south of the Linn Street overpass. The northbound ramps from OH 6th and 9th streets to I-75 will be removed requiring traffic from these points to utilize a new local roadway parallel to I-75 connecting to Winchell Avenue and access the interstate at Bank Street. Southbound I-75 traffic will separate from the local C-D roadway near Ezzard Charles Drive. The southbound C-D roadway will carry traffic over I-75 to OH 7th Street, allowing traffic to either access downtown at 7th Street, travel south to OH 5th and 2nd streets; or travel across the existing Brent Spence Bridge into Covington. Access to the local southbound C-D roadway will be provided at Western Avenue and at OH 4th and 8th streets.

Alternative E also improves Western and Winchell avenues to facilitate traffic flow and increase capacity. The ramps to Western Avenue and from Winchell Avenue just north of Ezzard Charles Drive will be removed. The ramp from Freeman Avenue to I-75 northbound and the ramp from I-75 southbound to Freeman Avenue will remain. Between Ezzard Charles Drive and WHV, southbound I-75 will have six lanes, northbound I-75 will have five lanes. The WHV Interchange will be reconfigured to provide a full movement interchange. The improved interchange will be a single-point urban interchange (SPUI) design.

3.4.2 Alternative I

Alternative I is a combination of Alternatives C and D with certain design elements of Alternative G (Exhibits 4A, 4B, 4C and Appendix C). Alternative I utilizes the existing I-71/I-75 alignment from the southern project limits to the Kyles Lane Interchange. The Dixie Highway and Kyles Lane interchanges will be modified slightly to accommodate a C-D roadway, which will be constructed along both sides of I-71/I-75 between the two interchanges. North of the Kyles Lane Interchange, the alignment shifts to the west to accommodate additional I-71/I-75 travel lanes. Between Kyles Lane and KY 12th Street, six

lanes will be provided in each direction for a total of 12 travel lanes. Near KY 12th Street, the alignment northbound separates into three routes for I-71, I-75 and a local C-D roadway.

In Alternative I, access into Covington from the interstate will be provided by the local C-D roadway; at KY 12th Street for northbound traffic and at KY 5th and 9th streets for southbound traffic. Access from Covington for northbound traffic will be provided by a ramp located between Pike Street and KY 9th Street from Jillians Way. The ramp will provide direct access to I-71 from Covington and provide access to I-75 northbound using the C-D roadway through downtown Cincinnati and connecting at the merge near Ezzard Charles Drive. Access from Covington will also be provided at KY 4th Street to the northbound C-D roadway. Access from Covington for southbound interstate traffic is located at KY 12th Street. Bullock Street will be extended north from Pike Street to KY 9th and 4th streets and Jillians Way will be extended north from Pike Street to KY 9th and 5th streets. Bullock Street and Jillians Way will function as one-way paired access controlled local frontage roadways.

A new double deck bridge will be built just west of the existing Brent Spence Bridge to carry northbound and southbound I-75 (three lanes in each direction), two lanes for southbound I-71 and three lanes for southbound local traffic (Exhibit 4D). The width of the upper and lower decks will be the same on the new Ohio River Bridge. The existing Brent Spence Bridge will be rehabilitated and striped to carry two lanes for northbound I-71 and three lanes for northbound local traffic.

Alternative I reconfigures I-75 through the I-71/I-75/US 50 Interchange and eliminates all access to and from I-75 from KY 12th Street to the Freeman Avenue overpass in the northbound direction. Alternative I eliminates access to I-75 southbound between the Freeman Avenue exit and KY 9th Street. Alternative I also eliminates access from I-75 southbound between the US 50/6th Street overpass and Kyles Lane.

In Ohio, a local C-D roadway will be constructed along both sides of I-75. The local northbound C-D roadway will carry local traffic from the existing bridge and provide access ramps to OH 2nd Street, I-71 northbound, US 50 westbound, OH 5th Street, and Winchell Avenue before reconnecting to I-75 just south of Ezzard Charles Drive. The northbound ramps from OH 4th Street will utilize the new local northbound C-D roadway for access to I-75. The northbound ramps from OH 6th and 9th streets to I-75 will be removed requiring traffic from these two points to utilize a new local roadway parallel to I-75 connecting to Winchell Avenue and access the interstate at Bank Street. The southbound C-D roadway begins near the Ezzard Charles Drive overpass and carries both downtown Covington and Cincinnati traffic. The southbound C-D roadway will provide access to OH 7th, 5th and 2nd streets, as well as connecting to access ramps from Western Avenue, OH 9th Street, and US 50 eastbound. The C-D roadway will continue south over the new bridge into Covington.

Between Ezzard Charles Drive and the WHV, northbound I-75 will have five lanes and southbound I-75 will have six lanes, for a total of 11 travel lanes. The ramps to Western Avenue and from Winchell Avenue just north of Ezzard Charles Drive to the interstate will be eliminated. The southbound ramp to Freeman Avenue and the northbound ramp from Freeman Avenue to I-75 will remain. Alternative I also improves Western and Winchell avenues to facilitate traffic flow and increase capacity. Ramps to Western Avenue and from Winchell Avenue will be provided around the WHV Interchange, which will be reconfigured to be a Tight Urban Diamond Interchange (TUDI) design.

3.5 Western Hills Viaduct Interchange

3.5.1 Interchange Alternative Development

The WHV is a multi level structure which spans across the Mill Creek Valley connecting I-75, Central Parkway, West McMillan Street, and Spring Grove Avenue on the east with Queen City Avenue, Harrison Avenue, and State Avenue on the west. The WHV carries local traffic between the west side of Cincinnati and downtown and provides connections to I-75 from the west side of Cincinnati. Interstate and local traffic movements are intermixed between the upper deck, which consists of four travel lanes, and the lower deck, which consists of three travel lanes. The WHV provides pedestrian access with a sidewalk on the south side of the upper deck; however, it does not have any shoulders or bike lanes along the travel lanes for bicycle access.

The existing interchange is a full movement interchange to the west only with a left-hand exit. Southbound I-75 traffic exits to the lower deck and enters from the lower deck while northbound I-75 traffic exits to the upper deck and enters from the upper deck.

In Step 4 of the PDP, several sub-alternatives were evaluated for the WHV Interchange. Three of these sub-alternatives were recommended for further study in the *Planning Study Report*. These three sub-alternatives were studied in the *Conceptual Alternatives Study* (April 2009) during Step 5 of the PDP: an offset roundabout diamond; a single roundabout diamond; and a SPUI with an at-grade intersection with Central Parkway.

During Step 5 of the PDP, all three sub-alternatives were dismissed from further study because analyses showed each concept did not have the capacity to handle the projected future traffic. A fourth alternative was considered during Step 5 which connected Spring Grove Avenue to I-75 by adding a third level to the interchange under I-75. This full movement interchange was also dismissed after further investigation due to several operationally and geometrically fatal flaws including inadequate interchange spacing with the Hopple Street Interchange to the north and inadequate capacity of the local roadway network.

The primary conceptual design constraints of the WHV were:

- Incorporating the existing WHV multi-level configuration into the proposed design to avoid replacing the entire structure to the west.
- Number of existing travel lanes on both levels of the WHV.
- Limited storage capacity between the I-75/WHV Interchange and the intersection to the east with Central Parkway and West McMillan Street.
- Large traffic demand created when adding additional movements to make a full movement interchange.
- Close proximity between the existing WHV and Hopple Street interchanges precluded designs which required two lane entrance ramps or ramp braiding from WHV to the north.
- Topography of the general area, particularly to the east of I-75 restricted possible realignment of side roads and intersection locations.

In Step 7 of the PDP, a SPUI alternative and a TUDI alternative were developed for the WHV Interchange. The geometric layout of either interchange will work with Alternative E or

Alternative I. For analysis purposes, the SPUI design is shown with Alternative E and the TUDI design is shown with Alternative I (Exhibits 3B and 4B).

3.5.2 Single Point Urban Interchange (grade-separated with Central Parkway)

A SPUI has a single intersection for all ramps located in the center of the interchange, versus a traditional diamond interchange which has two ramp intersections located to the right and to the left of the mainline.

The SPUI alternative is a full movement interchange (Exhibit 3B). Both northbound and southbound interstate traffic would have access to WHV eastbound and westbound. Local traffic from the east and from the west would also have access to both northbound and southbound I-75. Several of these movements are not provided by the existing interchange. There is one existing movement that would not be provided by the SPUI. Westbound traffic on West McMillan Street would no longer have access to northbound Central Parkway because the left turn movement onto the connector road would be prohibited. This movement would account for 10 vehicles in the AM peak period and 20 vehicles in the PM peak period. The design of the SPUI would accommodate pedestrians and bicyclists.

For the SPUI alternative, WHV was realigned to intersect West McMillan Street at the existing West McMillan Street/West McMicken Avenue intersection. This realignment also includes grade separating the intersection of the WHV and Central Parkway. A new bridge would replace the existing WHV structure from approximately 900 feet west of Spring Grove Avenue to just east of I-75. An additional structure would be required to carry the WHV over Central Parkway. The WHV would be connected to Central Parkway by a new two-way Connector Road. The addition of this new road would provide storage between the WHV and Central Parkway necessary for acceptable traffic operations at this interchange. In several locations multi-lane turning movements are required including one triple left turn movement from I-75 southbound to WHV eastbound.

On the upper deck of the WHV, traffic would be a mix of both local and interstate traffic. The lower deck connection to and from Spring Grove Avenue would remain; however, the existing access between I-75 and the lower deck would be removed. Pedestrian access on the south side of the upper deck would be maintained on the new structure with a connection to Central Parkway along the inside of the new connector road. Table 3 provides a summary comparison of the interchange options for the WHV interchange.

3.5.3 Tight Urban Diamond Interchange

A TUDI has two ramp intersections like a traditional diamond but they are located much closer to each other. This configuration creates a smaller footprint than a traditional diamond interchange.

The TUDI alternative is a full movement interchange to the west only. This alternative replaces the same movements provided in the existing condition but removes the undesirable left-hand exit and splits the existing function of the WHV by separating the local traffic movements from the interstate traffic movements between the upper and lower decks. The local traffic movement between the west side of Cincinnati and downtown would be located on the upper deck of the WHV, while interstate traffic movements would be located on the realigned lower deck (Exhibit 4B).

This interchange alternative would provide a replacement structure to the existing upper deck from just east of Spring Grove Avenue to the existing abutment. This replacement structure would connect to the existing upper deck of the WHV at Spring Grove Avenue. The lower deck structure would be realigned beginning west of the current I-75 southbound ramp diverge location. It would follow a new alignment which crosses Spring Grove Avenue and I-75 south of the WHV upper deck location. This new lower deck structure would be constructed along a new alignment to accommodate two lanes in each direction to carry WHV interstate traffic over I-75 to the lower deck of the WHV.

This new lower deck structure would provide the basis for the interchange, which would have the I-75 northbound and southbound ramps tying into it. Two lanes of traffic in each direction would be provided on the new I-75 interchange structure. The two lanes of traffic in the westbound direction would taper down utilizing pavement markings to one lane west of the interchange and would tie into the outside lane on the north side of the lower deck. The remaining two lanes on the lower deck of the WHV would be used to move eastbound traffic to the new I-75 interchange. This configuration requires reversing the direction of traffic in the center lane on the lower deck from the existing condition (westbound) to eastbound.

Realigning the lower deck removes the existing connection to and from Spring Grove Avenue. In order to restore this connection, two one-way connections are proposed. One connection replaces the movement from Spring Grove Avenue to the west and the other replaces the movement from the west to Spring Grove Avenue. Both connections utilize the footprint of the existing loop ramps, which would be removed as part of this interchange alternative. Pedestrian access to and from the upper deck would be provided along the inside of these two connections. The connection to carry traffic to the west would be located north of the interchange. This connection would have an intersection at Spring Grove Avenue, pass under I-75 and form a merge with the WHV to the east of I-75, closely following the alignment of the existing loop ramp. Similarly, in the eastbound direction, the connection would follow the alignment of the existing loop ramp for several hundred feet and then align to become the fourth leg of an intersection with Harrison Avenue and Winchell Avenue to the southeast of the new interchange. Table 3 provides a summary comparison of the interchange options for the WHV interchange.

3.6 Design Criteria

The feasible alternatives were developed in accordance with the geometric design criteria requirements of both the KYTC and ODOT. The Kentucky section of the conceptual alternatives was designed in accordance with the most current version of KYTC's *Highway Design Manual* and the Ohio section of the conceptual alternatives was designed in accordance with the most current version of ODOT's *Location and Design Manual*.

In Kentucky, three categories of design requirements were applied to the feasible alternatives; mainline, service ramps, and local streets. In Ohio, four categories of design requirements were applied to the feasible alternatives; mainline, directional ramps, service ramps, and local streets. Each of these categories has a roadway classification and design speed. The functional classification of the mainline roadway is "Principal Arterial – Interstate (Urban)" with a design speed of 60 miles per hour (mph). The directional ramps and service ramps are classified as "Collector (Urban)" with design speeds varying from 30 to 60 mph; and the local streets are classified as "Local (Urban)" with a design speed of 30 mph in Kentucky and 25 to 40 mph in Ohio.

Table 3. Western Hills Viaduct Interchange Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Single Point Urban Interchange	Tight Urban Diamond
Summary Description of Interchange Alternative	The No Build Alternative maintains the existing configuration of the WHV and consists of minor, short-term safety and maintenance improvements to the interchange which would maintain its continuing operation	WHV is realigned to intersect West McMillan Street at the existing West McMillan Street/West McMicken Avenue intersection. This also includes grade separating the intersection of WHV and Central Parkway. A new bridge would replace the existing WHV structure from ~900 feet west of Spring Grove Avenue to just east of I-75. An additional structure would be required to carry WHV over Central Parkway. WHV would be connected to Central Parkway by a new two-way connector road.	This interchange alternative would provide a replacement structure in the existing structure location from just east of Spring Grove Avenue to the existing abutment location. This structure would connect to the existing upper deck of the WHV at Spring Grove Avenue. The lower deck would be realigned beginning west of the current I-75 southbound ramp diverge location and follow an alignment which crosses Spring Grove Avenue and I-75 south of the WHV upper deck location.
Future (2035) levels of service at ramp junctions	Intersections – LOS B Ramps – LOS A through F	Intersections – LOS B through D Ramps – LOS C through E	Intersections – LOS A through C Ramps – LOS B through D
Future (2035) daily hourly volumes at ramp junctions	Ranges from 293 – 1,010	Ranges from 520 – 1,410	Ranges from 320 – 1,070
Right-of-way Impacts – (acres within construction limits)	No Impact	3.9 total acres	1.9 total acres
Residential – (total estimated structures and residences displaced)	No Impact	16 total (16-60 persons)	No residential displacements
Business – (total estimated businesses and employees displaced)	No Impact	3 businesses (15-30 employees)	2 businesses (10-20 employees)
Parcels – (total estimated parcels impacted)	No Impact	63 parcels	20 parcels

Table 3. Western Hills Viaduct Interchange Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Single Point Urban Interchange	Tight Urban Diamond
Compatibility with existing community land use plans	• Not compatible with economic development plans • Does not preclude future light rail plans • No changes to existing land uses	• Supports redevelopment and economic plans • Makes provisions for future light rail plans • Impacts residential land uses	• Supports redevelopment and economic plans • Makes provisions for future light rail plans
Community Cohesion	No impact	Loss of residences in West McMicken Avenue neighborhood	No loss of residences or facilities in communities
Facilities and Services	No impact	No impact	No impact
Environmental Justice – (impacts to neighborhoods and Census tracts with high percentage of low income and minority populations)	No impact	• Impact to low-income population • Impact to minority population • No impact to facilities and services within EJ area • No disproportionate impacts	• No impact to low-income population • No impact to minority population • No impact to facilities and services within EJ area • No disproportionate impacts
Wetlands – (wetland areas impacted)	No impact	No impact	No impact
Intermittent Streams	No impact	No impact	No impact
Ephemeral Streams	No impact	No impact	No impact
Indiana Bat Habitat (Potential /Marginal)	No impact	No impact	No impact
Potential Running Buffalo Clover Habitat	No impact	No impact	No impact
Floodplains	No impact	No impact	No impact
Farmland	No impact	No impact	No impact
Individual properties eligible for listing or listed in the National Register of Historic Places (NRHP)	No impact	Western Hills Viaduct	Western Hills Viaduct
Historic Districts (HD) directly impacted	No impact	West McMicken Avenue Historic District	No impact

Table 3. Western Hills Viaduct Interchange Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Single Point Urban Interchange	Tight Urban Diamond
Number of sites recommended for Phase II Environmental Site Assessment	No impact	1	1
Number of sites recommended for Phase I Environmental Site Assessment	No Impact	1	1
Section 6(f) Parks	No Impact	No impact	No impact
Section 4(f) Resources	No Impact	Western Hills Viaduct West McMicken Avenue Historic District	Western Hills Viaduct
Utilities	No Impact	5 total	5 total
Cost Estimates (in millions)	Not applicable	$269.6	$141.8

The required criteria for the nine categories of design features, with detailed subcategories, and the location of reference information in the respective design manuals, are detailed in Appendix C. Engineering line diagrams, and geometric plans and profiles of each conceptual alternative are provided in Appendix C.

A central part of the project is the rehabilitation/replacement of the existing Brent Spence Bridge. New structures would include an open span to preserve the navigation channel of the Ohio River. Coordination with the US Coast Guard (USCG) was initiated to determine locations of bridge piers in the Ohio River.

Alternatives E and I would cross the Ohio River on a new bridge with a centerline located approximately 140 feet west of the existing Brent Spence Bridge centerline. In accordance with USCG requirements, the piers for this bridge must be placed "outside" of the existing Brent Spence Bridge piers. The piers would be placed in the Ohio River approximately 85 feet closer to the banks of the Ohio River than the current Brent Spence Bridge piers. The existing Brent Spence Bridge has a middle span length of 830.5 feet between existing piers. The new bridge would have a middle span length of approximately 1,000 feet from center to center of the proposed piers.

3.7 Design Exceptions

Due to the constraints of the urban study area and required connections to existing roadways, some design exceptions were incorporated into the feasible alternatives. These design exceptions include the following categories:

- Increased grade: The degree of rise or descent of a vertical profile.
- Reduced shoulder width for the inside shoulders of the interstate mainline.
- Restrictions for horizontal stopping sight distance: When stopping sight distance is restricted horizontally, it occurs where the roadway ahead curves to the left and the median barrier on the left restricts stopping sight distance from the driver's eye to the object.
- Restrictions for vertical stopping sight distance: When stopping sight distance is restricted vertically, it occurs at either a crest or sag vertical curve within the roadway.
- Degree of curve.

The majority of the anticipated design exceptions within Ohio were requested by the city of Cincinnati to maintain existing access, and reduce right-of-way, environmental or business impacts associated with the project. A summary of all of the anticipated design exceptions for Alternatives E and I is found in Appendix C.

3.7.1 Alternative E

In Kentucky, five design exceptions involving grade, lane width, and shoulder width are anticipated. In Ohio, 37 design exceptions are anticipated. These design exceptions are classified as degree of curve, horizontal stopping sight distance, vertical stopping sight distance, and shoulder width.

3.7.2 Alternative I

In Kentucky, three design exceptions involving grade, lane width, and shoulder width are anticipated. In Ohio, 40 design exceptions are anticipated. These design exceptions are

classified as degree of curve, horizontal stopping sight distance, vertical stopping sight distance, grade, shoulder width, and taper rate.

3.8 Bridge Type Study

KYTC Bridge Type Selection Process was conducted for the new Ohio River Bridge to select the best design for the new Ohio River crossing. The results of this study are presented in the *Bridge Type Selection Report* (March 2011). The Bridge Type Selection Process is a three step process, which involves developing and analyzing numerous bridge concepts leading to a recommendation of three final bridge type alternatives. The following sections describe the Bridge Type Selection Process.

3.8.1 Step 1

The first activity of the Bridge Type Selection Process was a meeting with the Project Aesthetic Committee (PAC). On September 25, 2009, the project team met with the PAC to identify key visual and aesthetic criteria, which would be used to assist with evaluating bridge concepts developed during Step 1. Five key visual and aesthetic criteria were developed as a result of the PAC meeting. The five key criteria were:

- The new bridge should be visually attractive.
- The new bridge needs to be visible looking "through" the existing bridge (from the east).
- As much as possible, crossing the new bridge should allow views of the surrounding context (unlike existing bridge).
- The new bridge should have distinctive characteristics that identify it as a local landmark.
- The new bridge should have a visual relationship with the existing bridge.

A total of 24 bridge concepts were developed during Step 1. Through a series of meetings, the Federal Highway Administration (FHWA), ODOT, and KYTC identified 12 bridge concepts which met the purpose and needs of the project. These bridge concepts consisted of two truss bridges, three arch bridges and seven cable-stayed bridges.

3.8.2 Step 2

The 12 bridge concepts were presented to a combined meeting of the PAC and Project Advisory Committee on January 29, 2010. During the meeting, the bridge concepts which best met the five key visual and aesthetic criteria were identified. Additionally, various bridge components which could be incorporated into the 12 bridge concepts were presented. The 12 bridge concepts were posted on the project website to solicit public comment as well.

A one-week comment period followed the January 29th PAC meeting, which provided the public an opportunity to comment on the 12 bridge concepts. Comments were received via email, faxes, phone calls, and postings to the project website. The comments were analyzed and used to quantify the trends in the public's preferences and concerns regarding the overall project and the various bridge concepts. Based on the results of the January 29th meeting and the public comments received, six alternatives were recommended for further study in Step 3 of the process:

1. Arch Bridge: simply supported arch with inclined arch ribs,
2. Arch Bridge: continuous arch with vertical arch ribs,
3. Cable-stayed Bridge: two towers, three vertical legs/tower,
4. Cable-stayed Bridge: two towers, three inclined legs/tower,
5. Cable-stayed Bridge: two towers, two inclined legs/tower, and
6. Cable-stayed Bridge: one tower, two vertical legs/tower.

3.8.3 Step 3

The six bridge type alternatives were presented to a combined meeting of the PAC and Project Advisory Committee on April 15, 2010. As part of the presentation, the ways in which each of the six bridge type alternatives met the key design criteria established for the bridge type selection process were discussed. The ways in which the six alternatives met the five key visual and aesthetic criteria developed by the PAC during Step 1 were also discussed.

The six bridge type alternatives were posted on the project website to solicit public comments. Additionally, a press release was issued to notify the public of the opportunity to provide comments on the alternatives. A one-week comment period followed the April 15th meeting, which provided the committee members and the public an opportunity to comment on the six bridge type alternatives. Comments were received via email, faxes, phone calls, and postings to the project website. The public comments received were analyzed and used to quantify trends for the public's preferences and concerns regarding the overall project and for the various bridge concepts.

A comparative analysis was completed for the six bridge type alternatives with respect to construction cost; constructability/construction time; maintenance and durability; major rehabilitation feasibility; maintenance of traffic; and public comment. Based on this comparative analysis, it was recommended that Alternatives 1, 3, and 6 be the Final 3 Bridge Alternatives selected to proceed to preliminary design during Step 3 of the Bridge Type Selection Process. The reasons for the selection of these three bridge type alternatives are discussed in the following.

Alternative 1 was recommended to proceed through Step 3 of the Bridge Type Selection Process because it offers the lowest construction cost ($490 million based upon Step 2 cost estimates) of all bridge type alternatives, and it was well regarded by the public via the input received from the project website and a poll by the Cincinnati Chamber of Commerce. The construction of the Ohio River Crossing is on the overall project's critical path for construction. Alternative 1 has the shortest construction time of 2.5 to 3 years compared to 3.5 to 4 years for the other five bridge type alternatives.

Alternative 2 was not recommended to advance further in the Bridge Type Selection Process because its construction cost ($630 million based upon Step 2 cost estimates) is the second highest of the six bridge type alternatives, and its arch ribs will present a navigation hazard on the Ohio River for barges during flood events. Pier protection such as fenders or dolphins would be impractical and unsightly due to the variability of the river height. If the arch ribs are damaged, mitigation measures would be expensive and negatively impact river traffic. Additionally, construction of the main span of the bridge would interrupt river traffic for longer than that of Alternative 1. The construction time of 3.5 to 4 years is similar to the other alternatives, with the exception of Alternative 1.

Alternative 3 was recommended to proceed through Step 3 of the Bridge Type Selection Process because it offers the second lowest construction cost ($570 million based upon Step 2 cost estimates), which is the lowest of the cable-stayed alternatives. Alternative 3 was well regarded by the public via the input received from the PAC and Project Advisory Committee, the project website, and the Cincinnati Chamber of Commerce poll. From the drivers' point of view, the three needle towers are well proportioned and the vertical towers are more traditional and straightforward than the inclined tower bridge type alternatives.

Alternative 4 was not recommended to advance further in the Bridge Type Selection Process because its inclined needle towers would not be visible from either Cincinnati or Covington from the drivers' point of view; and it would be more difficult and expensive to construct than Alternative 3. Even though the construction cost ($610 million based upon Step 2 cost estimates) is similar to Alternative 6, this alternative does not offer the advantages of Alternative 6 as described below.

Alternative 5 was not recommended to proceed further in the Bridge Type Selection Process because its construction cost ($640 million based upon Step 2 cost estimates) is the highest of all the Bridge Type Alternatives. Additionally, compared to Alternative 6, the twin needle towers appear too short and poorly proportioned from the drivers' point of view.

Alternative 6 was recommended to proceed through Step 3 of the Bridge Type Selection Process because it is the most visible of the bridge type alternatives, especially from Cincinnati and Covington and it would serve as a landmark for the region. From the drivers' point of view, the tall and well proportioned twin-needle towers would serve as a gateway entrance to Cincinnati and Covington. This alternative was highly regarded by the public via the input received from the Cincinnati Chamber of Commerce poll, the PAC, and Project Advisory Committee. While the construction cost ($620 million based upon Step 2 cost estimates) is the third highest of all the Bridge Type Alternatives, it is only 1.6 percent ($10 million) higher than the fourth highest.

Upon selection and approval by FHWA, KYTC and ODOT of the Final 3 Bridge Alternatives, the project team assessed the suitability of each alternative based on more detailed examination of the structural requirements, cost, constructability, environmental impacts, aesthetics, and other key criteria. This assessment included performing significant preliminary design, preparing revised cost estimates, and preparing additional renderings for the Final 3 Bridge Alternatives.

While each of the Final 3 Bridge Alternatives has distinct characteristics, there are some elements common to all. The following is a list of these common elements:

- A bridge alignment adjacent to, and just west of, the existing Brent Spence Bridge.
- A double-decked truss superstructure carrying two roadways on each deck, with each roadway composed of two or three 12-foot-wide lanes and two 14 foot-wide shoulders.
- An approximately 1,000-foot main span with piers outside of the main span piers of the existing Brent Spence Bridge.
- The river to superstructure clearance will be no lower than that of the existing Brent Spence Bridge.
- Working in conjunction with the existing Brent Spence Bridge, to carry the Design Year 2035 traffic.

The Final 3 Bridge Alternatives are depicted below. The selection of the new Ohio River Bridge will be based on public hearing comments and results of the Bridge Type Study. The final bridge type will be determined in the next phase of the project.

Alternative 1: Tied Arch Bridge

Alternative 3: Two Tower Cable Stayed Bridge

Alternative 6: One Tower Cable Stayed Bridge

3.9 Cost Estimates

The 2010 construction cost estimates and inflation rates were prepared as outlined by the ODOT's *Procedure for Construction Budget Estimating* (May 2010) and by use of the Transport Estimator, Version 2.5a, with 2010 catalogs. The total estimated project costs are construction costs which include a design contingency, a construction inflation factor based on median construction date for each construction contract, right-of-way for roadway and utility relocations, major utility, and project development costs. Project development costs include detail design and construction management costs for each construction contract. Real estate costs are inflated two percent per year to completion of acquisition. Utility costs are inflated 15 percent to mid-year of utility construction. Table 4 summarizes total estimated project costs of each feasible alternative for Kentucky and Ohio, and the overall total estimated project costs. The associated costs for the new Ohio River Bridge, rehabilitation of the existing Brent Spence Bridge, and the WHV Interchange SPUI and TUDI are summarized independently (Table 4).

Table 4. Total Cost Estimates for Mainline Alternatives in Projected Build Year Dollars

Alternative	Construction Costs (millions)	Construction Costs Inflation (59.5%) (millions)	Real Estate Costs (millions)	Utility Costs (millions)	Project Development Costs (millions)	Total Estimated Costs (millions)
Kentucky						
Alternative E	$393.4	$222.3	$25.3	-	$59.2	$700.2
Alternative I	$362.3	$204.4	$20.2	-	$54.5	$641.4
Ohio						
Alternative E	$518.8	$278.2	$21.4	$93.0	$60.2	$971.6
Alternative I	$474.5	$255.8	$18.3	$93.0	$55.1	$896.7
WHV						
SPUI	$160.1	$82.1	$4.6	$0.2	$22.6	$269.6
TUDI	$84.8	$43.5	$1.3	$0.2	$12.0	$141.8
Bridges						
Existing Bridge	$40.6	$26.6	-	-	$6.3	$73.5
New Bridge[1]	$474.2	$194.4	-	-	$61.6	$730.2
Totals						
Alternative E with SPUI	$1,587.1	$803.6	$51.3	$93.2	$209.9	$2,745.1
Alternative E with TUDI	$1,511.8	$765.0	$48.0	$93.2	$199.3	$2,617.3
Alternative I with SPUI	$1,511.7	$763.3	$43.1	$93.2	$200.1	$2,611.4
Alternative I with TUDI	$1,436.4	$724.7	$39.8	$93.2	$189.5	$2,483.6

1. The new bridge total cost estimates range from $624.5 to $730.2 million, depending on the bridge alternative. Additionally, the construction costs with inflation range from $570.7 to $668.6 million and the project development costs range from $53.8 to $61.6 million. The new bridge cost estimates shown in the table are the highest cost of the bridge alternatives.

4.0 ENVIRONMENTAL RESOURCES, IMPACTS, AND MITIGATION

4.1 Introduction

The setting and environmental resources within the study area are discussed in *the Red Flag Summary* (December 2005), *Existing and Future Conditions* (February 2006), *Planning Study Report* (September 2006), and *Conceptual Alternatives Study* (April 2009), which are provided in Appendix A. A summary of existing conditions and new features not described previously due to the extended study area are detailed for each resource in this section. Existing conditions within the extended study area at the southern end of the study and the Western Hills Viaduct (WHV) interchange are also discussed.

The impacts of Alternative E and Alternative I are discussed for each environmental resource. As discussed in Sections 3.4 and 3.5, the WHV interchange options are interchangeable between Alternatives E and I. For analysis purposes, the single-point urban interchange (SPUI) design is shown with Alternative E and the tight urban diamond interchange (TUDI) design is shown with Alternative I. Where applicable, the impacts resulting from the SPUI and TUDI alternatives are presented independently of the feasible alternatives in the following sections.

4.2 Traffic

Travel demand model and recent traffic count data were utilized to develop traffic projections for the No Build Alternative and Alternatives E and I in the 2035 design year. The Ohio Department of Transportation (ODOT) certified traffic was used in the traffic analyses. Exhibits related to the traffic analyses are located in Appendix B.

4.2.1 Traffic Volumes

Traffic counts were performed on an average weekday within the Brent Spence Bridge study area in September, October, and November of 2005 in order to obtain existing weekday traffic volumes. Additional traffic counts were conducted in January 2008 to collect additional traffic data at the Dixie Highway Interchange, along McMillan Avenue, and on I-71 near the I-471 Interchange area. Additional traffic counts were collected in October 2009 for the Buttermilk Pike Interchange, and June of 2010 on Central Avenue between OH 6th Street and OH 7th Street because the street was converted from one-way to two-way in this block. Traffic volumes for at-grade intersections were collected using turning movement counts, while ramp and mainline volumes on I-71, I-75, and US 50 were collected using portable machine counters. The AM and PM peak hours were identified from the traffic counts and were used in the 2005 analyses for the study area. The AM and PM peak hours are 7:30 to 8:30 AM and 4:30 to 5:30 PM, respectively.

Design year (2035) traffic volumes were determined using the Ohio Kentucky Indiana Regional Council of Governments (OKI) regional travel demand model. In order to coordinate the traffic projections within the I-75 corridor and the region, traffic projections for all three adjoining I-75 projects (HAM-71/75-0.00/0.22 Brent Spence Bridge, HAM-75-2.30 Mill Creek Expressway, and HAM-75-10.10 Thru the Valley) were incorporated into the OKI regional travel demand model. The 2005 volumes were used to project the peak hour volumes for design year 2035. In addition to the No Build condition, the OKI demand model was used to compute 2035 design hour traffic volumes. The demand model was re-run for each of the project alternatives because differences in freeway access points could affect

local street and freeway traffic patterns. Truck percentages for the study area were calculated based on existing traffic counts and growth rates generated from the travel demand model.

4.2.2 Development of Certified Traffic

In the development of certified traffic by ODOT, the existing four hour turning movement counts were factored to average daily traffic (ADT) volumes using ODOT's hourly distribution and seasonal adjustment factors by functional class. The 72-hour and 48-hour ramp counts were converted to ADTs by applying the seasonal adjustment factor by functional class. The calculated ADT volumes were compared to historical count information and ODOT ramp counts. The existing traffic counts were then adjusted along the mainline and between intersections as appropriate for the AM, PM, and calculated ADT volumes. Finally, the AM and PM volumes were factored to the design hour (30^{th} highest hour) by applying a peak hour factor of 1.056, as was done for the HAM-75-2.30 PID 76257 (Mill Creek Expressway Project), which is located at the northern limits of this project. Application of this peak hour factor is consistent with traffic engineering practices. This process for developing certified traffic was agreed to by the Kentucky Transportation Cabinet (KYTC).

The OKI regional travel demand model was used to develop traffic assignments for the 2035 design year. Using the methods described in the National Cooperative Highway Research Program (NCHRP) 255 report, 24-hour model assignments were post-processed by comparing the ADT count data to the base year (2005) model assignment and applying the same over/under estimation to the future year (2035) model assignment. A hybrid mix of the ratio and delta methods were applied to each link. Finally, the 2035 ADT was calculated by applying a straight line extrapolation between the 2005 count and the post-processed 2035 ADT.

A growth factor was calculated for each link by dividing the 2035 ADT by the 2005 traffic count. This factor was then applied to the AM and PM peak hour count data to get 2035 AM and PM peak hour data.

Turning movement forecasts for the 2035 AM, PM, and ADT were made using the NCHRP 255 iterative proportional method. Interchanges were treated as single point intersections where possible to determine the mainline, cross street, and ramp volumes at one time.

Finally, all 2035 traffic volumes on the mainline and between intersections were adjusted as appropriate for the AM, PM, and ADT periods.

4.2.3 Capacity Analyses

The capacity analyses were performed for the No Build Alternative, Alternative E, and Alternative I using Highway Capacity Software (HCS+) version 5.4. Capacity analyses are performed to estimate the maximum amount of traffic that can be accommodated by a roadway while maintaining prescribed operational qualities. This is accomplished using the level of service (LOS) concept. Level of service is an assessment of roadway and intersection performance, expressed LOS A to LOS F. Level of service for freeways is based on traffic density; whereas level of service for intersections is based on delay. LOS A for freeway represents free-flow conditions where vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. LOS E by contrast is defined as using all available capacity, where vehicles are closely spaced within the traffic

stream and there are virtually no usable gaps to maneuver. LOS F exceeds the roadway's capacity and there is a breakdown of vehicle flow. Typically, in urban areas, a roadway component is deemed adequate if the corresponding level of service is LOS D or better, while LOS E and LOS F indicate near failure or failure respectively. The goal level of service for this region is LOS D; however, a level of service below LOS D is acceptable for the recommended preferred alternative provided the level of service is not degraded from what it is in the No Build Alternative.

Freeways consist of three parts: basic freeway segments, ramp (exit and entrance) segments, and weaving sections. The basic freeway segments are those sections of the freeway that are free from merging, diverging, and weaving. Freeway segments were analyzed using the HCS Freeway module and included information pertaining to total traffic volume, number of freeway lanes, design speed of the facility, and truck percentages as part of the analysis. Weaving volumes were allocated proportionately by the upstream and downstream ramp and mainline volumes. A volume/capacity > 1.00 denotes LOS F; higher values indicate how much over capacity the demand volume is for freeway segments having LOS F. The capacity of a particular freeway segment is directly related to the number of lanes available, the truck percentage on that segment, and the design speed. Both feasible alternatives were assumed to have a mainline design speed of 60 miles per hour (mph).

4.2.4 Future Traffic Demand (2035) Analyses Results

Capacity analyses are performed to estimate the maximum amount of traffic that can be accommodated by a roadway while maintaining prescribed operational qualities. The LOS were determined for freeway segments, ramp junctions, and intersections for the No Build Alternative, Alternative E, and Alternative I. Tables with LOS information are presented in the following sections. Graphics of the LOS at each freeway segment, ramp junction, and intersection are included in Appendix B to show the effects of the new or revised interchanges on the interstate system and the local road network. These graphics also show an overall comparison of operations between the No Build Alternative, Alternative E, and Alternative I. Detailed traffic data and exhibits are presented in the *Preferred Alternative Verification Report* (May 2011) and the *Access Point Request Document* (August 2011) located in Appendix F.

4.2.4.1 Freeway Segments

Where the demand traffic flowing from one section of the freeway to another or from an entrance ramp to the mainline exceeds the maximum capacity of the freeway, the demand traffic will be constrained to reflect the actual traffic volumes which can be accommodated on the freeway (volume to capacity ratio equal to 1.00). The portion of the demand traffic that exceeds the capacity of the freeway would be constrained and not used in downstream calculations.

Freeway capacity is the maximum volume of traffic that a freeway can accommodate without resulting in LOS F. As the volume of vehicles traveling on a freeway segment increases, the density of vehicles also increases, and speed decreases until the freeway reaches capacity. Once the volume of vehicles attempting to utilize the freeway exceeds the capacity, the freeway reaches a "stop-and-go" operating condition. When a freeway becomes overcapacity, the capacity of a freeway lane shrinks to about one-third the carrying capacity that it had under free flow conditions. The capacity of a freeway segment is dependent upon several parameters: number of vehicles, free flow speed, number of lanes, and the peak hour factor.

The freeway segment level of service criteria as defined by the Transportation Research Board (TRB) for freeway segment density is shown in Table 5.

Table 5. Freeway Segment Level of Service

Level of Service (LOS)	Freeway Segment Density (pc/mi/ln)
A	0 – 11
B	> 11 – 18
C	> 18 – 26
D	> 26 – 35
E	> 35 – 45
F	> 45

4.2.4.1.1 No Build Alternative

The operating goal is to maintain LOS D or higher for all roadway segments. As a result, degradation from the No Build Alternative to the build alternatives only occurs when the LOS for the build alternative is LOS E or LOS F and it has a lower LOS than the No Build Alternative. For this reason, only the number of locations which have LOS E or LOS F are discussed below. It should also be noted that the roadway system for the No Build Alternative and build alternatives are uniquely different, with the build alternatives having collector-distributor (C-D) roadways, no left hand exits, no drop lanes, less weaves, and lane balance throughout the project. As a result, it may be difficult to make direct comparisons between the No Build Alternative and build alternatives at every location.

No Build Alternative – Kentucky

Eighteen freeway segments were analyzed along the No Build Alternative in Kentucky (Table 6).

AM Peak

During the AM peak period, five of the freeway segments operated at LOS E, while two freeway segments operated at LOS F.

PM Peak

During the PM peak period, 11 of the freeway segments operated at LOS E, while three freeway segments operated at LOS F.

Table 6. No Build Alternative Freeway Analysis - Kentucky

Ref	Facility	Location	No Build LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-1	SB I-71/I-75	South of Ohio River	D	6,520	6,048	F	8,870	7,905
F-2	SB I-71/I-75	South of 5th Street Exit Ramp	D	5,660	5,250	E	8,020	6,880

Table 6. No Build Alternative Freeway Analysis - Kentucky

Ref	Facility	Location	No Build LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-3	SB I-71/I-75	South of Pike Street/12th Street Exit Ramp	D	5,390	5,000	D	7,430	6,370
F-4	SB I-71/I-75	North of 12th Street Entrance Ramp	D	5,870	5,470	E	8,580	7,470
F-5	SB I-71/I-75	South of 12th Street Entrance Ramp	D	6,220	5,820	F	9,160	8,050
F-6	SB I-71/I-75	South of Kyles Lane Exit Ramp	D	5,620	5,260	E	8,140	6,740
F-7	SB I-71/I-75	North of Dixie Highway Exit Ramp	D	6,060	5,700	E	8,780	7,380
F-8	SB I-71/I-75	South of Dixie Highway Exit Ramp	D	5,870	5,520	E	8,070	6,780
F-9	SB I-71/I-75	South of Dixie Highway Entrance Ramp	D	6,200	5,850	E	8,650	7,360
F-10	NB I-71/I-75	South of Dixie Highway Exit Ramp	F	5,760	5,710	F	6,570	5,730
F-11	NB I-71/I-75	North of Dixie Highway Exit Ramp	E	5,490	5,440	E	6,210	5,420
F-12	NB I-71/I-75	North of Dixie Highway Entrance Ramp	D	6,430	6,380	D	6,600	5,810
F-13	NB I-71/I-75	North of Kyles Lane Exit Ramp	E	5,930	5,680	E	5,790	5,100
F-14	NB I-71/I-75	North of Kyles Lane Entrance Ramp	E	7,250	5,760	E	6,410	5,720
F-15	NB I-71/I-75	North of 12th Street Exit Ramp	E	7,010	5,540	E	5,860	5,230
F-16	NB I-71/I-75	North of 5th Street Exit Ramp	E	6,370	5,040	D	5,310	4,740
F-17	NB I-71/I-75	North of Pike St. Entrance Ramp	F	7,490	5,810	E	5,710	5,140
F-18	NB I-71/I-75	North of 4th St. Entrance Ramp	D	8,650	6,970	D	6,690	6,120

[1]See Section 4.2.4.1 for explanation on constrained volume.

No Build Alternative – Ohio
There were 69 freeway segments analyzed along the No Build Alternative in Ohio (Table 7).

AM Peak
During the AM peak period, six of the freeway segments operated at LOS E, while five freeway segments operated at LOS F.

PM Peak
During the PM peak period, seven of the freeway segments operated at LOS E, while seven freeway segments operated at LOS F.

Table 7. No Build Alternative Freeway Analysis - Ohio

Ref	Facility	Location	No Build LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-1	I-75 SB	North of WHV	F	9,630	-	D	6,530	-
F-2	I-75 SB	Between WHV Ramps	E	9,370	7,674	D	6,030	-
F-3	I-75 SB	Between Western Avenue Ramps	E	9,430	7,857	D	5,960	-
F-4	I-75 SB	Between Ezzard Charles Drive & Freeman Avenue Ramp	E	8,810	7,340	D	5,720	-
F-5	I-75 SB	Between Freeman Avenue & Western Avenue Ramps	D	8,140	6,782	C	5,260	-
F-6	I-75 SB	Between 7th Street & 2nd Street/I-71 Ramps	D	7,080	5,962	D	5,550	-
F-7	I-75 SB	Between 9th & 7th streets	C	3,000	2,528	D	2,760	-
F-8	I-75 SB	Between 7th & 5th streets	D	3,160	2,688	E	3,700	-
F-9	I-75 SB	Between 5th and& 3rd streets	D	3,840	3,368	F	4,530	3,967
F-10	I-71 SB	North of Liberty Street	E	5,350	-	F	6,330	-
F-11	I-71 SB	Between Liberty Street & Eggleston Avenue	D	4,700	-	D	4,820	4,568
F-12	I-71 SB	Between Eggleston Avenue & 5th Street	D	3,030	-	F	4,290	4,066

Table 7. No Build Alternative Freeway Analysis - Ohio

Ref	Facility	Location	No Build LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-13	I-71 SB	Ramp to 3rd Street	D	1,670	-	A	530	502
F-14	US 50 WB	East of I-71	C	2,240	-	B	1,900	-
F-15	I-71 SB	Between US 50 & I-75 NB Exit Ramp	C	5,270	-	D	6,190	5,881
F-16	I-71 SB	Between I-75 NB Exit Ramp & 3rd Street Ramp	C	2,420	-	D	3,140	2,983
F-17	I-71 SB	Between 3rd Street Entrance Ramp & I-75 SB	D	2,680	-	F	4,340	3,966
F-18	I-71 SB	Crossing Ohio River SB	D	6,520	6,048	F	8,870	7,905
F-19	I-75 SB	I-75 SB Ramp between I-71 & 5th Street Ramp	D	4,080	3,434	D	2,790	-
F-20	I-75 SB	I-75 SB Ramp between 5th Street Ramp & 2nd Street Ramp	D	3,370	2,836	C	2,540	-
F-21	I-75 SB	I-75 SB Ramp between 2nd Street Ramp & 6th Street Ramp	D	1,860	1,565	D	1,730	-
F-22	I-75 SB	I-75 SB Ramp to 2nd Street	C	1,510	1,271	B	810	-
F-23	6th St. EB	Ramp to I-71 NB	D	1,750	-	C	1,190	-
F-24	I-75 SB	Ramp to I-71 NB	D	3,610	3,315	D	2,920	-
F-25	6th St. EB	West of 5th Street Ramp	B	3,330	-	A	2,290	-
F-26	6th St. EB	Ramp to 5th Street	A	560	-	A	150	-
F-27	6th St. EB	East of 5th Street Ramp	D	2,770	-	C	2,140	-
F-28	6th St. EB	Ramp to I-71/ I-75 SB & 2nd Street	C	1,020	-	C	950	-
F-29	6th St. EB	Ramp to I-71/ I-75 SB	B	680	-	B	830	-
F-30	6th St. EB	Ramp to 2nd Street	A	340	-	A	120	-
F-31	I-75 SB	I-75 SB Ramp/6th Street Ramp to 2nd Street	B	1,850	1,611	A	930	-
F-32	2nd St. EB	East of I-75 SB Ramp	B	2,070	1,831	A	1,340	-

Table 7. No Build Alternative Freeway Analysis - Ohio

Ref	Facility	Location	No Build LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-33	I-71 NB	Crossing Ohio River NB	D	8,650	6,970	D	6,690	6,120
F-34	I-71 NB	East of I-75 NB	E	4,800	3,868	C	2,330	2,131
F-35	I-71 NB	Between 2nd Street Ramp & I-75 SB Ramp	D	3,600	2,901	B	1,900	1,738
F-36	I-71 NB	East of I-75 SB Ramp	D	7,210	6,216	C	4,820	4,658
F-37	2nd St. EB	East of I-71 NB Ramp	A	3,270	2,798	A	1,770	1,733
F-38	I-71 NB	Between US 50 & 2nd St. Ramp	F	5,120	4,414	C	2,390	2,310
F-39	US 50 EWHVB	West of I-71 NB	B	2,090	1,802	C	2,430	2,348
F-40	I-71 NB	Between 2nd Street Ramp & 5th Street Ramp	C	5,210	4,033	B	2,820	2,740
F-41	I-71 NB	Between 5th Street Ramp & I-471 Ramp	D	5,430	4,253	C	3,440	3,360
F-42	I-71 NB	Between I-471 Ramp & Gilbert Avenue Ramp	F	7,400	6,004	D	4,560	4,480
F-43	I-71 NB	North of Gilbert Avenue Ramp	D	7,550	6,151	D	5,700	5,620
F-44	I-471 SB	East of I-71	A	970	-	D	2,920	-
F-45	I-471 NB	East of I-71	D	3,430	-	B	1,370	-
F-46	I-75 NB	Between I-71 & 5th Street Ramp	C	3,850	3,102	C	4,360	3,989
F-47	I-75 NB	Between 5th Street Ramp & 6th Street Ramp	C	3,090	2,490	E	3,990	3,650
F-48	I-75 NB	Ramp to 5th Street	B	760	612	A	370	339
F-49	I-75 NB	Between 6th Street & 9th Street	C	2,360	1,902	D	3,290	3,010
F-50	I-75 NB	Ramp to 6th Street	B	730	588	B	700	640
F-51	I-71 SB	Ramp to I-75 NB/6th Street	D	2,850	-	D	3,050	2,898
F-52	I-71 SB	Ramp to 6th Street	C	940	-	D	1,450	1,378

Table 7. No Build Alternative Freeway Analysis - Ohio

Ref	Facility	Location	No Build LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-53	I-71 SB	I-71 SB/I-75 NB Ramp to 6th Street	B	1,670	1,528	C	2,150	2,018
F-54	US 50 WB	West of I-71/I-75	A	1,860	1,718	B	3,110	2,978
F-55	I-71 SB	Ramp to I-75 NB	E	1,910	-	D	1,600	1,520
F-56	I-71 SB	Ramp to I-75 NB	C	2,200	-	D	3,200	3,120
F-57	I-71 SB	Ramp to I-75 NB (North of 6th Street)	B	2,390	-	B	3,720	3,640
F-58	I-71 SB	Ramp to I-75 NB (North of Winchell Exit Ramp)	B	2,220	-	C	3,400	3,327
F-59	I-75 NB	Between I-75 Ramp & 9th Street Ramp	C	4,580	4,122	D	6,690	6,337
F-60	I-75 NB	Between 9th Street Ramp & Freeman Avenue Ramp	C	4,730	4,272	E	7,520	7,167
F-61	I-75 NB	Between Freeman Avenue Ramp & Ezzard Charles Drive	C	5,220	4,762	E	8,080	7,727
F-62	I-75 NB	Between Winchell Avenue Ramp & Western Hills Viaduct	C	5,350	4,892	F	8,480	7,893
F-63	I-75 NB	Bank Street/WHV Entrance Ramp	C	1,010	-	B	910	-
F-64	I-75 NB	Between WHV Ramps	C	5,030	4,599	E	7,950	7,400
F-65	I-75 NB	North of WHV	D	6,040	5,609	F	8,860	7,888
F-66	I-75 SB	Between I-74 Merge & Hopple Street Diverge	F	*	9,452	D	*	6,863
F-67	I-75 NB	Between Hopple Street Merge & Bates Avenue Merge	C	*	5,340	E	*	7,591

Table 7. No Build Alternative Freeway Analysis - Ohio

Ref	Facility	Location	No Build LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-67A	I-75 NB	Between Hopple Street Diverge & Hopple Street Merge	C	*	5,081	E	*	7,329
F-68	I-75 SB	Between Hopple Street Diverge & Hopple Street Merge	F	*	8,636	D	*	6,079

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.
* - constrained volumes provided from the Millcreek Expressway Project, no certified traffic was provided.

4.2.4.1.2 Alternative E

Alternative E – Kentucky
Twenty-three freeway segments were analyzed along Alternative E in Kentucky.

AM Peak
During the AM peak period, four freeway segments would operate at LOS E, while three would operate at LOS F.

PM Peak
During the PM peak period, six of the freeway segments would operate at LOS E, while five segments would operate at LOS F.

At the southern end of the study area, I-71/I-75 currently has three mainline lanes in the northbound direction and four in the southbound direction. Calculations show that in the design year (2035) I-71/I-75 in the No Build Alternative would have numerous locations through the Buttermilk Pike, Dixie Highway, and Kyles Lane interchanges where the LOS would be LOS E or LOS F. For the build alternatives, I-71/I-75 would be widened to six mainline lanes in each direction just north of the Kyles Lane interchange. For southbound I-71/I-75, the expanded number of lanes must be reduced to connect to the existing number of lanes south of the study area. Since the additional lanes in Alternative E can carry more traffic than the No Build Alternative, the LOS falls below LOS D around the Dixie Highway and Kyles Lane interchanges. I-71/I-75 would operate at LOS F south of the Dixie Highway interchange in the northbound direction for Alternative E. In the southbound direction, I-71/I-75 would operate at LOS F between the Kyles Lane and Dixie Highway interchanges in the build alternatives. For this same freeway segment, the No Build Alternative would operate at LOS E. The No Build Alternative operates at a better LOS at this location because traffic is constrained from northern freeway segments. LOS D or better in this area can be obtained if additional lanes included under Alternative E are extended to the south.

The freeway segment analysis for Alternative E in Kentucky is presented in Table 8.

Table 8. Alternative E Freeway Segment Analysis – Kentucky

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-1	SB I-71	South of Ohio River	C	2,780	-	D	4,940	4,670
F-2	SB I-75	South of Ohio River	D	4,530	-	D	4,250	-
F-3	SB I-71	South of Bullock Exit Ramp	C	2,660	-	D	4,810	4,550
F-4	SB I-75	South of Bullock Exit Ramp	C	3,600	-	C	2,940	-
F-5	SB I-71	South of Local C-D Roadway Merge	C	2,960	-	F	5,990	5,710
F-6	SB I-71/I-75	South of I-71/ I-75 Merge	C	6,560	-	D	8,930	8,650
F-7	SB I-71/I-75	South of 12th Street Entrance Ramp	D	7,340	-	E	10,390	10,110
F-8	SB I-71/I-75	6-lane section south of Kyles Lane Exit Ramp	C	6,460	-	D	8,570	7,540
F-9	SB I-71/I-75	5-lane section south of Kyles Lane Exit Ramp	D	6,460	-	E	8,570	7,540
F-10	SB I-71/I-75	4-lane section south of Kyles Lane Exit Ramp	E	6,460	-	F	8,570	7,540
F-11	SB I-71/I-75	South of Kyles Lane Entrance Ramp	D	6,810	-	E	9,130	8,100
F-12	SB I-71/I-75	South of Dixie Highway Entrance Ramp	D	7,150	-	E	9,760	8,730
F-13	SB I-71/I-75	South of Buttermilk Pk. Exit Ramp	E	6,440	-	F	8,540	7,640
F-14	NB I-71/I-75	South of Dixie Highway Exit Ramp	F	7,160	-	F	8,280	-
F-15	NB I-71/I-75	3-lane section north of Dixie Highway Exit Ramp	F	6,440	-	F	7,180	-
F-16	NB I-71/I-75	4-lane section north of Dixie Highway Exit Ramp	D	6,440	-	E	7,180	-

Table 8. Alternative E Freeway Segment Analysis – Kentucky

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-17	NB I-71/I-75	South of Kyles Lane Entrance Ramp	D	7,440	-	D	7,560	-
F-18	NB I-71/I-75	South of 12th Street Exit Ramp	D	8,910	-	D	8,270	-
F-19	NB I-71/I-75	North of 12th Street Exit Ramp	E	6,740	-	E	6,730	-
F-20	NB I-71	North of I-71/I-75 split	E	3,670	-	C	2,240	-
F-21	NB I-75	North of I-71/I-75 Split	C	3,070	-	D	4,490	-
F-22	NB I-71	North of Bullock Street Loop Entrance Ramp	F	4,470	3,880	C	2,660	-
F-23	NB I-75	North of 9th Street Entrance Ramp	C	3,620	-	D	4,830	-

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.

Alternative E – Ohio

There were 73 freeway segments analyzed along Alternative E in Ohio.

AM Peak

During the AM peak period, two of the freeway segments would operate at LOS E, while three segments would operate at LOS F.

PM Peak

During the PM peak period, one of the freeway segments would operate at LOS E, while two segments would operate at LOS F.

At the northern end of the project, I-75 northbound north of the WHV Interchange will be LOS E in the PM peak period. Unlike the project limits of many freeway projects where the freeway adjacent to the project limits is old and in need of additional lanes, the Mill Creek Expressway project is concurrently under design and construction to the north. Additional lanes were not added at this location to raise the LOS to LOS D because the LOS E was contained to one freeway segment and did not extend into other freeway segments upstream or downstream on I-75. The LOS E is very close to being LOS D; and it would be very difficult and costly to add an additional lane for this isolated location and keep lane balance on I-75.

The LOS F for Segments F-8, F-10, F-16, and F-19 are all on I-71 and outside the study area. These locations were included for the purpose of making LOS comparisons between the No Build Alternative and Alternative E at the next freeway segments and interchanges adjacent to the study area. Within the study area, only four of the freeway segments in Ohio

would operate below LOS D, three of these freeway segments will operate at LOS E while one would operate at LOS F.

The freeway segment analysis for Alternative E in Ohio is presented in Table 9.

Table 9. Alternative E Freeway Segment Analysis - Ohio

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-1	I-75 SB	North of Western Hills Viaduct	D	9,360	-	C	6,850	-
F-1A	I-75 SB	Exit Ramp to Western Hills Viaduct & Western Avenue	D	4,490	-	B	870	-
F-1B	I-75 SB	Exit Ramp to Western Hills Viaduct	C	1,220	-	A	520	-
F-1C	I-75 SB	Entrance Ramp from Western Hills Viaduct	D	1,410	-	A	800	-
F-1D	I-75 SB	Exit Ramp to Western Avenue	A	270	-	A	350	-
F-2	I-75 SB	Between Western Hills Viaduct Ramps	D	7,870	-	C	5,980	-
F-4	I-75 SB	South of Western Hills Viaduct	D	9,280	-	C	6,780	-
F-4B	I-75 SB	Freeman Avenue Exit Ramp	A	380	-	A	450	-
F-4C	C-D Road SB	Between I-75 SB & Western Avenue Entrance Ramp	C	3,940	-	B	1,890	-
F-4D	8th Street	West of Gest Street	A	1,080	-	A	880	-
F-4E	C-D Road SB	Between Western Avenue Entrance Ramp & 7th Street	C	3,990	-	A	2,050	-
F-4F	8th Street	Between Gest Street & 7th Street	A	870	-	A	710	-
F-4G	8th Street	North Leg of 7th Street Intersection	A	140	-	A	180	-
F-4H	C-D Road SB	Between 7th Street & 5th Street	B	2,660	-	B	2,060	-

Table 9. Alternative E Freeway Segment Analysis - Ohio

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-4I	C-D Road SB	Between 5th Street & 4th Street	A	1,470	-	A	460	-
F-4J	C-D Road SB	Between 4th Street & Ohio River	A	330	-	A	370	-
F-5	I-75 SB	Between C-D Roadway SB & 9th Street	D	4,960	-	D	4,440	-
F-5A	I-75 SB to I-71 NB	Between 9th & 6th Streets	C	1,070	-	C	980	-
F-5B	I-75 SB to I-71 NB	Between 6th Street & I-71 NB	D	3,010	-	C	2,360	-
F-5C	6th St to I-71 NB	From 6th Street Ramp to I-71 NB	E	1,940	-	D	1,380	-
F-6	I-75 SB	9th St to 6th Street	C	3,890	-	C	3,460	-
F-7	I-75 SB	South of 6th Street	D	4,530	-	D	4,250	-
F-8	I-71 SB	North of Liberty Street	D	5,230	-	F	6,490	-
F-9	I-71 SB	Between Liberty Street & Eggleston Avenue	D	4,580	-	D	4,960	4,586
F-9A	I-71 SB	Ramp to 3rd Street	D	1,460	-	A	470	435
F-10	I-71 SB	Between Eggleston Avenue & 5th Street	D	3,120	-	F	4,490	4,151
F-10A	US 50 WB	East of I-71	C	2,320		C	1,970	-
F-11	I-71 SB	Between US 50 & I-75 NB Exit Ramp	D	5,440	-	D	6,460	5,951
F-11A	I-71 SB to I-75 NB	From FWW Trench to 6th St/I-75 NB	D	2,940	-	D	2,970	2,736
F-11B	I-71 SB to I-75 NB	From FWW Trench/6th St to I-75 NB	E	1,900	-	C	1,400	1,290
F-12	I-71 SB	FWW to 3rd St Entrance Ramp	C	2,500	-	D	3,490	3,215
F-13	I-71 SB	South of 3rd St Entrance Ramp	C	2,780	-	D	4,940	4,665
F-14	I-71 NB	South of FWW	F	4,470	3,880	C	2,660	-

Table 9. Alternative E Freeway Segment Analysis - Ohio

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-15	I-71 NB	In FWW Trench	D	7,480	6,879	C	5,020	-
F-15A	US 50 EB	West of I-71 NB	C	2,160	1,986	C	2,510	-
F-16	I-71 NB	Between US 50 & 2nd St Ramps	F	5,320	4,893	C	2,510	-
F-17	I-71 NB	Between 2nd St & 5th St Ramps	C	5,380	4,003	B	2,800	-
F-18	I-71 NB	Between 5th St & I-471 Ramps	D	5,570	4,193	C	3,330	-
F-19	I-71 NB	Between I-471 & Gilbert Ramps	F	7,530	6,153	D	4,440	-
F-20	I-71 NB	North of Gilbert Entrance Ramp	D	7,690	6,161	D	5,680	-
F-21	I-75 NB	South of C-D Roadway NB Exit Ramp	C	3,620	-	D	4,830	-
F-22	I-75 NB	After C-D Roadway NB Exit Ramp	C	2,870	-	D	4,100	-
F-23	I-75 NB	Between FWW & C-D Roadway NB Entrance Ramp	C	4,770	-	D	5,500	5,390
F-24	I-75 NB	Between C-D Roadway NB Entrance Ramp & Freeman Entrance Ramp	C	5,470	-	C	7,930	7,820
F-25	I-75 NB	North of Freeman Ave Entrance Ramp	C	5,980	-	D	8,680	8,570
F-26	I-75 NB	Between Western Hills Entrance & Exit Ramps	C	4,850	-	D	7,290	7,540
F-27	I-75 NB	Between Western Hills Entrance Ramps	C	5,160	-	D	8,400	7,974
F-28	I-75 NB	North of Western Hills Ramps	C	6,460	-	E	8,790	8,784
F-29	C-D Road NB	Between 2nd Street Exit Ramp & 4th Street	A	1,070	-	A	750	-
F-29A	C-D Road NB	2nd Street Exit Ramp	B	1,200	-	A	430	-

Table 9. Alternative E Freeway Segment Analysis - Ohio

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-30	C-D Road NB	Between 4th Street & 5th Street	A	470	-	A	400	-
F-31	C-D Road NB	Between 5th Street & 6th Street	A	720	-	B	2,250	-
F-31A	NB I-75 Ramp	Ramp to 9th Street WB	A	80	-	A	100	-
F-32	C-D Road NB	Between 6th Street & Exit Ramp to I-75 NB	A	710	-	C	2,440	-
F-33	Winchell Avenue	Between 9th Street & Freeman Avenue	A	200	-	A	380	-
F-34	Winchell Avenue	Between Freeman Avenue & Ezzard Charles	A	570	-	A	500	-
F-35	I-471 SB	East of I-71	A	1,000	-	D	3,050	-
F-36	I-471 NB	East of I-71	D	3,280	-	B	1,340	-
F-37	6th Street WB	East of C-D Road	A	620	-	B	1,290	-
F-38	6th Street EB	East of C-D Road	A	820	-	A	560	-
F-39	9th Street	Ramp to C-D Road NB	A	190	-	A	370	-
F-40	9th Street	East of Ramp to C-D Road NB	A	430	-	B	1,150	-
F-41	9th Street	Between C-D Road NB Ramps	A	240	-	A	780	-
F-42	C-D Road NB	Ramp to 8th Street	A	80	-	A	100	-
F-43	7th Street	East of C-D Road	B	2,200	-	A	700	-
F-45	I-71 SB	6th Street Entrance Ramp	B	1,790	-	C	2,300	-
F-49	6th Street EB	Between I-75 SB Entrance Ramp & I-71 Ramps	B	2,400	-	A	1,600	-
F-50	6th Street EB	West of I-75 SB Entrance Ramp	B	3,040	-	B	2,390	-
F-52	6th Street WB	West of I-71 Ramps	A	1,980	-	B	3,190	-

Table 9. Alternative E Freeway Segment Analysis - Ohio

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-54	C-D Road NB	Between Ohio River & 2nd Street Exit Ramp	B	2,270	-	A	1,180	-
F-55	2nd Street	East of C-D Road Ramps	B	2,450	-	A	1,070	-
F-62	I-75 SB	Between Hopple Street Entrance Ramps	D	8,560	-	C	6,610	-
F-63	I-75 NB	North of Hopple Street	C	5,990	-	D	8,278	-

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.

4.2.4.1.3 Alternative I

Alternative I – Kentucky

Twenty-one freeway segments were analyzed along Alternative I in Kentucky.

AM Peak

During the AM peak period, three freeway segments would operate at LOS E, while two would operate at LOS F.

PM Peak

During the PM peak period, five of the freeway segments would operate at LOS E, while four segments would operate at LOS F.

At the southern end of the project, I-71/I-75 currently has three mainline lanes in the northbound direction and four in the southbound direction. Calculations show that in the design year (2035) I-71/I-75 in the No Build Alternative will have numerous locations through the Buttermilk Pike, Dixie Highway, and Kyles Lane interchanges where LOS will be E or worse. In Alternative I, I-71/I-75 would be widened to six mainline lanes in each direction just north of the Kyles Lane interchange. For southbound I-71/I-75, the expanded number of lanes must be reduced to connect to the existing number of lanes at south of the study area. Since the additional lanes in Alternative I can carry more traffic than the No Build Alternative, the LOS will fall below LOS D in the area surrounding the Dixie Highway and Kyles Lane interchanges. I-71/I-75 would operate at LOS F south of the Dixie Highway interchange in the northbound direction for both Alternative I and the No Build Alternative. In the southbound direction, I-71/I-75 would operate at LOS F between the Kyles Lane and Dixie Highway interchanges in Alternative I. For this same freeway segment, the No Build Alternative would operate at LOS E. The No Build Alternative would operate at a better LOS at this location because traffic is constrained by the northern freeway segments. LOS D or better in this area could be achieved if additional lanes included under Alternative I are extended south of the study area.

Once the project's roadway is expanded from the existing three lanes at the southern limits of the project to the full complement of six lanes around Kyles Lane in Kentucky, only two other freeway segments in Kentucky will operate below LOS D with each operating at LOS

E. By contrast, the LOS at these same two locations would operate at LOS F in the No Build Alternative.

The freeway segment analysis for Alternative I in Kentucky is presented below in Table 10.

Table 10. Alternative I Freeway Segment Analysis - Kentucky

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-1	SB I-75	Between Brent Spence Bridge & SB C-D Roadway Merge	D	3,920	-	B	2,730	-
F-2	SB I-71	Between Brent Spence Bridge & I-71/I-75 Merge	C	2,310	-	D	3,170	2,920
F-3	SB I-75	Between C-D Roadway SB Merge & I-71/ I-75 Merge	C	4,250	-	C	5,760	5,740
F-4	SB I-71/I-75	7-lane section between I-71/ I-75 Merge & KY 12th Street Merge	C	6,560	-	D	8,930	8,660
F-5	SB I-71/I-75	6-lane section between I-71/ I-75 Merge & KY 12th Street Merge	C	6,560	-	D	8,930	8,660
F-6	SB I-71/I-75	Between KY 12th Street Merge & Kyles-Dixie C-D Roadway Diverge	D	7,340	-	E	10,390	10,120
F-7	SB I-71/I-75	6-lane section between Kyles-Dixie C-D Roadway Diverge & Kyles-Dixie C-D Roadway Merge	C	6,460	-	D	8,570	8,350
F-8	SB I-71/I-75	5-lane section between Kyles-Dixie C-D Roadway Diverge & Kyles-Dixie C-D Roadway Merge	D	6,460	-	E	8,570	8,350

Table 10. Alternative I Freeway Segment Analysis - Kentucky

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-9	SB I-71/I-75	4-lane section between Kyles-Dixie C-D Roadway Diverge & Kyles-Dixie C-D Roadway Merge	E	6,460	-	F	8,570	7,540
F-10	SB I-71/I-75	Between Kyles-Dixie C-D Roadway Merge & Dixie Highway Merge	D	6,810	-	E	9,130	8,100
F-11	SB I-71/I-75	Between Dixie Highway Merge & Buttermilk Pk. Diverge	D	7,150	-	E	9,760	8,730
F-12	SB I-71/I-75	Between Buttermilk Pk. Diverge & Buttermilk Pk. Merge	E	6,440	-	F	8,540	7,640
F-13	NB I-71/I-75	Between Buttermilk Pk. Merge & Kyles-Dixie C-D Roadway Diverge	F	7,160	-	F	8,280	-
F-14	NB I-71/I-75	3-lane section between Kyles-Dixie C-D Roadway Diverge & Kyles-Dixie C-D Roadway Merge	F	6,440	-	F	7,180	-
F-15	NB I-71/I-75	4-lane section between Kyles-Dixie C-D Roadway Diverge & Kyles-Dixie C-D Roadway Merge	D	6,440	-	E	7,180	-
F-16	NB I-71/I-75	Between Kyles-Dixie C-D Roadway Merge & Kyles Lane Merge	D	7,440	-	D	7,560	-

Table 10. Alternative I Freeway Segment Analysis - Kentucky

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-17	NB I-71/I-75	Between Kyles Lane Merge & C-D Roadway NB Diverge	D	8,910	-	D	8,270	-
F-18	NB I-71/I-75	Between C-D Roadway NB Diverge & I-71 NB Diverge	D	5,700	-	D	6,240	-
F-19	NB I-71	Between I-75 NB Diverge & Pike Street Merge	D	3,250	-	C	2,240	-
F-20	NB I-75	Between I-71 NB Diverge & Brent Spence Bridge	B	2,450	-	C	4,000	-
F-21	NB I-71	Between Pike Street Merge & Brent Spence Bridge	E	3,690	-	C	2,380	-

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.

Alternative I – Ohio

Fifty-five freeway segments were analyzed along the recommended preferred alternative in Ohio (Table 11).

AM Peak

During the AM peak period, seven of the freeway segments would operate at LOS E, while two segments would operate at LOS F.

PM Peak

During the PM peak period, one of the freeway segments would operate at LOS E, while two segments would operate at LOS F.

At the northern end of the project, I-75 northbound north of the WHV Interchange will be LOS E in the PM peak period. Unlike the project limits of many freeway projects where the freeway adjacent to the project limits is old and in need of additional lanes, the Mill Creek Expressway project is concurrently under design and construction to the north. Additional lanes were not added at this location to raise the LOS to LOS D because the LOS E was contained to one freeway segment and did not extend into other freeway segments. The LOS E is very close to being LOS D; and it would be very difficult and costly to add an additional lane for this isolated location and keep lane balance on I-75.

The LOS F for F-24, F-26, F-47, and F-51 are all on I-71 and outside the study area. These locations were included for the purpose of making LOS comparisons between the No Build Alternative and Alternative I at the next freeway segments and interchanges adjacent to the study area. Within the study area only five of the freeway segments in Ohio will operate below LOS D, with all five of these freeway segments will operate at LOS E.

Table 11. Alternative I Freeway Segment Analysis – Ohio

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-1	I-75 SB	Between Hopple Street Merge & Western Hills Viaduct Diverge	D	9,750	-	C	7,690	-
F-2	I-75 SB	Between Western Hills Viaduct Diverge & Western Hills Viaduct Merge	E	8,750	-	D	6,720	-
F-3	I-75 SB	Ramp to Western Hills Viaduct/Findlay Street	C	1,000	-	C	970	-
F-4	I-75 SB	Between Western Hills Viaduct Merge & C-D Roadway SB Diverge	D	9,550	-	C	7,120	-
F-5	I-75 SB	Between C-D Roadway SB Diverge & I-71 NB Diverge	E	5,240	-	C	3,950	-
F-6	I-75 SB	Between I-71 NB Diverge & Brent Spence Bridge	D	3,920	-	C	2,730	-
F-7	OH 9th Street WB	Between Central Avenue & Ramp to Winchell Avenue	A	400	-	A	1,540	-
F-8	OH 9th Street WB	Between Winchell Avenue Ramp & C-D Roadway SB Merge	A	330	-	A	1,190	-
F-9	OH 9th Street WB	Ramp to Winchell Avenue	A	70	-	A	350	-
F-10	OH 9th Street WB	Between C-D Roadway SB Merge & Linn Street	A	240	-	A	690	-
F-11	OH 9th Street WB	Ramp to C-D Roadway SB	A	90	-	A	500	-
F-12	OH 7th Street EB	Between Gest Street Merge & C-D Roadway SB Diverge	A	850	-	A	570	-

Table 11. Alternative I Freeway Segment Analysis – Ohio

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-13	OH 7th Street EB	Between C-D Roadway SB Diverge & Central Avenue	B	2,220	-	A	750	-
F-14	OH 6th Street WB	Between Ramp to Winchell Avenue & C-D Roadway NB Diverge	A	130	-	A	800	-
F-15	OH 7th Street EB	Between C-D Roadway NB Diverge & I-71 SB Diverge	A	980	-	A	1,630	-
F-16	OH 7th Street EB	Between I-71 SB Diverge & Gest Street Diverge	A	1,910	-	B	3,090	2,975
F-17	OH 6th Street EB	Between Linn Street Merge & C-D Roadway SB Merge	B	3,210	-	A	2,250	-
F-18	OH 6th Street EB	Between C-D Roadway SB Diverge & I-71 NB Diverge	C	2,270	-	B	1,340	-
F-19	OH 6th Street EB	Between I-71 NB Diverge & OH 5th Street Diverge	A	940	-	A	910	-
F-20	OH 6th Street EB	Ramp to OH 5th Street	A	270	-	A	90	-
F-21	OH 6th Street EB	Ramp to C-D Roadway SB	B	670	-	B	820	-
F-22	OH 6th Street EB	Ramp to OH 2nd Street	B	580	-	A	200	-
F-24	I-71 SB	Between Reading Rd./Dorchester Avenue Merge & I-471 Diverge	D	5,230	-	F	6,490	-
F-25	I-71 SB	Between I-471 Diverge & OH 3rd Street Diverge	D	4,580	-	D	4,960	4,586
F-26	I-71 SB	Between OH 3rd Street Diverge & US 50 Merge	D	3,120	-	F	4,490	4,151
F-27	I-71 SB	Ramp to OH 3rd Street	D	1,460	-	A	470	435
F-28	US 50 WB	Between OH 3rd Street Diverge & I-71 SB Merge	C	2,320	-	C	1,970	-

Table 11. Alternative I Freeway Segment Analysis – Ohio

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-29	I-71 SB	Between US 50 Merge & US 50 Diverge	D	5,440	-	D	6,460	5,951
F-30	I-71 SB	Between US 50 Diverge & Brent Spence Bridge	C	2,310	-	D	2,920	2,670
F-31	I-75 NB	Between Brent Spence Bridge & OH 3rd Street Merge	B	2,450	-	C	4,000	-
F-32	I-75 NB	Between OH 3rd Street Merge & NB C-D Roadway Merge	C	2,780	-	D	4,490	-
F-33	I-75 NB	Between I-71 SB Diverge & US 50 Diverge	D	2,940	-	D	2,970	2,736
F-34	I-75 NB	Between US 50 Diverge & OH 4th Street Merge	E	2,010	-	D	1,510	1,391
F-35	I-75 NB	Ramp to US 50 WB	B	930	-	C	1,345	1,230
F-36	I-75 NB	Between C-D Roadway NB Merge & Freeman Avenue Merge	C	5,490	-	D	7,740	7,629
F-37	I-75 NB	Between Freeman Avenue Merge & Western Hills Viaduct Diverge	C	6,160	-	D	8,490	8,379
F-38	I-75 NB	Between Western Hills Viaduct Diverge & Western Hills Viaduct Merge	C	5,840	-	D	7,856	7,752
F-39	I-75 NB	Between Western Hills Viaduct Merge & Hopple Street Diverge	D	6,910	-	E	8,870	8,766
F-40	OH 2nd Street EB	Between C-D Roadway SB Merge & C-D Roadway NB Merge	B	1,970	-	A	1,550	-

Table 11. Alternative I Freeway Segment Analysis – Ohio

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-41	OH 2nd Street EB	Between C-D Roadway NB Merge & Elm Street	B	3,170	-	A	1,980	-
F-42	US 50 EB	Between OH 2nd Street Diverge & I-75 SB Merge	D	1,690	-	C	1,140	-
F-43	I-75 SB	Between I-75 SB Merge & I-71 NB Merge	D	3,010	-	C	2,360	-
F-44	I-71 NB	Between Brent Spence Bridge & C-D Roadway NB Merge	E	3,690	-	C	2,380	-
F-45	I-71 NB	Between C-D Roadway NB Merge & I-75 SB Merge	E	4,470	3,943	C	2,660	-
F-46	I-71 NB	Between I-75 SB Merge & US 50 Diverge	E	7,480	6,953	C	5,020	-
F-47	I-71 NB	Between US 50 Diverge & OH 2nd Street Merge	F	5,320	4,945	C	2,510	-
F-48	US 50 EB	Between I-71 NB Diverge & OH 2nd Street Merge	C	2,160	2,008	C	2,510	-
F-49	I-71 NB	Between OH 2nd Street Merge & OH 5th Street Merge	C	5,380	4,041	B	2,800	-
F-50	I-71 NB	Between OH 5th Street Merge & I-471 NB Merge	D	5,570	4,231	C	3,330	-
F-51	I-71 NB	Between I-471 Merge & Gilbert Avenue Merge	F	7,530	6,005	D	4,440	-
F-52	I-71 NB	Between Gilbert Avenue Merge & Reading Rd. Diverge	D	7,690	6,161	D	5,680	-
F-53	I-471 NB	Between OH 6th Street Diverge & Liberty Street Diverge	D	3,280	-	B	1,340	-
F-54	I-471 SB	Between Liberty Street Merge & Columbia Pkwy. Merge	A	1,000	-	D	3,050	-

Table 11. Alternative I Freeway Segment Analysis – Ohio

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
F-56	I-75 SB	Between Hopple Street Merge & Hopple Street Merge	E	8,950	-	D	7,450	-
F-57	I-75 NB	Between Hopple Street Diverge & I-75 Diverge	C	6,440	-	D		8,410

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.

4.2.4.2 Ramp Junctions

Ramp merge and diverge areas were analyzed using one of two methodologies. If the ramp did not create an add-lane or a drop-lane condition, the HCS Ramps module provided estimated densities for the merge/diverge area. This analysis incorporated information pertaining to total freeway volume upstream of the merge/diverge area, ramp volumes, number of freeway lanes, number of ramp lanes, design speeds of both the freeway and ramp, and truck percentages for both the freeway and ramp. The densities correlate with the LOS for the merge/diverge area.

The second methodology for ramp areas is used when there is an add-lane or drop-lane condition in the merge/diverge area. In this case, these areas are treated as "major merge" or "major diverge" areas and each freeway segment of the merge/diverge area had its own density calculation. The HCS Freeway module can only analyze segments with two or more lanes. Therefore, single-lane ramps were analyzed as two-lane segments with double their actual volumes.

The ramp junction LOS criteria, as defined by the TRB for ramp junction density, are shown in Table 12.

Table 12. Ramp Junction Level of Service

Level of Service (LOS)	Ramp Junction Density (pc/mi/ln)
A	≤ 10
B	> 10 – 20
C	> 20 – 28
D	> 28 – 35
E	> 35
F	Demand Exceeds Capacity

4.2.4.2.1 No Build Alternative

No Build Alternative – Kentucky

Sixteen ramp junctions were analyzed along the No Build Alternative in Kentucky. Of these, eight were merges (entrance ramp) and eight were diverges (exit ramp).

AM Peak – Merges

During the AM peak period, of the eight ramp junction merges analyzed, two would operate at LOS F.

AM Peak – Diverges

During the AM peak period, of the eight ramp junction diverges analyzed, one would operate at LOS E, while two operated at LOS F.

PM Peak – Merges

During the PM peak period, of the eight ramp junction merges analyzed, one would operate at LOS E, while one would operate at LOS F.

PM Peak – Diverges

During the PM peak period, of the eight ramp junction diverges analyzed, five would operate at LOS E, while one would operate at LOS F.

The ramp junction analysis for the No Build Alternative in Kentucky is presented in Table 13.

Table 13. No Build Alternative Ramp Junction Analysis – Kentucky

Ref	Facility	Location	LOS					
			AM Peak[2]	Certified Traffic	Constrained Volume[1]	PM Peak[2]	Certified Traffic	Constrained Volume[1]
R-1	I-71/I-75 SB	KY 5th Street Exit Ramp	D	860	800	F	850	730
R-2	I-71/I-75 SB	Pike Street Exit Ramp	C	270	250	E	590	510
R-3	I-71/I-75 SB	KY 5th Street Entrance Ramp	C	480	470	E	1,150	1,100
R-4	I-71/I-75 SB	KY 12th Street Entrance Ramp	C	350	-	F	580	-
R-5	I-71/I-75 SB	Kyles Lane Exit Ramp	D	600	560	E	1,020	840
R-6	I-71/I-75 SB	Kyles Lane Entrance Ramp	ADD A	440	-	ADD A	640	-
R-7	I-71/I-75 SB	Dixie Highway Exit Ramp	DROP A	190	180	DROP A	710	600
R-8	I-71/I-75 SB	Dixie Highway Entrance Ramp	C	330	-	D	580	-
R-9	I-71/I-75 NB	Dixie Highway Exit Ramp	F	270	-	E	360	310
R-10	I-71/I-75 NB	Dixie Highway Entrance Ramp	ADD C	940	-	ADD A	390	-

Table 13. No Build Alternative Ramp Junction Analysis – Kentucky

Ref	Facility	Location	LOS					
			AM Peak[2]	Certified Traffic	Constrained Volume[1]	PM Peak[2]	Certified Traffic	Constrained Volume[1]
R-11	I-71/I-75 NB	Kyles Lane Exit Ramp	DROP A	500	-	DROP B	810	710
R-12	I-71/I-75 NB	Kyles Lane Entrance Ramp	F	1,320	-	D	620	-
R-13	I-71/I-75 NB	KY 12th Street Exit Ramp	F	240	220	E	550	490
R-14	I-71/I-75 NB	KY 5th Street Exit Ramp	E	640	500	E	550	490
R-15	I-71/I-75 NB	Pike Street Entrance Ramp	F	1,120	-	D	400	-
R-16	I-71/I-75 NB	KY 4th Street Entrance Ramp	ADD C	1,160	-	ADD C	980	-

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.
[2]Refers to locations where lanes were either considered add-lane or drop-lane as part of the analysis.

No Build Alternative – Ohio

Twenty-three ramp junctions were analyzed along the No Build Alternative in Ohio. Of these, 13 were merges (entrance ramp) and ten were diverges (exit ramp).

AM Peak – Merges

During the AM peak period, of the 13 merges analyzed, two would operate at LOS F.

AM Peak – Diverges

During the AM peak period, of the ten diverges analyzed, one would operate at LOS E, while one would operate at LOS F.

PM Peak – Merges

During the PM peak period, of the 13 merges analyzed, four would operate at LOS F.

PM Peak – Diverges

During the PM peak period, of the ten diverges analyzed, one would operate at LOS E, while two would operate at LOS F.

The ramp junction analysis for the No Build Alternative in Ohio is presented in Table 14.

Table 14. No Build Alternative Ramp Junction Analysis - Ohio

Ref	Facility	Location	LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
R-1	I-75 SB	WHV Exit Ramp	D	260	213	D	500	-
R-2	I-75 SB	Western Avenue/Ezzard Charles Drive Exit Ramp	D	620	517	C	240	-
R-3	I-75 SB	Freeman Avenue Exit Ramp	D	670	558	C	460	-
R-4	I-75 SB	OH 8th Street Entrance Ramp	C	160	-	D	940	-
R-5	I-75 SB	OH 6th Street Entrance Ramp	D	680	-	F	830	-
R-6	I-71 SB	I-471 Exit Ramp	D	650	-	F	1,510	1,432
R-7	I-71 SB	OH 3rd Street Entrance Ramp	C	260	-	F	1,200	-
R-8	I-75 SB	OH 5th Street Exit Ramp	D	710	598	C	250	-
R-9	US-50 EB	I-75 SB Entrance Ramp	B	680	-	A	830	-
R-10	I-71 NB	OH 2nd Street Exit Ramp	E	1,200	967	B	430	393
R-11	I-71 NB	OH 5th Street Entrance Ramp	C	220	-	B	620	-
R-12	I-71 NB	I-471 Entrance Ramp	F	1,970	-	C	1,120	-
R-13	I-75 NB	OH 6th Street Exit Ramp	C	730	588	D	700	640
R-14	I-75 NB	OH 9th Street Entrance Ramp	B	150	-	C	830	-
R-15	I-75 NB	Freeman Avenue Entrance Ramp	B	490	-	D	560	-
R-16	I-75 NB	Winchell Avenue/Ezzard Charles Drive Entrance Ramp	B	130	-	F	400	-
R-17	I-75 NB	WHV Entrance Ramp	A	760	-	B	370	-
R-18	I-75 NB	WHV Exit Ramp	C	320	293	F	530	493
R-19	I-75 NB	WHV Entrance Ramp	C	1,010	-	F	910	-
R-20	I-75 SB	Hopple Street Exit Ramp	F	960	816	D	930	784

Table 14. No Build Alternative Ramp Junction Analysis - Ohio

Ref	Facility	Location	LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
R-21	I-75 NB	Hopple Street Entrance Ramp	C	320	259	D	270	262
R-22	I-75 NB	Hopple Street Exit Ramp	D	620	528	E	630	559
R-23	I-75 SB	Hopple Street Entrance Ramp	F	810	749	D	390	243

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.

4.2.4.2.2 Alternative E

Alternative E – Kentucky

Twenty-seven ramp junctions were analyzed along Alternative E in Kentucky. Of these, 14 were merges (entrance ramp) and 13 were diverges (exit ramp).

AM Peak – Merges

During the AM peak period, of the 14 ramp junction merges analyzed, one would operate at LOS F.

AM Peak – Diverges

During the AM peak period, of the 13 ramp junction diverges analyzed, one would operate at LOS F.

PM Peak – Merges

During the PM peak period, of the 14 ramp junction merges analyzed, one would operate at LOS E.

PM Peak – Diverges

During the PM peak period, of the 13 ramp junction diverges analyzed, one would operate at LOS E, while one would operate at LOS F.

The ramp junction analysis for Alternative E in Kentucky is presented in Table 15.

Table 15. Alternative E Ramp Junction Analysis - Kentucky

Ref	Facility	Location	Alternative E LOS					
			AM Peak[2]	Certified Traffic	Constrained Volume[1]	PM Peak[2]	Certified Traffic	Constrained Volume[1]
R-1	SB I-71	Bullock Street Exit Ramp	B	120	-	C	130	120
R-2	SB I-75	Bullock Street Exit Ramp	D	930	-	C	1,310	-
R-3	SB Local C-D Roadway	Exit Ramp to I-71 SB	DROP A	300	-	DROP C	1,180	-

Table 15. Alternative E Ramp Junction Analysis - Kentucky

Ref	Facility	Location	Alternative E LOS					
			AM Peak[2]	Certified Traffic	Constrained Volume[1]	PM Peak[2]	Certified Traffic	Constrained Volume[1]
R-4	SB I-71	SB Local C-D Roadway Entrance Ramp	C	300	-	E	1,180	-
R-5	SB Local C-D Roadway	Crescent Avenue Entrance Ramp	ADD C	1,170	-	ADD C	1,210	-
R-6	SB Local C-D Roadway	Exit Ramp to I-71 NB	DROP B	800	-	DROP A	420	-
R-7	SB I-71/I-75	12th Street Entrance Ramp	B	780	-	D	1,460	-
R-8	SB I-71/I-75	Kyles-Dixie C-D Roadway Exit Ramp	C	880	-	E	1,820	1,770
R-9	SB Kyles-Dixie C-D Roadway	Kyles Lane Exit Ramp	B	690	-	D	1,140	1,110
R-10	SB Kyles-Dixie C-D Roadway	Kyles Lane Entrance Ramp	A	350	-	B	560	-
R-11	SB Kyles-Dixie C-D Roadway	Dixie Highway Exit Ramp	A	190	-	C	680	660
R-12	SB I-71/I-75	Kyles-Dixie C-D Roadway Entrance Ramp	ADD A	350	-	ADD B	560	-
R-13	SB I-71/I-75	Dixie Highway Entrance Ramp	B	340	-	C	630	-
R-14	SB I-71/I-75	Buttermilk Pk. Entrance Ramp	DROP A	710	-	DROP B	1,220	1,090
R-15	NB I-71/I-75	Kyles-Dixie C-D Roadway Exit Ramp	F	720	-	F	1,100	-
R-16	NB Kyles-Dixie C-D Roadway	Dixie Highway Exit Ramp	B	280	-	C	380	-
R-17	NB Kyles-Dixie C-D Roadway	Dixie Highway Entrance Ramp	B	1,000	-	B	380	-
R-18	NB I-71/I-75	Kyles-Dixie C-D Roadway Entrance Ramp	ADD C	1,000	-	ADD A	380	-
R-19	NB Kyles-Dixie C-D Roadway	Kyles Lane Exit Ramp	D	440	-	C	720	-
R-20	NB I-71/I-75	Kyles Lane Entrance Ramp	ADD D	1,470	-	ADD B	710	-

Table 15. Alternative E Ramp Junction Analysis - Kentucky

Ref	Facility	Location	Alternative E LOS					
			AM Peak[2]	Certified Traffic	Constrained Volume[1]	PM Peak[2]	Certified Traffic	Constrained Volume[1]
R-21	NB I-71/I-75	Exit Ramp to NB Local C-D Roadway	DROP C	2,170	-	DROP B	1,540	-
R-22	NB Local C-D Roadway	12th Street Exit Ramp	B	250	-	B	550	-
R-23	NB I-71	SB Local C-D Roadway Entrance Ramp	F	800	-	C	420	-
R-24	NB I-75	9th Street Entrance Ramp	B	550	-	C	340	-
R-25	NB Local C-D Roadway	5th Street Exit Ramp	B	890	-	A	650	-
R-26	NB Local C-D Roadway	9th Street Entrance Ramp	A	10	-	A	80	-
R-27	NB Local C-D Roadway	4th Street Entrance Ramp	B	1,230	-	B	760	-

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.
[2]Refers to locations where lanes were either considered add-lane or drop-lane as part of the analysis.

Alternative E – Ohio

Twelve ramp junctions were analyzed along Alternative E in Ohio. Of these, seven were merges (entrance ramp) and five were diverges (exit ramp) (Table 16).

AM Peak – Merges

During the AM peak period, of the seven merges analyzed, one would operate at LOS F.

AM Peak – Diverges

During the AM peak period, of the five diverges analyzed, one would operate at LOS E.

PM Peak – Merges

During the PM peak period, of the seven merges analyzed, every merge would operate at LOS D or better.

PM Peak – Diverges

During the PM peak period, of the five diverges analyzed, one would operate at LOS F.

Table 16. Alternative E Ramp Junction Analysis - Ohio

Ref	Facility	Location	Alternative E LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
R-1	I-75 SB	Freeman Avenue Exit Ramp	C	380	-	C	450	-
R-24	I-75 NB	Freeman Avenue Entrance Ramp	C	510	-	D	750	-
R-25	I-71 NB	5th Street Entrance Ramp	C	190	-	B	530	-
R-26	I-71 SB	I-471 Exit Ramp	D	650	-	F	1,530	1,415
R-27	I-71 NB	I-471 Entrance Ramp	F	1,960	-	C	1,110	-
R-30	I-75 NB	Western Hills Viaduct Exit Ramp	C	1,130	-	D	1,140	-
R-31	I-75 NB	Western Hills Viaduct Entrance Ramp	C	1,300	-	D	810	-
R-32	I-75 SB	Western Hills Viaduct Entrance Ramp	D	1,410	-	C	800	-
R-33	I-75 SB	Findlay Street Exit Ramp	E	1,220	-	D	520	-
R-34	I-75 SB	Eastbound Hopple Street Entrance Ramp	D	800	-	C	240	-
R-35	I-75 SB	Westbound Hopple Street Entrance Ramp	C	230	-	C	240	-
R-36	I-75 NB	Hopple Street Exit Ramp	C	470	-	C	352	-

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.

4.2.4.2.3 Alternative I

Alternative I – Kentucky

Twenty-three ramp junctions were analyzed along Alternative I in Kentucky. Of these, 11 were merges (entrance ramp) and 12 were diverges (exit ramp).

AM Peak - Merges

During the AM peak period, of the 11 merges analyzed, every merge would operate at LOS D or better.

AM Peak - Diverges

During the AM peak period, of the 12 diverges analyzed, one would operate at LOS F.

PM Peak - Merges
During the PM peak period, of the 11 merges analyzed, every merge would operate at LOS D or better.

PM Peak - Diverges
During the PM peak period, of the 12 diverges analyzed, one would operate at LOS E, while one would operate at LOS F.

All of the ramp junctions in Kentucky for Alternative I will have LOS D or better in the design year except for the I-71/I-75 southbound exit to Kyles Lane (LOS E) and the I-71/I-75 northbound exit to Dixie Highway (LOS F). Both of these locations have matching levels of service in the No Build Alternative. The LOS E at the I-71/I-75 southbound exit to Kyles Lane is an extremely good LOS E. If an additional lane is added to I-71/I-75 northbound immediately south of the Dixie Highway Interchange, the LOS would rise to LOS D.

The ramp junction analysis for Alternative I in Kentucky is presented in Table 17.

Table 17. Alternative I Ramp Junction Analysis - Kentucky

Ref	Facility	Location	Alternative I LOS					
			AM Peak[2]	Certified Traffic	Constrained Volume[1]	PM Peak[2]	Certified Traffic	Constrained Volume[1]
R-1	SB Local C-D Roadway	5th Street Exit Ramp	A	800	-	D	850	-
R-2	SB Local C-D Roadway	9th Street Exit Ramp	A	280	-	B	780	-
R-3	SB Local C-D Roadway	Merge with I-75 SB	ADD A	330	-	ADD D	3,030	3,010
R-4	SB I-71/I-75	12th Street Entrance Ramp	B	780	-	D	1,460	-
R-5	SB I-71/I-75	Kyles-Dixie C-D Roadway Exit Ramp	C	880	-	E	1,820	1,770
R-6	SB Kyles-Dixie C-D Roadway	Kyles Lane Exit Ramp	B	690	-	D	1,140	1,110
R-7	SB Kyles-Dixie C-D Roadway	Kyles Lane Entrance Ramp	A	350	-	B	560	-
R-8	SB Kyles-Dixie C-D Roadway	Dixie Highway Exit Ramp	A	190	-	C	680	660
R-9	SB I-71/I-75	Kyles-Dixie C-D Roadway Entrance Ramp	ADD A	350	-	ADD B	560	-
R-10	SB I-71/I-75	Dixie Highway Entrance Ramp	B	340	-	C	630	-
R-11	SB I-71/I-75	Buttermilk Pike Exit Ramp	DROP A	710	-	DROP B	1,220	1,090

Table 17. Alternative I Ramp Junction Analysis - Kentucky

Ref	Facility	Location	Alternative I LOS					
			AM Peak[2]	Certified Traffic	Constrained Volume[1]	PM Peak[2]	Certified Traffic	Constrained Volume[1]
R-12	NB I-71/I-75	Kyles-Dixie C-D Roadway Exit Ramp	F	720	-	F	1,100	-
R-13	NB Kyles-Dixie C-D Roadway	Dixie Highway Exit Ramp	B	280	-	C	380	-
R-14	NB Kyles-Dixie C-D Roadway	Dixie Hwy. Entrance Ramp	B	1,000	-	B	380	-
R-15	NB I-71/I-75	Kyles-Dixie C-D Roadway Entrance Ramp	ADD C	1,000	-	ADD A	380	-
R-16	NB Kyles-Dixie C-D Roadway	Kyles Lane Exit Ramp	D	440	-	C	720	-
R-17	NB I-71/I-75	Kyles Lane Entrance Ramp	ADD D	1,470	-	ADD B	710	-
R-18	NB I-71/I-75	Exit Ramp to NB Local C-D Roadway	DROP D	3,210	-	DROP C	2,030	-
R-19	NB Local C-D Roadway	12th Street Exit Ramp	C	1,140	-	B	1,200	-
R-20	Pike Street Entrance Ramp	Split to NB Local C-D Roadway and NB I-71	DROP B	1,430	-	DROP A	550	-
R-21	NB I-71	Pike Street Entrance Ramp	D	440	-	B	140	-
R-22	NB Local C-D Roadway	Pike Street Entrance Ramp	C	990	-	A	410	-
R-23	NB Local C-D Roadway	4th Street Entrance Ramp	ADD C	1,160	-	ADD C	1,050	-

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.
[2]Refers to locations where lanes were either considered add-lane or drop-lane as part of the analysis.

Alternative I – Ohio

Twenty ramp junctions were analyzed along Alternative I in Ohio. Of these, ten were merges (entrance ramp) and ten were diverges (exit ramp).

AM Peak – Merges

During the AM peak period, of the ten merges analyzed, two would operate at LOS F.

AM Peak – Diverges
During the AM peak period, of the ten diverges analyzed, every diverge would operate at LOS D or better.

PM Peak – Merges
During the PM peak period, of the ten merges analyzed, every merge would operate at LOS D or better.

PM Peak – Diverges
During the PM peak period, of the ten diverges analyzed, one would operate at LOS F.

Within the study area, only one ramp junction (R-16) will operate below LOS D, operating at LOS F. The C-D roadway ramp to I-71 northbound at the western end of Fort Washington Way (FWW) does not exist in the No Build Alternative; however, its comparable movement, the Pike Street entrance ramp in Kentucky, would operate at LOS F. The C-D roadway northbound entrance ramp to I-71 would have a better density (37.9 pc/mi/ln) than the comparable Pike Street entrance ramp to I-71 (38.6 pc/mi/ln), therefore degradation would not occur. If three lanes continue to exist for I-71/I-75 northbound in Kentucky, south of the Dixie Highway Interchange, the I-71/I-75 northbound traffic will be constrained. The reduced traffic volumes at the merge for the C-D roadway ramp to I-71 northbound would result in this ramp junction operating at LOS D. If a fourth lane is added at this location, the LOS would be LOS F due to additional traffic volumes.

There are two ramp junctions (R-7 and R-18), that would have LOS F in both the No Build Alternative and the build alternatives. Both of these ramp junctions are located outside of the study area. The diverge (R-7) and merge (R-18) are not being degraded as part of this project.

The ramp junction analysis for Alternative I in Ohio is presented in Table 18.

Table 18. Alternative I Ramp Junction Analysis - Ohio

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
R-1	I-75 SB	Findlay Street Exit Ramp	B	740	-	B	470	-
R-2	I-75 SB	Freeman Avenue Exit Ramp	D	810	-	C	610	-
R-3	I-75 SB	I-71 NB Exit Ramp	D	1,320	-	C	1,220	-
R-4	C-D Roadway SB	Western Avenue Entrance Ramp	B	160	-	A	350	-
R-5	C-D Roadway SB	US 50 Entrance Ramp	A	670	-	C	820	-
R-6	C-D Roadway SB	OH 3rd Street Exit Ramp	C	200	-	B	260	-

Table 18. Alternative I Ramp Junction Analysis - Ohio

Ref	Facility	Location	Alternative I LOS					
			AM Peak	Certified Traffic	Constrained Volume[1]	PM Peak	Certified Traffic	Constrained Volume[1]
R-7	I-71 SB	I-471 SB Exit Ramp	D	650	-	F	1,530	1,415
R-8	I-71 SB	C-D Roadway SB Exit Ramp	C	190	-	C	320	295
R-9	C-D Roadway SB	3rd Street Entrance Ramp	A	280	-	B	1,450	-
R-10	I-75 NB	3rd Street Entrance Ramp	B	330	-	C	490	-
R-11	C-D Roadway NB	5th Street Exit Ramp	B	580	-	B	280	-
R-12	I-75 NB	Freeman Avenue Entrance Ramp	B	670	-	C	750	-
R-13	I-75 NB	Western Hills Viaduct Exit Ramp	C	320	-	D	530	523
R-14	I-75 NB	Western Hills Viaduct Entrance Ramp	C	1,070	-	C	910	-
R-15	C-D Roadway NB	OH 2nd Street Exit Ramp	C	1,200	-	A	430	-
R-16	I-71 NB	C-D Roadway NB Entrance Ramp	F	780	-	C	280	-
R-17	I-71 NB	OH 5th Street Entrance Ramp	C	190	-	B	530	-
R-18	I-71 NB	I-471 NB Entrance Ramp	F	1,960	-	C	1,110	-
R-20	I-75 SB	Hopple Street Entrance Ramp	D	230	-	C	240	-
R-21	I-75 NB	Hopple Street Exit Ramp	C	470	-	D		356

[1]See Section 4.2.4.1 for explanation on constrained volume. "-" means there was no constrained traffic for the analyzed segment.

4.2.4.3 Intersections

The study area contains both signalized and unsignalized intersections on local streets. Intersections that had projected turning movements were analyzed using either the HCS Signals module for signalized intersections or the HCS Unsignalized module for unsignalized intersections, depending on whether a signal would be warranted in the design year. Operational analysis for the signalized intersections was provided by optimizing the signal cycle length and minimizing the number of signal phases to the extent possible for the design year for the No Build Alternative, Alternative E, and Alternative I.

The Highway Capacity Manual intersection analysis procedures calculate an "average vehicle delay" based on traffic volumes, number of lanes, and traffic signal phasing and timing at each intersection. Signal coordination was performed initially using Synchro to assist in establishing a common cycle length at intersections that were in close proximity to each other. HCS+ was used to properly balance each signalized intersection. For intersections, LOS is defined by the average amount of control delay experienced by vehicles. At traffic signals, delay is calculated for each approach as well as for the overall intersection. LOS D is considered acceptable in urban areas. The intersection LOS criteria as defined by the TRB for signalized and unsignalized intersections is shown in Table 19.

The intersection analysis includes the intersections within the study area which are formed by freeway ramps and their crossroads, as well as the intersections on the crossroads adjacent to those at the freeway ramps. These adjacent intersections are referred to as "check in" intersections and are included in this analysis to insure that the project does not negatively impact the LOS for intersections beyond the project's limits. Additionally, other adjacent intersections were analyzed if they would be affected by Alternative E or Alternative I. The analysis was conducted for the No Build Alternative, Alternative E, and Alternative I; however, due to the additional intersections created by the C-D roadways, Alternative E and Alternative I analyzed additional intersections when compared to the No Build Alternative analysis.

Table 19. Intersection Level of Service Criteria

Level of Service (LOS)	Signalized Intersection: Control Delay per Vehicle (seconds)	Two-Way Stop-Controlled (Unsignalized) Intersection: Average Control Delay per Vehicle (seconds)
A	Less than 10	Less than 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

4.2.4.3.1 Kentucky

No Build Alternative – Kentucky

A total of 18 intersections were analyzed in Kentucky for the No Build Alternative. Five intersections were analyzed as unsignalized for the No Build Alternative: I-1 (West KY 4th Street and Crescent Avenue), I-6 (West KY 5th Street and Crescent Avenue), I-8 (West KY 5th Street and Bakewell Street), I-12 (West KY 12th Street and Bullock Street), and I-13 (West KY 12th Street and Jillians Way).

AM Peak

Of the unsignalized intersections during the AM peak period in the No Build Alternative, one would operate at LOS E and one would operate at LOS F. Of the signalized intersections, during the AM peak period in the No Build Alternative, three would operate at LOS F.

PM Peak
Of the unsignalized intersections during the AM peak period in the No Build Alternative, two would operate at LOS F. At the signalized intersections during the PM peak period, one of the intersections would operate at LOS E and two of the intersections would operate at LOS F.

Intersection analyses for the No Build Alternative in Kentucky are presented in Table 20. Of the 18 intersections analyzed for the No Build Alternative in Kentucky, five will operate below LOS D during both the AM and PM peak periods, but three of these intersections are "check in" locations, or non-project locations, which are intersections adjacent to those intersections analyzed as part of this project. These "check in" locations are included to show that while the project may improve the LOS at intersections within the study, it also does not negatively impact the intersections beyond the study area.

Alternative E – Kentucky
A total of 21 intersections were analyzed in Kentucky for Alternative E. Two intersections were analyzed as unsignalized for Alternative E: I-8 (West KY 5th Street and Bakewell Street) and I-E. New signals will be required at the KY 12th Street and Bullock Street, KY 12th Street and Jillians Way, KY 9th Street at Jillians Way, KY 9th Street and Bullock Street, KY 5th Street and Jillians Way, and KY 4th Street and Jillians Way (Table 20).

AM Peak
Of the unsignalized intersections during the AM peak period in Alternative E, one would operate at LOS F. Of the signalized intersections during the AM peak period in Alternative E, three would operate at LOS F.

PM Peak
Of the unsignalized intersections during the PM peak period in Alternative E, one would operate at LOS E. At the signalized intersections during the PM peak period, two of the intersections would operate at LOS F.

Intersection analyses for Alternative E in Kentucky are presented in Table 20. Only one of the intersections constructed for Alternative E would operate below LOS D while the remaining intersections identified in Table 20 as having LOS E or worse are "check in" locations, which are intersections adjacent to those intersections that would be constructed/reconstructed as part of this project. These "check in" locations are included to show that while the project may improve the LOS at intersections within the study area, the project does not negatively impact intersections beyond the study area.

It is indicated that the LOS at intersections I-4 and I-9 LOS during the PM Peak will be degraded from the No Build Alternative. After the project is completed and traffic is following the new pattern, KYTC will evaluate these locations.

Alternative I – Kentucky
A total of 21 intersections were analyzed in Kentucky for Alternative I. Three intersections were analyzed as unsignalized for Alternative I: I-1 (KY 4th Street and Crescent Avenue), I-6 (KY 5th Street and Crescent Avenue), I-8 (KY 5th Street and Bakewell Street).

AM Peak
Of the unsignalized intersections during the AM peak period in Alternative I, one would operate at LOS F. Of the signalized intersections during the AM peak period in Alternative I, two would operate at LOS F.

PM Peak
None of the unsignalized intersections in Alternative I would operate below LOS D. At the signalized intersections during the PM peak period, two of the intersections would operate at LOS F.

Intersection analyses for Alternative I in Kentucky are presented in Table 20. None of the intersections constructed for Alternative I will operate below LOS D. Those intersections identified in Table 20 as having LOS E or worse are "check in" locations, which are intersections adjacent to those intersections that would be constructed/reconstructed as part of this project. These "check in" locations are included to show that while the project may improve the LOS at intersections within the study area, it also does not negatively impact the intersections beyond the study area.

It is indicated that the LOS at intersections I-4 and I-9 LOS during the PM Peak will be degraded from the No Build Alternative. After the project is completed and traffic is following the new pattern, KYTC will evaluate these locations. The intersection analysis for Alternative I in Kentucky is presented in Table 20.

Table 20. Intersection Analysis - Kentucky

Ref	Intersection	LOS					
		No Build		Alternative E		Alternative I	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
I-1	4th Street & Crescent Avenue	C	F	B	B	C	C
I-2	4th Street & Philadelphia Street	D	E	F	B	C	B
I-3	4th Street & Bakewell Street	B	B	B	B	B	B
I-4	4th Street & Clay Wade Bailey Bridge	B	C	B	D	B	D
I-6	5th Street & Crescent Avenue	B	C	-	-	B	C
I-7	5th Street & Philadelphia Street	B	B	B	B	B	B
I-8	5th Street & Bakewell Street	E	C	F	D	F	D
I-9	5th Street & Main Street	B	B	B	D	B	D
I-10	Pike Street & Bullock Street	C	C	B	B	C	C
I-11	Pike Street & Jillians Way	D	B	B	B	B	B
I-12	12th Street & Bullock Street	C	C	B	B	B	B
I-13	12th Street & Jillians Way	F	F	B	B	C	B

Table 20. Intersection Analysis - Kentucky

Ref	Intersection	LOS					
		No Build		Alternative E		Alternative I	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
I-14	Kyles Lane & Dixie Highway	F	F	F	F	F	F
I-15	Kyles Lane & I-75 SB Ramps	C	D	B	C	B	C
I-16	Kyles Lane & I-75 NB Ramps	F	C	C	C	C	C
I-17	Kyles Lane & Highlands Avenue	F	F	F	F	F	F
I-18	Dixie Highway & I-75 SB Ramps	B	C	B	C	B	C
I-19	Dixie Highway & I-75 NB Ramps	C	B	C	B	C	B
I-A	9th Street & Jillians Way	-	-	C	C	B	B
I-B	9th Street & Bullock Street	-	-	B	C	B	B
I-C	5th Street & Jillians Way	-	-	B	B	B	B
I-E	4th Street & Jillians Way	-	-	C	E	-	-

X LOS D or better, Movement V/C > 1.0
X LOS E or F
X Non-Project Intersection

4.2.4.3.2 Ohio

No Build Alternative – Ohio

In Ohio, 41 intersections were analyzed in the No Build Alternative. Three of the intersections were analyzed as unsignalized intersections for the No Build Alternative: I-4 (Bank Street and Linn Street), I-21 (Court Street and Linn Street), and I-28 (OH 6th Street and Linn Street).

AM Peak

None of the intersections in the No Build Alternative would operate below LOS D.

PM Peak

None of the unsignalized intersections in the No Build Alternative would operate below LOS D. At the signalized intersections during the PM peak period, one of the intersections would operate at LOS E.

The intersection analysis for the No Build Alternative in Ohio is presented in Table 21.

Alternative E – Ohio

For Alternative E, 47 intersections were analyzed. Three of the intersections were analyzed as unsignalized intersections: I-4 (Bank Street and Linn Street), I-21 (Court Street and Linn Street), and I-28 (OH 6th Street and Linn Street).

New signals will be required at the C-D roadway and 4th Street; the C-D roadway and 5th Street; the C-D roadway and 7th Street; I-75 northbound and southbound Ramps at 6th Street; and the WHV Interchange at the I-75 northbound and southbound ramps (Table 21).

Table 21. Intersection Analysis - Ohio

Ref	Intersection	LOS					
		No Build		Alternative E		Alternative I	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
I-1	Bank Street & Dalton Avenue	B	B	B	B	B	B
I-2	Bank Street & Winchell Avenue	B	B	B	B	B	B
I-3	Central Parkway & Linn Street	B	B	B	C	B	B
I-4	Bank Street & Linn Street	B	B	B	B	B	B
I-5	Dalton Avenue & Findlay Street	B	B	B	B	B	B
I-6	Findlay Street & Western Avenue	B	B	B	B	B	B
I-7	Findlay Street & Winchell Avenue	B	B	B	B	B	B
I-8	Dalton Avenue & Liberty Street	B	B	B	B	B	B
I-9	Western Avenue & Liberty Street	C	B	B	B	C	C
I-10	Liberty Street & Winchell Avenue	B	B	B	B	B	B
I-11	Liberty Avenue & Linn Street	B	B	B	B	B	B
I-12	Ezzard Charles Drive (WB) & Western Avenue	B	B	B	B	B	B
I-13	Ezzard Charles Drive (WB) & Winchell Avenue	B	B	B	B	B	B
I-14	Ezzard Charles Drive (EB) & Western Avenue	B	B	B	B	B	B
I-15	Ezzard Charles Drive (EB) & Winchell Avenue	B	B	B	B	B	B
I-16	Ezzard Charles Drive & Linn Street	B	B	B	B	B	B
I-17	Gest Street & Dalton Avenue	B	B	B	B	B	B
I-18	Gest Street & Western Avenue	B	B	B	B	B	B
I-18*	Gest Street & Western Avenue	A	A	A	B	A	B
I-19	Gest Street & Freeman Avenue	C	C	C	C	D	D
I-19*	Gest Street & Western Avenue	D	D	D	D	D	D
I-20	Linn Street & Gest Street	B	B	B	B	B	B
I-21	Court Street & Linn Street	C	C	B	C	B	B

Table 21. Intersection Analysis - Ohio

Ref	Intersection	LOS					
		No Build		Alternative E		Alternative I	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
I-23	8th Street & Dalton Avenue	B	B	B	B	B	B
I-24	8th Street & Freeman Avenue	B	B	B	B	B	B
I-25	8th Street & Linn Street	B	C	B	B	B	B
I-26	Western Hills Viaduct & Spring Grove Avenue	B	B	B	C	-	-
I-27	Dalton Avenue & Linn Street	B	B	B	B	B	B
I-28	6th Street & Linn Street	A	B	A	D	A	C
I-29	Court Street & Central Avenue	B	B	B	B	B	B
I-30	9th Street & Central Avenue	B	D	B	B	B	C
I-31	7th Street & Central Avenue	B	B	C	B	B	B
I-32	6th Street & Central Avenue	B	C	D	D	B	B
I-33	5th Street & Central Avenue	C	B	D	C	C	B
I-34	4th Street & Central Avenue	B	D	B	E	B	D
I-35	3rd Street & Central Avenue	D	E	D	C	D	D
I-36	4th Street & Plum Street	B	B	B	B	B	B
I-37	3rd Street & Plum Street	B	B	B	B	B	B
I-38	4th Street & Elm Street	B	B	B	B	B	B
I-39	3rd Street & Elm Street	B	B	B	B	B	B
I-40	2nd Street & Elm Street	B	B	B	B	B	B
I-41	3rd Street & Clay Wade Bailey Bridge	C	D	B	C	C	D
I-43	Central Parkway & McMillan Street	C	D	A	B	C	D
I-43B	Central Parkway & McMillan Street	-	-	B	A	-	-
I-50	Western Hills Viaduct & I-75 SB Ramp	-	-	D	C	A	A
I-51	Western Hills Viaduct & I-75 NB Ramp	-	-	-	-	C	B
I-60	C-D Roadway & 4th Street	-	-	B	D	-	-

Table 21. Intersection Analysis - Ohio

Ref	Intersection	LOS					
		No Build		Alternative E		Alternative I	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
I-61	C-D Roadway & 5th Street	-	-	B	A	-	-
I-62	I-71 SB/I-75 NB & 6th Street	-	-	C	C	-	-
I-63	C-D Roadway & 7th Street	-	-	D	B	-	-

**Synchro Results for I-18 and I-19 (not included in intersection count)*

X LOS OK, Movement v/c > 1.00
X LOS E or F
X Non-Project Intersection

AM Peak
None of the intersections in Alternative E would operate below LOS D.

PM Peak
None of the unsignalized intersections in Alternative E would operate below LOS D. At the signalized intersections during the PM peak period, one of the intersections would operate at LOS E.

The intersection analysis for Alternative E in Ohio is presented in Table 21.

Alternative I – Ohio
For Alternative I, 42 intersections were analyzed. Three of the intersections were analyzed as unsignalized intersections: I-4 (Bank Street and Linn Street), I-21 (Court Street and Linn Street), and I-28 (OH 6th Street and Linn Street).

AM Peak
None of the intersections in Alternative I would operate below LOS D.

PM Peak
None of the intersections in Alternative I would operate below LOS D.

The intersection analysis for Alternative I in Ohio is presented in Table 21.

4.3 Social and Economic Resources

4.3.1 Land Use

4.3.1.1 Existing Conditions

The study area is both urban and suburban in nature. The primary land uses within the study area are commercial, industrial, residential, institutional, and existing roadway rights of way (Exhibits 5A – 5C). No farmland is present within the study area. A detailed description of land use in the study area is presented in the *Conceptual Alternatives Study* (April 2009) (Appendix A).

4.3.1.2 Impacts

Land use is directly affected where land is converted to right-of-way or other land use. Land use impacts for Alternatives E and I are presented in Table 22. The total acres impacted in Kentucky are: Alternative E – 24.45 acres and Alternative I – 21.76 acres. The total acres impacted in Ohio are: Alternative E – 12.45 acres and Alternative I – 9.61 acres. In the vicinity of the Western Hills Viaduct (WHV), the single-point urban interchange (SPUI) would impact 3.9 acres and the tight urban diamond interchange (TUDI) design would impact 1.9 acres.

Alternatives E and I would convert mostly residential, commercial, and undeveloped land uses. In Kentucky, residential land use would be impacted through loss of homes along Crescent Avenue and in the Lewisburg neighborhood. Commercial land would be lost through displacements north of KY 4th Street, adjacent to existing I-75, and near Pike Street.

Table 22. Land Use Impacts (acres)

Land Use	Alternative E	Alternative I
Kentucky		
Residential	4.93	3.60
Industrial	0.70	0.41
Commercial	2.89	3.97
Undeveloped	11.98	7.89
Institutional	2.57	1.40
Other	1.38	4.49
Subtotal KY	*24.45*	*21.76*
Ohio		
Residential	1.41	0.10
Industrial	1.39	1.76
Commercial	2.00	1.03
Undeveloped	1.74	1.03
Institutional	3.16	3.85
Undefined[1]	2.75	1.84
Subtotal OH	*12.45*	*9.61*
Total	36.90	31.37

Source: Cincinnati Area Geographic Information System (CAGIS) (2010)
[1]Undefined land uses are those that do not have a specified land use as noted by the source of the data.

Alternatives E and I would also require land from recreational uses in Goebel Park.

Within Kentucky, impacts to land use would be the same for both feasible alternatives south of KY 12th Street. Mostly open space would be converted to transportation right-of-way in areas south of KY 12th Street with select residences displaced. South of KY 12th Street, institutional uses would be converted to right-of-way by both feasible alternatives at Notre Dame Academy, Central Nazarene Church, and Saint Elizabeth Hospital Development. However, these impacts would not change the land use activities at the properties or result in displacements. Commercial uses between Kyles Lane and Dixie Highway would be impacted the same by both feasible alternatives. There is a loss of property but not a loss in the function of the commercial land use.

In Ohio, Alternative I would impact approximately 5 acres of institutional and commercial land uses. Alternative E would convert approximately 4 acres of institutional and commercial land uses adjacent to the transportation right-of-way. Alternatives E and I would

require conversion of utility land uses to right-of-way at the Duke Energy power station. Both Alternatives E and I would impact recreational land use at the Queensgate Playground and Ball Fields.

North of Ezzard Charles Drive, residential, commercial, and industrial uses adjacent to the existing right-of-way would be impacted by both Alternative E and I, however the land uses would not be precluded due to the amount of acreage required. Some impacts are only property takes that impact land and not a building. To accommodate the improvements of the WHV Interchange, residential land uses would be required for right-of-way for the SPUI design and industrial uses for the TUDI design.

The No Build Alternative would not affect land uses within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

4.3.2 Neighborhood and Community Cohesion

4.3.2.1 Existing Conditions

The study area encompasses several communities within the Greater Cincinnati/Northern Kentucky region (Exhibits 5A – 5C). The study area includes the cities of Fort Wright, Park Hills, and Covington within Kentucky and the city of Cincinnati in Ohio. 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, neighborhoods include Queensgate, West End, Fairview-Clifton Heights, and Camp Washington. With the exception of the I-75 corridor itself and the Ohio River, no physical barriers exist between neighborhoods and the Central Business Districts within Cincinnati and Covington. Details of each neighborhood are described in the *Existing and Future Conditions* (February 2006), *Planning Study Report* (September 2006) and the *Conceptual Alternatives Study* (April 2009). These reports are included in Appendix A.

Census tract data were used to assess population conditions within the study area in both Kentucky and Ohio. Further demographic information of the study area is provided in the *Existing and Future Conditions Report* (February 2006) and *Conceptual Alternatives Study* (April 2009) (Appendix A).

4.3.2.2 Impacts

Alternatives E and I are expected to have a minimal impact on community cohesion within Kentucky as the transportation improvements would be completed within as much existing right-of-way as possible. In Kentucky, displacements occur with both feasible alternatives in the Lewisburg neighborhood and historic district on KY 11th and 12th streets. Additionally, Alternative E also has a concentration of displacements along Crescent Avenue between KY 5th and 9th streets and Alternative I would displace residences on Pike Street near I-71/I-75 and along Crescent Avenue south of KY 5th Street. One family cluster at 825 and 832 Crescent Avenue was identified during public involvement activities. Alternative E would displace 832 Crescent Avenue impacting the cohesion of this cluster.

Within Ohio, the WHV TUDI design would not directly impact community cohesion since this option would not displace residences. The WHV SPUI option would impact the cohesion of the West McMicken neighborhood through displacements and demolition of residences.

Additional discussion of potential displacements is found in Section 4.3.4 Neither of the two feasible alternatives are expected to increase community interaction since the only barrier, I-75, would not be removed or provide new connections. No other changes in cohesion are expected to the neighborhoods in the study area.

The No Build Alternative would not affect community cohesion within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

4.3.3 Community Facilities

4.3.3.1 Existing Conditions

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 in Table 23 and correspond to Exhibits 5A – 5C.

Table 23. Community Facilities and Services

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
3. Central Church of the Nazarene	2006 Pieck Drive, Fort Wright	Church of the Nazarene
Nursing Home	**Location**	**Description**
4. Baptist Life Communities	800 Highland Avenue, Covington	Nursing Home
Recreation	**Location**	**Description**
5. Kenney Shields Park	West KY 9th Street and Philadelphia Street, Covington	Small neighborhood corner lot with playground equipment - Owned by the City of Covington
6. Neighborhood Pool	West KY 8th Street and Dalton Avenue, Covington	Neighborhood pool - Owned by the City of Covington
7. Devou Park/Golf Course/Overlook	1344 Audubon Road, Covington	700-acre park and golf course - Owned by the City of Covington
8. Goebel Park/Mainstrasse Village District	KY 6th Street Area of Covington	Park area and surrounding retail and restaurants - Owned by the City of Covington
9. Neighborhood Park	West KY 11th Street and Hermes Avenue, Covington	Owned by the City of Covington
School	**Location**	**Description**
10. Notre Dame Academy	1699 Hilton Drive, Park Hills	Parochial College Preparatory High School - 594 female students
11. Prince of Peace Catholic School	625 Pike Street, Covington	Parochial Grade School – Grades K – 8
43. Beechwood Elementary and High Schools	54 Beechwood Road, Fort Mitchell	Public Schools – Grades K – 12
Institutional	**Location**	**Description**
44. Saint Elizabeth Medical Center	South of KY 12th Street, Covington	Hospital campus

Table 23. Community Facilities and Services

45. Highland Cemetery	2167 Dixie Highway, Fort Mitchell	250 acre cemetery
Ohio		
Attraction	**Location**	**Description**
12. Paul Brown Stadium	One Paul Brown Stadium	Pro Football Facility – Home of NFL Cincinnati Bengals
13. National Underground Railroad Freedom Center	50 East Freedom Way	Museum
14. Great American Ball Park	100 Main Street	Pro Baseball Facility – Home of MLB Cincinnati Reds
15. US Bank Arena	100 Broadway	Multi-purpose facility
16. Duke Energy Center	525 Elm Street	Convention and Exhibition Facility
17. Cincinnati Fire Museum	315 West Court Street, Cincinnati	Museum
18. Geier Research and Collections Museum	760 West OH 5th Street	Museum
19. Union Terminal	1301 Western Avenue	Omnimax Theatre, Museum Center, Children's Museum, Natural History Museum, Amtrak
Churches/Religious	**Location**	**Description**
20. York Street United Methodist	816 York Street	Methodist Church
21. Plum Street Temple	726 Plum Street	Jewish Temple
22. St. Peter in Chains Cathedral	325 West OH 8th Street	Catholic Church
23. Jarriel Baptist Church	Wesley and Court streets	Baptist Church
Fire Station	**Location**	**Description**
24. Fire House - Company 14	OH 5th and Central	Fire House
25. Fire House - Company 29, Ladder 29	564 West Liberty at Linn Street	Fire House
Government Building	**Location**	**Description**
26. Cincinnati City Hall	801 Plum Street	Offices of Mayor, City Manager, City Council, administration, etc.
27. Jail - Hamilton County Queensgate Facility	516 Linn Street	Correctional Facility (recently closed)
Library	**Location**	**Description**
28. Public Library of Cincinnati and Hamilton County	805 Ezzard Charles Drive	Public Library
29. Lloyd Library and Museum	917 Plum Street	Botanical, Medical, Pharmaceutical, and Scientific books
Public Agency	**Location**	**Description**
30. Cincinnati Job Corp Center	1409 Western Avenue	Training Facility and Dormitories
Post Office	**Location**	**Description**
31. Main Post Office - Dalton Avenue	1623 Dalton Avenue	Post Office Facility
32. Post Office Branch	Dalton Avenue and Gest Street	Post Office Facility-Mid City Carrier Unit
Recreation	**Location**	**Description**
33. Lincoln Park - Union Terminal	Freeman Avenue and Ezzard Charles Drive	Owned by the City of Cincinnati - Operated by Cincinnati Park Board - Greenspace

Table 23. Community Facilities and Services

Recreation	Location	Description
34. Park at Derrick Turnbow and Linn Street	1525 Linn Street	Behind apartment buildings and a strip shopping center - Owned by the City of Cincinnati
35. Dyer Park	Baymiller and Bank streets	Ball Field, Pool and Playground -Owned by the City of Cincinnati - Operated by Cincinnati Recreation Commission
36. Lincoln Community Center	1027 Linn Street	Pool, playground, tennis court, basketball courts -Owned by the City of Cincinnati - Operated by Cincinnati Recreation Commission
37. Queensgate Playground and Ball Fields	707 West Court Street	Playground and ball fields – Owned by the City of Cincinnati - Operated by Cincinnati Recreation Commission
School	**Location**	**Description**
38. St. Joseph's Catholic School	805 Ezzard Charles Drive	Parochial Elementary School
39. Cincinnati Hamilton County Community Action Agency	880 West Court Street	Theodore M. Berry Head Start Program
40. Lafayette Bloom B-O-T Accelerated Middle	1941 Baymiller Street	Cincinnati Public School - Grades 6-8
41. Heberle Elementary	2015 Freeman Avenue	Cincinnati Public School - Preschool – 8
TV/Radio Station	**Location**	**Description**
42. WXIX - TV	635 West 7th Street	Network TV Station

Note: Site numbers correspond to site numbers on Exhibit 5

4.3.3.2 Impacts

Recreation Facilities

Goebel Park would be impacted by widening the interstate. Goebel Park is 14.8 acres. Alternative E would take 3.7 acres, including a parking lot, a basketball court, and a walking path located on the west side of the park. Alternative I would take 1.9 acres of the park avoiding impacts to the walking path but would impact the parking lot and basketball court. A neighborhood pool, located in Goebel Park would not be directly impacted by either feasible alternative. The total acreage impacts to Goebel Park, including Kenney Shields Park, and percentage of the total park land impacted are listed in Table 24. Additional discussion of the Goebel Park is found in Section 4.14.

View of Goebel Park

Goebel Park mainly serves as a neighborhood park but there are periods throughout the year that it serves the entire county for large-scale events and numerous smaller events. The average daily attendance is 146 for the pool within the park. The estimated total number of annual pool users is 1,000 (October 2011 email coordination with Covington Neighborhoods, Parks, and Recreation Department). Randolph Park is the closest park to this community with similar amenities (pool, basketball courts, baseball field, and picnic shelter). Randolph Park is located approximately one mile from Goebel Park at KY 8th and Greenup streets.

KYTC will vacate 2.6 acres of land immediately adjacent to Goebel Park along KY 5th street and transfer the land to the city of Covington for the purpose of mitigating the loss of parkland. Mitigation measures proposed to minimize the impacts to Goebel Park are described further in Section 6.5.5. Discussion of environmental justice issues related to the impact of Goebel Park is presented in Section 4.3.6.

Due to concerns regarding current and predicted noise levels within Goebel Park, 24 hour noise measurements were collected in August 2011. The readings were collected in early August when the pool was open to the public and late August after the pool had been closed for the year, to determine if activities associated the pool contributed to the overall diurnal noise cycle. In general, noise levels with the pool open were generally higher than with the pool closed. However, measurements at the pool were above the FHWA Noise Abatement Criteria (NAC) impact threshold of 66 dBA.

For the predicted Future (2035) No Build Alternative, noise levels would be expected to increase slightly (about one dBA) over the peak hour existing (2010) conditions. For Alternative E and I, noise levels would be expected to increase by one to two dBA. However, because all Alternative E and I future noise levels would be above the NAC impact threshold, mitigation was considered in accordance with the KYTC Noise Analysis and Abatement Policy. Based upon the abatement analysis, a noise barrier does not meet the KYTC criteria at Goebel Park (Appendix F).

In Ohio, the Queensgate Playground and Ball Fields would be impacted by both Alternatives E and I. Alternative E would require 0.6 acres and Alternative I would require 0.9 acres along the southwestern edge of the property adjacent to I-75. Both feasible alternatives impact trees and parkland. Also, the proposed right-of-way of either Alternative E or I extend to the outfield area of the existing ball fields within the park. The Queensgate Playground and Ball Fields provide recreational opportunities for the West End neighborhood. Additional discussion of the Queensgate Playground and Ball Fields, including mitigation, is found in Section 6.5.5.

View of Queensgate Playground and Ball Fields

No other parks in Ohio would be impacted by the feasible alternatives or WHV interchange alternatives.

The No Build Alternative would not affect park and recreation areas within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

Table 24. Recreation Facilities Impacts

Property/Facility	Description/Amenities	Ownership	Alternative Impacts (% of Total Property)
Goebel Park and Pool Complex	Facilities include: playground equipment, walking trails, shelter house, basketball and tennis courts, Olympic size pool, baby pool, bath house with showers and restrooms, and a parking lot	city of Covington	Alternative E - 3.7 acres (25.0%) Alternative I - 1.9 acres (12.8%)
Kenney Shields Park (element of Goebel Park)	Small neighborhood corner lot with playground equipment	city of Covington	
Queensgate Playground and Ball Fields	Playground and ball fields	city of Cincinnati	Alternative E - 0.6 acres (11.4%) Alternative I - 0.9 acres (17.1%)

Schools and Churches

There are two schools and one church, all within Kentucky, located within the rights-of-way of Alternatives E and I. The Notre Dame Academy, a private institution, would be impacted by both feasible alternatives. A total of 1.34 acres would be impacted on this property, including portions of an existing ball field and a parking lot. Beechwood Elementary and High Schools would be impacted by both Alternatives E and I with a sliver take for new right-of-way. This would not impact any facilities on the property. The Central Church of the Nazarene, near the Dixie Highway Interchange, is located within the right-of-way limits of both feasible alternatives. A total of 0.44 acres would be required from the parcel of the church, including approximately 24 parking spaces, by both feasible alternatives. The church building would not be impacted and half of the parking spaces lost could be replaced on the same property.

The No Build Alternative would not affect schools and churches within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

Social Services

Groups that provide social services to neighborhoods in the study area would not be expected to be impacted by Alternative E and I or the No Build Alternative.

Public Safety and Emergency Services

Emergency response would be expected to improve due to reduced traffic congestion resulting from the feasible alternatives.

The No Build Alternative would not improve public safety or emergency response times within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would not improve traffic capacity on the interstate system.

Disadvantaged Populations

Elderly and disabled populations and zero-car households can be affected by a transportation project. Results from surveys mailed to potentially displaced residences in Kentucky in July and September 2011 (Appendix E) showed that disadvantaged populations are present and would be impacted by the feasible alternatives. Based on the surveys, Alternative E would impact seven elderly households, six disabled households, and five zero-car households, or 23.6 percent of residential displacements, collectively. Alternative I would impact three elderly households, four disabled households, and three zero-car households, or 24.4 percent of residential displacements collectively.

The acquisition and relocation for these residences displaced will be conducted in accordance with state and federal directives, in compliance with the Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970, the Surface Transportation and Uniform Relocation Assistance Act, and 49 CFR Part 24. These social groups are not expected to experience changes in mobility and accessibility. Changes to existing bus stops are not anticipated as part of the project. If impacts occur to existing bus stops in Kentucky, KYTC will work with Transit Authority of Northern Kentucky (TANK) to resolve conflicts, if necessary. The effects of the project on minority and low-income populations are further discussed in Section 4.3.6.

Travel Patterns and Accessibility

Changes in travel patterns as a result of the project are identified in Table 25. Local access in Kentucky and Ohio would be changed in both Alternatives E and I. In Kentucky, access would be modified to Goebel Park in both feasible alternatives. Access to the Lewisburg Historic District would change with Alternative E, while Lewis Street would be closed with Alternative I changing travel patterns to locations west of the historic district. Access to and from the interstate system would be altered in Kentucky and Ohio.

The No Build Alternative would not affect travel patterns and accessibility within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

Table 25. Changes in Travel Patterns and Accessibility

Access Point	Alternative E	Alternative I
Kentucky – Local Access	Crescent Avenue will be closed as a through street. A cul-de-sac will be used to access residential areas between KY 9th Street and 826 Crescent Avenue. New frontage roadways between KY 12th Street and KY 4th Street in northbound and southbound directions.	New frontage roadways between KY 12th Street and KY 5th/4th Street in northbound and southbound directions. Pike Street connection to Lewis Street removed.
Kentucky, Goebel Park – southern access	Access point from KY 9th Street will be modified (Appendix G).	Access point from KY 9th Street will be modified (Appendix G).

Table 25. Changes in Travel Patterns and Accessibility

Access Point	Alternative E	Alternative I
Kentucky, Lewisburg Historic District	Access to the district would change as a result of this alternative. Crescent Avenue will be closed as a through street. New local frontage roadways will be connected to KY 9th Street.	Lewis Street which currently provides access would be closed at Pike Street. Access would be provided by Bullock and KY 9th streets and Western Avenue.
Ohio – Local Access	Access along OH 6th Street between US 50 and Central Avenue would change from to a two-way movement providing an additional connection.	Local access will largely remain unchanged.
Access to interstate system	In Kentucky: All access to southbound I-71/I-75 is from KY 12th Street ramp. Access to northbound I-71 and I-75 will be by ramp connections from new frontage roadways or by C-D roadway. In Ohio: Access to I-75 from CBD will be by ramp connections from existing frontage roadways or by C-D roadway.	In Kentucky: All access to south bound I-71/I-75 is from KY 12th Street ramp. Access to northbound I-71 and I-75 will be by ramp connections from new frontage roadways or by C-D roadway. In Ohio: Access to I-75 from CBD will be by ramp connections from existing frontage roadways or by C-D roadway.
Access from interstate system	In Kentucky: Access to KY 5th Street is removed. All southbound interstate traffic would exit at KY 9th Street and then use local frontage roadways. Northbound traffic would use the C-D roadway with access at 12th and 5th streets. In Ohio: Interstate traffic would utilize C-D roadway to gain access to CBD. Access to Clifton-University Heights-Fairview (CUF) would be improved with I-75 traffic having direct access to Central Parkway and McMicken Avenue with new WHV Interchange.	In Kentucky: Southbound access is provided from C-D roadway at ramps to KY 5th Street and at KY 9th Street, and then use local frontage roadways to access local streets. In the northbound direction, vehicles would use exit ramp at 12th Street to access local streets. In Ohio: Interstate traffic would utilize C-D roadway to gain access to CBD.

4.3.4 Displacements and Relocations

A *Relocation Assistance Program Conceptual Survey* (January 2007) and *Conceptual Stage Relocation Report* (February 2007) (Appendix F) were completed for Ohio and Kentucky, respectively, to identify potential displacements and relocations resulting from the conceptual alternatives. The reports also discussed the availability of relocation opportunities in the area (Appendix F). These reports originally estimated displacements and relocations based on the study area.

To provide an update to the relocation reports from 2007, a survey was distributed to businesses to determine the potential employment and property impacts resulting from the project. Businesses were asked to note the number of current employees and relocation

options should they be displaced. Businesses were asked where they would relocate or if there would be no impact to their operations. An additional survey was distributed in July and September 2011 to potential residential displacements in Kentucky to determine if environmental justice (EJ) and disadvantaged populations would be impacted (Appendix E). The results are further described in Section 4.3.6.

Property impacts and displacements were estimated by using Hamilton County Auditor information, Cincinnati Area Geographic Information System (2010), Kenton County Property Value Administrator (2010) information, project aerial photography, field review, and right-of-way limits of the two feasible alternatives. A list of properties impacted is provided in Appendix D.

The No Build Alternative would not result in displacements because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

Within Kentucky, Alternative E would potentially displace 76 resident units and eight businesses. Alternative I would potentially displace 40 resident units and six businesses. Within Ohio, Alternative E would potentially displace 16 residences and nine businesses. Alternative I would not displace any residences, but would potentially displace eight businesses.

Table 3 in Section 3.5 lists how displacements would specifically occur for the WHV interchange options. The SPUI alternative would potentially displace 16 residential units and three businesses. The TUDI alternative would not displace residences but would potentially displace two businesses.

Table 26 lists the potential displacements by feasible alternative. The number of parcels impacted is presented in Appendix D. The map identification numbers correspond to plan sheets in Appendix D.

Table 26. Potential Displacement Locations

Map ID	Parcel Number and/or Business Name	Address	Land Use Class	Alternative
Kentucky				
KY-008	028-30-12-006.00	1971 Pieck Lane	Residential	E and I
KY-011	041-20-00-151.02	45 Rivard Drive	Residential	E and I
KY-013	041-20-00-002.00	1945 Dixie Highway	Commercial	E and I
KY-018	041-20-00-080.02	15 Highview Drive	Residential	E and I
KY-030	041-40-00-005.00	505 Street Joseph Lane	Residential	E and I
KY-032	041-40-00-001.04	502 Street Joseph Lane	Residential	E and I
KY-038	041-40-00-017.00	1132-34-35-37 Cedar Ridge Lane	Residential	E and I
KY-039	041-30-00-020.01	507 Scenic Drive	Residential	E and I
KY-040	041-30-00-020.02	508 Scenic Drive	Residential	E and I
KY-041	041-30-00-020.09	506 Scenic Drive	Residential	E and I
KY-043	041-30-00-020.03	510 Scenic Drive	Residential	E and I
KY-047	041-33-08-004.00	607 Watkins Street	Residential	E
KY-048	040-44-09-026.01	612 12th Street West	Residential	E
KY-049	040-44-09-026.00	610 12th Street West	Residential	E
KY-050	040-44-09-025.00	608 12th Street West	Residential	E and I
KY-051	040-44-09-024.00	606 12th Street West	Residential	E and I
KY-052	040-44-09-023.00	604 12th Street West	Residential	E and I

Table 26. Potential Displacement Locations

Map ID	Parcel Number and/or Business Name	Address	Land Use Class	Alternative
KY-053	040-44-09-020.00	605 11th Street West	Residential	E and I
KY-054	040-44-09-019.00	609 11th Street West	Residential	E
KY-055	040-44-08-017.01	606 11th Street West	Residential	E and I
KY-056	040-44-08-017.02	608 11th Street West	Residential	E and I
KY-057	040-44-08-018.00	610-12 11th Street West	Residential	E
KY-067	040-44-06-024.00	622 Lewis Street	Residential	I
KY-068	040-44-06-023.00	624 Lewis Street	Residential	I
KY-069	040-44-06-022.00	626 Lewis Street	Residential	I
KY-070	040-44-06-021.00	628 Lewis Street	Residential	I
KY-071	040-44-06-020.00	630 Lewis Street	Residential	I
KY-078	040-44-06-002.00	639 9th Street West	Residential	E
KY-079	040-44-06-003.00	641-5 9th Street West	Commercial	E
KY-081	040-44-06-005.00	904 Baker Street	Residential	E
KY-082	040-44-06-004.00	902 Baker Street	Residential	E
KY-084	040-44-05-005.00	901 Baker Street	Residential	E
KY-096	040-44-04-033.00	872 Crescent Avenue	Residential	E and I
KY-097	040-44-04-032.00	870 Crescent Avenue	Residential	E
KY-098	040-44-04-031.00	868 Crescent Avenue	Residential	E
KY-099	040-44-04-030.00	866 Crescent Avenue	Residential	E
KY-100	040-44-04-029.00	862 Crescent Avenue	Residential	E
KY-101	040-44-04-028.00	860 Crescent Avenue	Residential	E
KY-102	040-44-04-027.00	858 Crescent Avenue	Residential	E
KY-103	040-44-04-026.00	856 Crescent Avenue	Residential	E
KY104	040-44-04-025.00	854 Crescent Avenue	Residential	E
KY-105	040-44-04-024.00	852 Crescent Avenue	Residential	E
KY-106	040-44-04-023.00	850 Crescent Avenue	Residential	E
KY-107	040-44-04-022.00	848 Crescent Avenue	Residential	E
KY-108	040-44-04-021.00	846 Crescent Avenue	Residential	E
KY-109	040-44-04-018.00	844 Crescent Avenue	Residential	E
KY-111	040-44-04-016.00	832 Crescent Avenue	Residential	E
KY-112	040-44-04-015.00	830 Crescent Avenue	Vacant - Residential	E
KY-115	040-44-04-012.00	824 Crescent Avenue	Residential	E and I
KY-116	040-44-04-011.00	822 Crescent Avenue	Residential	E and I
KY-117	040-44-04-010.01	820 Crescent Avenue	Residential	E and I
KY-118	040-44-04-009.00	818 Crescent Avenue	Residential	E and I
KY-119	040-44-04-008.00	816 Crescent Avenue	Residential	E and I
KY-120	040-44-04-007.00	812 Crescent Avenue	Residential	E and I
KY-121	040-44-04-005.00	810 Crescent Avenue	Vacant - Residential	E and I
KY-122	040-44-04-004.00	808 Crescent Avenue	Residential	E and I
KY-123	040-44-04-003.00	806 Crescent Avenue	Residential	E and I
KY-124	040-44-04-002.00	804 Crescent Avenue	Residential	E and I
KY-127	040-44-19-004.00/ Marshall Dodge	555 Pike Street	Commercial	E and I
KY-134	040-44-11-001.00/ Service Experts Heating and Air Conditioning	902-26 Willow Run	Commercial	E
KY-142	040-43-02-014.00	731 Crescent Avenue	Residential	E
KY-143	040-43-02-014.03	729 Crescent Avenue	Residential	E
KY-144	040-43-02-014.02	727 Crescent Avenue	Residential	E
KY-145	040-43-02-014.01	725 Crescent Avenue	Residential	E
KY-147	040-43-02-012.00	641 Crescent Avenue	Residential	E and I

Table 26. Potential Displacement Locations

Map ID	Parcel Number and/or Business Name	Address	Land Use Class	Alternative
KY-148	040-43-02-011.00	637-39 Crescent Avenue	Vacant - Residential	E and I
KY-149	040-43-02-010.00	635 Crescent Avenue	Residential	E and I
KY-150	040-43-02-009.05	627-33 Crescent Avenue	Vacant - Residential	E and I
KY-154	040-43-02-009.04	625 Crescent Avenue	Residential	E and I
KY-156	040-43-02-009.02	621 Crescent Avenue	Residential	E and I
KY-157	040-43-02-009.01	619 Crescent Avenue	Residential	E and I
KY-158	040-43-02-008.00	615-17 Crescent Avenue	Residential	E and I
KY-159	040-43-02-007.00	611-13 Crescent Avenue	Residential	E
KY-160	040-43-02-006.00	609 Crescent Avenue	Residential	E
KY-161	040-43-02-005.00	607 Crescent Avenue	Residential	E
KY-162	040-43-02-004.00	605 Crescent Avenue	Residential	E
KY-163	040-43-02-003.00	601-03 Crescent Avenue	Residential	E
KY-164	040-43-03-028.00/Hue Enterprises Inc	502 Crescent Avenue	Commercial	E and I
KY-167	040-43-02-018.00	640 Western Avenue	Residential	E
KY-168	040-43-02-019.00	638 Western Avenue	Residential	E
KY-169	040-43-02-020.00	636 Western Avenue	Residential	E
KY-170	040-43-02-021.00	632-34 Western Avenue	Residential	E
KY-171	040-43-02-022.00	630 Western Avenue	Residential	E
KY-172	040-43-02-023.00	628 Western Avenue	Vacant - Residential	E
KY-173	040-43-02-024.00	624 Western Avenue	Vacant - Residential	E
KY-174	040-43-02-025.00	622 Western Avenue	Residential	E
KY-177	040-34-03-005.00/ City of Covington	670 4th Street West	Vacant - Commercial	E and I
KY-178	040-34-03-003.00/ City of Covington	669-71 3rd Street West	Vacant - Commercial	E and I
KY-180	040-34-02-001.00/ Rusk Heating and Cooling	664-66 3rd Street West	Commercial	E and I
Ohio				
--	14700070133 / ARTIMIS	602 West 4th Street	Commercial	E and I
OH-004	013700030060 / Hilltop Concrete	612 Mehring Way	Industrial	E and I
OH-006	013700030044	603 Pete Rose Way	Commercial	E and I
OH-016	014700050121/Longworth Hall	700 Pete Rose Way	Commercial	E and I
OH-057	014600060115	500 Seventh Street	Commercial	E
OH-075	018500060022/Gold Star Chili	2020 Dalton Avenue	Commercial	E and I
OH-083	018700080070	2408 Spring Grove Avenue	Commercial	E
OH-097	009700010021	2321 W McMicken Avenue	Residential	SPUI
OH-098	009700010020	2323 W McMicken Avenue	Residential	SPUI
OH-099	009700010019	2325 W McMicken Avenue	Residential	SPUI
OH-103	009700010015	2335 W McMicken Avenue	Residential	SPUI
OH-104	009700010014	2341 W McMicken Avenue	Residential	SPUI
OH-105	009700010013	2343 W McMicken Avenue	Residential	SPUI
OH-107	009700010011	2351 W McMicken Avenue	Commercial	SPUI
OH-108	009700010010	2355 W McMicken Avenue	Residential	SPUI
OH-109	009700010009	2359 W McMicken Avenue	Residential	SPUI
OH-116	009700010223	2310 Central Parkway	Commercial	SPUI
OH-118	009700010004	2316 Central Parkway	Residential	SPUI

Table 26. Potential Displacement Locations

Map ID	Parcel Number and/or Business Name	Address	Land Use Class	Alternative
OH-120	009700010003	2318 Central Parkway	Residential	SPUI
OH-121	009700010002	2320 Central Parkway	Residential	SPUI
OH-122	009700010001	2322 Central Parkway	Residential	SPUI
OH-131	009800050105	2402 Fargo Alley	Residential	SPUI
OH-133	009800050103	2406 Fargo Alley	Residential	SPUI
OH-134	9800050204	2406 Fargo Alley	Vacant - Residential	SPUI
OH-135	009800050100	1059 Rush Street	Residential	SPUI
OH-140	18700090123	2229 Spring Grove Avenue	Industrial	TUDI
OH-141	18700090004	1220 Harrison Avenue	Industrial	TUDI
OH-142	013400060323	817 West Court Street	Commercial	I

4.3.4.1 Residential Displacements

More residential displacements are expected in Kentucky than in Ohio due to the type of land uses in the study area. The majority of residences in Kentucky are single-family, and residential displacements are concentrated on the west side of I-71/I-75 in the Lewisburg neighborhood (Appendix D). Both feasible alternatives would potentially displace multi-family housing along the hillside of the Lewisburg neighborhood and on KY 12th and 11th streets in the Lewisburg historic district. Alternative E also has a concentration of displaced residents along Crescent Avenue between KY 5th and 9th streets. Alternative I would displace residences on Pike Street near I-71/I-75 and along Crescent Avenue south of KY 5th Street. In addition, several residential properties would have parcel impacts but would not result in displacements.

In Ohio, Alternative E is not expected to displace residences outside of the WHV Interchange. For the WHV interchange alternatives, the SPUI alternative would displace 16 residential units along Central Parkway, McMicken Avenue and McMillen Street, while the TUDI alternative would not displace residents in Ohio. Alternative I with either WHV interchange design would displace fewer residences for the entire project than Alternative E. Table 3 in Section 3.5 lists impacts for both WHV interchange alternatives.

Potential displacements, for residential units and number of persons by alternative, within Kentucky and Ohio are shown in Table 27.

Table 27. Estimated Residential Displacements

Alternative	Kentucky		Ohio		Total	
	Residential Units	Persons	Residential Units	Persons	Residential Units	Persons
Alternative E	76	76-296	16	16-60	92	92-356
Alternative I	40	40-168	0	0	40	40-168

Note: See Table 3 in Section 3.5 for residential displacements for the WHV interchange options.

4.3.4.2 Business Displacements

The estimated business displacements that are within the construction limits of the Alternatives E and I were identified (Appendix D). Potential business displacements and estimated number of employees displaced by the feasible alternatives are shown in Table 28. If any portion of a business' building is located within the construction limits of the

feasible alternatives, it was considered a potential displacement. The No Build Alternative would not result in any business displacements within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

There are eight Kentucky businesses within the construction limits of the feasible alternatives. The majority of employees impacted in Kentucky are employed at Marshall Dodge, Service Experts Heating and Air Conditioning, and Rusk Heating and Air Conditioning. Alternative E would potentially displace more employees than Alternative I (Table 28). Alternative E would potentially displace businesses along KY 3rd, 4th, 9th streets and Pike Street. Business displacements would be located along KY 3rd and 4th streets and Pike Street by Alternative I (Appendix D).

Within Ohio, business displacements would potentially occur in the area of the WHV due to the proposed new interchange configuration. The SPUI alternative would displace three businesses while the TUDI alternative would displace two businesses. Business displacements would occur west of I-75 in the Queensgate area, Dalton Avenue, and Spring Grove Avenue. Business displacements would also occur at Longworth Hall and ARTIMIS for both Alternatives E and I. Both feasible alternatives would impact many of the same businesses. However, Alternative E is expected to displace more businesses than Alternative I (Table 28).

Table 28. Estimated Business Displacements

Alternative	Kentucky		Ohio		Total	
	Businesses	Estimated Number of Employees	Businesses	Estimated Number of Employees	Businesses	Estimated Number of Employees
Alternative E	8	100-130	9	308-399	17	408-529
Alternative I	6	90-115	8	251-267	14	341-382

Note: See Table 3 in Section 3.5 for business displacements for the WHV interchange options.

The largest number of Ohio employees that would be affected by the feasible alternatives are employed by businesses located in Longworth Hall and Hilltop Concrete. These facilities would be impacted by both Alternatives E and I. Alternative I would impact (displace) approximately five percent of Ohio employees within a ½ mile radius of the Brent Spence Bridge. Alternative E is estimated to displace approximately seven percent of Ohio employees within ½ mile radius of the Brent Spence Bridge.

4.3.4.3 Relocation Potential

Residential

The *Relocation Assistance Program Conceptual Survey* (January 2007) and *Conceptual Stage Relocation Report* (February 2007) (Appendix F) for Ohio and Kentucky, respectively, estimated the number of families and businesses, which may be displaced by the project. The *Conceptual Stage Relocation Report* estimated the number of bedrooms per unit of potential displaced residences. The households were assumed to have four or less people based on the relocation studies. Based on this assumption, calculations for the number of persons displaced used a range of one to four persons per residential unit.

Within Kentucky and Ohio, potential residential displacements consist of single-family homes and renter-occupied homes. The relocation reports indicate that there are enough homes and rental units available within five miles of the study area that are comparable to most of the potential displacements. The majority of available, replacement property is less than $200,000. Residential properties valued greater than $200,000 would be more difficult to locate within close proximity to the study area than homes of lesser value.

The relocation reports concluded that there is enough housing available within comparable price ranges and within the income ranges of those persons displaced. Last Resort Housing may be necessary for low-income and rental units. Last Resort Housing may be applied if comparable housing, related to an occupant's financial means, is not available to those displaced. Last Resort Housing is a method by which supplemental payments in excess of the normal cost limits may be approved. The acquisition and relocation for all residences displaced as a result of the project would be conducted in accordance with state and federal directives, in compliance with the Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970, the Surface Transportation and Uniform Relocation Assistance Act and 49 CFR Part 24.

Business

Surveys conducted in 2009, indicated that affected businesses within Kentucky would be able to relocate within the area in either existing structures or new construction, should they choose to do so. Businesses, including office, industrial, and manufacturing operations, displaced in Ohio should be able to relocate within the Cincinnati area, if desired.

4.3.5 Economy and Employment

4.3.5.1 Existing Conditions

Employment data for the study area are discussed in the *Existing and Future Conditions Report* (February 2006) (Appendix A). Descriptions of employers and locations of the type of businesses within the study area are discussed in the *Conceptual Alternatives Study* (April 2009) (Appendix A).

4.3.5.2 Impacts

The loss in property revenue would occur where land is converted to right-of-way for the feasible alternatives. Loss of residential and commercial properties by the feasible alternatives would result in decreased revenues from lost property taxes. The property value of residences close to the I-75 corridor could decrease due to change in views, noise, or access. Also the property value could decrease for sites left near the widened interstate as opposed to being displaced. Several rental properties are located within the proposed work limits. Loss of these types of properties will reduce potential income to property owners. Rental properties left near the widened interstate may also experience reduced potential to be rented due to physical proximity to the interstate.

Both feasible alternatives would result in the loss of property value and property taxes. In Kentucky, the estimated property value loss (in 2010 dollars) for Alternative E is $15.4 million and is $13.1 million for Alternative I. In Ohio, the estimated property value loss for each feasible alternative is: Alternative E - $13.5 million; and Alternative I - $10.2 million.

The likelihood of businesses relocating that would be displaced by this project was investigated through a survey administered in January 2011 (Appendix E). Based on the

survey, the majority (66 percent) of businesses in Ohio indicated that they would not relocate out of Cincinnati or the state or did not indicate how they would be impacted by the project. Within Kentucky, the three surveys that were returned indicated that one business would relocate out of Kentucky and two businesses indicated they would close if their facilities were displaced. As noted in the relocation reports, other businesses affected within Kentucky would be able to relocate within the area in either existing structures or new construction, should they choose to do so.

There is the potential to lose employment from businesses that would be displaced and relocated. The estimated number of employees that would be displaced by the feasible alternatives is shown in Table 28 as discussed in Section 4.3.4.2.

Within a ½ mile of the Brent Spence Bridge there are approximately 5,094 employees in Ohio, this includes portions of the Central Business District. Alternative I would impact (displace) approximately five percent of Ohio employees within ½ mile radius of the Brent Spence Bridge. Alternative E is estimated to displace approximately seven percent of Ohio employees within ½ mile radius of the Brent Spence Bridge. The largest number of employees are within the businesses located in Longworth Hall and Hilltop Concrete. The facilities would be impacted by both Alternatives E and I.

Loss of employment would add to the Greater Cincinnati's unemployment rate of 8.7 percent, compared to the national average of 9.1 percent (US Bureau of Labor Statistics, September 2011) and is similar to the Kentucky state rate of 9.7 percent and Ohio state rate of 9.1 (US Bureau of Labor Statistics, September 2011). Employees would be displaced from mostly industrial type of businesses, plus automotive service, convenience stores and restaurants, and some office buildings.

The No Build Alternative would not result in any economic impacts resulting from land use conversion within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way. The No Build Alternative would not displace any employees. The No Build Alternative would also result in impacts to businesses through increasing traffic congestion on the I-71/I-75 corridor and delays from decreasing LOS.

4.3.6 Environmental Justice

Executive Order 12898 (*Federal actions to Address Environmental Justice in Minority Populations and Low Income Populations*, issued February 11, 1994) requires each federal agency to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low income populations. Definitions of these populations include:

- Low-income is defined as a household with income at or below the Department of Health and Human Services poverty guidelines.
- Minority is defined as a person who is Black, Hispanic, Asian American, American Indian, or Alaskan Native.

4.3.6.1 Existing Conditions

To assess current existing conditions in the study area census data was gathered and analyzed at the census tract, census block, and census block group level. According to U.S. Census Bureau, Census 2000 Geographic Definitions:

> *Census tracts are small, relatively permanent statistical subdivisions of a county delineated by local participants as part of the U.S. Census Bureau's Participant Statistical Areas Program. The U.S. Census Bureau delineated census tracts in situations where no local participant existed or where local or tribal governments declined to participate. The primary purpose of census tracts is to provide a stable set of geographic units for the presentation of decennial census data.*
>
> *Census blocks are areas bounded on all sides by visible features, such as streets, roads, streams, and railroad tracks, and by invisible boundaries, such as city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads. Generally, census blocks are small in area; for example, a block bounded by city streets. However, census blocks in remote areas may be large and irregular and contain many square miles.*
>
> *A Census block group (BG) is a cluster of census blocks having the same first digit of their four-digit identifying numbers within a census tract. For example, block group 3 (BG 3) within a census tract includes all blocks numbered from 3000 to 3999. BGs generally contain between 600 and 3,000 people, with an optimum size of 1,500 people. Most BGs were delineated by local participants as part of the U.S. Census Bureau's Participant Statistical Areas Program. The U.S. Census Bureau delineated BGs only where a local, state, or tribal government declined to participate or where the U.S. Census Bureau could not identify a potential local or tribal participant.*

Based on *Guidance and Best Practices for Incorporating Environmental Justice in Ohio Transportation Planning and Environmental Processes* (August 2002), environmental justice (EJ) communities are defined as census tracts with low-income and minority populations that exceed the regional average by 25 percent. According to OKI's Participation Plan (June 14, 2007), EJ communities are defined as a population having greater than 19.9 percent minorities and 11.5 percent for low-income populations.

Low-income and minority populations are found to be within the study area in both Covington and Cincinnati (Exhibits 6A-6D). According to 2000 census data, the total population in the study area is 31,935, with 10,784 identified as minorities and 7,788 identified as low-income. Table 29 identifies low-income and minority population percentages by block group and EJ census tracts in the project study area. Minority population data were also identified by Census blocks. Low-income population data are not available at the block level. Tables of 2000 block level Census data are provided in Appendix F.

In the Kentucky, nine of the 22 block groups meet one of the thresholds (low income) for EJ communities. In general, the population is 85 percent white with a median household income ranging between $19,000 and $47,000 per year. Based on U.S. Census data, EJ communities mostly occur within in the Peaselburg, Lewisburg and Mainstrasse neighborhoods (Exhibit 6A). Block level data identified three blocks that meet the threshold for minority populations in Kentucky.

In Ohio, all 15 block groups are above the EJ community thresholds for both income and ethnicity. Some block groups show poverty levels as greater than 70 percent (Table 29) along the northeastern portion of the study area (Exhibit 6B). Similarly, some block groups in the northeast part of the study area show minority levels of over 90 percent (Table 29 and Exhibit 6D).

Table 29. Environmental Justice Population Statistics

Census Tract (Block Group)	Total Population (2000)	Minority Population (2000)	Total Population for Whom Poverty Status is Determined (2000)	Low Income Population[1] (2000)	EJ Community
Kentucky					
603 (1)	961	158 (16.44%)	961	464 (48.28%)	Yes
603 (2)	848	129 (15.21%)	819	334 (40.78%)	Yes
607 (2)	739	94(12.72%)	703	177(25.18%)	Yes
607 (3)	630	97 (15.40%)	630	88 (13.97%)	Yes
616 (1)	515	23 (4.47%)	501	6 (1.20%)	No
616 (2)	905	68 (7.51%)	905	273 (30.17%)	Yes
638 (1)	1,028	27 (2.63%)	1,028	106 (10.31%)	No
638 (4)	629	28 (4.45%)	563	35 (6.22%)	No
640 (3)	741	38 (5.13%)	653	143 (21.90%)	Yes
647 (1)	596	11 (1.85%)	596	5 (0.84%)	No
647 (2)	1,839	34 (1.85%)	1,839	23 (1.25%)	No
647 (3)	1,392	68 (4.89%)	1,392	48 (3.45%)	No
648 (2)	1,480	66 (4.46%)	1,442	106 (7.35%)	No
648 (3)	671	11 (1.64%)	671	13 (1.94%)	No
649 (3)	1,108	58 (5.23%)	1,108	102 (9.21%)	No
650 (2)	706	63 (8.92%)	669	130 (19.43%)	Yes
651 (1)	514	69 (13.42%)	514	37 (7.20%)	No
651 (2)	768	59 (7.68%)	757	60 (7.93%)	No
652 (1)	1,119	85 (7.60%)	1,108	89 (8.03%)	No
652 (2)	1,014	25 (2.47%)	998	0 (0.00%)	No
670 (1)	1,437	221 (15.38%)	1,036	188 (18.15%)	Yes
670 (3)	1,071	156 (14.57%)	999	190 (19.02%)	Yes
Ohio					
1.00 (1)	641	497 (77.54%)	32	32 (100.00%)	Yes
2.00 (1)	1,335	1,323 (99.10%)	1,274	540 (42.39%)	Yes
3.01 (1)	1,232	1,229 (99.76%)	1,232	884 (71.75%)	Yes
3.02 (1)	963	919 (95.43%)	963	657 (68.22%)	Yes
4.00 (1)	1,114	718 (64.45%)	1,106	472 (42.68%)	Yes
6.00 (1)	550	167 (30.36%)	513	88 (17.15%)	Yes
8.00 (1)	547	397 (72.58%)	485	152 (31.34%)	Yes
14.00 (1)	663	602 (90.80%)	619	190 (30.69%)	Yes
15.00 (1)	245	222 (90.61%)	221	180 (81.45%)	Yes
15.00 (2)	467	464 (99.36%)	467	242 (51.82%)	Yes
15.00 (3)	852	842 (98.83%)	790	551 (69.75%)	Yes
15.00 (4)	697	668 (95.84%)	661	295 (44.63%)	Yes
16.00 (3)	834	738 (88.49%)	829	443 (53.44%)	Yes
27.00 (2)	445	243 (54.61%)	441	152 (34.47%)	Yes
28.00 (2)	639	167 (26.13%)	639	293 (45.85%)	Yes
Total Study Area	31,935	10,784	30,164	7,788	

Source: US Census Bureau, 2000

1. Low-income population percentages are based on the population for whom poverty status is determined, as noted by the US Census Bureau. This population may or may not equal the *total* population for the census tract block group.

4.3.6.2 Methodology

The process for evaluating project EJ concerns for the Brent Spence Bridge Replacement/Rehabilitation Project included:

- Identifying the distribution of EJ communities within the study area.
- Considering the burdens and net benefits of anticipated impacts by the feasible alternatives.
- Determining whether project impacts are disproportionately high and adverse to EJ populations.

In Kentucky, the evaluation methodology included the distribution of a direct mailing survey in addition to the review of census tract and block data. The additional level of detail was completed based on the higher number of residential relocations within Kentucky. This survey was conducted to gather socio-economic data and to help identify locations of EJ populations that could be potentially relocated as a result of Alternative E or I. The survey also helps document the effects that the proposed project would have on these households. A total of 93 surveys were mailed by KYTC to these potentially affected residents (Appendix E).

Due to the number of comments received from the surveys related to right-of-way issues, a Right-of-Way Informational Meeting was held on October 13, 2011. The purpose of the meeting was to provide project information to those who could be potentially relocated as a result of the project. At the meeting, the socioeconomic survey previously sent to affected residents by KYTC was made available. Attendees were requested to complete the survey if they had not previously done so.

In Ohio, the evaluation methodology for identifying the distribution of EJ communities within the study area was through review of census tract and block group data. This level of evaluation was completed based on the number of residential impacts by the feasible alternatives.

4.3.6.3 Impacts

The No Build Alternative would not result in direct impacts to EJ communities because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

<u>Kentucky Residential Impacts</u>

Table 30 identifies EJ impacts by displacement for the EJ surveys received. Based on the 36 EJ surveys received, Alternative E would displace three minority households and 12 low-income households in Kentucky. Alternative I would displace four minority households and nine low-income households in Kentucky. Assuming the surveys returned to be representative of all displacements in Kentucky, for Alternative E, 9 percent of total residential displacements are minority and 35 percent are low-income. Of the total residential displacements for Alternative I, 40 percent of the total relocations are low-income and 18 percent are minority. Based on this information, it appears that EJ communities in Kentucky will be affected by Alternatives E and I.

Table 30. Environmental Justice - Kentucky Survey Results

Map ID	Address	Alternative Impact	EJ Population	EJ Impact
Kentucky				
KY-008	1971 Pieck Lane	E and I	No	No
KY-011	45 Rivard Drive	E and I	No	No
KY-018	15 Highview Drive	E and I	No	No
KY-030	505 St. Joseph Lane, Apt. #77	E and I	Minority; Low-income	Yes
KY-032	502 St. Joseph Lane	E and I	Low-income	Yes
KY-038	1132-34-35-37 Cedar Ridge Lane	E and I	Minority; Low-income	Yes
KY-039	507 Scenic Drive	E and I	No	No
KY-041	506 Scenic Drive	E and I	No	No
KY-047	607 Watkins Street	E	No	No
KY-049	610 12th Street W	E	No	No
KY-053	605 11th Street W	E and I	Low-income	Yes
KY-054	609 11th Street W	E	Low-income	Yes
KY-056	608 11th Street W	E and I	Low-income	Yes
KY-067	622 Lewis Street	I	Minority	Yes
KY-071	630 Lewis Street	I	Low-income	Yes
KY-081	904 Baker Street	E	No	No
KY-096	872 Crescent Avenue	E and I	No	No
KY-100	862 Crescent Avenue	E	No	No
KY-101	860 Crescent Avenue	E	No	No
KY-102	858 Crescent Avenue	E	Low-income	Yes
KY-103	856 Crescent Avenue	E	Low-income	Yes
KY-104	854 Crescent Avenue	E	No	No
KY-106	850 Crescent Avenue	E	No	No
KY-111	832 Crescent Avenue	E	Low-income	Yes
KY-115	824 Crescent Avenue	E and I	No	No
KY-116	822 Crescent Avenue	E and I	No	No
KY-117	820 Crescent Avenue	E and I	Minority	Yes
KY-118	818 Crescent Avenue	E and I	Low-income	Yes
KY-120	812 Crescent Avenue	E and I	No	No
KY-123	806 Crescent Avenue	E and I	Low-income	Yes
KY-149	635 Crescent Avenue	E and I	Low-income	Yes
KY-157	619 Crescent Avenue	E and I	No	No
KY-158	615-17 Crescent Avenue	E and I	No	No
KY-169	636 Western Avenue	E	No	No
KY-170	632-34 Western Avenue	E	No	No
KY-174	622 Western Avenue	E	Low-income	Yes

During the course of obtaining baseline socio-economic data, several residents that may be relocated as a result of this project were identified as being a disadvantaged population. A disadvantaged population is one that is elderly, disabled, or a zero-car household.

Several rental properties, including apartment complexes, would be impacted by Alternatives E and I in Kentucky. Tenants of these properties all have the potential to be an EJ household. Several of these tenants were identified as low-income or elderly through socio-economic surveys distributed by KYTC. These residents indicated a concern that they could not be relocated to similar conditions, including rent, utilities, and access to transit. Both feasible alternatives would reduce the amount of available rental units in the area. While there is a concern about being relocated to comparable housing, responses also noted that being relocated could be beneficial and allow for relocating to a more desirable location.

As part of the Brent Spence Bridge Replacement/Rehabilitation Project, a *Conceptual Stage Relocation Report* (February 2007) and *Relocation Assistance Program Conceptual Survey* (January 2007) was completed for Kentucky and Ohio, respectively. The findings indicate there is enough housing available with comparable price ranges and within the income ranges of those persons displaced to address all project relocations. Because there are displacements to low-income residents and rental units, Last Resort Housing may be necessary. Last Resort Housing may be applied if comparable housing, related to an occupant's financial means, is not available for those residents displaced by the project. Last Resort Housing is a method by which supplemental payments in excess of the normal cost limits may be approved. The acquisition and relocation for all residences displaced as a result of the project would be conducted in accordance with state and federal directives, in compliance with the Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970, the Surface Transportation and Uniform Relocation Assistance Act, and 49 CFR Part 24.

Ohio Residential Impacts

In Ohio, the West McMicken neighborhood would be impacted through loss of residences by the SPUI alternative at the WHV interchange. All residential displacements in Ohio resulting from the SPUI are within EJ communities. The TUDI alternative at WHV would not result in residential displacements. No additional residential impacts would occur with Alternative E or I in Ohio.

Kentucky Community Facilities

Goebel Park is adjacent to and frequented by low-income and minority populations in the Mainstrasse neighborhood. The neighborhood park also serves the city of Covington for special events, according to the city's recreation department (October 2011 email coordination with Covington Neighborhoods, Parks, and Recreation Department). Right-of-way would be required from this park in both Alternatives E and I. Alternative E would remove 3.7 acres of the park, including a parking lot, a basketball court, and a walking path located on the west side of the park. Alternative I would remove 1.9 acres of the park, including a parking lot and a basketball court. Other existing facilities in Goebel Park would remain. Residents in the area would lose use of these recreational resources thus impacting the EJ community. However, mitigation measures would be carried out to minimize impacts to this park and possibly enhance existing facilities. KYTC will vacate 2.8 acres of land immediately adjacent to Goebel Park [existing 5th Street exit ramp and transfer the land to the city of Covington for the purpose of mitigating the loss of parkland and impacted park facilities (i.e. basketball court and parking lot)]. Following mitigation, adverse effects are not anticipated. Mitigation measures for the loss of park land and associated impacted facilities such as the basketball courts and parking lot will be developed and documented through a Memorandum of Agreement (MOA) between KYTC and the City of Covington.

Ohio Community Facilities

The Queensgate Playground and Ball Fields in Ohio are located within EJ communities and would be impacted by both Alternatives E and I. Alternative E would impact 0.6 acres, while Alternate I would impact 0.9 acres of the park. The impacts to the Queensgate Playground and Ball Fields are a loss of land, including a walkway and part of the outfields. A MOA has been completed for the reconfiguration of the ball fields and walkways (Appendix E).

Ohio Business Impacts

Within Ohio, business displacements within EJ communities would potentially occur in the area of the Western Hills Viaduct due to the new interchange configuration for the SPUI and the TUDI. For the WHV interchange alternatives, the SPUI alternative would displace three businesses while the TUDI alternative would displace two businesses. No other businesses impact by either feasible alternative would occur within EJ communities.

Kentucky Neighborhood and Community Cohesion

Impacts to neighborhood and community cohesion are minimized by using as much existing right-of-way as possible. In addition, relocations occur adjacent to the existing transportation right-of-way and do not result in "fragmented" or isolated pockets of homes that are separated from the remaining portion of the community by a roadway network.

Apartment complexes would be displaced by both Alternatives E and I. Loss of one building within a full complex could impact community cohesion should there not be enough apartments remaining in the same complexes for tenant relocation. Three apartment complex buildings would be displaced by both Alternatives E and I. These buildings contain 10, 11, and 40 units, respectively. During field review by the project team, these buildings appear to be within EJ communities. However, only one survey response was received from these apartments so little can be drawn from this limited sample.

Ohio Neighborhood and Community Cohesion

Within Ohio, the SPUI alternative for the WHV would have an impact on community cohesion because it would displace residences in the West McMicken neighborhood. The TUDI alternative for the WHV would not impact community cohesion since no residences will be displaced and neighborhoods would remain intact. Neither Alternative E nor I would have additional impacts to community cohesion in Ohio.

Kentucky Access/Travel Patterns

In Kentucky, access into the Lewisburg neighborhood would be altered by both Alternatives E and I. Under Alternative E, 1,800 feet of Crescent Avenue would be eliminated between 826 Crescent Avenue and the Cork 'N Bottle (501 Crescent Avenue) that links the Lewisburg neighborhood to the interstate system and the regional roadway network. Crescent Avenue would be realigned to connect to Bullock Street to the south. Access to Lewisburg would be provided by Bullock and KY 9th streets. Alternative access is available via Western Avenue which runs parallel to Crescent approximately 200 feet to the west. Under Alternative I, Lewis Street, which provides access to the Lewisburg neighborhood, would be closed at Pike Street.

Kentucky EJ survey respondents identified availability of public transportation as an important issue. Many displaced by the project would be adversely affected if relocated to areas without access to transit. Therefore, these populations would need to be relocated to comparable housing that meets their needs.

Existing public transit stops are anticipated to remain at their current locations in these communities and it is anticipated that future plans for transit will not be precluded by the project.

Ohio Access/Travel Patterns
In Ohio, travel patterns would be altered at the WHV by both interchange alternatives, but access would remain to and from EJ communities.

Noise
Under the No Build Alternative, peak hour noise levels exceed noise abatement criteria (NAC) within the Queensgate Playground and Ball Fields. Under both Alternatives E and I, decibel levels increase between 1.6 and 7.1 dB(A). Since both alternatives exceed NAC levels, a noise abetment analysis was undertaken to minimize impacts to the area.

A noise wall is recommended for both alternatives. Under Alternative E, the recommended wall is 22 feet high and 687 feet long. This wall would provide a 5 dB(A) noise reduction for over 66 percent of impacted receivers in the area (including the Queensgate Playground and Ball Fields and nearby residential areas). Under Alternative I, the recommended wall is 24 feet high and 687 feet long. This wall would provide a 5 dB(A) noise reduction for over 83 percent of impacted receivers in the area (including the Queensgate Playground and Ball Fields and the nearby residential area).

4.3.6.4 Denial of Benefits and Burdens

The main benefits of the Brent Spence Bridge Replacement/Rehabilitation Project are improved safety, improved regional connections, improved traffic flow, and corrected geometric deficiencies. The roadway improvements are throughout the I-75 corridor. EJ communities would not be denied the benefits of the project. The improvements to the existing roadways are to benefit the entire study area and the region.

4.3.6.4.1 Kentucky EJ Populations

Some EJ populations in Kentucky identified specific benefits that would be associated with the project such as providing the opportunity to move to a more desirable location. None of the residents answering the survey or in attendance at the Right-of-Way informational meeting in October 2011, identified impacts to Goebel Park as an adverse effect or burden.

As described in Section 4.3.6.3, burdens would occur from the loss of residences, impacts to community facilities, and changes in access. As noted in the Kentucky survey results, concerns expressed with regard to the project impacts included:

- Some residents are dependent on transit and would be adversely affected if moved to a location where transit was not available.
- The level of financial compensation and timing of the acquisition may influence the level of concern.
- Being relocated adds to the emotional changes already occurring in this economy.
- Impending project can negatively impact the chances of selling a home that would be displaced.
- There is a concern with being able to find a comparable home after being displaced.

The vast majority of concerns raised by the EJ populations were primarily related to right-of-way compensation issues. Even the issue of transit availability is one that would be documented and mitigated through KYTC's relocation process for disadvantaged persons. Special considerations will be given to this population through an enhanced right-of-way process. The consistent right of way concerns raised by the EJ populations prompted KYTC to conduct the Right-of-Way Informational Meeting in October 2011. The intent was not only

to provide information regarding the right-of-way process, but also to better understand the concerns of the EJ populations and confirm that these were their primary points of interest.

Survey results do not suggest that the project will be adversely affecting community cohesion, community resources, family clusters or residents dependent on family or neighbors. Additionally, it should be noted that none of the 36 respondents to the survey indicated they were opposed to being relocated as a result of the project.

4.3.6.4.2 Ohio EJ Populations

Since EJ populations cover almost all of the study area in Ohio, impacts would equally be both a benefit and burden.

4.3.6.5 Disproportionate Analysis

A disproportionately high and adverse effect on minority and low-income populations means an adverse effect that:

1. Is predominately borne by a minority population and/or a low-income population; or
2. Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population (FHWA Order 6640.23, 1995).

Information regarding specific project effects on EJ populations was documented by conducting socio-economic surveys and through additional public outreach meetings. As a result of this effort, project effects to EJ populations were found to be similar to project effects being borne on non-EJ communities. No adverse impacts specific only to EJ communities were documented.

For the entire study area as a whole, effects associated with the feasible alternatives would be spread throughout the length of the project. While EJ populations will be effected by both Alternative E and I, overall project impacts would not appreciably more severe and greater in magnitude than effects suffered by the non-EJ community.

4.3.6.5.1 Kentucky Disproportionate Analysis

Effects resulting from displacements are borne by a higher number of non-EJ populations in Kentucky. In Kentucky, the impact to Goebel Park will potentially affect the recreational opportunities for the neighboring EJ communities. However, this impact would be expected to be suffered by both EJ and non-EJ communities alike and would not expect to be disproportionately borne by EJ communities.

4.3.6.5.2 Ohio Disproportionate Analysis

The effects in Ohio would be disproportionately high and adverse for only the WHV SPUI alternative since all residential displacements occur in areas with identified EJ populations. Alternative I and the WHV TUDI alternative would not result in residential displacements in Ohio. The impact to Queensgate Playground and Ball Fields in Ohio will not affect recreational opportunities and will not be a disproportionately high and adverse effect to neighboring EJ communities.

4.3.6.6 Expanded Outreach

Outreach to EJ communities has and will continue to occur throughout the project development process. Public meetings have been held within EJ communities for easier visibility and accessibility. Community leaders serve as members of the Advisory Committee and will actively work with community members as the project progresses. Future activities could include sending newsletters specifically to EJ communities announcing upcoming public meetings and solicit for additional input.

4.4 Natural Environment

4.4.1 Existing Conditions

Detailed descriptions of the wetlands, aquatic resources, terrestrial ecology, and threatened and endangered species within the study area are discussed in the *Ecological Survey Report – Kentucky* (February 2010) and *Level One Ecological Survey Report – Ohio* (March 2010) (Appendix F). These reports were distributed to federal and state natural resources agencies in each respective state in April 2010. A list of agency coordination letters received and a summary of their comments regarding the ecological reports are provided in Table 62 and Table 63. Copies of agency letters received are provided in Appendix E.

The US Army Corps of Engineers (USACE) conducted a jurisdictional determination field review of the streams and wetlands within the study area on July 7, 2010. The following discussions are based upon the Jurisdictional Determination letter from the USACE on January 24, 2012 (Appendix E). The jurisdictional determinations are valid until January 24, 2017 unless new information warrants revision of the delineation.

4.4.1.1 Wetlands

There are six wetlands in the Kentucky portion of the study area, which total 1.57 acres (Exhibits 7A – 7C). There are no wetlands in the Ohio portion of the study area. All of the wetlands are low quality palustrine emergent wetlands. Two of the wetlands are isolated wetlands and four of the wetlands are hydrologically connected to streams or drainage ways. There are 1.38 acres of jurisdictional wetlands found within the study area.

4.4.1.2 Aquatic Resources

Jurisdictional aquatic resources in the study area are limited to the Ohio River, four perennial streams, 12 intermittent streams, and one ephemeral stream (Exhibits 7A – 7C). All jurisdictional streams are located in Kentucky. The streams are highly disturbed and generally rate in the category of “low quality.” Tributaries to the Ohio River that may have historically existed in Ohio have been either filled or incorporated into the underground storm sewer network. There are no designated wild and scenic rivers, outstanding resource waters, high quality fishing streams, or spawning areas in the study area.

4.4.1.3 Terrestrial Resources

The majority of the study area is occupied by intensively developed urban land, including commercial, residential, and industrial uses. Additionally, transportation facilities (e.g., highways, streets, railways) and maintained lawns are also present within the study area. Undeveloped areas within the survey area include mixed-age woods, young woods, and old field.

In the Kentucky portion of the study area, terrestrial habitats are urban in nature but have a mixed-age woods component that likely has not been cleared in the past 30 to 40 years. Understory species within the mixed-age woods are dominated by invasive species such as bush honeysuckle (*Lonicera tatarica*) and wintercreeper (*Euonymus fortunei*), which are indicative of a disturbed habitat. In Ohio, terrestrial habitats are limited to a narrow, wooded riparian zone consisting of young trees and shrubs located along portions of the Ohio River and scrub shrub areas along the existing interstate right-of-way (Exhibit 7C).

4.4.1.4 Threatened and Endangered Species

The study area lies within the ranges of several federal listed species (Table 31). However, there are currently no documented populations of threatened and endangered species or critical habitat within the study area.

4.4.1.4.1 Mussels

According to state and federal resource agencies, federal listed mussel species have not been collected or identified within the project limits of the Ohio River since 1966 and are no longer believed to be present in the area (Appendix E). No surveys of the Ohio River have been conducted for this project to date. The presence of endangered mussel species in the Ohio River will be determined through field surveys. The surveys will be completed and coordinated with state and federal resource agencies prior to construction.

4.4.1.4.2 Indiana Bat

No suitable winter roosting habitat for the Indiana bat was identified within the study area, and no suitable summer habitat was identified within the Ohio portion of the project. In Kentucky, potential habitat consists of mixed-age woods, which exhibit larger trees with characteristics most preferred by for the species. Approximately 137 acres of potential Indiana bat habitat were identified within the survey area. Marginal Indiana bat habitat consists of single-family residential developments with scattered individual mature trees and young woods. Approximately 187 acres of marginal Indiana bat habitat was identified within the study area. Additional analysis on the Preferred Alternative will be coordinated with the US Fish and Wildlife Service (USFWS) to make an effect determination on the species.

4.4.1.4.3 Running Buffalo Clover

The survey conducted for the federally endangered running buffalo clover was completed by the Kentucky Transportation Cabinet – Division of Environmental Analysis (KYTC-DEA). The survey focused on the area between Pleasant Run Creek, located west of the Dixie Highway Intersection, to the Ohio River. Potential areas of running buffalo clover habitat identified in the survey area consist of partially shaded woodlots, periodically mowed areas (lawns, parks, cemeteries), and partially shaded woods along streams and trails. A majority of the potential woodlots were not considered potential running buffalo clover habitat due to understory dominance of bush honeysuckle and wintercreeper. Only one partially shaded woodlot was identified within the survey area as possessing potential running buffalo clover habitat. This 10-acre woodlot is located along the west side of I-71/I-75 east of the Kyles Lane Intersection and along Intermittent Stream 6. The biological assessment prepared by KYTC-DEA concluded that the proposed project is “Not Likely to Adversely Affect” the running buffalo clover. The USFWS concurred with this finding on May 11, 2010. This determination of affect is valid until May 11, 2015 (Appendix E).

Table 31. Federally Listed Species with Known or Historic Ranges within the Study Area.

Scientific Name	Common Name	Federal Status*	Known or Historic Ranges (County)	Potential Impact
Cyprogenia stegaria	Fanshell mussel	E	Kenton, Hamilton	To be determined based upon additional surveys
Epioblasma obliquata obliquata	Purple catspaw pearly mussel	E	Kenton	To be determined based upon additional surveys
Epioblasma torulosa	Northern riffleshell mussel	E	Kenton	To be determined based upon additional surveys
Epioblasma triquetra	Snuffbox mussel	E	Hamilton	To be determined based upon additional surveys
Haliaeetus leucocephalus	Bald eagle	SC	Kenton, Hamilton	No Effect
Lampsilis abrupta	Pink mucket pearly mussel	E	Kenton, Hamilton	To be determined based upon additional surveys
Myotis sodalis	Indiana bat	E	Hamilton	To be determined based upon additional surveys
Obvaria retusa	Ring pink mussel	E	Kenton	To be determined based upon additional surveys
Plethobasus cooperianus	Orangefoot pimpleback	E	Kenton	To be determined based upon additional surveys
Plethobasus cyphyus	Sheepnose mussel	PE	Kenton, Hamilton	To be determined based upon additional surveys
Pleurobema clava	Clubshell	E	Kenton	To be determined based upon additional surveys
Pleurobema plenum	Rough pigtoe	E	Kenton	To be determined based upon additional surveys
Trifolium stoloniferum	Running buffalo clover	E	Kenton, Hamilton	Not Likely to Adversely Affect
Villosa fabalis	Rayed bean	E	Hamilton	To be determined based upon additional surveys

* E=Listed as Endangered, PE = Proposed Endangered, SC = Special Concern

The biological assessment was submitted with the *Ecological Survey Report – Kentucky* (February 2010) to federal and state natural resources agencies in Kentucky in April 2010. A list of agency coordination letters received and a summary of their comments regarding the ecological report are provided in Table 63. Copies of agency letters received are provided in Appendix E.

4.4.1.4.4 Bald Eagle

During field reviews for the project, no bald eagle nests were identified within the study area. The closest known bald eagle nesting location is approximately 15 miles northeast of the study area along the Great Miami River in Ohio. Due to the survey findings and the distance to the nearest known nest location, ODOT and KYTC determined that the project will have no effect on the species. On May 11, 2010, the USFWS indicated that if no nesting locations occur within the study area, "adverse impacts to the species would not be expected." If a bald eagle nest is established within the study area, coordination with the USFWS will be initiated.

4.4.1.4.5 Other Species

The peregrine falcon was listed as a species of greatest conservation need in Kentucky's State Wildlife Action Plan in 2005. Based upon the Kentucky Department of Fish and Wildlife Resources, *2011 Peregrine Falcon Report*, a pair nested on the Brent Spence Bridge and produced one young in 2011. Coordination with the Kentucky Department of Fish and Wildlife Resources would occur in the spring prior to the rehabilitation of the existing Brent Spence Bridge or the demolition of the bridge approaches to address nesting of peregrine falcons.

4.4.1.5 Floodplain

Floodplains are located along the north and south banks of the Ohio River within the study area (Exhibit 7C). The 100-year flood elevation is 498.5 feet. The new Ohio River Bridge would impact the floodplain in Ohio. Piers would be located within the floodplain area on the north bank of the Ohio River.

4.4.1.6 Geological

The surface geologic material of the southern portion of the project area consists of Ordovician age interbedded shale and limestone of the Kope, Fairview, and Bull Fork formations. As the project moves to the north out of the upland area it crosses over glacial outwash and Holocene age alluvial material on the south side of the Ohio River. After crossing the river, the project is situated again over unconsolidated alluvium, lacustrine, and glacial outwash material of the Ohio River and Mill Creek. On both sides of the Ohio River these unconsolidated sediments can be as much as 150 feet thick.

4.4.2 Impacts

A summary of impacts to ecological resources by the feasible alternatives is shown in Table 32. Neither alternative provides a significantly greater ecological impact than the other. Alternative E impacts one less acre of mixed-age woods which is also considered marginal Indiana bat habitat than Alternative I. As a result, Alternative E provides the minimal impact to ecological resources. No impacts to notable ecological resources are anticipated from this project.

On May 11, 2010, the USFWS determined that the project is "Not Likely to Adversely Affect" running buffalo clover (Appendix E). This determination of affect is valid until May 11, 2015.

Table 32. Ecological Impact Summary

Resource	Alternative E	Alternative I
Intermittent Stream Length (linear feet)	3,335	3,340
Ephemeral Stream Length (linear feet)	0	0
Wetland (acres)	1.38	1.38
Potential /Marginal Indiana Bat Habitat (acres)	28/27	28/28
Potential Running Buffalo Clover Habitat (acres)	2	2
Mixed-Age Woods (acres)	27	28
Young Woods (acres)	10	10
Old Field (acres)	14	14

A mussel survey and Indiana bat habitat assessment will be completed after a Preferred Alternative has been selected. An effects determination on these species will be based on the results of the surveys and the proposed level of disturbance and coordinated with the USFWS.

Both feasible alternatives propose a new bridge over the Ohio River, a perennial stream, located 120 feet west of the existing Brent Spence Bridge. There are two bridge types under consideration, an arch bridge and a cable-stayed bridge. In accordance with US Coast Guard (USCG) requirements, the piers for this bridge must be placed "outside" of the existing Brent Spence Bridge piers. The piers would be placed in the Ohio River approximately 85 feet closer to the banks of the Ohio River than the current Brent Spence Bridge piers. The existing Brent Spence Bridge has a middle span length of 830.5 feet between existing piers. The new bridge would have a middle span length of approximately 1,000 feet from center to center of the proposed piers. Pier construction will impact approximately 1.1 acres of the Ohio River bank area along the Kentucky side and 2.7 acres on the Ohio side. Construction details and impacts will be determined during detail design of the new Ohio River Bridge.

The No Build Alternative would not impact streams or the Ohio River, wetlands, terrestrial habitat, threatened or endangered species, or floodplains within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

4.5 Farmland

Since the study area is entirely within an area identified as an "urbanized area" on the US Census Bureau map, no impacts to farmland are expected as a result of this project.

ODOT Office of Environmental Services determined on April 4, 2010 that a Farmland Conversion Impact Rating (AD-1006) form is not required because the project will not affect farmland (Appendix E).

4.6 Hazardous Materials

The Federal Highway Administration (FHWA), KYTC and ODOT policies emphasize the early identification of sites with potential environmental concerns such as contamination; assessment of the type and extent of contamination and estimated clean-up costs; and avoidance of

substantially contaminated properties. The current policies of the agencies recognize that minor contamination (i.e., limited contamination from leaking underground storage tanks [USTs]) can be easily remediated and do not generally result in excessive project delays, clean-up costs, or liability.

Environmental Site Assessment (ESA) is the process in which properties are identified at various levels pursuant to project development. The ESA process is comprised of three basic levels of investigation that may include historical/environmental research, visual assessments, and sampling and testing. Documentation is subsequently generated for each level of the ESA process in the form of ESA Screening, Phase I ESA, and Phase II ESA. The ESA Screenings and Phase I ESAs were conducted in accordance with ODOT's Site Assessment Guidelines (April 2009).

4.6.1 Existing Conditions

An inventory of hazardous materials sites in the study area was completed through ESA Screenings and Phase I ESAs. The results are documented in the following reports: *Environmental Site Assessment Screening* (April 2007); *Environmental Site Assessment Screening-Western Hills Viaduct* (May 2010); and *Phase I Environmental Site Assessments* (April 2010).

A review of literature and secondary information sources completed for the ESA Screenings resulted in the identification of properties recommended for Phase I ESAs. Phase I ESAs were conducted on 33 sites within the right-of-way limits of Alternatives E and I (Exhibits 8A and 8B). These properties included gas stations, auto repair and dealerships, junk yards, gas and electric facilities, and industrial businesses. Contaminants associated with such properties included gasoline, diesel, solvents, paint wastes, and other commercial/industrial wastes.

4.6.2 Impacts

The May 2010 ESA Screening recommended that a Phase I ESA be conducted for the Harrison Terminal site (1220 Harrison Avenue) due to historic land uses and listings in multiple databases. Alternative I would result in a building and right-of-way take from this parcel.

Eleven sites impacted by the feasible alternatives are recommended for Phase II ESA investigations. Two sites are located in Kentucky and nine sites are located in Ohio. Table 33 lists the sites warranted for Phase II ESA investigations and which feasible alternative impacts the property. The Phase II ESAs will be conducted during detailed design of the project on sites impacted by the Preferred Alternative.

Table 33. Sites Warranted for Phase II ESA

Site ID	State	Name	Facility Address	Issue	Alternative Impacts
1	OH	Parkway Market Food Mart	2310 Central Parkway	Historic Filling Station	E and I
3	OH	Sunset Janitorial Supply	1151 Harrison Avenue	OH LUST	E and I
9	OH	Wegman Company	1101 York Street	Multiple Manufacturing Facilities	E and I

Table 33. Sites Warranted for Phase II ESA

Site ID	State	Name	Facility Address	Issue	Alternative Impacts
29	OH	city of Cincinnati Right-of-way	Formerly 817 Mound Street	Historic Filling Station	E and I
49	OH	ARTIMIS (ODOT)/ Former Gas Station	508 West 3rd Street	Historic Filling Station	E and I
51	OH	Vacant Site Owned by city of Cincinnati	4th Street and Central Avenue	Historic Filling Station	E and I
53	OH	Speedway Super America	605 West 3rd Street	Historic Filling Station	E and I
58	OH	Parking Lot Owned by the city of Cincinnati	205 Central Avenue	Historic Filling Station, OH UST, OH LUST	E and I
60	OH	Parking Lot Owned by Duke Energy	646 Mehring Way	Historic MGP	E and I
71	KY	Rusk Heating and Air Conditioning	666 West 3rd Street	Historic Junkyard Location, KY UST	E and I
78	KY	Kerry Toyota	550 Pike Street	Historic Filling Station, KY UST	I

LUST - Leaking Underground Storage Tank
UST - Underground Storage Tank
MGP - Manufactured Gas Plant
RCRA-NonGen - Resource Conservation and Recovery Act Non Generator
RCRA-SQG - Resource Conservation and Recovery Act Small Quantity Generator

The following three sites do not require Phase II ESAs:

- Site 52 – city of Cincinnati, 351 John Street,
- Site 54 – city of Cincinnati, 514 West 3rd Street, and
- Site 57 – city of Cincinnati, 302-304 Central Avenue.

However, based on known information about these sites, if dewatering is necessary for construction purposes, plan notes for petroleum contaminated soil (PCS) and contaminated groundwater will be developed and placed into plans for these areas.

The No Build Alternative would not impact hazardous materials resources within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

4.7 Cultural Resources

4.7.1 Existing Conditions

4.7.1.1 Historic Resources

A literature search and Phase I and Phase II history/architecture surveys of the Area of Potential Effects (APE) within Kenton County, Kentucky and Hamilton County, Ohio were conducted for

the Brent Spence Bridge Replacement/Rehabilitation Project. The results of these investigations are documented in five reports: *History/Architecture Survey – Kenton County, Kentucky* (April 2010); *Phase I History/Architecture Survey – Hamilton County, Ohio* (June 2007); and *Phase II History/Architecture Survey – Hamilton County, Ohio* (December 2008); *Phase II History/Architecture Survey – Hamilton County, Ohio* (September 2009); and *Phase I History/Architecture Survey Addendum Report for the Western Hills Viaduct Interchange – Hamilton County, Ohio* (November 2010).

The project APE is largely defined by pre- and post-1960 resources along the current alignment for I-75 (Exhibits 9A and 9B). Within Kentucky, the majority of resources that are more than 50 years old are located within the West Side/MainStrasse and Lewisburg historic districts. Within Ohio, the majority of resources that are more than 50 years old are located within the Dayton Street and West Fourth Street historic districts. Thirty-seven historic properties were identified within the project APE. Twelve are listed on the National Register of Historic Places (NRHP) and 25 were determined eligible for listing on the NRHP.

In Kentucky, there are seven historic resources or historic districts within or in close proximity to the APE listed on the NRHP:

- Kenney's Crossing,
- Westside/Mainstrasse Historic District,
- Lewisburg Historic District,
- Old Fort Mitchell Historic District,
- Bavarian Brewing Company,
- Fort Mitchell Historic District, and
- Highland Cemetery Historic District.

Additionally, there are 14 properties in Kentucky within the APE determined eligible for the NRHP (Table 34).

In Ohio there are three individual properties and two historic districts listed on the NRHP within the APE. One of the resources, Union Terminal, is a National Historic Landmark:

- Union Terminal,
- Our Lady of Mercy,
- Longworth Hall (Baltimore & Ohio Railroad Freight Station and Storage Warehouse),
- Dayton Street Historic District, and
- West Fourth Street Historic District and Amendment.

Additionally, there are eleven properties in Ohio determined eligible for listing on the NRHP (Table 35).

Table 34. Kentucky Architectural Properties within APE Listed or Eligible for Listing in the NRHP

Resource Number	Name	Address	Construction Date/ Condition	National Register/ Landmark Status
KEC 50, NRHP No. 90000481	Kenney's Crossing	1001 Highway Avenue	1880/Good	NRHP 1990
KEC 107	C&O Railroad Bridge	Spans Ohio River east of Brent Spence Bridge	1929/Altered	Eligible 2008
KECL 817	Boehmer Decorating Center	533-535 Pike Street	Ca. 1870/Good	Eligible 2008
NRHP No. 83003650	Westside/Main Strasse Historic District	Various	1840-1877/Good	NRHP 1983
NRHP No. 93001165	Lewisburg Historic District	Various	1870-1880/Good	NRHP 1993
NRHP No. 96000281	Bavarian Brewing Company	522 West 12th Street	1894-1966/Good	NRHP 1996
NRHP No. 89001170	Old Fort Mitchell Historic District	Various	1905-1929 and post World War II/ Excellent	NRHP 1989
KECL 1018	Residence	521 Western Avenue	1870/Excellent	Eligible 2008
KEC 462	Glier's Goetta	533 Goetta Place	1903/Excellent	Eligible 2008
KE 4	Kennedy-Rivard House	50 Rivard Drive	1850/Excellent	Kentucky Landmark 1995/ NRHP Eligible 2009
KECL 621	Residence	504 West 12th Street	Ca. 1885/Good	Eligible 2009
KECL 626	Residence	514 West 12th Street	Ca. 1880/Good	Eligible 2009
KECL 628	Residence	516 West 12th Street	Ca. 1885/Good	Eligible 2009
KEC 460	Residence	881 Highway Avenue	Ca. 1870/ Good	Eligible 2009
KECL 1046	Residence	632 Western Avenue	Ca. 1920/ Good	Eligible 2009
KEFM 317	Residence	2 East Orchard Road	Ca. 1850/ Excellent	Eligible 2009
NRHP No. 89001169	Fort Mitchell Heights Historic District	Various	1905-1929/ Excellent	NRHP 1989
NRHP No. 89001585	Highland Cemetery Historic District	2167 Dixie Highway	Ca. 1869/ Excellent	NRHP 1989
KEC 456	Residence	1000 Emery Drive	Ca. 1900/ Excellent	Eligible 2010
KEC 458	Residence	45 Rivard Drive	Ca. 1917/ Good	Eligible 2009
KEC 459	Residence	509 Street Joseph Lane	Ca. 1950/ Good	Eligible 2009

Table 35. Ohio Architectural Properties Listed or Eligible for Listing in the NRHP

Resource Number	Name	Address	Construction Date/ Condition	National Register/ Landmark Status
HAM-1295-43 NRHP No. 72001018	Union Terminal	1301 Western Avenue	1933/ Excellent	NRHP 1972, National Historic Landmark 1977
HAM-1342-43	Harriet Beecher Stowe Elementary School (Fox 19 TV Station)	635 West 7th Street.	1921/ Excellent	Eligible 2009
HAM-1656-43 NRHP No. 86003521	Longworth Hall (Baltimore Ohio RR – Freight)	700 Pete Rose Way	1904/ Rehabilitated	NRHP 1986
HAM-1709-40	Chem-Pack Inc.	2261 Spring Grove Avenue	1890/ Good	Eligible 2007
HAM-1804-43 NRHP No. 80003070	Our Lady of Mercy	1409 Western Avenue	1897/ Altered	NRHP 1980
--	John Mueller House	724 Mehring Way	1877/ Deteriorated	Eligible 2007
NRHP No. 73001457	Dayton Street Historic District	West End	1860-1880/ Good	NRHP Listed 1973
NRHP Nos. 76001443 and 79001861	West Fourth Street Historic District and Amendment	Central Business District	1870-1927/ Excellent	NRHP Listed 1976 Amended 1979
SFN 3101533	Brighton Bridge (Colerain Viaduct)	Colerain Avenue spanning Central Parkway	1925/ Altered	Eligible 2010
HAM-7366-28	Central Trust-Brighton office	1110 Harrison Avenue	1903/ Excellent	Eligible 2011
SFN 3105458	Western Hills Viaduct	Spans I-75 and Mill Creek Valley between Central Parkway and Harrison Avenue	1931/ Altered	Eligible 2011
Cincinnati Historic Inventory District Form	West McMicken Avenue Historic District	2321-2411, 2342-2464 West McMicken Avenue	Ca. 1870-1910/ Good	Eligible 2011
HAM-7633-28	High-Craft Printing Building	1120 Harrison Avenue	Ca. 1890/ Good	Eligible 2011
HAM-1462-06	Rummane Building	635 Kress Alley	Ca. 1860	Eligible 2011
HAM-0484-06	--	650 West McMicken Avenue	1878	Eligible 2011
--	Western Hills Viaduct Subway Tunnel Portals	Central Parkway near Addison Street	Ca. 1920-1927	Recommended Eligible 2007

4.7.1.2 Archaeological Resources

There are several previously documented archaeological sites either within or in close proximity to the study area. Table 36 and Table 37 provide a summary of these sites within two kilometer radius of the study area. In Kentucky, there are eight previously recorded archaeological sites, all of which are associated with historic Nineteenth and Twentieth Century occupations. There are seven documented sites in Ohio which relate to the former locations of prehistoric mound complexes. Background research also was conducted to identify any inventoried or known locations of sunken vessels within or in the immediate vicinity of the Brent Spence Bridge. No recorded sunken vessels were identified as a result of this research. The probability of locating an intact vessel lying within the study area was considered to be low due to poor visibility and repeated dredging in the Ohio River.

Table 36. Kentucky Previously Recorded Archaeological Sites

Site Number	Site Type/Function	Temporal Affiliation
15KE101	Resource Procurement/ Activity Area	Historic, Nineteenth-Twentieth Century
15KE107	Industrial	Historic, Nineteenth Century
15KE119	Domestic/ Farmstead	Historic, Nineteenth-Early Twentieth Century
15KE120	Military/ Earthwork	Historic, Nineteenth Century
15KE122	Military/ Earthwork	Historic, Nineteenth Century
15KE140	Domestic/ Farmstead	Historic, Mid-Nineteenth-Early Twentieth Century
15KE141	Domestic/ Farmstead	Historic, Mid-Nineteenth-Early Twentieth Century
15KE142	Domestic/ Farmstead	Historic, Mid-Nineteenth-Early Twentieth Century

Table 37. Ohio Previously Recorded Archaeological Sites

Site Number	Site Type/Function	Temporal Affiliation
33HA0001	Stone Mound	Prehistoric, Early Woodland
33HA0002	Prehistoric Cemetery Location	Prehistoric, Middle Woodland
33HA0242	Effigy Mound	Prehistoric, Middle Woodland
33HA0307	Prehistoric/ Unknown	Prehistoric, Unknown
33HA0311	Earthen Mound	Prehistoric, Middle Woodland
33HA0312	Earthen Mound	Prehistoric, Woodland
33HA0780	Historic/ Unknown	Historic, Unknown

In accordance with the KYTC policy and procedures, a Phase I archaeological survey was conducted within the Kenton County portion of the APE. The results of this survey are presented in the *Phase I Intensive Archaeological Survey - Kenton County, Kentucky* (September 2011). The archaeological APE included the construction limits for Alternative E and Alternative I. Phase I field investigations consisted of a combination of walkover inspection, systematic shovel testing, and systematic surface inspection throughout the archaeological

APE. This included both existing I-71/75 right-of-way as well as 207 individual real estate parcels that have the potential to be impacted. A total of approximately 330 acres was surveyed.

Twenty-six of the individual parcels were not surveyed because field crews were unable to contact the owner/occupant to obtain access to 22 properties and permission was denied at four parcels.

The Kentucky Phase I archaeological survey resulted in the identification of 16 archaeological resources (Table 38). Fifteen are not eligible for inclusion in the NRHP. These include 12 historical sites (15KE147, 15KE148, 15KE149, 15KE150, 15KE151, 15KE152, 15KE153, 15KE154, 15KE156, 15KE157, 15KE158, and 15KE159) and three historic, non-site localities (Localities BS-1, BS-7, and BS-12). Each resource was considered for NRHP eligibility under Criterion D, the potential to yield data significant to the history of the area. Based on the results of the Phase I survey, it is not possible to provide a recommendation concerning the NRHP eligibility of Site 15KE160. Due to fluvial deposition at the site, geo-archaeological deep testing is recommended to assess the potential for deeply buried cultural deposits at Site 15KE160.

Table 38. Summary of Identified Archaeological Resources for Kentucky

Site Number	Site Type/Function	Temporal Affiliation
15KE147	Historic/Domestic	Late Nineteenth/Twentieth Century
15KE148	Historic/Domestic	Late Nineteenth/Twentieth Century
15KE149	Historic/Undetermined (Scatter)	Mid-Nineteenth/Twentieth Century
15KE150	Historic/Domestic	Late Nineteenth/Twentieth Century
15KE151	Historic/Domestic	Late Nineteenth/Twentieth Century
15KE152	Historic/Undetermined (Scatter)	Mid-Nineteenth/Twentieth Century
15KE153	Historic/Domestic	Late Nineteenth/Twentieth Century
15KE154	Historic/Domestic	Late Nineteenth/Twentieth Century
15KE156	Historic/Domestic	Late Nineteenth/Twentieth Century
15KE157	Historic/Domestic	Early to Mid- Twentieth Century
15KE158	Historic/Domestic	Early to Mid- Twentieth Century
15KE159	Historic/Domestic	Mid-Nineteenth/Twentieth Century
15KE160	Historic/undetermined (scatter)	Mid-Nineteenth/Twentieth Century
Location BS-1	Historic/Undetermined (Scatter)	Late Nineteenth/Twentieth Century
Location BS-7	Historic/Undetermined (Scatter)	Late Nineteenth/Twentieth Century
Location BS-12	Historic/Undetermined (Scatter)	Late Nineteenth/Twentieth Century

Within the Ohio portion of the APE, a disturbance assessment for archaeological resources was completed and documented in *Archaeological Existing Conditions and Disturbance Assessment for Ohio* (September 2010). The goal of the assessment was to identify the overall level of disturbance and the potential to contain archaeological resources within the APE for Alternative

E and Alternative I. For the purposes of the archaeological assessment, the APE was subdivided into three subcorridors and within these subcorridors, survey areas were identified for visual inspection and, where possible, a series of judgmental auger or shovel tests were excavated.

Subcorridors 1 and 2 extended from along the Ohio River northward to Ezzard Charles Drive. As a result the visual inspection and subsurface auger results, no additional archaeological work was recommended for those portions of Alternative E and Alternative I. Subcorridor 3 extended from Ezzard Charles Drive to the project's northern terminus near the I-75/Western Hills Viaduct Interchange. With the exception of one Survey Area (#24), the field investigations documented a heavily disturbed and modified landscape and soil profile.

Survey Area 24 is a roughly formed triangle with its boundaries composed of West McMicken Avenue on the east, West McMillan Street on the north and west, and Central Parkway on the south and west. The area appears to be a surviving remnant of a historic neighborhood characterized by approximately 14 structures exhibiting a mixture of nineteenth century Italianate and Second Empire architectural styles. The auger and shovel tests excavated in this area did not yield any artifactual material or archaeological features. The soil profiles did not exhibit high levels of disturbance or modification. Because the soil in this area is not disturbed and older residences remain, the area has the potential to contain archaeological remains of a late nineteenth/early twentieth century neighborhood. A Phase I archaeological survey within the limits of Survey Area 24 would be necessary if Alternative E is selected as the Preferred Alternative. No additional archaeological work is recommended for the remaining survey areas within Subcorridor 3 due to previous construction disturbances.

4.7.2 Determination of Effects

The *Determination of Effects Report* (June 2011) documented the impacts that the feasible alternatives would have on the historic resources within the APE. Three of the 37 historic resources would be affected by the feasible alternatives. Both Alternatives E and I would have an adverse effect on the Lewisburg Historic District and Longworth Hall. The WHV Interchange SPUI alternative would have an adverse effect on the West McMicken Avenue Historic District. Determinations of effect for resources that would be impacted by the feasible alternatives are presented in Table 39. The No Build Alternative would not impact historic resources within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

4.7.2.1 Lewisburg Historic District

Alternative E would require the acquisition of 5.1 acres of land within the boundary of the Lewisburg Historic District. Land from 53 properties that are contributing elements to the historic district would be affected. A total of 38 parcels would be totally acquired with demolition of associated residential structures and land from 15 others would also be acquired for right-of-way without impact to any structures.

Alternative I would require the acquisition of 2.1 acres of land within the historic district boundary, affecting 28 of the 430 properties that are considered to be contributing elements to the Lewisburg Historic District. Twenty-one parcels would be acquired as total right-of-way acquisitions with demolition of structures; seven additional parcels would be affected through partial or strip-take right-of-way acquisition, which would not require taking of any structures.

Table 39. Cultural Resources Impacts

Resource Number	Name	National Register Status	Alternative Impacts	Determination of Effect
NRHP No. 93001165	Lewisburg Historic District	NRHP 1993	Alternative E – 5.1 acres (53 contributing properties; 38 fully acquired; 15 with partial acquisition); Change in access to the district on Crescent Avenue Alternative I – 2.1 acres (28 contributing properties; 21 fully acquired; 7 with partial acquisition); Change in access to the district, Lewis Street would be closed at Pike Street	Adverse Effect
HAM-1342-43	Harriet Beecher Stowe Elementary School (Fox 19 Television Station)	Eligible 2009	No impacts to the historic building Alternative E – 1,330 square feet of floor area from the parking garage Alternative I – 2,400 square feet of floor area from the parking garage	No Effect
HAM-1656-43 NRHP No. 86003521	Longworth Hall (Baltimore Ohio RR – Freight)	NRHP 1986	Alternative E –204 linear feet of the eastern end of the building Alternative I –204 linear feet of the eastern end of the building	Adverse Effect
Cincinnati Historic Inventory District Form	West McMicken Avenue Historic District	Eligible 2011	SPUI Alternative – Demolition of eight contributing buildings TUDI Alternative – None	Adverse Effect No Effect
SFN 3105458	Western Hills Viaduct	Eligible 2011	SPUI Alternative – Realign viaduct to intersect at the existing West McMillan Street/West McMicken Avenue intersection; and grade-separate the intersection of WHV and Central Parkway. Reconstruction of the viaduct structure from approximately 900 feet west of Spring Grove Avenue to just east of I-75 TUDI Alternative – Reconstruction of 1,108 feet of the viaduct's eastern approach ramps to connect to I-75	No Adverse Effect

Additionally, the historic district would experience changes in access with both Alternatives E and I. Under Alternative E, 1,800 feet of Crescent Avenue would be eliminated between 826 Crescent Avenue and the Cork 'N Bottle (501 Crescent Avenue). Crescent Avenue links the Lewisburg Historic District to the interstate system and the regional roadway network. Crescent Avenue would be realigned to connect to Bullock Street to the south. Access to the historic district would be provided by Bullock and KY 9th streets. Alternative access is available via

Western Avenue which runs parallel to Crescent approximately 200 feet to the west. Under Alternative I, Lewis Street which provides access to the historic district would be closed at Pike Street. Access to the historic district would still be provided by Bullock and KY 9th streets as well as Crescent Avenue.

Noise levels within the Lewisburg Historic District were modeled using the Federal Highway Administrations (FHWA) Traffic Noise Model Version 2.5 (TNM) at 241 noise sensitive locations (Appendix F). Based upon the analysis, the existing ambient noise levels (2010) exceed the FHWA's NAC at 123 locations (51 percent). Under the No Build 2035 conditions, the NAC criteria are exceeded at 138 locations (57 percent). Based upon Alternative E, the FHWA NAC criteria would be exceeded at 140 locations (63 percent), however, an additional 13 receptors would be acquired for implementation. For Alternative I, the FHWA NAC criteria would be exceeded at 152 locations (63 percent). Even though the existing and future noise levels exceed the FHWA NAC, the noise increases will not introduce audible elements that diminish the integrity of the historic district's significant historic features.

In accordance with FHWA noise policies, abatement should be considered for locations where traffic-related noise impacts would occur. For this project, noise barriers have been determined to be the only potentially effective noise abatement measure. KYTC has defined criteria for determining the feasibility and reasonableness of constructing a noise barrier. The determination of reasonableness of a proposed abatement measure is based upon three primary factors: the noise reduction design goal, acoustic feasibility, and cost effectiveness. Four noise barrier locations were analyzed for the Lewisburg Historic District:

- along I-71/75 between approximately Crescent Avenue to KY West 9th Street,
- along I-71/75 between KY West 9th Street to West Pike Street,
- along I-71/75 between West Pike Street to KY West 12th Street, and
- along I-71/75 between Pike Street and the end of the historic district.

Based upon the analysis, the four locations above do not meet KYTC criteria for noise abatement for either Alternative E or I.

A MOA between FHWA, KYTC and the Kentucky Heritage Council (KHC) will be prepared to address the adverse effects to the Lewisburg Historic District resulting from the project.

4.7.2.2 Longworth Hall

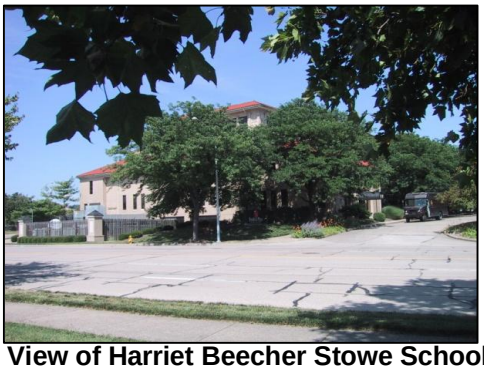
Feasible Alternatives E and I would directly impact the eastern section of Longworth Hall. Both alternatives would pass through 204 feet of the eastern end of the building, requiring that three, 15-foot, two 13-foot, and six 12-foot bays of the building be demolished. This affected section of the building is that portion which was previously altered by reducing its length by 150 feet in 1961, to allow for the supporting piers of elevated I-71/I-75. A five-story 30,000 square foot brick addition was then built onto the northeast corner.

View of Longworth Hall

A memorandum of agreement (MOA) among FHWA, ODOT and Ohio Historic Preservation Office (OHPO) and other consulting parties was prepared to address the adverse effect to Longworth Hall resulting from the project. The MOA is provided in Appendix E.

4.7.2.3 Harriet Beecher Stowe Elementary School

Feasible Alternatives E and I would not directly impact the former Harriet Beecher Stowe Elementary School or land within the historic boundary of the property. Both feasible alternatives would impact the parking garage east of the school building. The parking garage is not a contributing element to the property and would be located within the construction limits of Alternative E. The shoulder of the southbound C-D roadway to OH 7th Street would pass within five feet of the northeast corner of the parking garage. Because the garage would be located within the construction limits, approximately 1,330 square feet could require demolition or reconstruction. The parking garage would be directly impacted by Alternative I. The OH 9th Street ramp would impact a 700 square foot portion of the northeast corner of the parking garage. This impact could require demolition or reconstruction of 2,400 square feet of the parking garage.



View of Harriet Beecher Stowe School (Fox 19 TV Station)

4.7.2.4 West McMicken Avenue Historic District

The West McMicken Avenue Historic District would be affected by the SPUI alternative at the WHV. This interchange alternative would require construction of a connector road between the Central Parkway and the WHV. This would result in the demolition of eight of the 21 residences that are contributing elements to the historic district. Alternative I and the TUDI alternative would not directly impact the West McMicken Avenue Historic District.

Noise levels at modeled receiver sites in the West McMicken Avenue Historic District indicate that current (2010) ambient noise levels range between 54.3 and 70.1 dB(A). For the remaining (those not acquired as a result of the alternative) receiver sites under the Future (2035) noise levels for Alternative E would range between 64.4 dB(A) and 71.7 in the AM peak hour and 65.1 and 72.1 dB(A) in the PM peak hour. As a result of Alternative E, noise in 2035 would approach or exceed NAC at seven of nine modeled receiver locations within the historic district. The noise increases would not introduce audible elements that diminish the integrity of the historic district's significant historic features.

Noise levels for Alternative I would range between 63.2 and 70.9 dB(A) during the AM and 63.2 and 71.6 dB(A) during the PM Peak Hour periods. As a result of Alternative I, noise in 2035 would approach or exceed NAC at 10 of 14 modeled receiver locations. The noise increases would not introduce audible elements that diminish the integrity of the historic district's significant historic features.

4.7.2.5 Western Hills Viaduct

The WHV would be impacted by the SPUI alternative. The viaduct would be realigned to intersect West McMillan Street at the existing West McMillan Street/West McMicken Avenue intersection. This realignment also includes grade separating the intersection of WHV and Central Parkway. A new bridge would replace the existing WHV structure from approximately

900 feet west of Spring Grove Avenue to just east of I-75. An additional structure would be required to carry the WHV over Central Parkway. The WHV would be connected to Central Parkway by a new two-way connector road. The existing access between I-75 and the lower deck would be removed. The alteration will not have an adverse effect on the viaduct because it reworks the connection to the bridge, which originally was built in 1960 with the construction of I-75.

The WHV would be affected by the TUDI alternative through reconstruction of the interchange connecting I-75 to the viaduct. The TUDI would require reconstruction of 1,108 feet of the approach ramps of the WHV to connect with the interstate reconstruction at ground level. This will not result in any physical destruction or damage to the viaduct, but does constitute an alteration to the property as it currently exists. The alteration will not have an adverse effect on the viaduct because it reworks the connection to the bridge, which originally was built in 1960 with the construction of I-75.

4.7.3 Section 106 Consulting Parties Coordination

Section 106 of, 36 CFR Part 800 of the National Historic Preservation Act requires that those parties eligible to participate as consulting parties in the historic preservation review process be identified. The Section 106 process requires the coordination of findings of the Section 106 investigations with the KHC and the OHPO as well as other defined consulting parties. In 2006 individuals and organizations with interests in the affected communities and historic preservation were invited to participate as consulting parties. Consulting party application forms were also provided at the public meetings held for the project in 2006. Table 40 provides a list of local, state, and federal consulting parties for the Brent Spence Bridge Replacement/ Rehabilitation Project.

Section 106 consulting party coordination has included written correspondence as well as meetings and site visits with consulting parties, which resulted in concurrence of a defined APE, impacts to cultural resources, and development of potential mitigation measures. The following sections present a summary of Section 106 coordination throughout the project development process (PDP). Consulting parties correspondence and meeting summaries are provided in Appendix E.

4.7.3.1 2006 Activities

The first public involvement meetings for the Brent Spence Bridge Replacement/ Rehabilitation Project were held on May 2 and 4, 2006. These public meetings represented Concurrence Point #1 and were held to present work completed in Steps 1 through 4 of the PDP. These meetings were also the first Section 106 public meetings. The meeting advertisement specifically requested that citizens provide information about historic and archaeological resources within the study area. Exhibits showing the locations of documented cultural resources within the study area were displayed at the meetings and posted on the project website. Consulting party application forms were also provided at the public meetings and on the project website.

Meetings with consulting parties in Ohio were held on August 10 and November 16, 2006. Meetings with consulting parties in Kentucky were held on August 30 and November 29, 2006.

Table 40. Consulting Parties

Consulting Party	Ohio	Kentucky
Local Agencies	Cincinnati Historic Conservation Office Cincinnati Preservation Association Historic Southwest Ohio, Inc. - Hauck House Dayton Street Historic District Association Lower Price Hill Community Council Price Hill Civic Club West End Community Council Cincinnati Metropolitan Housing Authority Community Revitalization Agency Cincinnati Park Board	City of Covington – Mayor City of Covington – Historic Preservation Officer City of Covington – Assistant City Engineer
Local Community Groups	Cincinnati Museum Center	Lewisburg Neighborhood Association Covington Neighborhood Services Coordination Kenton Hills Botany Hills Home Owners Association Botany Hills Neighborhood (West Covington)
State Agencies	Ohio Department of Transportation Ohio Historic Preservation Office	Kentucky Transportation Cabinet Kentucky Heritage Council
Federal Agencies	FHWA, Urban Programs Engineer	FHWA, Kentucky Division
Citizens	Jenny Edwards Michael Schweitzer	None

4.7.3.2 2007 Activities

Consulting party coordination in 2007 focused on the results of the historic architecture surveys completed in Kentucky and Ohio within the study area. Determination of eligibility recommendations by the Project Team were presented in separate historic architecture survey reports for Kentucky and Ohio properties. These reports were submitted to KHC and OHPO for review and concurrence. There were further discussions/meetings between the KYTC, ODOT, KHC, and OHPO regarding the APE, viewshed APE and consulting party coordination.

The *Phase I History/Architecture Survey Report: Hamilton County, Ohio* (June 2007) was circulated to Ohio consulting parties in August 2007. The *History/Architecture Survey Report: Kenton County, Kentucky* (June 2007) was circulated to Kentucky consulting parties in November 2007. Only two consulting parties provided comments on the report.

4.7.3.3 2008 Activities

Phase II historic architecture surveys were conducted for Ohio resources and reports prepared in 2008. There were further discussions/meetings between ODOT and OHPO regarding eligibility determinations and impacts to historic resources held on October 30 and November 6, 2008.

The *History/Architecture Survey Report: Kenton County, Kentucky* was revised in accordance with agency and consulting party comments in November 2008.

4.7.3.4 2009 Activities

The second public involvement meetings for the Brent Spence Bridge Replacement/ Rehabilitation Project were held on May 6 and 7, 2009. These public meetings represented Concurrence Point #2 and were held to present work completed through Step 5 of the PDP. The meeting advertisement and handout specifically requested that citizens provide information about cultural resources within the study area. Exhibits showing the locations of documented cultural resources from the historic architecture surveys within the APE were displayed at the meetings and posted on the project website. Consulting party application forms were also provided at the public meetings and on the project website.

The *Phase II History/Architecture Survey Report: Hamilton County, Ohio* (December 2008) was submitted to OHPO for review and concurrence in January 2009. This report was circulated to consulting parties in June 2009. An *Addendum Phase II History/Architecture Survey Report: Hamilton County, Ohio* (September 2009) was submitted to OHPO for review and concurrence in September 2009. This addendum report was circulated to Ohio consulting parties in October 2009.

KHC provided comments on the revised *History/Architecture Survey Report: Kenton County, Kentucky* (November 2008) in May 2009. The study area in Kentucky was extended south to Dixie Highway Interchange and a historic architecture survey was conducted in this new area in August 2009. The *History/Architecture Survey Report: Kenton County, Kentucky* was revised to include the results of the survey in the extended study area in November 2009.

4.7.3.5 2010 Activities

The study area in Ohio in the vicinity of the WHV was widened and a historic architecture survey was conducted in this expanded portion of the APE in March 2010. The *Addendum Phase I History/Architecture Survey Report for the Western Hills Viaduct* (July 2010) was submitted to OHPO for review in August 2010. This report was distributed to Ohio consulting parties in September 2010.

ODOT, OHPO, and FHWA met on July 15, 2010 to discuss impacts to Longworth Hall and the Harriet Beecher Stowe School. Information about the impacts to these resources was sent to Ohio consulting parties for comment and posted on the project website. A consulting parties meeting was held on October 7, 2010 to discuss impacts to Longworth Hall and the Harriet Beecher Stowe School and possible mitigation measures. These mitigation opportunities are discussed in Section 6.6.4.

KYTC, the city of Covington, and FHWA held meetings to discuss impacts to the Lewisburg Historic District on April 1 and June 28, 2010.

The *History/Architecture Survey Report: Kenton County, Kentucky* (April 2010) was reviewed by FHWA and KHC in May and June 2010. KHC concurred with the report findings in July 2010. This report was distributed to consulting parties in September 2010. A Kentucky consulting parties meeting was held on October 15, 2010 to discuss impacts to the Lewisburg Historic District and possible mitigation measures. These mitigation opportunities are discussed in detail in Section 6.5.5.

4.7.3.6 2011 Activities

The *Phase I History/Architecture Survey Addendum Report for the Western Hills Viaduct Interchange* (November 2010) was submitted to OHPO for review and concurrence in January 2011. The OHPO concurred with the findings of the report on February 25, 2011. OHPO's concurrence letter was circulated to Ohio consulting parties in March 2011.

The *Determination of Effects Report* (February 2011) was submitted to KHC for review in April 2011. This report was revised in accordance with KHC comments and resubmitted to KHC in June 2011. The *Determination of Effects Report* (June 2011) was also submitted to OHPO and FHWA for review and concurrence in June 2011 and July 2011, respectively. KHC concurred with the findings of the report on August 12, 2011.

ODOT notified the Advisory Council on Historic Preservation (ACHP) of the adverse effects of the project on Longworth hall and the Lewisburg Historic District in August 2011. ODOT submitted to ACHP the draft MOA between ODOT, FHWA and OHPO, the *Determination of Effects Report* (June 2011), and the *Longworth Hall Impact Analysis Report – Part Three: Potential Mitigation Measures* (June 2011). ACHP reviewed this documentation and notified ODOT that their participation in the consultation to resolve adverse effects of the project was not warranted. ODOT distributed the ACHP correspondence, draft MOA concerning adverse effects to Longworth Hall, *Determination of Effects Report* (June 2011), and *Longworth Hall Impact Analysis Report – Part Three: Potential Mitigation Measures* (June 2011) to Ohio consulting parties in August 2011.

The *Phase I Intensive Archaeological Survey - Kenton County, Kentucky* (April 2011) was submitted to KHC for review in April 2011. This report was revised in accordance with KHC comments and resubmitted to FHWA and KHC in May 2011. FHWA provided conditional clearance of the Phase I archaeological survey on July 15, 2011. Additional archaeological surveys were completed at the request of KHC within the APE and documented in the *Phase I Intensive Archaeological Survey - Kenton County, Kentucky* (September 2011). KHC concurred with the survey results and report findings on September 22, 2011.

In correspondence dated October 28, 2011, ODOT notified OHPO of FHWA's determination that the Brent Spence Bridge Replacement/ Rehabilitation Project will have an *Adverse Effect* on Longworth Hall. This letter also documented FHWA's effect findings for 16 other historic resources. OHPO concurred with FHWA's determinations of effect on October 31, 2011. A copy of the letter is included in Appendix E.

An Ohio consulting parties meeting was held on November 2, 2011 to discuss impacts to Longworth Hall and proposed mitigation measures. The details of the measures, their advantages and disadvantages, and estimated costs were discussed. Following the Ohio consulting parties meeting, OHPO prepared a prioritized list of proposed mitigation measures for Longworth Hall. This list was submitted to ODOT in correspondence dated November 21, 2011. A copy of this letter is included in Appendix E.

A second meeting was held with the Ohio consulting parties on December 8, 2011 to further discuss impacts and mitigation for Longworth Hall. An MOA among the FHWA, ODOT, OHPO and other consulting parties was prepared to address the adverse effects to Longworth Hall resulting from the project. Mitigation measures for Longworth Hall are presented in Section 6.6.5.4 and the MOA provided in Appendix E.

KYTC distributed the *Determination of Effects Report* (June 2011) to Kentucky consulting parties in November 2011. A Kentucky consulting parties meeting was held on November 16, 2011 to discuss impacts to the Lewisburg Historic District and proposed mitigation measures. KYTC led the discussion of mitigation of effects to the Lewisburg Historic District. The potential mitigation measures that were presented included the following:

- Photo documentation.
- Survey forms for the 430 contributing resources to the historic district.
- Revise the NRHP nomination form to include building that were not yet 50 years old.
- Preservation plan to preserve the history of the district.
- Vegetative plan to replace screening removed by the project.

The following suggestions for mitigation measures were provided by the consulting parties:

- Façade grant pool for rehabilitation of buildings.
- Mitigation for the change in access to Devou Park and implementation of a gateway plan.
- Pedestrian and bicycle connections to Pike Street, Mainstrasse and Goebel Park.
- Enhanced vibration standards during construction.

The parties seemed in agreement with the benefits of the development of documentation, survey forms and updating of the NRHP nomination form. There was little support for a preservation plan that was not accompanied with funding for implementation. There was also comment that a vegetative plan may be more of a project commitment than historic mitigation.

The consulting parties generally seemed highly supportive of a façade grant pool. The city of Covington also suggested that access improvements into the neighborhood would help to promote future investment.

Representatives from FHWA, KYTC and KHC met on December 19, 2011, to discuss mitigation measures for impacts to the Lewisburg Historic District. KHC stated that they approved of the mitigation options presented at the November 16, 2011 consulting parties meeting. Other potential mitigation options were also discussed during the meeting. FHWA and KHC agreed that a Façade Program and vibration testing during construction are the options that would best mitigate actual impacts to the historic district.

4.8 Air Quality

"Air Pollution" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, and/or reducing human or animal health. Air quality is a term used to describe the amount of air pollution to which the public is exposed.

Air quality in the United States is governed by the Federal Clean Air Act (CAA), administered by the United States Environmental Protection Agency (USEPA). The USEPA is responsible for establishing the National Ambient Air Quality Standards (NAAQS) and enforcing the CAA, and regulates emission sources, such as aircraft, ships, on-road and off-road vehicles, and certain types of locomotives, under the exclusive authority of the federal government. The USEPA also

has jurisdiction over emission sources outside state waters (e.g., beyond the outer continental shelf) and establishes various emission standards.

4.8.1 Clean Air Act Amendments of 1990

The Clean Air Act Amendments (CAAA) of 1990 and the Final Transportation Conformity Rule (40 CFR Parts 51 and 93) direct the USEPA to implement environmental policies and regulations that will ensure acceptable levels of air quality. The CAA and the Final Transportation Conformity Rule affect proposed transportation projects. According to Title I, Section 176 (c) 2:

> "No federal agency may approve, accept, or fund any transportation plan, program, or project unless such plan, program, or project has been found to conform to any applicable State Implementation Plan (SIP) in effect under this act."

The Final Conformity Rule defines conformity as follows:

> "Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards; and that such activities will not:
>
> - Cause or contribute to any new violation of any NAAQS in any area,
> - Increase the frequency or severity of any existing violation of any NAAQS in any area, or
> - Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area."

4.8.2 National and State Ambient Air Quality Standards

The USEPA has established NAAQS for six major air pollutants. These pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare.

4.8.3 Mobile Source Air Toxics (MSAT)

In addition to the criteria pollutants for which there are NAAQS, the USEPA also regulates air toxics. Toxic air pollutants are those that are known or suspected to cause cancer or other serious health effects. The USEPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS)[1]. In addition, USEPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA)[2]. These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic

[1] http://www.epa.gov/ncea/iris/index.html
[2] http://www.epa.gov/ttn/atw/nata1999/

organic matter. A brief description of the seven priority MSATs is provided in the *Air Quality Technical Report: Mobile Source Air Toxics* (November 2010) located in Appendix F.

On February 9, 2007 and under authority of CAA Section 202(l), USEPA signed a Final Rule, Control of Hazardous Air Pollutants from Mobile Sources, which sets standards to control MSATs from motor vehicles. Under this rule, USEPA is setting standards on fuel composition, vehicle exhaust emissions, and evaporative losses from portable containers. The new standards are estimated to reduce total emissions of MSATs by 330,000 tons in 2030, including 61,000 tons of benzene. Concurrently, total emissions of volatile organic compounds (VOC) will be reduced by over 1.1 million tons in 2030 as a result of adopting these standards.

On September 30, 2009, the FHWA released "*Interim Guidance Update on Air Toxic Analysis in NEPA Documents."* The purpose of FHWA's guidance is to advise on when and how to analyze MSATs in the NEPA process for highways. In accordance with this guidance document, the Brent Spence Bridge Replacement/Rehabilitation Project is "a project with higher potential MSAT effects." As such a qualitative analysis was performed to identify and compare the potential differences among MSAT emissions from the project alternatives. This analysis is presented in the *Air Quality Technical Report: Mobile Source Air Toxics* (November 2010) located in Appendix F.

4.8.4 Ambient Air Quality Data

4.8.4.1 Local Meteorology

The study area is located within the northern limit of the humid subtropical climate and the southern limit of the humid continental climate zone, with average temperatures by US standards. Summers are hot, humid and wet. July is the warmest month, with an average high of 87°F (31°C) and an average low of 68°F (20°C). Winters are generally cool to cold, with occasional snowfall. January is the coldest month, with an average high of 38°F (3°C) and an average low of 21°F (-6°C). Precipitation is fairly evenly distributed each month, averaging 41 inches of rainfall and 23.9 inches of snowfall annually.

4.8.4.2 Local Monitored Air Quality

There are three monitoring stations nearest the study area, two in Cincinnati, Ohio and one in Highland Heights, Kentucky. Table 41 presents the 2006 through 2008 data monitored at each of these stations for CO, O_3, NO_2, PM_{10}, SO_2, and Pb. This information illustrates the study area's general air quality trends. Table 42 presents data from 2007 through 2009 in the vicinity of the project for $PM_{2.5}$. These data indicate that air quality is improving in the study area.

4.8.5 Pollutant Description

Pollutants that have established national standards are referred to as "criteria pollutants." The sources of these pollutants, their effects on human health and the nation's welfare, and their final deposition in the atmosphere vary considerably. A brief description of each pollutant is provided in the Air Quality technical reports found in Appendix F.

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Table 41. Air Quality Summary for Study Area Monitoring Stations.

Air Polluant	Standard/ Exceedance	100 E. 5th Street Cincinnati, OH			250 Wm Howard Taft Road Cincinnati, OH			524a John Hill Road Highland Heights, KY		
		2006	2007	2008	2006	2007	2008	2006	2007	2008
Carbon Monoxide	Maximum 1-hour Concentration (ppm)	10.6	4.9	5.9	NM	NM	NM	NM	NM	NM
	Maximum 8-hour Concentration (ppm)	4.3	3.1	3.6	NM	NM	NM	NM	NM	NM
	Number of Days >Federal 1-hour Standard of >35 ppm	0	0	0	NM	NM	NM	NM	NM	NM
	Number of Days >Federal 8-hour Standard of >9 ppm	0	0	0	NM	NM	NM	NM	NM	NM
Ozone	Maximum 1-hour Concentration (ppm)	NM	NM	NM	0.101	0.118	0.101	NM	0.105	0.090
	Maximum 8-hour Concentration (ppm)	NM	NM	NM	0.089	0.097	0.086	NM	0.095	0.084
	Number of Days >Federal 8-hour Standard of >0.075 ppm	NM	NM	NM	8	15	7	NM	19	2
Nitrogen Dioxide	Maximum 1-hour Concentration (ppm)	NM	NM	NM	0.061	0.081	0.079	NM	0.044	0.044
	Annual Average (ppm)	NM	NM	NM	0.018	0.017	0.016	NM	0.006	0.006
Sulfur Dioxide	Maximum 24-hour Concentration (ppm)	NM	NM	NM	NM	NM	NM	NM	0.020	0.017
	Annual Average (ppm)	NM	NM	NM	NM	NM	NM	NM	0.004	0.003
	Number of Days >Federal 24-hour Standard of >0.14 ppm	NM	NM	NM	NM	NM	NM	NM	0	0
Suspended Particulates (PM_{10})	Maximum 24-hour Concentration ($\mu g/m^3$)	NM	NM	NM	58.0	46.0	46.0	NM	NM	NM
	Number of Days >Federal 24-hour Standard of >150 $\mu g/m^3$	NM	NM	NM	0	0	0	NM	NM	NM
Lead	Maximum Monthly Concentration ($\mu g/m^3$)	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Number of Months Exceeding Federal Standard	NM	NM	NM	NM	NM	NM	NM	NM	NM

Source: USEPA AIRSData: http://www.epa.gov/air/data/geosel.html
NM = not measured

Table 42. $PM_{2.5}$ Monitored Data for the Study Area

Standard/ Exceedance	250 William Howard Taft Cincinnati, Ohio			11590 Grooms Road Cincinnati, Ohio			Seymour & Vine Street Cincinnati, Ohio			2101 West 8th Street Cincinnati, Ohio			2059 Sherman Avenue Norwood, Ohio			300 Murray Road St. Bernard, Ohio			3254 E. Kemper Road Sharonville, Ohio		
	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009
24-hour Concentration - 98th Percentile (microgram per cubic meter [µg/m^3])	34.7	25.5	24.8	34.7	27.0	24.2	36.5	34.7	31.1	35.9	27.5	27.0	33.7	30.3	25.7	35.4	31.0	28.7	34.0	28.2	N/A
Annual Average (µg/m^3)	15.09	12.62	12.73	14.63	12.48	12.11	16.59	15.25	13.89	15.90	14.40	13.71	15.09	13.74	12.97	16.07	14.40	13.44	14.85	13.32	N/A

Standard/ Exceedance	Bonita and St. John Middletown, Ohio			400 Nilles Road Fairfield, Ohio			2400 Clermont Center Drive Batavia, Ohio			416 Southeast Street Lebanon, Ohio			1401 Dixie Highway Covington, Kentucky			524a John Hill Road Highland Heights, Kentucky		
	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009	2007	2008	2009
24-hour Concentration - 98th Percentile (microgram per cubic meter [µg/m^3])	36.8	30.9	25.3	34.5	31.5	27.2	33.5	23.6	22.0	33.6	24.2	23.6	31.6	25.2	23.1	34.0	26.1	22.5
Annual Average (µg/m^3)	15.41	14.32	12.68	14.94	13.75	13.08	14.01	11.75	11.01	13.98	11.92	11.70	14.20	11.99	11.04	14.36	11.83	11.34

Source: http://epa.ohio.gov/portals/27/SIP/Appendix_A-2_1_AQS_Data.pdf
N/A = data not available

4.8.6 Attainment Status

Section 107 of the 1977 CAAA requires that the USEPA publish a list of all geographic areas in compliance with the NAAQS, plus those not attaining the NAAQS (Table 43). Areas not in NAAQS compliance are deemed non-attainment areas. Areas that have insufficient data to make a determination are deemed unclassified, and are treated as being attainment areas until proven otherwise. An area's designation is based on the data collected by the state monitoring network on a pollutant-by-pollutant basis.

The study area is located in Hamilton County, Ohio and Kenton County, Kentucky. As shown, the USEPA has classified both counties as nonattainment areas for $PM_{2.5}$ and nonattainment in Hamilton County and maintenance in Kenton County for O_3.

4.8.7 State Implementation Plan and Transportation Improvement Program Status

Under the CAAA, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and the Transportation Equity Act for the 21st Century (TEA-21), proposed transportation projects must be derived from a long-range transportation plan (LRP) or Metropolitan Transportation Plan (MTP) that conforms with the state air quality plans as outlined in the SIP. The SIP sets forth the state's strategies for achieving air quality standards. Projects must also be included in a Transportation Improvement Program (TIP) that conforms with the SIP, and localized impacts from proposed projects must conform to state air quality plans in non-attainment and maintenance areas.

The latest regional emissions and air quality conformity analysis was completed in June 2008 with the adoption of OKI's 2030 Regional Transportation Plan and amended FY 2008-FY 2011 Transportation Improvement Program.

Table 43. Study Area Attainment Status.

Pollutant	Federal Attainment Status Hamilton County, OH	Federal Attainment Status Kenton County, KY
Ozone (O_3)	Nonattainment	Attainment with Maintenance Plan
Nitrogen Dioxide (NO_2)	Attainment	Attainment
Carbon Monoxide (CO)	Attainment	Attainment
Particulate Matter (PM_{10})	Attainment	Attainment
Particulate Matter ($PM_{2.5}$)	Nonattainment	Nonattainment
Lead (Pb)	Attainment	Attainment

Source: USEPA, 2010

4.8.8 Air Quality Results

The Brent Spence Bridge Replacement/Rehabilitation Project is a conforming project in the TIP, and will have air quality impacts consistent with those identified in the State Implementation Plans for achieving the NAAQS. The technical studies completed for the project included an MSAT analysis, $PM_{2.5}$ Hot Spot Analysis, and a CO analysis. The results of these analyses are documented in the following technical reports which are located in Appendix F:

- *Air Quality Technical Report: Mobile Source Air Toxics* (November 2010),
- *Air Quality Technical Report: Carbon Monoxide* (November 2010), and
- *Qualitative $PM_{2.5}$ Hot Spot Analysis* (June 2011).

In accordance with ODOT guidance policy, the *Qualitative Hot $PM_{2.5}$ Hot Spot Analysis* was made available to the public on February 7, 2011. The 30-day public comment period closed on March 7, 2011. No public comments were received.

The air quality analyses conducted for the proposed project determined that neither feasible alternative would cause or exacerbate an exceedance of the carbon monoxide NAAQS or increase regional emission burdens or mobile source air toxic levels.

On August 29, 2011, based upon the *Qualitative $PM_{2.5}$ Hot Spot Analysis* (June 2011) and consultation with Ohio Environmental Protection Agency (OEPA) and USEPA, the FHWA determined that the Brent Spence Bridge Replacement/Rehabilitation Project will not cause or contribute to a new violation of the 24 hour or annual $PM_{2.5}$ standards. The FHWA also determined that since the project has not changed since inclusion in the conforming Metropolitan Transportation Plan (MTP) and the TIP for $PM_{2.5}$ and O_3, the Brent Spence Bridge Replacement/Rehabilitation Project has met the statutory requirements of the CAA and conforms to the SIP.

USEPA's MOBILE6.2 emission factor model was used to calculate annual MSAT pollutant burdens in tons per year for each of the project alternatives. MOBILE6.2 input parameters recommended by OKI were used, along with traffic volumes, speeds and travel characteristics forecasted for the project. As shown in Table 44 all MSAT levels are predicted to decrease as compared to the No Build Alternative, with the exception of Formaldehyde, which is predicted to increase by 0.8 percent. As this increase is less than one percent, it is not considered to be significant. The *Air Quality Technical Report: Mobile Source Air Toxics* (November 2010) is found in Appendix F.

Table 44. MSAT Regional Emission Burden Assessment

Alternative	Vehicle Miles Travelled (miles)	Average Speed	Emission Burden (Tons per Day)						
			Acrolein	Benzene	1,3-Butadiene	Diesel Particulate Matter	Formaldehyde	Napthalene	POM
No Build (2035)	89,731,288	32.0	21.16	1,269.5	144.2	0.17	468.1	39.2	5.1
Alternative E	89,667,285	32.0	21.15	1,268.8	134.9	0.17	472.0	39.1	5.1
Alternative I	89,667,285	32.0	21.15	1,268.7	134.8	0.17	472.0	39.1	5.1
Percent Change from No Build									
No Build (2035)	--	--	--	--	--	--	--	--	--
Alternative E	-0.1	NA	-0.1%	-0.1%	-6.5%	-0.1%	0.8%	-0.1%	-0.1%
Alternative I	-0.1	NA	-0.1%	-0.1%	-6.5%	-0.1%	0.8%	-0.1%	-0.1%

4.9 Noise Analysis

Noise is defined as unwanted sound perceived subjectively by individuals. A variety of methods are used to describe noise. For the purpose of this analysis, noise is described using the sound level in decibels (dB). Decibels are a unit of measure on a logarithmic scale used to demonstrate the amount of sound pressure at a given location from the general environment or specific sources. Noise, as measured by a sound level meter, is called the "A-weighted noise level" (dBA).

Traffic noise levels are expressed in terms of hourly equivalent continuous noise level (L_{eq} (1-hr) dBA). L_{eq} (1-hr) is defined as the equivalent steady-state sound level which, in a 1-hour period, contains the same acoustic energy as the time-varying sound level during that hour. This descriptor correlates with human response to changes in noise levels. The 1-hour equivalent noise level (L_{eq}) during the noisiest traffic hour, expressed as L_{eq} (1-hr), is used by FHWA, ODOT and KYTC as the descriptor for determining the effects of traffic noise. The average individual's ability to perceive changes in community noise levels is well documented. Generally, changes in noise levels of approximately 3 dBA or less is barely noticed by most listeners, a change of 5 dBA is readily perceptible, and a 10 dBA change is perceived as doubling (or halving) of loudness.

4.9.1 Noise Impact Criteria

The Brent Spence Bridge Replacement/Rehabilitation Project is categorized as Type I roadway improvement. This classification refers to projects that include federal funding for construction of highways on a new location or the alteration of an existing highway resulting in substantial change in either alignment or the number of through-traffic lanes. The noise analysis for this project was conducted in general compliance with Code of Federal Regulations (CFR), Title 23, Part 772, FHWA, *Highway Traffic Noise: Analysis and Abatement Guideline* (revised January 2011). The basic goals of noise criteria, as they apply to highway projects, are to minimize potential adverse noise impacts on the community and, where necessary and appropriate, to provide feasible and reasonable measures to abate noise impacts.

To determine if highway noise levels are compatible with various land uses, FHWA has developed noise abatement criteria and procedures to be used in the planning and design of highways. The criteria and procedures were developed to minimize potential adverse noise impacts on communities and, where necessary and appropriate, to provide feasible and reasonable abatement measures to either reduce or eliminate projected future build noise impacts. A summary of the FHWA Noise Abatement Criteria (NAC) for various land uses is presented in *Noise Analysis Report: Ohio* (December 2011) and the *Noise Analysis Report: Kentucky* (December 2011) (Appendix F).

Both the KYTC's *Noise Analysis and Abatement Policy* (July 2011) and ODOT's *Standard Procedure for Analysis and Abatement of Highway Traffic Noise* (May 2011) procedures define "approach" as being within one dBA of the NAC. All properties covered by NAC B (generally residential) that have a calculated L_{eq} levels of 66 dBA or higher would "approach or exceed" the 67 dBA NAC B criterion. Similarly, all properties covered by NAC C (commercial, industrial, and manufacturing) with a L_{eq} value of 71 dBA or higher would "approach or exceed" the 72 dBA NAC C criterion.

In addition to the approach impact threshold both ODOT and KYTC NAC policies consider an impact to occur if there is a "substantial" noise level increase. A substantial noise level increase

is defined as occurring when predicted build traffic noise levels increase by 10 or more dBA above the corresponding existing noise level. Therefore a noise impact can occur two separate ways: either when build noise levels approach or exceed the NAC; or when a substantial increase of 10 dBA or more from existing to project build conditions is predicted to occur.

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an area. For the areas where impacts are identified, methods of noise abatement are evaluated to determine the feasibility and reasonableness of their implementation. The evaluation is based on many factors, some of which include constructability, cost, wall height, amount of land use, whether changes in existing land use are expected and the overall acoustic effectiveness of the barrier to reduce noise levels.

4.9.2 Noise Analysis Methodology

The noise analysis process included the development of a three-dimensional geometric representation of the project study area utilizing the FHWA Traffic Noise Model (TNM version 2.5). This involved computer coding of the physical roadway configurations and major geographic features such as tree zones, pavement surfaces, terrain lines and adjacent noise sensitive properties (described as receptor sites).

The TNM file coding process was completed using electronic based Micro-Station design plans of the project study area, which depict the existing I-71 and I-75 highways, service roads, primary intersecting streets and proposed roadway improvements. For each roadway segment, traffic volumes and vehicle travel speeds were input into the TNM file. The TNM program was then executed and noise levels were predicted at applicable receptor sites.

4.9.2.1 Noise Monitoring Sites

Noise monitoring sites were selected in residential communities fronting the I-75 corridor, which would result in maximum exposure to future traffic noise generated by the proposed Build Alternatives and to provide adequate geographic coverage within the study area. Noise measurements were collected in January and February 2010, at 48 representative noise sensitive properties spanning the entire project study area between Ohio and Kentucky. The 16 noise measurement sites in Ohio are identified as sites M-1 through M-16 and the 32 monitoring sites in Kentucky are identified as M-17 thru M-48. To provide continuity with the *Brent Spence Bridge Noise Screening Report* completed in February 2009, the former noise receptor identification numbers are provided in parenthesis adjacent to the new identification numbers. In addition to the 2009 receptor locations new receptors were added to provide adequate geographic coverage of the study area as required under the revised KYTC traffic noise policy (July 2011).

At each representative site, noise measurements were made during the 7:00 to 9:00 AM and 4:00 to 6:00 PM peak hours for 20-minute periods. Noise measurements were collected using several Brüel & Kjær (B&K) Type 2231 and 2238 sound level meters fitted with a B&K Type 5155 condenser microphone and windshield. Calibration of the noise equipment was performed before and after each reading.

4.9.2.2 Traffic Noise Model Validation

A Traffic Noise Model (TNM) model validation was completed at six of the 48 representative noise monitoring locations where noise measurements were originally collected in January and February 2010. The validation process is necessary to verify that the existing ambient noise conditions measured in the field are reproducible within the TNM model. Simultaneous traffic counts and noise measurements were collected in August 2011. Each measurement was recorded for a 30 minute continuous duration using a calibrated B & K Model 2231 sound level meter (SLM) fitted with a windshield. In addition, prior to each noise measurement the SLM was calibrated for accuracy using a B & K 4230 calibrator. The B&K 2231 SLM and 4230 Calibrator are annually laboratory certified pieces of calibrated monitoring equipment satisfying the ANSI Type I precision for noise measurement sampling accuracy. All measurements were performed under acceptable climatic and street surface conditions (i.e., dry road surface and low wind speeds). Measured readings were compared with model predicted noise levels at these same locations. In accordance with FHWA requirements, results were found to be within 3 dBA of measured readings and, therefore, the model was considered calibrated.

In addition, detailed noise modeling is required to a distance of 500 feet away from the proposed project edge of pavement for noise sensitive land uses. At a minimum, noise modeling must be completed at a distance that covers the extent of noise impacts identified from the Build Alternatives for each NAC land use activity category.

4.9.2.3 Determination of Equivalent Receptors

The existing land uses surrounding the project area in Kentucky are primarily residential in the southern half of the study area, with scattered commercial and residential throughout the northern half of the study area. In Ohio, the study area includes mostly industrial and commercial land uses with a few small pockets of residential uses. Several historic structures, schools, and parks are found within the study area in both Kentucky and Ohio. Based on these findings, land uses in the study area are categorized, following the Noise Abatement Criteria, as Activity Categories B (residential) and C (commercial). Sites listed on the National Register of Historic Places are categorized according to the current use of each property.

A noise receiver location is an area where noise is measured and/or determined. The receiver locations are normally restricted to “exterior areas of frequent human use.” A typical residential property is considered to be a single receptor. For properties such as schools, churches, parks, etc. that do not have continuous occupation, an equivalent number of receptors is calculated to represent the use at these properties. Determining the equivalent number of receptors is an important step in properly establishing the number of potentially impacted people exposed to traffic noise generated from the Build Alternatives and the effectiveness of a proposed noise wall. Both KYTC and ODOT have developed a set of guidelines and procedures to determine the number of equivalent receptors for many of the land uses listed above. A detailed discussion on the calculations of equivalent receptors is found in the *Noise Analysis Report: Ohio* and the *Noise Analysis Report: Kentucky* (Appendix F). Determining the equivalent number of receptors is necessary in establishing the feasibility and reasonableness of a proposed noise barrier in providing cost and acoustically effective abatement.

A total of 1,580 noise receptors were identified and included in the noise analysis for Ohio and Kentucky, of which 959 locations were in Kentucky and 621 locations were in Ohio. The *Noise Study Report: Ohio* (December 2011) and the *Noise Study Report: Kentucky* (December 2011) are found in Appendix F.

4.9.3 Noise Analysis Results

In Kentucky, the study area from south of the Brent Spence Bridge to Lewis Street is primarily established neighborhoods with single- or multi-family homes. Noise receptors were also provided for large tracks of municipal park lands (either in front or behind residential neighborhoods). The land uses adjacent to the interstate from Lewis Street to Kyles Lane, contains some established single-family residential neighborhoods, newer homes in subdivisions, institutional/medical facilities, some office/commercial noise receptors, and identified undeveloped and unpermitted lands. From Kyles Lane to south of Dixie Highway, land usage is a mix of established and newer single family homes, commercial facilities, institutional facilities, and cemetery.

Typical first row noise receptors may be un-shielded but were buffered by park lands, home owner association properties, or undeveloped and unpermitted institutional or municipally owned properties. The noise analysis shows predicted existing conditions (2010) noise levels that are above the NAC for some first row receptors on the west side of I-71/I-75, and a majority of first row receptors on the east side of I-71/I-75. Most second row receptors and back row receptors east of I-71/I-75 have predicted noise levels that are below the NAC. The noise analysis generally shows predicted No Build and Future Build (2035) noise levels that are above the NAC for first row receptors mostly on the east side of I-75.

In Ohio, west of I-75 is primarily medium to large industrial properties, but also includes some office and commercial noise receptors. Land uses to the east of I-75 consist of commercial and residential (multi-family homes, apartments, and condominiums) noise receptors. Typical first row noise receptors were un-shielded and were placed near residential and some commercial establishments with property lines adjacent to the interstate. The noise analysis shows predicted existing conditions (2010) noise levels that are above the NAC for first row receptors west of I-75 and first and some second row receptors east of I-75. Most second row receptors and back row receptors east of I-75 have predicted noise levels that are below the NAC. The noise analysis generally shows predicted No Build and Future build (2035) noise levels that are above the NAC for first and second row receptors (and a few back row receptors) on both sides of I-75.

4.9.3.1 Existing Conditions

The predominate source of noise in the study area is generated from motor vehicles traveling on I-75, service roads and connecting roadways. Residential areas and community facilities adjacent to these roadways are exposed to moderate to high levels of existing road traffic noise. Noise levels which approach or exceed the NAC impact thresholds are shown in bold type in Table 46.

In Kentucky, existing peak-hour noise levels approached or exceeded the FHWA Category B impact threshold of 66 dBA at a total of 23 out of the 32 monitoring locations. Noise measurements ranged from a low reading of 53.8 dBA at Site M-34 during the peak AM time period to a high monitored level of 76.1 dBA at Site M-43 during the peak PM time period.

In Ohio, noise levels at the 16 monitoring sites ranged from a low measured level of approximately 61 decibels in dBA at Site M-15 to high reading of nearly 78 dBA at Site M-3. Existing peak-hour noise levels approached or exceeded ODOT impact thresholds at 12 out of

the 16 representative noise measurement locations. Noise measurements collected all 10 residential properties exceeded the NAC B 66 dBA approach level, one NAC C property and one out of five NAC Activity Category E land uses reported measured peak hour noise levels above the NAC impact thresholds.

4.9.3.2 Future No Build Noise Levels

In Kentucky, Future (2035) No Build noise levels were estimated at 959 noise modeling receiver locations. Table 45 presents a summary of the future No Build Alternative impacts by NAC Activity Category. The PM peak period has a slightly higher number of impacts than the AM peak hour. Under the 2035 No Build Alternative, the total number of projected impacts is expected to increase by approximately 15 percent.

There are 478 Future 2035 No Build PM peak hour receiver impacts comprised of 1,262 equivalent residences as compared to 416 receiver impacts equating to 1,178 equivalent residential dwellings under the PM peak hour existing conditions. The largest impact by NAC Activity Category is projected to occur for NAC Activity Category B uses where 554 equivalent receptor impacts represented by 429 TNM receiver points are expected during the PM peak period. In addition, there are numerous NAC Activity Category C impacts due to the numbers of schools, playgrounds and parks within the study area that are impacted and which equate to a substantial number of equivalent residential units. In general the noise impacts occur along the east side of I-71/I-75. Along the west side of the interstate, noise impacts occur in the vicinity of the Lewisburg neighborhood.

In Ohio, future (2035) No Build noise levels were estimated for 621 modeling receiver locations. The PM peak period has a slightly higher number of impacts than the AM peak hour. Under the 2035 No Build conditions, the total number of projected impacts is expected to increase by about three percent. There are 252 Future No Build PM peak hour receiver impacts occurring at 712 equivalent receptors compared to 244 receiver impacts representing 685 equivalent receptors under the PM peak hour existing conditions. The largest impact by NAC Activity Category occurred for Category B (residential) where 501 equivalent receptor impacts representing 187 receiver points are expected to occur during the PM peak period. The noise analysis generally shows predicted No Build and Build (2035) noise levels that are above the NAC for first and second row receptors (and a few back row receptors) on both sides of I-75 throughout the study area.

Table 45. Summary of Impacts by FHWA NAC Activity Category

Alternative	NAC A		NAC B		NAC C		NAC D		NAC E		NAC G		Totals	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Kentucky														
Existing (2010)	0	0	326 (436)[1]	370 (483)	29 (376)	31 (386)	6 (303)	6 (303)	9 (6)	9 (6)	0	0	370 (1,121)	416 (1,178)
2035 No Build	0	0	386 (501)	429 (554)	31 (386)	33 (399)	6 (303)	6 (303)	9 (6)	10 (6)	0	0	432 (1,196)	478 (1,262)
Alternative E	0	0	453 (580)	491 (631)	24 (356)	25 (356)	6 (303)	6 (303)	9 (21)	15 (26)	0	0	492 (1,260)	537 (1,316)
Alternative I	0	0	479 (615)	512 (659)	33 (400)	34 (400)	6 (303)	6 (303)	10 (21)	13 (23)	0	0	528 (1,339)	565 (1,385)
Ohio														
Existing (2010)	0	0	175 (484)	183 (490)	23 (174)	22 (175)	0	0	36 (18)	39 (20)	0	0	234 (676)	244 (685)
2035 No Build	0	0	178 (501)	187 (501)	25 (190)	24 (191)	0	0	38 (18)	41 (20)	0	0	241 (709)	252 (712)
Alternative E	0	0	195 (537)	204 (551)	29 (238)	28 (238)	1(24)	1(24)	42 (19)	45 (20)	0	0	267 (818)	278 (833)
Alternative I	0	0	201 (543)	210 (562)	28 (238)	27 (238)	1(24)	1(24)	39 (19)	45 (20)	0	0	269 (824)	283 (844)

[1] Numbers not in parenthesis represent the total number of receivers with impacts for each FHWA NAC Activity Category evaluated for each alternative. Numbers shown in parenthesis represent the total impacted number of equivalent receptors for each FHWA NAC Activity Category for each alternative.

[2] NAC Activity Category B is residential. Category C includes exterior areas of hospitals, schools, and libraries. Category D includes interior areas of hospitals, schools, and libraries. Category E includes hotels/motels offices and restaurants. Full definitions of all NAC Activity Categories are found in the *Noise Study: Ohio* and *Noise Study: Kentucky* reports in Appendix F.

Table 46. Summary of Existing Measured Peak Hour Noise Levels (Leq [1hr]) dB(A)

Site Number	Address of Measurement Site	Land Use	NAC Activity Category[2]	AM	PM
				L_{eq} (1hr) dB(A)	L_{eq} (1hr) dB(A)
Kentucky					
M-17(K161)	881 Highway Avenue, Covington	Residential	B	63.6	63.0
M-18(K190)	407 Western Avenue, Covington	Residential	B	65.3	**65.5**
M-19(K25)	514 Western Avenue, Covington	Residential	B	**67.0**	64.5
M-20(K309)	Goebel Park, (north) near Philadelphia Street, Covington	Recreational	C	**66.2**	**69.5**
M-21(K304)	641Crescent Ave, Covington	Residential	B	**70.8**	**68.5**
M-22(K484)	818 Crescent Avenue, Covington	Residential	B	**73.5**	**69.6**
M-23(K506)	Goebel Park, (southern) near West 9th and Philadelphia streets, Covington	Recreational	C	**67.0**	**65.6**
M-24(K655)	619 West Pike Street, Covington	Residential	B	**71.7**	**71.2**
M-25(K707)	605 West 11th Street, Covington	Residential	B	**70.9**	**70.7**
M-26(K697)	522 West 12th Street, Covington	Commercial	E	**71.3**	**71.5**
M-27(K1007)	536 West 13th Street, Covington	Residential	B	**70.9**	**74.1**
M-28(K879)	1304 Hinde Street, Covington	Residential	B	**71.7**	**69.5**
M-29(K1148)	625 Edgecliff Road, Covington	Residential	B	61.1	64.5
M-30(K1176)	506 Scenic Drive, Park Hills	Residential	B	65.1	**68.1**
M-31(K1979)	1132 Cedar Ridge Lane, Park Hills	Residential	B	**66.6**	**68.9**
M-32(K1983)	500 Highland Avenue, Covington	Nursing Home	B	61.1	62.2
M-33(K1581)	1000 Emery Drive, Covington	Residential	B	**69.9**	**75.0**
M-34(K1604)	1042 Emery Drive, Covington	Residential	B	53.8	55.5
M-35(K1503)	502 St Joseph Lane, Park Hills	Residential	B	**67.3**	**68.7**
M-36(K1573)	Notre Dame Academy, 1699 Hilton Drive, Park Hills	School	D	**67.7**	**67.3**
M-37(K1616)	1565 Saint Anthony Street, Fort Wright	Residential	B	**69.8**	**70.6**
M-38(K1609)	1586 Marcella Drive, Fort Wright	Residential	B	**70.3**	**72.6**
M-39(K2037)	101 Kyles Lane, Fort Wright	Residential	B	**68.1**	64.6
M-40(K1315)	1 Lake Street, Fort Wright	Residential	B	61.2	61.0
M-41(K1318)	15 Highview Drive, Fort Wright	Residential	B	**70.7**	**72.1**
M-42(K1348)	1 Highview Drive, Fort Wright	Residential	B	**66.4**	**70.7**
M-43(K1349)	Days Inn, 1945 Dixie Highway, Fort Wright	Commercial	E	**74.4**	**76.1**
M-44(K75)	1971 Pieck Drive, Fort Mitchell	Residential	B	**68.1**	**72.3**
M-45(K1484)	Central Church of Nazarene, 2006 Pieck Drive, Fort Wright	Church	D	**70.4**	**73.7**
M-46(K1469)	15 Leslie Avenue, Fort Mitchell	Residential	B	**68.3**	**69.2**
M-47(K2141)	Beechwood Elementary and High schools, 54 Beechwood Road, Fort Mitchell	School	C	56.8	59.1
M-48(K37)	102 West Maple Avenue, Fort Mitchell	Residential	B	62.1	63.7

Table 46. Summary of Existing Measured Peak Hour Noise Levels (Leq [1hr]) dB(A)

Site Number	Address of Measurement Site	Land Use	NAC Activity Category[2]	AM	PM
				L_{eq} (1hr) dB(A)	L_{eq} (1hr) dB(A)
Ohio					
M-1(O314)	1130 Draper Street	Residential	B	**72.2**	**70.3**
M-2(O415)	2503 Addison Street	Residential	B	**68.5**	**70.8**
M-3(O70)	Naeher Street	Residential	B	**77.3**	**77.5**
M-4(O494)	George F. Sands School, 900 Poplar Street	School	C	**70.7**	**70.0**
M-5(O683)	1502A Dudley Walk	Residential	B	**70.9**	**72.9**
M-6(O560)	Cincinnati Job Corps 1356 Western Avenue (crossing Kenner Street)	Commercial	E	**72.2**	69.7
M-7(O819)	The Arts Apartments at Music Hall, 885 Ezzard Charles Drive	Residential	B	**72.5**	**73.4**
M-8(O951)	880 West Court Street	Residential	B	**71.7**	**72.1**
M-9(O578)	1010 Linn Street	Residential	B	**68.6**	**68.7**
M-10(O490)	907 Mound Street	Residential	B	**69.1**	**71.1**
M-11(O151)	Former Harriet Beecher Stowe School (Fox19 bldg), 635 7th Street	Commercial	E	66.4	67.7
M-12(O604)	516 Linn Street	Commercial	E	65.6	66.3
M-13(O292)	112 West 3rd Street	Residential	B	**74.0**	**73.4**
M-14(O664)	Longworth Hall West Pete Rose Way	Commercial	E	67.8	67.8
M-15(O664)	Longworth Hall 700 West Pete Rose Way	Commercial	E	62.0	61.2
M-16(O756)	724 Mehring Way	Residential	B	**66.0**	65.0

[1] Noise measurements collected in January and February 2010 for duration of 20 minutes per noise measurement.

[2] NAC Activity Category B is residential. Category C includes exterior areas of hospitals, schools, and libraries. Category D includes facilities listed in Category C that may have noise sensitivity to interior areas such as hospitals, schools, and libraries. Category E includes hotels/motels offices and restaurants. Full definitions of all NAC Activity Categories are found in the *Noise Study: Ohio* and *Noise Study: Kentucky* reports in Appendix F.

4.9.3.3 Alternative E Noise Levels

In Kentucky, the number of PM peak period impacts is slightly greater than the corresponding AM peak projections. Under Alternative E, the total number of PM peak hour impacts is expected to increase by approximately 12 percent (537 versus 478 impacts) from the 2035 future No Build conditions and increase by 29 percent (537 versus 416 impacts) when compared to existing (2010) noise levels. In terms of equivalent residential dwelling impacts, there is a 12 percent increase (1,316 versus 1,178) under the Alternative E PM peak hour compared to the 2010 existing conditions. The largest number of impacts by NAC Activity Category is for Category B residential uses, where 491 receivers exceed the impact threshold, representing 631 equivalent residences during the PM peak period. The 631 equivalent dwelling impacts yield a 29 percent increase from the existing (2010) PM conditions (483 equivalent residences). Noise impacts would occur along the entire length of the alternative on both sides of the interstate.

In Ohio, the number of PM peak period impacts is slightly greater than the corresponding AM peak projections. Under Alternative E, the total number of PM peak hour impacts is expected to increase by approximately 10 percent (278 versus 252 impacts) from the 2035 future No Build conditions and increase by 14 percent (278 versus 244 impacts) when compared to existing (2010) noise levels. In terms of equivalent receptor impacts, there is a 22 percent increase (833 versus 685) under the Alternative E PM peak hour compared to the 2010 existing conditions. The largest number of impacts by NAC Activity Category is for Category B (residential), where 204 receivers exceed the impact threshold representing 551 equivalent receptors during the PM peak period. The impacts to 551 equivalent receptors represent a 12 percent increase during the PM peak hour time period over the existing (2010) conditions. Noise impacts would occur along the entire length of the alternative on both sides of the interstate.

4.9.3.4 Alternative I Noise Levels

In Kentucky, the PM peak period has a slightly higher number of impacts than the AM peak hour. Under Alternative I, the PM peak hour impacts increase by approximately 18 percent (565 versus 478 impacts) from 2035 future No Build conditions and increase by 36 percent (565 versus 416 impacts) when compared to the existing (2010) noise levels. In terms of equivalent residential unit impacts, there is a 28 percent increase (1,385 versus 1,078) compared to the existing (2010) conditions. The largest number of impacts by NAC Activity Category is for Category B residential uses; where 512 receivers representing 659 equivalent residential units exceed impact thresholds during the PM peak period. The 659 equivalent receptor impacts represent a 36 percent increase over comparable existing (2010) conditions (483 equivalent residences). Noise impacts would occur along the entire length of the alternative on both sides of the interstate.

In Ohio, the number of PM peak impacts is slightly greater than the corresponding AM peak hour projections. Under Alternative I, the PM peak hour impacts increase by approximately 12 percent (283 versus 252 impacts) from 2035 future No Build conditions and increase by 16 percent (283 versus 244 impacts) when compared to the existing (2010) noise levels. In terms of equivalent receptor impacts, there is a 23 percent increase (844 versus 685) compared to the existing (2010) conditions. The largest number of impacts by NAC Activity Category is for Category B (residential), where 210 receiver locations represent 562 equivalent receptors exceed impact thresholds during the PM peak period. The 562 equivalent receptor impacts represent a 15 percent increase (490 equivalent receptors) over the existing (2010) conditions.

Noise impacts would occur along the entire length of the alternative on both sides of the interstate.

4.9.4 Noise Abatement

ODOT and KYTC require that noise abatement measures be considered at locations where traffic related noise impacts are identified. The need to consider abatement is based on the potential for impacts at exterior areas where frequent human use occurs and lowered noise levels would be of benefit. In conformance with these requirements, abatement measures were evaluated in terms of their effectiveness to substantially reduce predicted design year noise levels at locations where impacts occur. For transportation related projects, the most effective abatement measures are noise barriers. To be effective, a noise barrier should be located adjacent to either the source or the receiver. The noise wall must also be long, continuous and break the line-of-sight from the highway to the receiver. ODOT and KYTC have defined criteria for determining the feasibility and reasonableness of constructing noise barriers (Appendix F). Summaries of the noise abatement analyses are presented below and in Table 47 and Table 48 for Kentucky and Table 49 and Table 50 for Ohio.

4.9.4.1 Noise Barrier Analysis Findings: Kentucky

A noise abatement analysis was completed for impacted areas where the construction of noise walls was determined to be feasible based upon KYTC noise policy. The noise abatement evaluation considered sound barriers at 11 locations. The abatement analysis findings indicate that three proposed noise barriers would satisfy the KYTC noise abatement feasibility and reasonableness requirements for cost and acoustic effectiveness. The three recommended noise barriers under the Build Alternatives provide abatement for the three residential communities Fort Mitchell, Park Hills, and Covington. The three recommended noise barriers consist of a total of 9,707 linear feet of barrier wall, ranging in height from 20 to 22 feet for Alternative E and 9,697 linear feet and ranging in height from 20 to 22 feet under Alternative I. The locations of the three recommended noise barriers are provided in the *Noise Analysis Report: Kentucky* (December 2011) found in Appendix F.

The recommended noise barriers are located between the following major intersections:

- I-71/I-75 northbound between Beechwood Road and Dixie Highway (Fort Mitchell),
- I-71/I-75 northbound between Dixie Highway and Kyles Lane (Park Hills), and
- I-71/I-75 northbound between Kyles Lane and West 12th Street (Covington).

The recommended noise barriers under Alternative E would reduce noise levels for 436 equivalent noise receptors at a cost of approximately $6.9 million. Under Alternative I, the recommended noise barriers would reduce noise levels for 494 noise receptors at a cost of approximately $7.7 million dollars. The final decision on the installation of any noise abatement measure will be determined in coordination with local officials and residents of the impacted properties during the public involvement process.

Table 47. Summary of Noise Abatement Analysis Findings for Alternative E in Kentucky

Potential Barrier Site #	Percentage of Benefited Receptors which Receive 7 dB(A) or Greater Noise Reduction (%)	Percentage of Impacted Receptors which Receive 5 dB(A) or Greater Noise Reduction (%)	Barrier Description					Number Of Benefited Properties	Estimated Cost Per Benefiting Receptor (CBR) ($)	Noise Barrier Effectiveness			KYTC Noise Abatement Criteria Satisfied (Yes/No)
			Length (feet)	Beginning Point and Highway Direction	Ending Point and Highway Direction	Noise Barrier Height (feet)	Estimated [1] Cost ($)			Design Goal Achieved[2]	Acoustic Feasibility Achieved [3] (Yes/No)	Cost Effective Achieved [4] (Yes/No)	
B1	76.0	38.5	1,129	SB 560+86	SB 550+33	22	745,140	25	$29,806	Yes	No	Yes	No
B2	33.3	11.5	593	SB 549+71	SB 543+78	24	426,960	3	$142,320	No	No	No	No
B3	85.7	14.6	491	SB 542+92	SB 537+83	24	353,520	7	$50,503	Yes	No	No	No
B4	23.1	20.0	1,257	SB 537+16	SB 523+82	24	905,040	13	$69,618	No	No	No	No
B5	29.3	100.0	1,041	SB 413+81	SB 403+29	24	749,520	41	$18,281	No	Yes	Yes	No
B6	68.8	94.1	1,453	SB 384+82	SB 370+60	24	1,046,160	16	$65,385	Yes	Yes	No	No
B7	53.7	95.1	4,487	NB 347+62	NB 391+74	20	2,692,200	203	$13,262	Yes	Yes	Yes	**Yes**
B8	46.1	92.5	2,617	NB 405+57	NB 431+88	20	1,570,200	102	$15,394	Yes	Yes	Yes	**Yes**
B9	71.4	58.3	1,990	NB 446+15	NB 465+63	24	1,432,800	21	$68,229	Yes	Yes	No	No
B10	60.3	58.8	2,603	NB 511+30	NB 536+37	22	1,717,980	68	$25,264	Yes	Yes	Yes	**Yes**
B11	84.1	42.9	1,473	NB 557+17	NB 572+05	20	883,800	47	$18,804	Yes	No	Yes	No
			Total Cost of Recommended Noise Barriers =				**5,980,380**	**373**					

Table 48. Summary of Noise Abatement Analysis for Alternative I in Kentucky

Potential Barrier Site #	Percentage of Benefited Receptors which Receive 7 dB(A) or Greater Noise Reduction (%)	Percentage of Impacted Receptors which Receive 5 dB(A) or Greater Noise Reduction (%)	Barrier Description					Number Of Benefited Properties	Estimated Cost Per Benefiting Receptor (CBR) ($)	Noise Barrier Effectiveness			KYTC Noise Abatement Criteria Satisfied (Yes/No)
			Length (feet)	Beginning Point and Highway Direction	Ending Point and Highway Direction	Noise Barrier Height (feet)	Estimated [1] Cost ($)			Design Goal Achieved[2]	Acoustic Feasibility Achieved [3] (Yes/No)	Cost Effective Achieved [4] (Yes/No)	
B12	76.0	38.5	1,151	SB 561+63	SB 550+32	24	828,720	25	$33,149	Yes	No	Yes	No
B13	70.0	15.9	606	SB 549+82	SB 543+92	24	436,320	10	$43,632	Yes	No	No	No
B14	45.5	22.0	504	SB 542+96	SB 537+84	24	362,880	11	$32,989	Yes	No	Yes	No
B15	0.0	13.8	1,407	SB 537+33	SB 522+55	24	1,013,040	8	$126,630	No	No	No	No
B16	29.3	100.0	1,041	SB 413+81	SB 403+29	24	749,520	41	$18,281	No	Yes	Yes	No
B17	68.8	94.1	1,453	SB 384+82	SB 370+60	24	1,046,160	16	$65,385	Yes	Yes	No	No
B18	52.0	94.9	4,487	NB 347+62	NB 391+74	20	2,692,200	198	$13,597	Yes	Yes	Yes	**Yes**
B19	46.1	92.5	2,617	NB 405+57	NB 431+88	20	1,570,200	102	$15,394	Yes	Yes	Yes	**Yes**
B20	71.4	58.3	1,990	NB 446+15	NB 465+63	24	1,432,800	21	$68,229	Yes	Yes	No	No
B21	43.1	63.8	2,593	NB 511+29	NB 536+30	22	1,711,380	65	$26,329	Yes	Yes	Yes	**Yes**
B22A	NA[5]	NA[5]	582	NB 550 +76	NB 557 +34	26	453,960	4	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]
B22B	NA[5]	NA[5]	1,410	NB 557 +34	NB 571+35	30	1,269,000	8	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]
B22(A+B)	50.0	9.6	1,992	NB 550 +76	NB 571+35	26-30	1,722,960	12	$143,580	Yes	No	No	No
			Total Cost of Recommended Noise Barriers =				**5,973,780**	**365**					

Notes:
[1] Estimated cost of barrier is based on the surface area of $30 per square foot of barrier wall.
[2] A design goal of 7 dB(A) noise reduction for a minimum of 40 percent of all benefiting receptors is required.
[3] Acoustic feasibility of a barrier was judged by providing a noise reduction of 5 dB(A) or greater at 50 percent or more of the impacted receptors.
[4] Cost effectiveness was based on KYTC unit cost of $35,000 per benefiting receptor (CBR).
[5] Not Applicable (NA). See line B22(A+B). Noise barrier feasibility and reasonableness for Barrier B22 was determined for the combined length of B22A plus B22B. The two barrier segments act as a system to provide abatement to portions of Goebel Park.

Table 49. Summary of Noise Abatement Analysis Findings for Alternative E in Ohio

Potential Barrier Site #	Maximum Noise Reduction Achieved dB(A)	Percentage of Impacted Receptors that Receive 5 dB(A) or Greater Noise Reduction (%)	Barrier Description					Number Of Benefited Receptors	Estimated Cost Per Benefiting Receptor ($)	Noise Barrier Effectiveness			ODOT Noise Abatement Criteria Satisfied (Yes/No)
			Length (feet)[1]	Beginning Point and Highway Direction	Ending Point and Highway Direction	Noise Barrier Height (feet)	Estimated [2] Cost ($)			Design Goal Achieved[3]	Acoustic Feasibility Achieved [4] (Yes/No)	Reasonable Cost Effective Achieved [5] (Yes/No)	
B1	11.2	72.1	804	Sta. 105+67	Sta. 113+96	18	361,800	55	6,578	Yes	Yes	Yes	Yes
B2	8.5	58.6	883	Sta. 92+00	Sta. 100+60	22	485,650	42	11,563	Yes	Yes	Yes	Yes
B3	12.4	55.2	1,397	Sta. 89+08	Sta. 90+87	22	768,350	151	5,088	Yes	Yes	Yes	Yes
B4A & B4B	13.5	72.4	937	Sta. 76+20	Sta. 86+80	20	468,500	168	2,789	Yes	Yes	Yes	Yes
B5	16.6	66.7	687	Sta. 60+06	Sta. 66+93	22	377,850	19	19,887	Yes	Yes	Yes	Yes
			Total Cost of Recommended Noise Barriers =				**$2,462,150**	**435**	**$5,660**				

Table 50. Summary of Noise Abatement Analysis for Alternative I in Ohio

Potential Barrier Site #	Maximum Noise Reduction Achieved dB(A)	Percentage of Impacted Receptors that Receive 5 dB(A) or Greater Noise Reduction (%)	Barrier Description					Number Of Benefited Receptors	Estimated Cost Per Benefiting Receptor ($)	Noise Barrier Effectiveness			ODOT Noise Abatement Criteria Satisfied (Yes/No)
			Length (feet)[1]	Beginning Point and Highway Direction	Ending Point and Highway Direction	Noise Barrier Height (feet)	Estimated [2] Cost ($)			Design Goal Achieved[3]	Acoustic Feasibility Achieved [4] (Yes/No)	Reasonable Cost Effective Achieved [5] (Yes/No)	
B6	10.5	71.2	804	Sta. 104+86	Sta. 113+14	18	361,800	52	6,958	Yes	Yes	Yes	Yes
B7	8.3	56.2	883	Sta. 91+19	Sta. 99+79	22	485,650	42	11,563	Yes	Yes	Yes	Yes
B8	12.3	90.0	1,397	Sta. 76+56	Sta. 90+05	22	768,350	159	4,832	Yes	Yes	Yes	Yes
B9A & B9B	14	82.8	937	Sta. 63+69	Sta. 74+28	14	327,950	180	1,822	Yes	Yes	Yes	Yes
B10	19.8	83.3	687	Sta. 47+57	Sta. 54+38	24	412,200	17	24,247	Yes	Yes	Yes	Yes
			Total Cost of Recommended Noise Barriers =				**$2,355,950**	**450**	**$5,235**				

[1] Barrier length was obtained from the “Barrier Description Table” tab in TNM.
[2] Estimated cost of the barriers is based on the surface area cost of $30 per square foot of barrier wall.
[3] A design goal of 7 dB(A) noise reduction of one benefiting receptor is required for the first row receivers.
[4] An acoustically feasible noise barrier provides a minimum noise reduction of five dB(A) or greater at 40 percent of the impacted receptors.
[5] Reasonableness cost was based on a maximum unit cost of $35,000 per benefiting receptor. A benefiting receptor is defined as a receptor receiving a minimum noise reduction of five dB(A) in the Build Alternative predicted noise level.

4.9.4.1.1 Noise Barrier Analysis Findings for Goebel Park

Noise abatement was evaluated for Goebel Park for Alternatives E and I. For both feasible alternatives, a noise barrier was considered between KY 8th Street and the KY 5th Street ramp. A noise barrier was not proposed along the southern extent of the park boundary (south of the outdoor pool area) because the parking lot and basketball court area would be displaced by the alternative which would eliminate these features as potential benefiting receptors.

Noise barrier acoustic effectiveness for Goebel Park would be limited to the portions of the park closest to the noise barrier. For the noise abatement analysis, the total park area was assumed to be comprised of a total of 60 equivalent benefiting receptors.

For Alternative E, the proposed noise barrier would be 20 feet tall and would provide 5 dB(A) or greater noise reduction to 47 equivalent benefiting receptors comprised of 15 equivalent benefiting receptors associated with the pool area and 32 Goebel Park general usage receptors. The 47 equivalent benefiting receptors represent approximately 43 percent of total number of impacted receptors, which achieve a 5 dB(A) or greater noise reduction. The KYTC policy states a minimum of 50 percent of the impacted receptors behind a proposed sound barrier must achieve a noise reduction of 5 dB(A) or greater. Additionally, a noise barrier of different heights was analyzed for Alternative E. Increasing the barrier height beyond 20 feet would not change the outcome of the analysis. The results of the noise barrier analysis for Alternative E determined the proposed noise barrier would not be considered acoustically feasible under the KYTC noise abatement policy.

Additionally, a noise barrier of different heights was analyzed for Alternative I. The southern portion of the noise barrier would be 26 feet tall and the northern portion of the barrier would be 30 feet tall. The analysis assumed a conservative approach with all 60 equivalent benefiting receptors. The analysis findings indicate that the proposed noise barrier would provide 5 dB(A) or greater noise reduction to only 12 equivalent benefiting receptors comprised entirely of general park usage receptors. The existing outdoor pool area would not receive benefit from the barrier. The 12 equivalent benefiting receptors represent less than 10 percent of total number of impacted receptors which is far below KYTC's 50 percent minimum requirement. Furthermore, the unit cost per benefiting receptor was estimated at over $143,000 which exceeds the $35,000 limit. The results of the proposed sound barrier for Alternative I would not be acoustically feasible and cost effective.

4.9.4.2 Noise Barrier Analysis Findings: Ohio

A noise abatement analysis was completed for impacted communities where the construction of noise walls was determined to be feasible (i.e., where there were no driveway or roadway accessibility restrictions preventing the construction of the barriers).

The abatement analysis findings indicate that for both build alternatives, five noise barriers would satisfy the ODOT feasibility and reasonableness requirements for cost and acoustic effectiveness. The five recommended sound barriers consist of a total combined length of approximately 4,700 linear feet of barrier wall ranging in height from 14 to 24 feet. All five of the proposed barriers are located on the east side of I-75 between the Western Hills Viaduct Interchange and Cutter Street. They would provide noise reduction for residential properties in the West End neighborhood of Cincinnati and the Queensgate Playground and Ball Fields. The locations of the five recommended noise barriers are provided in the *Noise Analysis Report: Ohio* (December 2011) found in Appendix F.

For Alternatives E and I, noise barriers are recommended for:

- Winchell Avenue between Bank and York streets,
- Winchell Avenue between Findlay Street and West Liberty Street,
- Winchell Avenue between West Liberty Street and Ezzard Charles Drive,
- Winchell Avenue between Ezzard Charles Drive and West Court Street, and
- Queensgate Playground and Ball Fields between Linn and Cutter streets.

For Alternative E, 435 equivalent residential dwelling would receive benefit at a total cost of approximately $2.5 million. For Alternative I, 450 equivalent residential dwellings would receive benefit at a total cost of approximately $2.4 million. The overall unit cost for abatement for both build alternatives would be less than $6,000 per equivalent benefiting receptor.

4.10 Visual Resources

The visual resources assessment was prepared in general accordance with the methodology found in *Visual Impact Assessment for Highway Projects* (Federal Highway Administration [FHWA] 1990). The FHWA guidance defines the visual environment by a descending order approach that considers: the region's topography and land cover attributes (regional landscape); areas within the regional landscape with distinguishing visual characteristics (landscape units); and locations within landscape units that are of specific visual interest due to their character, quality or visually sensitive resources [visual survey locations (VSLs)].

The study area's regional landscapes, landscape units and VSLs were determined using online aerial photography (Google Earth©), topographic maps, project Geographic Information System (GIS) maps and field survey. Because of the feasible alternatives' potential size and complexity, the study area includes a number of distinctly different visual settings.

The following sections summarize the *Visual Resources Assessment* (August 2009) completed for the project. The complete *Visual Resources Assessment* (August 2009) is provided in Appendix F.

4.10.1 Existing Conditions

4.10.1.1 Kentucky

Visual settings found in the Kentucky portion of the study area are comprised of urban and suburban commercial uses, medium density suburban residential uses and open vegetated areas. The layouts of the residential areas emphasize views of the Ohio River, its bridges, and the Cincinnati skyline.

4.10.1.2 Covington Suburban Regional Landscape

The Covington Suburban Regional Landscape is shown in Figure 1 of the *Visual Resources Assessment* (August 2009) located in Appendix F and was determined to be a regional landscape because of its sprawling medium density suburban development. Suburban uses within this landscape unit include: transportation; limited multi-family residences; a number of medium density single-family residential subdivisions; limited office facilities and

commercial uses. Views in the south part of this landscape are somewhat more limited than those in its north part and those within the Kentucky and Ohio Urban Regional Landscape. This is because of trees, higher vegetation, and topography. However, some locations have vistas because of their topography.

Covington Suburban Landscape Unit #1
The Covington Suburban Landscape Unit #1 is characterized by hilly topography, medium to high density residential land uses that include single-family and multi-family residences and vegetation consisting of higher bushes and trees. Many residential land uses in this landscape unit emphasize views of the Ohio River and Cincinnati skyline. This is partly evident by some of the place names observed in this unit.

Covington Suburban Landscape Unit #2
The Covington Suburban Landscape Unit #2 is characterized by mildly hilly to flat topography with medium density residential subdivisions and suburban commercial uses (e.g. limited strip type commercial uses).

4.10.1.3 Ohio

Visual settings found in the Ohio portion of the study area are comprised exclusively of urban industrial, commercial, high density residential and transportation land use views.

4.10.1.4 Cincinnati/Covington Urban Regional Landscape

The Cincinnati/Covington Urban Regional Landscape is shown in Figure 1 of the *Visual Resources Assessment* (August 2009) located in Appendix F and was determined to be a regional landscape because of its dense and extensive urban development. Urban uses within this regional landscape include: highway and rail transportation facilities; low-rise industrial and storage facilities; high-rise commercial and office uses; city parks; urban multi-family residences and a dense arrangement of single family residences. Because of the relatively minor presence of trees, especially in the center of this regional landscape, there are many open views of the highly urbanized environment.

Covington Urban Landscape Unit
The Covington Urban Landscape Unit is characterized by relatively flat topography with a slight declination northward toward the Ohio River. It is characterized by medium density highway-related commercial land uses and parking lots.

Cincinnati Urban Landscape Unit #1
The Cincinnati Urban Landscape Unit #1 is characterized by relatively flat topography with the exception of intentional topographic change at the I-75 right-of-way. It is also characterized by a dense juxtaposition of single and multifamily residences with commercial and light industrial uses intermixed. The northern portion of this landscape unit is a historic district. There are no views of the Brent Spence Bridge or Ohio River from this landscape unit.

Cincinnati Urban Landscape Unit #2
The Cincinnati Urban Landscape Unit #2 has similar topography to the Cincinnati Urban Landscape Unit #1, and is characterized by a dense coverage of commercial, industrial, institutional and rail transportation land uses. This landscape unit has very limited views of the Brent Spence Bridge and Ohio River at its southern end, and these are mostly from Longworth Hall.

4.10.1.5 Visual Survey Locations

Visual survey locations (VSLs) selected for the visual resources assessment are identified in Table 51 and shown in Figure 1 of the *Visual Resources Assessment* (August 2009) located in Appendix F. The *Visual Resources Assessment* discusses each VSL in detail.

Table 51. Visual Survey Locations (VSL)

VSL	Landscape Unit	Regional Landscape
K1	Covington Urban Landscape Unit	Cincinnati/Covington Urban Regional Landscape
K2		
K3	Covington Suburban Landscape Unit #1	Covington Suburban Regional Landscape
K4		
K5		
K6		
K7		
K8		
K9		
K10		
K11		
K12		
K13		
K14	Covington Suburban Landscape Unit #2	
K15		
O1	Cincinnati Urban Landscape Unit #1	Cincinnati/Covington Urban Regional Landscape
O2		
O3		
O4	Cincinnati Urban Landscape Unit #2	
O5		
O6		
O7		

4.10.2 Impacts

This visual resources assessment considered the potential visual impacts from the project at 22 representative locations in Covington and Cincinnati. To facilitate this analysis, the proposed project improvements were divided into four areas of activity which included:

- widening or changes to the I-75 corridor on the Covington side of the Ohio River,
- changes to the Brent Spence Bridge,
- a new bridge to the west of the existing Brent Spence Bridge, and
- new I-75 alignments and associated grade separations on the Cincinnati side of the Ohio River.

Table 52 indicates the level of potential visual impacts, which would result from Alternatives E and I.

The visual resources assessment determined that the greatest amount of potential visual impact would be in the residential land uses to west of the Brent Spence Bridge on the south bank of the Ohio River. Of these land uses, those with the greatest level of potential impacts are located on Wright Street and Western Avenue at an elevation that is the same or higher than the feasible alternatives in the area. The area with the least amount of potential impact

Table 52. Potential Visual Impacts per Visual Survey Locations

Visual Survey Location (VSL)	Actual Location	Level of Potential Upset			
		With I-71 / I-75 New Alignments and Associated Grade Separations on Cincinnati Side	With New Bridge Developed West of Brent Spence Bridge	With Changes to Brent Spence Bridge	With Widening or Changes to I-71/I-75 on Covington Side
Kentucky					
K1	Waterfront Restaurant, Covington	Low	Low	Medium	None
K2	Three Sixty Restaurant/Radisson Hotel, Covington	Medium	Medium	Medium	Medium
K3	Harbor House Apartments on Swain Court, Covington	Low	High	Low	None
K4	Residence at 309 Wright Street, Covington	None	High	Medium	High
K5	Hathaway Court Senior Citizens Apartments, Covington	Medium	High	Low	None
K6	Corner of Highway Avenue and Wright Street, Covington	Low	High	Low	None
K7	East side third floor Balcony of Hillside Condominiums, Covington	Medium	High	Medium	None
K8	Residence 446 Western Avenue, Covington	None	High	High	High
K9	Residence at 521 Western Avenue, Covington	None	Medium	High	Medium
K10	East lawn of Bluff Apartments at Devou Park, Covington	None	Low	High	Low
K11	Residence at 1124 Panorama Drive, Covington	Medium	Low	None	None
K12	Vista area of Devou Park, Covington	None	Low	Low	None
K13	Residence at 45 Rivard Drive, Covington	None	None	None	High
K14	Residence at 1971 Pieck Drive, Covington	None	None	None	High
K15	Residence at 512 Scenic Drive, Covington	None	None	None	None
Ohio					
O1	2333 W. McMicken Avenue, Cincinnati	Low	None	None	None
O2	Corner of York Street and Lubke Alley, Cincinnati	Low	None	None	None
O3	Corner of West Court Street and Cutter Street, Cincinnati	High*	None	None	None
O4	Drop off area in front of the Union Terminal, Cincinnati	Low	None	None	None
O5	East end of the Harriet Beecher Stowe Elementary School (Fox 19 Television Station), Cincinnati	Low	None	None	None
O6	Vacant lot east of Longworth Hall, Cincinnati	High	High	Low	None
O7	John Mueller House at 724 Mehring Way, Cincinnati	High	High	None	None

* Indicates that special project design considerations may affect the level shown in this table (e.g. if vegetation were removed or not).

would be in the suburban residential areas south of Covington. This is because the only changes proposed for this area include limited widening of the interstate.

The impacts to visual quality are expected to be the same for Alternatives E and I. Both alternatives will be along the existing alignment of I-71/I-75 in Kentucky and I-75 in Ohio.

The No Build Alternative would not result in changes to visual quality within and surrounding the study area.

4.11 Indirect and Cumulative Effects

The Council on Environmental Quality (CEQ) regulations 40 CFR §§ 1508.7 and §1508.8 (b) were used to guide the assessment of indirect and cumulative impacts. According to these regulations, indirect impacts are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative impacts are those which result from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions.

4.11.1 Indirect and Cumulative Effects Study Area

The indirect and cumulative effects (ICE) study area consists of the collective known or reasonably foreseeable projects within the Covington and Cincinnati metropolitan areas that have the potential to be built between now and 2030. These projects were identified through review of the project or plan documents discussed below. The ICE study area is shown in Exhibit 10.

4.11.2 Other Reasonably Foreseeable Actions

Documents and websites reviewed to determine reasonably other foreseeable actions included*: The Ohio Kentucky Indiana Regional Council of Governments (OKI) 2030 Regional Transportation Plan* (June 2008); *OKI Transportation Improvement Program (TIP) Fiscal Year 2012 – 2015* (April 2011); *Draft Hamilton County Transportation Policy Plan* (December 2009); *Kenton County Transportation Plan* (March 2003); *North South Transportation Initiative* (MVRPC; February 2004); City of Cincinnati's Revive I-75 website (2010); and the *West End Comprehensive Plan* (City of Cincinnati). The projects identified through these resources are presented in Table 53.

Table 53. Other Reasonably Foreseeable Actions

Project	Location	Status of Action
I-75 Thru the Valley	Suburban Cincinnati, north of the Brent Spence Bridge study area	In-process
I-75 Mill Creek Expressway	Urban Cincinnati, directly north of the Brent Spence Bridge study area	
Brent Spence Bridge	This project	
KY 1120 Widening	Covington, east of the project	
I-75 / Buttermilk Pike Interchange Improvements	Kenton County south of project	Identified in TIP, but no funding committed
KY 8th / 4th Street Realignment	Covington immediately east of Brent Spence Bridge study area	

The in-process projects include environmental analyses that have identified their respective potential indirect and/or cumulative impacts, these are shown in Table 54. The projects identified in the TIP, but not yet in process have not had their potential indirect or cumulative effects analyzed, and therefore are discussed in Table 54 in general terms.

4.11.3 Project Indirect and Cumulative Impacts

4.11.3.1 Socioeconomic Resources

The project's business displacements would include warehouses, restaurants, and a few manufacturing facilities and offices. As indicated in Table 54, other reasonably foreseeable actions could include up to 24 business displacements (see I-75 Mill Creek Expressway and KY 1120 Widening). These displacements would represent a minor cumulative impact region-wide because they represent a small fraction of the businesses and job opportunities available in the area.

A concern was raised by stakeholders that changes to project access may have the potential to result in traveler confusion as to how to access Covington from southbound I-75 out of Cincinnati. Confusion could result in the indirect economic loss to these Covington businesses but should be avoided by installation of standard signing.

4.11.3.2 Community Resources

The community resources features found in the ICE study area include recreational facilities and public and commercial sports facilities. The project's partial acquisition of some of these land uses would contribute to the cumulative impact with the other reasonably foreseeable actions (i.e. I-75 Thru the Valley and KY 1120 Widening projects). With respect to indirect impacts, since the project would have no potential for inducing development, it is unlikely that there would be a change in utilization of these resources.

4.11.3.3 Ecological Resources

The project would not include substantial improvements to the existing traffic LOS. While access would be changed, traffic volumes and the locations of each access termini would be generally the same as existing conditions. Because of this, the project is not expected to have impetus for inducing development. Hence, indirect and cumulative impacts to ecosystem features such as wooded lands; natural preserves; (e.g. easements; habitats; protected species would be very unlikely. Although the project would have the potential for cumulative increases in stormwater runoff into local water bodies (the Ohio River), it is anticipated that the improved drainage technologies and designs that will be incorporated into the project would keep such impacts to a minimum.

Table 54. Potential Impacts of Other Reasonably Foreseeable Actions

Environmental Feature	I-75 Thru the Valley	I-75 Mill Creek Expressway	Brent Spence Bridge	KY 1120 Widening	I-75 / Buttermilk Pike Interchange Improvements	KY 8th / 4th Street Realignment
Socioeconomic	• Potential for up to 46 residential relocations. • Potential for up to 10 full or partial commercial or industrial relocations and associated jobs loss. • Access near Cooper and Davis streets will be improved.	• Potential for up to 22 residential relocations. • Potential for up to 15 commercial relocations and associated jobs loss.	See Section 4.11.3	• Potential for up to 34 residential relocations. • Potential for up to four mixed use and 12 commercial/ industrial relocations and associated jobs loss. • One in 10 relocations potentially minority. • One in five relocations potentially low-income. • Property tax loss to Covington.	None expected because improvements would likely be in or nearby existing right-of-way.	None expected because improvements would likely be in an area that is open land between two existing roadways.
Community	Temporary right-of-way impacts on 0.04 acres of the Veteran's Memorial Park.	Approximately 1.7 acres of temporary right-of-way impacts to two parks and 0.8 acres of permanent right-of-way from five park resources.		Minor indirect impacts to Seminary Square.		
Ecological	Project could result in up to 932 feet of stream impacts.	• Project results in 39 feet of stream impacts. • Pier footing impacts to the Mill Creek will be determined during detail design.		None Identified.		
Cultural	Project requires 12.3 acres of permanent and 0.24 acres of temporary impact to one NRHP eligible property.	Minor property impacts to two NRHP eligible properties.		• Two historic residences would be acquired for right-of-way • Structures bordering Leehoven, east Lewisburg, and Helentown historic districts would be acquired.		

Sources: I-75 Thru the Valley Environmental Assessment (January 2010)
I-75 Mill Creek Expressway Environmental Assessment (December 2008)
EA/FONSI /Section 4(f) for KY 1120 (January 2008)

4.11.3.4 Cultural Resources

The project's direct impacts to cultural resources would include direct acquisition of residences in the Lewisburg Historic District in Covington and structural changes to the Longworth Hall building in Cincinnati. These project impacts would contribute the cumulative loss of cultural resources when considered in conjunction with those identified under the I-75 Mill Creek Expressway and KY 1120 Widening projects. With respect to indirect impacts, the project required changes to Longworth Hall could lead to a revision in the building's various uses.

4.12 Construction Impacts

Construction of the Brent Spence Bridge Replacement/Rehabilitation Project is anticipated to begin in 2014 and be complete by 2022. This section describes the potential conceptual construction phasing of the feasible alternatives as well as the anticipated temporary construction impacts on environmental resources. If an environmental resource is not specifically discussed in this section, it is anticipated to have, at most, minor impacts from construction activities. There would be no construction impacts with the No Build Alternative.

4.12.1 Construction Phasing Plan

A conceptual construction phasing plan and maintenance of traffic plan were developed for the feasible alternatives to maintain traffic operations throughout the corridor and minimize disruption to the surrounding communities. Due to the complexity of the work and the large volume of traffic that utilizes the I-75 corridor, it was imperative to create a construction sequencing plan that minimizes disruption to interstate traffic. The needs for road closures, detours, temporary widening, and temporary roadways to maintain traffic flow were determined. The phasing plan presented in this section is one possible scenario based on many assumptions, which are the same for both Alternatives E and I. These assumptions included the creation of several contract packages for each state as listed below.

Kentucky:

- I-471 Widening and Ramp Modifications.
- Kyles Lane Bridge Replacement.
- Dixie Highway Bridge Replacement.
- New Bridge over the Ohio River.
- I-75 Reconstruction from mile post (MP) 187.2 to MP 189.5.
- I-75 Reconstruction from MP 189.5 to the Southern Termini of the 12th Street Interchange.
- I-75 Reconstruction from the South Termini of the 12th Street Interchange to the New Bridge over the Ohio River and Existing Brent Spence Bridge.
- Rehabilitation of the Existing Brent Spence Bridge.

Ohio:

- I-71/ I-471 Ramp Modifications.
- Linn Street Bridge Replacement and Gest Street Reconstruction.

- Ezzard Charles Drive Bridge Replacement; Western Avenue Reconstruction; Freeman Avenue Interchange Reconstruction; Winchell Street Reconstruction; 9th Street Northbound Entrance Ramp; and the Court Street Cul-de-sac Construction.
- 7th/8th/9th Street Interchange Reconstruction and the 6th Street Northbound Entrance Ramp.
- I-75 Reconstruction from Findlay Street to the Northern Terminus of the Corridor and the Western Hills Viaduct Interchange Reconstruction.
- I-75 Reconstruction from North of Linn Street to Findlay Street.
- I-75 Reconstruction from the New Bridge Over the Ohio River and the Existing Brent Spence Bridge to North of Linn Street.

The first phase of construction involves the modification of the ramps to I-71 and I-471, as well as the widening of I-471, to support detours and lane shifts in later phases. As part of the detour for the I-75 corridor reconstruction, I-71 traffic would be diverted to I-471 utilizing I-275 in Kentucky.

The second phase of construction includes replacement of overpass bridges (i.e., Kyles Lane Bridge, Dixie Highway Bridge, and Linn Street Bridge) to accommodate the widening of I-75 corridor. The overpass bridges can be designed and constructed quickly, with minimal disruption to existing I-75 corridor traffic. The second phase also includes reconstruction of the Western Hills Viaduct and of local routes such as Gest Street; Winchell Street; and the Court Street cul-de-sac.

The third and fourth phases of construction include the new Ohio River Bridge and the approaches in Kentucky and Ohio. Once these elements are completed, southbound I-75 traffic would be diverted to the new, widened interstate, crossing the new bridge on the bottom deck, and utilizing the widened portion of the interstate in Kentucky. Northbound I-75 traffic would remain in its current location, leaving a large work area available to the contractor to construct new I-75 pavement and available ramp areas.

The fifth and final phase involves shifting northbound I-75 to its final location on the new Ohio River Bridge, which would allow the connections to Fort Washington Way and OH 2nd Street to be constructed. The rehabilitation of the existing Brent Spence Bridge would also occur during this phase.

4.12.2 Community Cohesion and Facilities

Any major construction project may inconvenience and disturb adjacent residents and businesses. In the case where an existing road is widened or otherwise improved, inconvenience to motorists also can occur. Without proper planning and implementation of controls, traffic disruption, loss of access, dust, noise, burning debris, and utility relocation could adversely affect the comfort and daily life of residents and visitors.

During construction of the feasible alternatives, access to all neighborhoods and community facilities would be maintained to the extent practical through controlled construction scheduling and/or provisions of alternate routes of entry. Any access changes would be mitigated by providing adequate signage for the access changes and, where necessary, by working with the facility throughout the construction period to provide advanced notification to the community regarding the changes.

Utilities may be impacted temporarily by the construction of the feasible alternatives but it is anticipated that there would be no service interruptions. Utility impacts would be similar to that of any large construction project where temporary support of large or shallow utilities may be required. To mitigate temporary utility impacts, KYTC and ODOT would coordinate closely with the various utility owners in the study area throughout the design and construction phases of the project. Early coordination will decrease the chance of surprises during construction and will enable efficient phasing of the roadway, bridges, and utility work.

4.12.3 Public Outreach

A regional outreach program would be established to inform the public about major traffic delays associated with the construction phases. The local news media would be notified in advance of road closures, diversions, and other construction. The program's objective would be to create awareness of the potential problems and provide alternate travel routes for drivers, including transit options. One option for an outreach program could include a transit voucher program to encourage drivers to use public transportation, thereby reducing congestion. The combination of identifying alternative routes with the regional outreach program should ensure that effective traffic operations could be maintained throughout all phases of construction.

4.12.4 Economy and Employment

During all construction phases of the project, new jobs will be created to make the improvements to the roadways and bridges. Project construction would also increase the sale of construction supplies, materials, equipment, and fuel from local and regional sources. Also, as in any large construction project, there will be traffic diversions resulting in traffic delays that will add some travel time to residents, businesses (including employees and patrons) as well as commuters. To reduce temporary impacts to the economy with the feasible alternatives, KYTC and ODOT would ensure that access to businesses is maintained at all times.

4.12.5 Air Quality

Construction-related air quality effects of the feasible alternatives would be limited to short-term increased fugitive dust and mobile-source emissions during construction. State and local regulations regarding dust control and other air quality emission reduction controls would be followed to minimize air impacts during construction.

4.12.5.1 Fugitive Dust Emissions

Fugitive dust is airborne particulate matter, generally of a relatively large particulate size. Construction-related fugitive dust would be generated by haul trucks, concrete trucks, delivery trucks, and earth-moving vehicles operating around the construction sites. This fugitive dust would be due primarily to particulate matter (i.e. dust) re-suspended by vehicle movement over paved and unpaved roads, dirt tracked onto paved surfaces from unpaved areas at access points, and material blown from uncovered haul trucks.

Generally, the distance that particles drift from their source depends on their size, the emission height, and wind speed. Small particles (30 – 100 micron range) can travel several hundred feet before settling to the ground. Most fugitive dust, however, is comprised of relatively large particles (i.e., particles greater than 100 microns in diameter). These particles are responsible for the reduced visibility often associated with roadway

construction. Given their relatively large size, these particles tend to settle within 20 to 30 feet of their source.

In order to minimize the amount of construction dust generated, the mitigation measures presented below could be followed.

Site Preparation:

- Minimize land disturbance.
- Use watering trucks to minimize dust.
- Cover trucks when hauling dirt.
- Stabilize the surface of dirt piles if they are not removed immediately.
- Use windbreaks to prevent accidental dust pollution.
- Limit vehicular paths and stabilize these temporary roads.
- Pave all unpaved construction roads and parking areas to road grade for a length no less than 50 feet from where such roads and parking areas exit the construction site. This prevents dirt from washing onto paved roadways.

Construction:

- Cover trucks when transferring materials.
- Use dust suppressants on unpaved traveled paths.
- Minimize unnecessary vehicular and machinery activities.
- Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road.

Post-Construction:

- Re-vegetate any disturbed land not used.
- Remove unused material.
- Remove dirt poles.
- Re-vegetate all vehicular paths created during construction to avoid future off-road vehicular activities.

4.12.5.2 Carbon Monoxide

CO emissions from motor vehicles generally increase with decreasing vehicle speed. Disruption of traffic during construction (such as the temporary reduction of roadway capacity and the increased queue lengths) could result in short-term, elevated concentrations of CO. In order to minimize the amount of emissions generated, every effort would be made during construction to limit disruption to traffic, especially during peak travel hours.

4.12.6 Noise

Construction activities for the feasible alternatives would have short-term noise effects on receptors in the immediate vicinity of the construction site. Effects on community noise levels during construction would result from noise from construction equipment and from construction and delivery vehicles traveling to and from the site. The level of effect would depend on the noise characteristics of the equipment and activities involved, such as, the

duration of the activity, the construction schedule, and the distance from noise receptors. Resultant noise levels at a given receptor location would depend on the type and number of pieces of construction equipment being operated and the distance from the construction site. Noise levels from construction activities can vary widely, depending on the phase of construction, which include land clearing and excavation, construction of new roadways, pile driving, and construction of retaining walls. At a typical receptor, the noise levels would be highest during the early phases of construction, when excavation and heavy daily truck traffic would occur. To abate or minimize expected construction noise impacts, mitigation measures could be noted directly in contract plans and specifications.

4.12.7 Health and Safety Plan

Contractors would comply with all federal, state, and local laws governing safety, health, and sanitation during all phases of construction. All reasonable safety considerations and safeguards necessary to protect the life and health of employees on the job, the safety of the public, and the protection of property in connection with construction would be taken.

4.12.8 New Ohio River Bridge

Drilled shaft construction in rivers is traditional and special constructability issues are not expected. The footing construction would occur within sheet pile cofferdams, which is also a traditional construction method. The concrete towers and pier columns are anticipated to be cast-in-place using self-climbing forms.

4.12.9 Geology, Topography, and Soils

Construction activities for the feasible alternatives would disturb soils and possibly cause erosion and sedimentation. KYTC's and ODOT's standard specifications for sediment and erosion control would be implemented during all phases of construction. An amendment to the Clean Water Act broadened the definition of point source pollutants to include stormwater discharge from industrial activities and construction sites. Construction projects are required to have a Storm Water Management Plan, which includes erosion and sediment control measures. Kentucky and Ohio Point Discharge Elimination System (PDES) Construction Stormwater permits will be required.

During construction permanent erosion control measures would be implemented at the earliest practicable time; temporary erosion control measures would be coordinated with permanent measures; and erosion and sediment control measures would be monitored, maintained, or revised during construction.

4.12.10 Traffic and Transportation

Construction of either feasible alternative would affect the interstates, local roads and modify traffic patterns. Transportation and circulation impacts from construction activities would result from temporary road detours, narrowing and closings, causing traffic to detour around or reduce speeds near construction sites. Slow-moving construction vehicles on the roadways near construction sites would also affect levels of service on the roadways.

Temporary and permanent street closings due to the construction of either feasible alternative would have impacts on bus routes in Covington and Cincinnati. Although rerouting of bus routes and relocation of bus stops could be necessary, neither of the feasible alternatives would cause severe, long-term service disruptions.

A conceptual Maintenance of Traffic Plan (MOT) was developed for the feasible alternatives to maintain traffic operations throughout the corridor and minimize disruption to the surrounding communities. The conceptual MOT plan primarily focused on local and regional vehicular travel patterns and local transit bus operations. During the detail design phase of the project, additional coordination with the local transit agencies regarding the final MOT plan will be required to study potential impacts to current operations and to consider additional opportunities to provide supplementary services to alleviate congestion to both the interstate and local roadway networks. Maintaining the other modes of travel (ie, pedestrian, bicyclists, etc) will be incorporated into the final MOT plan and will be coordinated with the local cities and communities.

The first phase of construction involves modifications to interstates east of the study area to support a temporary detour and lane shifts. In order to reduce the volume of traffic using the I-75 corridor, I-71 traffic would be temporarily diverted to I-275 and I-471 in Kentucky. To support this detour, the ramp from southbound I-71 to southbound I-471 would be temporarily reconfigured to provide two travel lanes. KYTC has a project scheduled that will reconfigure the existing single lane ramp from southbound I-471 to westbound I-275 to two travel lanes. Similarly, the ramp from northbound I-471 to northbound I-71 would be widened to two lanes. Using existing shoulders, I-471 would be temporarily widened to four lanes in each direction to enhance capacity on this interstate to accommodate the additional detoured I-71 traffic.

The second phase of construction includes replacement of overpass bridges to accommodate the widening of the I-75 corridor. The proximity of the existing bridge piers to the proposed bridge piers requires that the existing structures be removed from service to allow construction of the new structures. Access to some existing ramps would be temporarily prohibited. I-71 traffic in both directions could be closed through downtown Cincinnati, with traffic diverted to I-275 and I-471. This would enable a large and cost efficient work area for construction of the many structures in this area.

The third and fourth phases of construction include the new Ohio River Bridge and the approaches in Kentucky and Ohio. Access to Covington would be modified to provide only one entrance and one exit in the southbound and northbound directions. Access from southbound I-71/I-75 would be maintained via the Pike Street exit and access to southbound I-71/I-75 from Covington would be maintained via the KY 12th Street entrance ramp. In Cincinnati, I-75 would be reduced to two travel lanes in each direction where possible. Three travel lanes would be provided in the northbound direction on I-75 north of Freeman Avenue and in the southbound direction north of OH 9th Street in Cincinnati.

Once the southbound collector-distributor system in Ohio, new Ohio River Bridge and the approaches in Kentucky and Ohio are completed, southbound I-75 traffic would be diverted to the new, widened interstate, crossing the new bridge on the bottom deck, and utilizing the widened portion of the interstate in Kentucky. The new southbound I-71/I-75 connections to Covington would open. Northbound I-75 traffic would remain in its current location, leaving a large work area available to the contractor to construct new I-75 pavement and available ramp areas.

The fifth and final phase involves shifting northbound I-75 to its final location on the new Ohio River Bridge, which would allow the connections to Fort Washington Way and OH 2nd Street to be constructed. The rehabilitation of the existing Brent Spence Bridge would also

occur during this phase. During this phase, most of the existing northbound I-75 ramps in Kentucky and Ohio would be accessible; however, all Ohio southbound I-75 exit ramps south of 7th Street would be closed. These include the ramps to OH 5th Street, Fort Washington Way, and OH 2nd Street. Ramps would be re-opened to traffic whenever possible as the work progresses.

4.13 Utilities

4.13.1 Existing Conditions

A wide range of underground and aboveground utilities are present within the study area in both Kentucky and Ohio. These utilities include electric transmission lines, high pressure gas mains, electric substations, sanitary and combined sewer lines, water mains, fiber optic lines, and transmission towers. A total of 13 public utility companies have been identified as having facilities within the study area:

- AT&T Fiber Optics,
- Cincinnati Bell (telephone),
- Cincinnati Water Works,
- Duke Energy (gas and electric),
- Insight Communications,
- Level 3 Communications, LLC,
- MCI/Verizon Fiber Optic,
- Metropolitan Sewer District (Greater Cincinnati),
- Northern Kentucky Water District,
- Qwest National Network Services,
- Sanitation District Number 1 (Northern Kentucky),
- Sprint Fiber Optic, and
- Time Warner Cable.

A utility coordination meeting was held on March 16, 2006 to provide preliminary project information and to begin coordination between the Project Team and utility providers. From the meeting, a utility coordination team was formed. This team will work together to ensure that no loss of service occurs during construction or operation of the project. ODOT sent out letters to all utility companies on March 2, 2009 depicting potential utility impacts. In the March 2, 2009 letter, ODOT requested the utility companies provide back an estimate of the cost to relocate their facilities. A summary of the utility coordination conducted for the project is provided in Section 5.8, and the letters and responses are provided in Appendix E.

4.13.2 Impacts

The potential utility conflicts and possible relocations are described in Table 55 for Kentucky and Table 56 for Ohio and are presented in Exhibits 11A – 11G. The potential impacts are the same for both feasible alternatives. Alternatives E and I could potentially impact a total of 57 individual utilities (46 below ground and 11 above ground) as presented in Table 55 and Table 56.

Table 55. Utility Impacts in Kentucky

Item Number[1]	Utility	Description
Cincinnati Bell and Other Telecommunications Providers		
1-3	Telephone Feeder Lines	Cincinnati Bell Telephone overhead feeder lines drop and run underground along Rivard Drive at the existing Rivard Drive structure. I-71/I-75 mainline widening will require these lines to be relocated.
2-2	Fiber Optic Lines	AT&T aerial fiber optics and Cincinnati Bell Telephone feeder lines are located on the Duke Energy poles along the west side of Crescent Avenue. I-71/I-75 mainline widening will require these lines to be relocated.
Duke Energy		
1-1	Electric Lines	Overhead transmission lines serving the Fort Mitchell Substation (approximately 120 feet south of Dixie Highway) and overhead electric lines approximately 890 feet north of Dixie Highway. I-71/I-75 mainline widening and ramp and structure construction may impact these lines.
1-4	Gas Main	An 8-inch gas main is located under the I-71/I-75 mainline and ramps just south of the existing Kyles Lane Bridge. I-71/I-75 mainline widening may require relocation of this main.
1-8	Electric Line	A 138 kilovolt (KV) overhead transmission line crosses I-71/I-75 1,500 feet south of KY 12th Street. West side grading and potential wall construction may impact the electric lines.
1-10	Electric Lines	Two overhead electric lines crosses I-71/I-75, one crossing at KY 12th Street and one crossing approximately 225 feet south of KY 12th Street. I-71/I-75 mainline widening may require these lines to be relocated.
1-12	Electric Line	A 69 KV overhead transmission line crosses I-71/I-75 approximately 120 feet north of KY 12th Street and runs parallel to the west side of I-75 to near Pike Street. I-71/I-75 mainline and ramp widening may require this line to be relocated.
2-1	Electric Line	A 69 KV overhead electric transmission line runs along the west side of Crescent Avenue in Covington. New Ohio River Bridge will require these lines to be relocated from approximately 1,400 feet north of Pike Street to the Ohio River.
2-3	Gas Main	A 12-inch high pressure gas transmission main runs along Crescent Avenue in Covington. New Ohio River Bridge will require these lines to be relocated from approximately 1,400 feet north of Pike Street to the Ohio River.
Northern Kentucky Water District		
1-5	Water Main	A 10-inch water main crosses the I-71/I-75 mainline under the Kyles Lane Bridge. Structure construction will require relocation of this water main.
1-11	Water Main	A 20-inch water main exists under KY 12th Street in Covington at the I-71/I-75 crossing. This main may require relocation due to mainline structure construction.
Sanitation District Number 1		
1-2	Sanitary Sewer	Sanitary sewer crossing approximately 1,025 feet north of Dixie Highway. I-71/I-75 mainline widening may require the manhole to be relocated.

Table 55. Utility Impacts in Kentucky

Item Number[1]	Utility	Description
1-6	Combined Sewer	A four-foot x four-foot box culvert serves as a combined sewer located approximately 5,000 feet north of Kyles Lane. I-71/I-75 mainline widening may require this culvert to be lengthened.
1-7	Storm Water Detention Basin	A regional storm water detention basin is located on the west side of I-75 approximately 1,900 feet south of KY 12th Street in Covington. I-71/I-75 mainline widening may require modifications due to proposed grading and drainage construction. The existing Sanitation District No 1 combined sewer running north from the detention basin along the west side of I-71/I-75 will require relocation/modification due to mainline widening.
1-9	Combined Sewer	The Willow Run 108-inch diameter combined sewer. I-71/I-75 mainline widening and ramp construction will require relocation/ modifications of the sewer line from approximately 1,500 feet south of KY 12th Street in Covington to approximately 375 feet north of Pike Street.
1-13	Combined Sewer	A 96-inch diameter combined sewer crosses I-71/I-75 at KY 9th Street in Covington. I-71/I-75 mainline, ramp and structure widening will require relocation/modifications to the sewer line.
1-14	Sanitary Sewer	A 27-inch diameter sanitary sewer by-pass runs along the east side of I-71/I-75 from just north of Pike Street in Covington to approximately 200 feet north of KY 9th Street. I-71/I-75 mainline, ramp and structure widening will require relocation/modifications to the sewer line.
1-15	Combined Sewer	A combined sewer line ranges in diameter from 36 to 60 inches. I-71/I-75 mainline widening will require relocation/modifications to the sewer line.
2-13	Sanitary Sewer	A 33-inch sanitary sewer bypass crosses I-71/I-75 at a skew from Goebel Park in Covington on the east side to approximately 480 feet south of KY 5th Street on the west side of I-71/I-75 where it widens to 36 inches. I-71/I-75 mainline widening will require relocation/modifications to this sewer line.
2-14	Combined Sewer	The 12-foot x 14-foot Willow Run interceptor is located on the east side I-71/I-75 and crosses the interstate at a skew south of KY 5th Street. I-71/I-75 mainline widening will require relocation/modifications to this sewer line from approximately 900 feet north of KY 9th Street to KY 5th Street.
2-15	Storm Water Ponding Outlet	Two storm water ponding outlets (combined sewer overflows) are located in Goebel Park. I-71/I-75 mainline widening will require relocation/modifications to these ponding areas.
2-16	Combined Sewer	A 48-inch diameter combined sewer runs west to east from Western Avenue toward I-71/I-75 between KY 3rd and KY 4th streets. I-71/I-75 mainline, ramp and structure widening will require relocation/modifications to the sewer line.

[1] Item numbers represent utility identification numbers shown on Exhibit 11.

Table 56. Utility Impacts in Ohio

Item Number[1]	Utility	Description
Cincinnati Bell and Other Telecommunications Providers		
2-20	Fiber Optic Line	Verizon and AT&T underground fiber optic lines; and Cincinnati Bell Telephone and Level 3 Communications underground duct banks in and along OH 3rd Street. Interstate improvements may impact these lines.
2-21	Fiber Optic Line	Verizon and MCI underground fiber optic lines run west from OH 4th and Plum streets then south to OH 3rd Street. Interstate improvements may impact these lines.
2-24	Telephone Line	Duke Energy, Level 3 Communications and Cincinnati Bell Telephone conduits are hung on the Linn Street bridge over I-75. These lines will require relocation due to new structure construction.
2-26	Fiber Optic Line	AT&T fiber optics in Duke Energy conduits cross at a skew under I-75 approximately 360 feet north of Linn Street. Interstate improvements may require relocation of these lines.
2-27	Trunk Line	Cincinnati Bell Telephone and Level 3 Communications trunk lines cross under I-75 approximately 620 feet north of Linn Street. Interstate improvements may require relocation of these lines.
2-28	Cell Tower	A multi-use cell tower is located on the east side of I-75 just north of Linn Street. Interstate improvements may require relocation of the cell tower.
2-33	Fiber Optic Line	A Level 3 Communications trunk line is located along OH 3rd Street. Interstate improvements may require relocation of this fiber optic line.
2-35	Fiber Optic Line	An AT&T underground fiber optics line runs approximately 410 feet north along the west side of I-75 from OH 3rd Street then runs west to Gest Street. Interstate improvements may require relocation of these lines.
3-2	Duct Bank	A Cincinnati Bell Telephone duct bank crosses I-75 approximately 425 feet south of Liberty Street, then runs north along the west side of I-75 to Dalton and Bank streets. Interstate improvements may require relocation of the duct bank.
3-5	Duct Bank	A Cincinnati Bell Telephone duct bank crosses I-75 just north of Poplar Street, then runs north along the west side of I-75 to approximately 500 feet north of York Street. Interstate improvements may require relocation of the duct bank.
3-12	Duct Bank	A Cincinnati Bell Telephone duct bank crosses I-75 approximately 500 feet north of the Western Hills Viaduct. I-75 mainline and ramp widening will require relocation of the duct bank.
Duke Energy		
2-18	Electric Line	A 138 KV underground oil filled transmission line runs east, parallel to and 240 feet south of Pete Rose Way, then north along Central Avenue. Interstate improvements may require relocation of this line.
2-19	Electric Line	A 69 KV underground oil filled transmission line runs north from Pete Rose Way under existing I-75 structures then east along OH 3rd Street. Interstate improvements may require relocation of this line.

Table 56. Utility Impacts in Ohio

Item Number[1]	Utility	Description
2-21	Oil Transmission Line	Verizon and MCI underground fiber optics running west from 4th and Plum streets in Cincinnati then south to OH 3rd Street may be impacted.
2-26	Fiber Optic Line	The AT&T fiber optics in Duke Energy conduits crossing at a skew under I-75 approximately 360 feet north of Linn Street in Cincinnati may require relocations depending on potential mainline profile revisions.
3-7	Electric Line	Primary underground electric lines cross I-75 approximately 90 feet south of York Street. Interstate improvements will require relocation of these lines.
2-31	Substation	West End substation located on the north bank of the Ohio River. Interstate improvements will require relocation of this substation.
2-32	Electric Line	A 138 KV underground oil filled transmission line is located just east of the West End substation. Interstate improvements may require relocation of this line where it crosses Rose Street.
3-9	Gas Main Line	A 24-inch gas main runs north along the east side of Spring Grove Avenue/west side of I-75 from Bank Street to north of the Western Hills Viaduct. Improvements to the Western Hills Viaduct connection may impact this line.
3-11	Electric Line	Primary underground electric line crosses I-75 approximately 500 feet north of the Western Hills Viaduct. I-75 mainline and ramp widening may require relocation of this line.
3-14	Electric Line	Overhead electric lines located west of the Western Hills Viaduct Interchange. Improvements to the Western Hills Viaduct connection may impact these lines.
3-15	Substation & Electric Line	Substation and overhead transmission lines located south of the Western Hills Viaduct. Improvements to the Western Hills Viaduct connection may impact these lines.
Metropolitan Sewer District (MSD)		
2-17	Combined Sewer	A 48-inch and two 60-inch combined sewers located in the area of Central Avenue, OH 2nd and OH 3rd streets. Interstate improvements may impact these lines.
2-22	Combined Sewer	A 36-inch combined sewer is located under I-75 approximately 400 feet north of OH 8th Street. I-75 mainline and ramp widening may require relocation of this line.
2-25	Combined Sewer	A 66-inch combined sewer under I-75 runs northwest from the Linn Street overpass on the east side of I-75. I-75 mainline widening may require relocation of this line.
2-30	Combined Sewer	60-inch and 72-inch combined sewers cross I-75 approximately 300 feet south of Ezzard Charles Drive and parallel the east side of I-75 south to Clark Street. I-75 mainline widening may require relocation of these lines.
3-1	Combined Sewer	A 30-inch combined sewer crosses I-75 approximately 425 feet south of Liberty Street. I-75 mainline widening may require relocation or modification of this line.
3-8	Combined Sewer	A 30-inch combined sewer crosses I-75 just north of York Street. I-75 mainline widening may require relocation of this line.

Table 56. Utility Impacts in Ohio

Item Number[1]	Utility	Description
Cincinnati Water Works		
2-23	Water Main	A 36-inch water main crosses I-75 approximately 545 feet north of OH 8th Street and then runs north along the west side of I-75/Gest Street. I-75 mainline widening may require relocation of this main.
2-34	Water Main	A 24-inch water main runs along OH 3rd Street. I-75 improvements may impact this main.
3-3	Water Main	A 42-inch water main crosses under I-75 at Liberty Street. I-75 mainline widening may require relocation of this main.
3-4	Water Main	A 36-inch water main runes north from Liberty Street to approximately 270 feet north of York Street along the west side of I-75. I-75 mainline widening and retaining wall construction may impact this main.
3-6	Water Main	A 24-inch water main crosses under I-75 at Findlay Street. I-75 mainline widening may require relocation of this main on the west side of I-75.
3-10	Water Main	A 48-inch water main is located in Central Parkway at the east end of the Western Hills Viaduct. Improvements to the Western Hills Viaduct Interchange may impact this main.
3-13	Water Main	A 48-inch water main crosses I-75 approximately 1,100 feet north of the Western Hills Viaduct. I-75 mainline widening may require relocation of this main.

[1] Item numbers represent utility identification numbers shown on Exhibit 11.

Notable utility impacts in Kentucky include two gravity fed sewer lines and high voltage electric lines. There is a 33-inch sanitary sewer bypass which crosses I-71/I-75 at a skew from Goebel Park in Covington to approximately 480 feet south of KY 5th Street on the west side of I-71/I-75 where it widens to 36 inches. I-71/I-75 mainline widening may require relocation/modifications to this sewer line. The 12-foot by 14-foot Willow Run combined sewer is located on the east side I-71/I-75 and crosses the interstate at a skew south of KY 5th Street. I-71/I-75 mainline widening may also require relocation/modifications to this sewer line from approximately 900 feet north of KY 9th Street to KY 5th Street. The high voltage electric lines parallel Western and Crescent avenues could be impacted by Alternatives E and I.

Notable utility impacts in Ohio include the Duke Energy West End substation and oil filled transmission lines; and two combined sewer lines that cross under I-75 north of OH 9th Street.

KYTC and ODOT have been coordinating with the utility companies throughout the project development process. A summary of this coordination is provided in Section 5.8.

4.13.3 Intelligent Transportation System

The building that houses the Advanced Regional Traffic Interactive Management and Information System (ARTIMIS) operation would be affected by both feasible alternatives and would need to be relocated. The existing building is located north of OH 3rd Street between northbound I-75 and southbound I-75.

4.14 Section 4(f) Resources

Section 4(f) of the Department of Transportation Act of 1966, codified in 49 USC 303 and 23 USC 138 protects publicly owned land within parks, recreation areas, and wildlife and waterfowl refuges and historic and archaeological sites whether publicly or privately owned. For purposes of Section 4(f), historic sites are protected, if they have been listed in or determined eligible for listing on the National Register of Historic Places (NRHP). Section 4(f) applies to archaeological sites that are on or eligible for listing on the NRHP and that warrant preservation in place. Properties protected by Section 4(f) are referred to as "Section 4(f) resources."

The requirements of Section 4(f) apply only to agencies within the U.S. Department of Transportation (USDOT). The Secretary of the USDOT may approve a transportation project that "uses" a Section 4(f) resource only if the Secretary makes the following findings:

- There is no feasible and prudent alternative available to the use of land from the Section 4(f) resources; and
- The project includes all possible planning to minimize harm to the Section 4(f) resource resulting from the use (23 CFR 774.17).

A Section 4(f) use occurs when property from a Section 4(f) resource is:

- Permanently incorporated into a transportation project;
- When there is a temporary occupancy of the Section 4(f) site that is adverse in terms of the statutes' preservationist purposes; and/or
- When the proximity of the project's impacts are so severe that the protected activities, features, or attributes that qualify the resource for protection are substantially impaired.

When impacts are determined not be adverse, a USDOT agency can approve the use of a Section 4(f) resource, by making a finding of *de minimis* impact. The option of making a finding of *de minimis* impact was created by an amendment to Section 4(f) in Section 6009 (Public Law: 109-59, August 10, 2005) of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU), which was enacted on August 10, 2005. Section 6009 also required the Section 4(f) regulations to be updated in order to provide greater clarity regarding the standards and procedures for determining whether there are "prudent and feasible" avoidance alternatives for a potential Section 4(f) use. Revised Section 4(f) regulations were issued on March 12, 2008 and are codified in 23 CFR Part 774 (73 FR 13395, March 12, 2008).

4.14.1 Existing Conditions

4.14.1.1 Section 4(f) Resources

There are several historic Section 4(f) resources located within the study area (Exhibits 12A – 12K). These resources are listed in Table 34 and Table 35 of Section 4.7. Parks that qualify as Section 4(f) resources include Devou Park, Goebel Park, the Queensgate Playground and Ball Fields, and small community parks owned by the cities of Covington and Cincinnati. These resources are listed in Table 23 of Section 4.3.3. The Section 4(f) resources within the proposed right-of-way limits of the feasible alternatives are listed in Table 57.

Table 57. Section 4(f) Resources

Resource	Address	Type	Ownership	Description
Goebel Park	KY 6th Street Area of Covington	Public Park	City of Covington	Facilities include: playground equipment, walking trails, shelter house, basketball and tennis courts, Olympic size pool, baby pool, bath house with showers and restrooms, and a parking lot. Park is approximately 14.8 acres in size.
Lewisburg Historic District	Roughly bounded by I-75 and the Covington city limits	NRHP Listed	Private	The district includes 430 buildings and 48 non-contributing buildings; Most of the buildings were constructed in the 1870s and 1880s; Listed in the NRHP in 1993 under Criteria A and C for its significance of suburban growth in Covington from 1840 to 1947 and for its cohesive community of domestic, institutional, and commercial architecture. The district covers approximately 700 acres.
Longworth Hall	700 Pete Rose Way	NRHP Listed	Private	The building was constructed in 1904 and was originally 1,277 feet in length. The structure is currently a 1,160 foot long, five-story, common bond brick railroad freight storage building, which exhibits details associated with the Romanesque style. This warehouse is an important surviving example of an industry that is losing its older distinctive buildings.
Queensgate Playground and Ball Fields	707 West Court Street	Public Park	City of Cincinnati	Playground facilities and ball fields. Park is approximately 5.26 acres in size.
Harriet Beecher Stowe School (Fox 19 Station)	635 West 7th Street	NRHP Eligible	Private	The structure is a three-story, Italian Renaissance style elementary school built in 1921. The former school has a large parking garage addition on the east and south sides. The building is now home to television station WXIX Fox19. Eligible under Criterion B for its association with Dr. Jennie Porter, a significant person in Cincinnati's African-American history.

Table 57. Section 4(f) Resources

Resource	Address	Type	Ownership	Description
Western Hills Viaduct	Located at the intersection of Central Parkway and West McMillan Street, one mile south of US 52	NRHP Eligible	ODOT	Constructed in 1931, the double decked structure is ½ mile long with two open spandrel arch spans flanked by T-beam spans with arched fascia beams and Art Deco pylons at the abutment corners topped with luminaries. Eligible under Criterion A for its historic association with the Union Terminal Project and transportation planning in Cincinnati.
West McMicken Historic Avenue District	West McMicken Avenue between West McMillan Street and the Brighton Bridge Approach	NRHP Eligible	Private	The West McMicken Avenue Historic District consists of 21 buildings that form a cohesive neighborhood located along a ridge above the Millcreek Valley. The district contains good examples of several architectural styles, including Greek Revival, Second Empire, Victorian, Italianate, and American Foursquare. The district is recommended eligible for inclusion in the NRHP under Criterion C.

4.14.2 Impacts

Impacts to Section 4(f) resources by alternative are presented in Table 58 and discussed in detail in the *Draft Individual Section 4(f) Evaluation* (March 2012) for Kentucky and Ohio resources provided in Appendix F.

The No Build Alternative would not impact Section 4(f) resources within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

4.14.3 De Minimis Findings

A USDOT agency can approve the use of a Section 4(f) resource, by making a finding of *de minimis* impact. The option of making a finding of *de minimis* impact was created by an amendment to Section 4(f) in section 6009 of SAFETEA-LU. A *de minimis* impact is defined in 23 CFR 774.17 as follows:

- For public parks, recreational areas and wildlife and waterfowl refuges, a *de minimis* impact is one that would not adversely affect the features or attributes or activities that qualify a property for protection under Section 4(f).

Table 58. Section 4(f) Resource Impacts

Resource	Alternative	Direct Impacts	Section 4(f) Evaluation Type
Goebel Park (14.8 acres)	No Build	None	*De Minimis*
	Alternative E	3.7 acres acquired Loss of basketball court, parking lot, and portion of walking trail	
	Alternative I	1.9 acres acquired Loss of basketball court and parking lot	
Lewisburg Historic District (Approximately 700 acres including 430 buildings)	No Build	None	Individual
	Alternative E	5.1 acres acquired Affects 53 contributing elements (38 fully acquired; 15 with partial acquisition)	
	Alternative I	2.1 acres acquired Affects 28 contributing elements (21 fully acquired; 7 with partial acquisition).	
Queensgate Playground and Ball Fields (5.26 acres)	No Build	None	*De Minimis*
	Alternative E	0.6 acres	
	Alternative I	0.9 acres	
Longworth Hall (1,160 feet in length, five stories tall)	No Build	None	Individual
	Alternative E	Demolition of 204 feet of the eastern section of the building	
	Alternative I	Demolition of 204 feet of the eastern section of the building	
West McMicken Avenue Historic District (consists of 21 buildings)	No Build	None	Individual
	SPUI Alternative	Demolition of 8 contributing buildings	
	TUDI Alternative	None	
Western Hills Viaduct	No Build	None	*De Minimis*
	SPUI Alternative	Realign viaduct to intersect at the existing West McMillan Street/West McMicken Avenue intersection; and grade-separate the intersection of WHV and Central Parkway. Reconstruction of the viaduct structure from approximately 900 feet west of Spring Grove Avenue to just east of I-75	
	TUDI Alternative	Reconstruction of 1,108 feet of the viaduct eastern approach ramps to connect to I-75	

- For historic and archaeological sites, a *de minimis* impact means that the Federal Highway Administration (FHWA) has determined, in accordance with 36 CFR 800, the project will have either "no effect" or "no adverse effect" on the property in question, and the SHPO concurs in writing with the determination.

FHWA-Kentucky Division has determined that the project with the KYTC committed mitigation will have a *de minimis* impact, as defined in 23 CFR 774.17, on Goebel Park in Covington, Kentucky. ODOT has stated their intent to request *de minimis* Section 4(f) findings for the Queensgate Playground and Ball Fields and the Western Hills Viaduct in Cincinnati, Ohio.

4.14.3.1 Goebel Park

Alternatives E and I would directly impact the western edge of Goebel Park through widening of I-71/I-75 and reconstruction of the interchange at KY 5th Street. Much of the affected area is unimproved parkland that is alternatively used during storm events to contain overflow from the Willow Run Sewer. A small portion of the area affected by either feasible alternative is used for recreational activities. Alternative E would impact 3.7 acres, or 25 percent, of the total park area. Alternative E would impact a parking lot, a basketball court, and a walking path. Alternative I would affect 1.9 acres, or 12.8 percent, of the total park area. Alternative I would not impact the walking path but would impact the parking lot and basketball court. A neighborhood pool, located in Goebel Park will not be directly impacted by either feasible alternative.

Due to concerns regarding current and predicted noise levels within Goebel Park, 24 hour noise levels were collected in August 2011. The readings were taken in early August when the pool was open to the public and in late August after the pool had been closed for the year, to determine if activities associated the pool contributed to the overall diurnal noise cycle. Noise levels when the pool was open were generally higher than when the pool was closed. However, measurements at the pool were above the FHWA noise criteria. A noise barrier was analyzed along Goebel Park in accordance with the KYTC noise abatement policy guidelines. Based upon the abatement analysis, a noise barrier does not meet the KYTC criteria for the area around the park.

To mitigate the impact to Goebel Park from the project, KYTC will vacate 2.6 acres of land immediately adjacent to the park along KY 5th Street and transfer the land to the city of Covington for the purpose of mitigating the loss of parkland (Exhibits 12A and 12B). Additionally, KYTC will reimburse the city of Covington $77,600 for the reconstruction of the basketball court and associated resources.

Additionally, mitigation of impacts to the Goebel Park resource includes reduction of stormwater impacts on the area also used by Sanitation District 1 for the Willow Street stormwater overflow. The KYTC is working with Sanitation District 1 to develop a management plan that reduces stormwater runoff from I-71/I-75 onto Goebel Park property.

On July 19, 2011, the city of Covington submitted correspondence to the Department for Local Government, Office of Federal Grants requesting that land adjacent to Goebel Park along KY 5th Street owned by KYTC be transferred to the City to replace the 1.9 acres of Goebel Park impacted by the project. This letter is provided in Appendix E. By letter dated November 28, 2011, the city documented its conclusion that the impacts of the project do not adversely affect the park and its agreement with a *de minimis* finding by FHWA. This

letter is provided in Appendix E. FHWA-Kentucky Division's *de minimis* determination is documented in correspondence dated February 14, 2012. This letter is provided in Appendix E. The KYTC and city of Covington concurred with this determination on February 14 and 17, 2012, respectively.

4.14.3.2 Queensgate Playground and Ball Fields

The Queensgate Playground and Ball Fields would be impacted by both feasible alternatives. Alternative E would require 0.6 acres and Alternative I would require 0.9 acres along the southwestern edge of the property adjacent to I-75. The impacts extend a maximum of 55 feet into the ball fields. A small walkway leading from Cutler Street into the park may be directly affected by the alternatives. The existing ball diamonds fall within the proposed right-of-way of either Alternative E or I. The impacts to the Queensgate Playground and Ball Fields are unavoidable in order to improve traffic flow, LOS, improve safety, and correct geometric deficiencies, while minimizing impacts to the surround area.

To mitigate the impacts, the ball fields within the remaining park area will be reconfigured and reconstructed. Reconfiguration of the ball fields will result in the loss of mature shade trees located along West Court Street and displacement of two sections of an intra-park walkway, which meanders along the north and east perimeters of the park. A MOA between ODOT and the Cincinnati Recreation Commission was prepared to address impacts and mitigation commitments for the Queensgate Playground and Ball Fields. The MOA is provided in Appendix E and the mitigation measures are discussed in Section 6.6.4.

In correspondence dated March 4, 2011, ODOT requested concurrence from the Cincinnati Recreation Commission that the project as proposed including mitigation, will not adversely affect the activities, features, and attributes that qualify the Queensgate Playground and Ball Fields for protection under Section 4(f). ODOT also stated their intent to request a *de minimis* Section 4(f) finding. The Cincinnati Recreation Commission concurred by signing the MOA on April 21, 2011.

4.14.3.3 Western Hills Viaduct

The WHV would be affected by the SPUI alternative. The viaduct would be realigned to intersect West McMillan Street at the existing West McMillan Street/West McMicken Avenue intersection. This realignment also includes grade separating the intersection of WHV and Central Parkway. A new bridge would replace the existing WHV structure from approximately 900 feet west of Spring Grove Avenue to just east of I-75. An additional structure would be required to carry the WHV over Central Parkway. The WHV would be connected to Central Parkway by a new two-way Connector Road. The existing access between I-75 and the lower deck would be removed. The alteration will not have an adverse effect on the viaduct because it reworks the connection to the bridge, which originally was built in 1960 with the construction of I-75.

The WHV would be affected by the TUDI alternative through reconstruction of the interchange connecting I-75 to the viaduct. The TUDI would require reconstruction of 1,108 feet of the approach ramps of the WHV to connect with the interstate reconstruction at ground level. This will not result in any physical destruction or damage to the viaduct, but does constitute an alteration to the property as it currently exists. The alteration will not have an adverse effect on the viaduct because it reworks the connection to the bridge, which originally was built in 1960 with the construction of I-75.

ODOT proposed a *No Adverse Effect* finding for the WHV in correspondence dated October 28, 2011. The Ohio State Historic Preservation Office (OHPO) concurred with the *No Adverse Effect* finding on October 31, 2011. A copy of the letter is included in Appendix E. ODOT has stated their intent to request a *de minimis* Section 4(f) finding for the WHV.

4.15 Section 6(f) Resources

The Land and Water Conservation Fund Act of 1965 (Public Law 88-578) established a funding source for both federal acquisition of park and recreation lands and matching grants to state and local governments for recreation planning, acquisition and development. Land and Water Conservation Funds (LWCF) are provided in the form of grants through the National Park Service (NPS). Section 6(f)(3) of the Act states that grant-assisted areas are to remain forever available for "public outdoor recreation use," or be replaced by lands of equal market value and recreation usefulness. Properties which are purchased or improved with LWCF grants are known as Section (6f) resources. Goebel Park is the only Section 6(f) resource in the study area. According to the NPS's detailed listing of grants by county dated June 15, 2010 (http://waso-lwcf.ncrc.nps.gov/public/index.dfm), the city of Covington received $687,545.81 from the NPS for Goebel Park in May 1978.

Section 6(f) of the LWCF Act states that such resources cannot, "without the approval of the Secretary (of the Department of Interior), be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreational plan and only upon such conditions as he deems necessary to assure substitution of other recreation properties of at least fair market value and of reasonably equivalent usefulness and location."

4.15.1 Existing Conditions

Goebel Park is located in the city of Covington, Kentucky. It is bordered by KY 9th Street to the south, I-71/I-75 to the west, KY 5th Street to the north and Philadelphia Street to the east. It is a public park owned by the city of Covington. The park is approximately 14.8 acres in size; recreational facilities include playground equipment, walking trails, shelter house, basketball and tennis courts, Olympic size pool, baby pool, bath house with showers and restrooms, and a parking lot. There is also a small parcel wholly contained within Goebel Park that is privately owned and houses a radio antenna for a Christian Broadcasting Radio Station.

Almost the entire western half of the park is depressed between the ridge to the east and the I-71/I-75 corridor to the west. As such, this area also serves as a combined sewer overflow reservoir for the Willow Run Sewer owned by Sanitation District 1. This area floods when the Ohio River nears flood stage and subsequently is closed for public use. A portion of the walking trail system and the basketball courts are located in this area.

4.15.2 Impacts

Goebel Park would be impacted by both feasible alternatives. Alternative E would impact 3.7 acres (25 percent) of the park. A parking lot, basketball court, and a section of a walking path located on the west side of the park would be displaced by Alternative E. Alternative I would impact 1.9 acres (12.8 percent) of the park. Alternative I would avoid impacts to the walking path but would impact the parking lot and basketball court. A neighborhood pool, located in Goebel Park is not expected to be directly impacted by either feasible alternative.

The No Build Alternative would not impact Section 6(f) resources within the study area because any minor, short-term safety and maintenance improvements to the Brent Spence Bridge and I-75 corridor would be within the existing right-of-way.

To mitigate the impact to Goebel Park, the Kentucky Transportation Cabinet (KYTC) will vacate 2.6 acres of land immediately adjacent to the park along KY 5th Street and transfer the land to the city of Covington for the purpose of mitigating the loss of parkland. In correspondence dated July 19, 2011, to the Department for Local Government, Office of Federal Grants, the city of Covington requested that land adjacent to Goebel Park along KY 5th Street owned by KYTC be transferred to the City to replace the 1.9 acres of Goebel Park impacted by the project. A copy of this letter is included in Appendix E. KYTC will continue coordination on the proposed conversion and mitigation options with Federal Highway Administration (FHWA), the city of Covington, and the US Department of the Interior-NPS to obtain required approvals under Section 6(f).

Additionally, mitigation of impacts to the Goebel Park resource includes reduction of stormwater impacts on the area also used by Sanitation District 1 for the Willow Street stormwater overflow. The KYTC is working with Sanitation District 1 to develop a management plan that reduces stormwater runoff from I-71/I-75 onto Goebel Park property.

5.0 PUBLIC INVOLVEMENT AND AGENCY COORDINATION

Public participation for the Brent Spence Bridge Replacement/Rehabilitation Project has been in accordance with Ohio Department of Transportation's (ODOT) Major Project Development Process (PDP). Public involvement was initiated in Step 1 of the PDP and will continue through to Step 14 of the process. In Kentucky, public involvement has been in accordance with the Kentucky Transportation Cabinet's (KYTC) Highway Design Manual. Public involvement was initiated during the Transportation Decision Making Process and will continue through project development. All public involvement activities are communicated to, approved by, and coordinated through the project managers for KYTC and ODOT.

A Public Involvement Plan (PIP) was prepared for the Brent Spence Bridge Replacement/Rehabilitation Project for Steps 1 through 4 of the PDP, and updated in Step 5. KYTC and ODOT recognize that a proactive, effective communications effort will enhance this 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 also educates the public on the long-term benefits of the infrastructure improvements under consideration, such as increased travel safety and improved mobility.

All informational materials are updated as new information becomes available to keep information accurate and to ensure up-to-date communication is being maintained. Since public involvement is a fluid process, all communication tools used in this plan must remain flexible to meet the changing needs of the Project Advisory Committee and the general public. The following lists a summary of the public involvement activities that have taken place:

- Establishment of project identity,
- Establishment of an Project Advisory Committee,
    - Project Advisory Committee meetings
    - Project Advisory Committee survey
- Establishment of an Project Aesthetic Committee (PAC),
- Identification and engagement of environmental justice populations,
- Stakeholder meetings,
- Community meetings and presentations,
- Public meetings,
- Project newsletters and E-newsletters,
- Website coordination,
- Media relations,
- Project fact sheets, and
- Roving information display.

5.1 Project Website, Newsletters, and Media

5.1.1 Project Website

The project website established for the Brent Spence Bridge Replacement/Rehabilitation Project is www.brentspencebridgecorridor.com. The website has been active and media coverage of alternatives and other elements of the project have generated an increase in website visits and web comments. The website is updated to reflect the latest information and technical reports associated with the project development. The project website includes

a feedback link that provides an opportunity for anyone to make comments and ask questions about the project. A list of comments received is in Appendix E.

5.1.2 Project Newsletters

Two traditional newsletters were prepared and distributed to approximately 250 individuals and organizations to date. The first newsletter was mailed in February 2006 and provided background, project purpose, contact information, project schedule, a list of Project Advisory Committee member organizations, and a map of the project study area. The second was mailed in January 2007 and provided details about the alternatives that were carried forward through Step 4.

E-newsletters were developed to facilitate communications with the Project Advisory Committee between general mail newsletters, public meetings, and Project Advisory Committee meetings. The first E-Newsletter was sent out in June 2007 and the second in August 2007. A third was distributed in advance of the Concurrence Point #2 public meetings in May 2009. Since August 2009, E-newsletters have been distributed monthly. The E-newsletters are included in Appendix E.

5.1.3 Media Relations

The media has provided positive support and accurate communication about the Brent Spence Bridge Replacement/Rehabilitation Project. Project related stories have been on the front page of various local news publications numerous 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. The announcement of the recommended conceptual alternatives for the project generated a significant amount of media interest.

As the project moves forward, media relations will be maintained in order to provide information to the media so they can help communicate any messages that are important in obtaining community response. Contact with reporters is maintained by KYTC, ODOT, and the Project Team.

5.1.4 Roving Project Display

A project display was developed and placed in public buildings and high traffic areas within the study area with the purpose of extending project outreach efforts. This display appeared throughout 2006. The project display was placed in the following locations: City of Newport City Hall; Newport on the Levee; Northern Kentucky Chamber of Commerce; Tower Place Mall; Cincinnati Public Library (Covedale Branch); Drawbridge Inn and Convention Center; and Kenton County Public Library (Erlanger Branch and Mary Ann Mongan Branch). Currently, the project display is used by the project team as appropriate for public involvement.

5.2 Project Advisory and Aesthetic Committees

At the outset of the project, KYTC and ODOT instituted two committees to help provide guidance to the Project Team. The Project Advisory Committee provides input from local community and political leaders on community issues and concerns. This provides an opportunity for important issues brought up to the Project Advisory Committee to be communicated back to their constituents.

The Project Aesthetics Committee, a sub-committee of the Project Advisory 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 moves forward, more detail is provided to and from this committee in order to give input on community values with respect to the aesthetics of the bridge.

5.2.1 Project Advisory Committee

A total of six Advisory Committee meetings have been held to date:

- August 19, 2005,
- October 13, 2005,
- March 23, 2006,
- July 27, 2006,
- February 25, 2008, and
- April 20, 2009.

Agendas and meeting minutes for each Project Advisory Committee Meeting are posted to the project website and found in Appendix E. The next Project Advisory Committee meeting is anticipated to be held in early 2012. At this meeting an overview of the studies completed in Steps 6 and 7 will be presented. The recommended Preferred Alternative for the interstate and the new Ohio River crossing will also be presented.

The Project Advisory Committee was also involved with the Bridge Type Selection Process for the new Ohio River crossing. The committee's participation in this process is discussed in Sections 5.5.1 through 5.5.3.

5.2.2 Project Aesthetic Committee

Two PAC meetings were held during Steps 1 through 5 of the PDP. The first meeting was held on December 16, 2005 and the second on August 29, 2006. Agendas and meeting minutes for each PAC meeting are posted to the project website.

Four PAC meetings were held during Steps 6 and 7 of the PDP to aid in selecting the design for the new Ohio River crossing. These meetings focused on KYTC's Bridge Type Selection Process conducted for the new Ohio River Bridge. The Bridge Type Selection Process is a three step process, which involves developing and analyzing numerous bridge concepts which led to a recommendation of three final bridge type alternatives. The meetings were held on September 25, 2009, January 29, 2010, April 15, 2010, and September 20, 2010. Summaries of these four PAC meetings are presented in Table 59.

Table 59. Project Aesthetic Committee Meetings

Meeting Date	Meeting Summary
September 25, 2009	• Context of aesthetics in the project study area was presented • Key design criteria for the project was developed • Bridge types feasible for this location were shown, including cable-stayed, arch, and truss • Suspension bridge type is not feasible

Table 59. Project Aesthetic Committee Meetings

Meeting Date	Meeting Summary
January 29, 2010	• Twelve bridge concepts were presented • Committee members completed a criteria matrix for the 12 bridge concepts • Preference stated for cable-stayed bridges is a harp arrangement paired with a Pratt truss with stays parallel to the truss diagonals • Double-deck truss style bridge was not preferred • Two-legged cable-stayed towers are generally preferred over a three-legged tower option
April 15, 2010	• Receive feedback on six bridge type alternatives to select three final bridge alternatives • Committee presented more details of the six bridge type alternatives • Key visual and aesthetic criteria were provided to the committee which was then used to evaluate the six bridge type alternatives • Cable-stayed bridges were more favorably received than the arch bridges • Aesthetics not related to the actual bridge structure were noted as just as important as the bridge aesthetics • Costs of bridges were noted as a concern
September 20, 2010	• Discuss aesthetic treatment of the I-75 corridor • Receive feedback for possible themes that could be applied to the project • Provide examples of project design themes, elements and treatments • Brainstorm potential aesthetic ideas

In addition, a survey was sent to the PAC on November 9, 2010. The purpose of the survey was:

- to identify the one unifying theme for the entire corridor as well as themes for each state; and
- to develop preferences for aesthetic design elements of the project.

Three survey responses were submitted to the project team. All respondents selected the "River and Hills" unifying theme for the corridor. This theme represents the common physical characteristic of both states; the river and hills are seen as positive features that are valued for recreation, views, habitation and for revitalization of the region. For the Kentucky theme, responses included a corridor neighborhood influenced theme, equestrian theme, and a nature theme. For the Ohio theme, responses included Art Deco architecture, aviation, and a nature theme.

The responses also provided input on design elements of the corridor that can be modified. These elements include structures themselves, their forms, sizes, materials, styles, textures, colors, and finishes. The selection of design elements will be coordinated with the local communities and incorporated into the project construction documents during detailed design, where possible.

5.3 Public Meetings

A series of public meetings have been held for both Concurrence Point #1 to present the work completed in Steps 1 through 4 of the PDP and for Concurrence Point #2 to present the work completed up through Step 5 of the ODOT PDP.

Two public meetings were held for Concurrence Point #1 on May 2 and 4, 2006. These public meetings were held to present work completed in Steps 1 through 4 of the PDP. The purpose of the meetings was to inform the public about the *Purpose and Need Statement* (May 2006), *Red Flag Summary* (December 2005), *Existing and Future Conditions* Report (February 2006), and *Conceptual Alternatives Solutions* (April 2009).

Based on the public comments received, there was a general consensus that improvements are needed in the I-75 corridor. The comments provided by the public and community representatives from Concurrence Point #1 were used to refine the conceptual alternatives throughout Step 5. A summary of Concurrence Point #1 and public comments received are available in the *Conceptual Alternatives Study* (April 2009) in Appendix A.

Two meetings were held for Concurrence Point #2 on May 6 and 7, 2009 to present the conceptual alternatives for the project. These meetings presented the feasible alternatives recommended for further study and the results of the *Conceptual Alternatives Study*. Summaries of the public meetings and comments received are in Appendix E.

5.3.1 Right of Way Public Meeting

A public meeting was held on October 13, 2011 to discuss right of way impacts to residences and businesses in Kentucky. The meeting was held in two sessions, 12:00 to 2:00 pm and 6:00 to 8:00 pm in Covington, Kentucky. The purpose of the meeting was to update citizens on the current status of project and to discuss KYTC's right of way acquisition process.

5.4 Public Hearings

Public hearings will be conducted in Step 7 of the PDP. These hearings will be advertised through notices in newspapers and methods previously used to advertise public meetings for the project. The purpose of the hearings is to provide the public the opportunity to comment on the recommended Preferred Alternative, its impacts, and proposed mitigation strategies.

There will be two public hearings, one in Kentucky and one in Ohio. The information presented and the format of each hearing will be the same. An open house format will begin each public hearing, during this time the public will be able to view displays which illustrate alternatives, their impacts, proposed mitigation, and other important aspects of the project. A formal presentation will be given by the Project Team, which will be followed by a comment session. The public will be encouraged to provide written and/or verbal comments. A court reporter will be available to record verbal comments. A comment period of at least 14 days will follow the public hearings.

There will be a minimum 30-day comment period following the release of this Environmental Assessment (EA) during which the public and agencies will be given the opportunity to comment on the alternatives, the potential impacts, and proposed mitigation measures. The EA will be made available to the public in hard copy format at a number of accessible

locations. The document will also be made available electronically in a common format (PDF) on the project, KYTC's and ODOT's websites. Paper and/or electronic data (CD-ROM) copies will be provided to representatives of the agencies and organizations as identified by KYTC and ODOT.

5.5 Public Comments

A summary of comments received to date for the Brent Spence Bridge Replacement/ Rehabilitation Project is presented in Appendix E. During Steps 6 and 7 of the Project Development Process, the public was asked to comment on the bridge types developed for the project. The KYTC Bridge Type Selection Process was conducted for the new Ohio River Bridge to select the best design for the new Ohio River crossing.

5.5.1 Concurrence Point Comments

A summary of Concurrence Point #1 and public comments received are available in the *Conceptual Alternatives Study* (April 2009) in Appendix A. Public comments made during Concurrence Point #2 are included in Appendix E.

5.5.2 Bridge Type Comments

The public provided comments on the six bridge type alternatives evaluated during Step 3 of the Bridge Type Selection Process. The public comments received were analyzed and used to quantify trends for the public's preferences and concerns regarding the overall project and the various bridge concepts. A summary of the public comments received for the bridge type are in the Public Involvement Steps 6 – 7 section of Appendix E. The *Bridge Type Selection Report* (March 2011) also includes public involvement activities for the Bridge Type Selection Process.

5.5.3 Environmental Justice Outreach

KYTC conducted a survey in 2011 to obtain additional information about the impacts the feasible alternatives would have on environmental justice (EJ) populations. The survey attempted to better identify the location of EJ populations that would potentially be displaced and relocated as a result of this project. Surveys were mailed to residential properties that would be displaced by the feasible alternatives in the Kentucky portion of the study area in July 2011 and September 2011. Surveys were mailed to over 75 residences. Due to the number of comments received on the surveys related to right of way issues, a Right of Way Informational Meeting was held on October 13, 2011. The purpose of the meeting was to provide information to those potentially relocated and to seek additional information from persons who were potentially part of the EJ population of the area. Those at the meeting who had not returned survey forms were encouraged to complete them.

A total of 35 surveys were returned to KYTC. A copy of the survey and responses are included in Appendix E. The results of the survey indicated the following:

- Low-income and minority populations would be displaced.
- Elderly citizens with mobility challenges may be displaced.
- Several zero-car households that are dependent on transit may be displaced.
- A disabled person who is dependent on transit may be displaced.
- Being displaced would be beneficial by providing for the chance to move to a more desirable location.

- Impacts depend on the financial compensation and time frame for acquisition. The financial compensation needs to make up for renovations and needed additions that have occurred to existing homes.
- Being relocated adds to the emotional changes already occurring in this economy

5.6 Presentations and Meetings with Stakeholders

Project managers from KYTC and ODOT have met individually with local government officials, residential organizations, professional societies, and other interested parties in the greater Cincinnati-Northern Kentucky area to discuss the project, answer questions, and address concerns (Table 60).

Table 60. Project Meetings and Presentations within the Greater Cincinnati-Northern Kentucky Area

Date	Organization
March 15, 2007	American Society of Civil Engineers
March 22, 2007	Lewisburg Neighborhood Association
May 1, 2007	Northern Kentucky Sanitation District #1
July 27, 2007	City of Covington
September 12, 2007	City of Covington/City of Cincinnati
January 11, 2008	City of Covington/City of Cincinnati
May 15, 2008	Special Stakeholder Meeting
May 22, 2008	City of Covington
May 29, 2008	Lewisburg/Downtown Covington/Botany Hill Neighborhood Associations
June 6, 2008	Northern Kentucky Developers Day
June 24, 2008	Transportation and Infrastructure Subcommittee of Cincinnati City Council
August 25, 2008	City of Covington
March 2, 2010	Cincinnati Transportation and Infrastructure Subcommittee
April 1, 2010	City of Covington
April 7, 2010	American Council of Engineering Companies of Ohio
May 13, 2010	City of Cincinnati
May 24, 2010	Ohio Kentucky Indiana Regional Council of Governments Bridge Builders
June 10, 2010	American Society of Highway Engineers 2010 National Conference
June 15, 2010	City of Covington Caucus
August 24, 2010	Covington City Council
September 16, 2010	Botany Hills Neighborhood Association
September 23, 2010	City of Covington Business Council
October 6, 2010	American Public Works Association –Kentucky Chapter
October 12, 2010	Ft. Wright Broker Breakfast
October 13, 2010	Cincinnati Bar Association Environmental Law Seminar
October 27, 2010	Northern Kentucky Area Planning Commission
November 3, 2010	Ft. Wright City Council
November 16, 2010	Cincinnati Museum Center at Union Terminal
November 18, 2010	City of Covington
December 1, 2010	University of Cincinnati
February 17, 2011	American Society of Civil Engineers
February 24, 2011	City of Covington
February 25, 2011	Ohio Society of Professional Engineers
March 16, 2011	City of Cincinnati
March 30, 2011	Newport Business Association
April 19, 2011	Cincinnati Recreation Commission

Table 60. Project Meetings and Presentations within the Greater Cincinnati-Northern Kentucky Area

Date	Organization
April 26, 2011	City of Covington
July 7, 2011	City of Cincinnati Council
September 13, 2011	City of Cincinnati Council Transportation and Infrastructure Committee

5.7 Agency Coordination

An important element of the environmental process is the integration of the National Environmental Policy Act (NEPA) with other planning and environmental review procedures required by law or agency practice (i.e. Section 106 of the National Historic Preservation Act). KYTC, ODOT, and the Federal Highway Administration (FHWA) have entered into agreements with federal and state resource agencies in an effort to standardize procedures for environmental investigations and project reviews, streamline the review process, and develop mitigation measures.

5.7.1 Participating and Cooperating Agencies

In accordance with Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), an Agency Coordination Plan was developed. As part of the Agency Coordination Plan, KYTC, ODOT, and FHWA invited federal, state, and local agencies to participate in the project. Agencies responded either by letter or e-mail accepting or declining the invitation to participate. Table 61 provides a list of agencies invited and whether or not they accepted the invitation to participate in the Brent Spence Bridge Replacement/Rehabilitation Project.

Table 61. Agencies Invited to Participate

Agencies	Participating (Yes or No)
Federal	
Federal Emergency Management Agency	No
Federal Transit Administration	No
US Army Corps of Engineers	Yes
US Coast Guard	Yes
US Environmental Protection	Yes
US Fish and Wildlife Service	Yes
Ohio	
Ohio Department of Agriculture	No
Ohio Department of Natural Resources	Yes
Ohio Environmental Protection Agency	Yes
Ohio Historic Preservation Office	No
Kentucky	
Environmental and Public Protection Cabinet	No
Kentucky Cabinet for Economic Development	No
Kentucky Department of Agriculture	No
Kentucky Department Environmental Protection	Yes
Kentucky Department of Fish and Wildlife Resources	Yes
Kentucky Department of Natural Resources	No
Kentucky Environmental Education Council	No
Kentucky Environmental Quality Commission	No

Table 61. Agencies Invited to Participate

Agencies	Participating (Yes or No)
Kentucky Heritage Council, State Historic Preservation Office	No
Office for Consumer & Environmental Protection	No
State Nature Preserves Commission	No

5.7.2 Natural Resources Coordination

During development of the *Red Flag Summary Report* (December 2005) coordination was initiated with federal and state natural resources agencies regarding ecological resources (Table 62). Coordination with these agencies continued throughout the PDP. Agency coordination letters are provided in Appendix E.

Table 62. Natural Resources Agency Coordination Steps 1-5

Agency	Coordination
• US Fish and Wildlife Service • Ohio Department of Natural Resources • Kentucky Department of Fish and Wildlife Resources (KDFWR)	Contacted to determine the presence of unique or significant ecological resources such as threatened and/or endangered species, champion trees, geologic features, natural preserves, state parks, forested or wildlife areas, breeding or non-breeding animal concentrations and rare habitat.
• US Coast Guard	Contacted to initiate coordination on pier placement and navigation requirements for new Ohio River Bridge options.
• US Environmental Protection Agency • Ohio Environmental Protection Agency (OEPA) • Kentucky Department of Environmental Protection	Contacted for river mile and water quality data.

In a letter dated August 16, 2006, the US Fish and Wildlife Service (USFWS) Reynoldsburg, Ohio Office accepted the invitation to act as a participating agency and further noted that they would serve as the lead USFWS field office on the project.

Two ecological reports *Level One Ecological Survey Report – Ohio (ODOT PID No. 75119)* (March 2010) and *Ecological Survey Report – Kentucky (KYTC Item No.6-17)* (February 2010) were distributed to federal and state natural resources agencies in each respective state in April 2010. A list of agency coordination letters received and a summary of their comments regarding the ecological reports are provided in Table 63. Copies of agency letters received are provided in Appendix E.

In addition, a jurisdictional determination field review of streams and wetlands within the study area was held on July 7, 2010. Representatives from the US Army Corps of Engineers (USACE), KYTC and ODOT attended this field review. USACE issued their jurisdictional determination for the project in correspondence dated January 24, 2012. The findings of the field review and jurisdictional determination letter are discussed in Section 4.4.1. The jurisdictional determination letter is provided in Appendix E.

Ecological coordination will continue to meet the NEPA interagency coordination requirements, the US Fish and Wildlife Coordination Act requirements, Section 7 of the Endangered Species Act requirements, and to provide pre-application coordination for necessary permits.

Table 63. Agency Coordination for Ecological Resources

Agency	Correspondence Date	Comments
Kentucky Department of Fish and Wildlife Resources (KDFWR)	May 10, 2010	• Provided comments regarding the presence of breeding pairs of Peregrine Falcons within the study area. • Concerned that bridge construction may have negative effects on the falcons due to the proximity of the nest locations to the bridge. • The nongame branch of KDFWR can confirm if falcons are nesting on the bridge, prior to construction.
US Fish and Wildlife Service	May 11, 2010	• The USFWS concurs with KYTC's may affect but is not likely to adversely affect determination for the running buffalo clover. • KYTC should coordinate with the USFWS regarding the appropriate actions if trees will be cleared in areas of summer bat habitat. • The USFWS recommends that a mussel habitat reconnaissance survey be conducted under the proposed alignment site and under the existing bridge if any in-water work is required for rehabilitation of the structure. • Impacts to Trust Resources resulting from the development of staging, borrow, or waste areas or from the relocation of utilities should be coordinated with the USFWS as these are considered part of the action.
Ohio Environmental Protection Agency (OEPA)	May 20, 2010	• OEPA has no substantive issues with the project.
KY Department for Environmental Protection – Division of Water	May 21, 2010	• The Division recommends Alternative E as the Preferred Alternative. • Any water or monitoring wells, either drilled or dug in the construction corridor should be properly abandoned by a Kentucky Certified Water Well Driller to prevent the introduction of surface water directly into groundwater during construction. • A Groundwater Protection Plan may be required for construction.
KY Department for Environmental Protection – Division of Enforcement	May 21, 2010	• Prior to construction, all applicable permits and registrations must be in place and that KYTC remains in compliance during construction, demolition or repair activities.

Table 63. Agency Coordination for Ecological Resources

Agency	Correspondence Date	Comments
Ohio Department of Natural Resources	May 24, 2010	• Since 2005, two more records for rare species within the study are have been added. These species are the Channel Darter, threatened in the Ohio River and the Peregrine Falcon, threatened in downtown Cincinnati. • The agency recommends no in-water work between March 15 and June 30 to reduce impacts to the Channel Darter and other aquatic species and their habitat. • A detailed mussel survey should be conducted within the area of the new bridge. • The agency believes that the project will not likely impact the Peregrine Falcon.

5.7.3 Air Quality Coordination

In accordance with ODOT Technical Guidance for Mobile Source Air Toxics (MSAT), the OEPA reviewed the *Quantitative MSAT Analysis Report* (November 2010). In correspondence dated January 27, 2011, the agency indicated it had no comments on the report's conclusion that "the Build Alternatives and the No Build Alternative do not have significant differences in the MSAT effects of the design year."

In May, 2011, the FHWA through consultation with Ohio Environmental Protection Agency (OEPA), and the United States Environmental Protection Agency (USEPA) determined that the Brent Spence Bridge Replacement/Rehabilitation Project will not cause or contribute to a new violation of the 24 hour or annual $PM_{2.5}$ standards. The FHWA also determined that since the project has not changed since inclusion in the conforming Metropolitan Transportation Plan (MTP) and the Transportation Improvement Program (TIP) for $PM_{2.5}$ and ozone, the Brent Spence Replacement/Rehabilitation Project has met the statute requirements of the Clean Air Act and conforms to the State Implementation Plan (SIP).

5.7.4 Section 106 Coordination

Section 106 of 36 CFR Part 800 of the National Historic Preservation Act requires that those parties eligible to participate as consulting parties in the historic preservation review process be identified. The Section 106 process requires the coordination of findings of the Section 106 investigations with the Kentucky Heritage Council (KHC) and the Ohio Historic Preservation Office (OHPO) as well as other defined consulting parties. In 2006, individuals and organizations with interests in the affected communities and historic preservation were invited to participate as consulting parties. Consulting party application forms were also provided at the public meetings held for the project and a consulting party application form is posted on the project website. Section 4.7.3 provides a list of local, state, and federal consulting parties for the Brent Spence Bridge Replacement/Rehabilitation Project.

Section 106 consulting party coordination has included written correspondence as well as meetings and site visits with consulting parties, which resulted in concurrence of a defined Area of Potential Effects (APE), impacts to cultural resources, and development of potential

mitigation measures. The following sections present a summary of Section 106 coordination throughout the PDP.

5.7.4.1 2006 Activities

The first public involvement meetings for the Brent Spence Bridge Replacement/ Rehabilitation Project were held on May 2 and 4, 2006. These public meetings represented Concurrence Point #1 and were held to present work completed in Steps 1 through 4 of the PDP. These meetings were also the first Section 106 public meetings. The meeting advertisement specifically requested that citizens provide information about historic and archaeological resources within the study area. Exhibits showing the locations of documented cultural resources within the study area were displayed at the meetings and posted on the project website. Consulting party application forms were also provided at the public meetings and on the project website.

Meetings with consulting parties in Ohio were held on August 10 and November 16, 2006. Meetings with consulting parties in Kentucky were held on August 30 and November 29, 2006.

5.7.4.2 2007 Activities

Consulting party coordination in 2007 focused on the results of the historic architecture surveys completed in Kentucky and Ohio within the study area. Determination of eligibility recommendations by the Project Team were presented in separate historic architecture survey reports for Kentucky and Ohio properties. These reports were submitted to KHC and OHPO for review and concurrence. There were further discussions/meetings between KYTC, KHC, ODOT, and OHPO regarding the APE, viewshed APE and consulting party coordination.

The *Phase I History/Architecture Survey Report: Hamilton County, Ohio* (June 2007) was circulated to Ohio consulting parties in August 2007. The *History/Architecture Survey Report: Kenton County, Kentucky* (June 2007) was circulated to Kentucky consulting parties in November 2007. Only two consulting parties provided comments on the report.

5.7.4.3 2008 Activities

Phase II historic architecture surveys were conducted for Ohio resources and reports prepared in 2008. There were further discussions/meetings between ODOT and OHPO regarding eligibility determinations and impacts to historic resources held on October 30 and November 6, 2008.

The *History/Architecture Survey Report: Kenton County, Kentucky* was revised in accordance with agency and consulting party comments in November 2008.

5.7.4.4 2009 Activities

The second public involvement meetings for the Brent Spence Bridge Replacement/ Rehabilitation Project were held on May 6 and 7, 2009. These public meetings represented Concurrence Point #2 and were held to present work completed through Step 5 of the PDP. The meeting advertisement and handout specifically requested that citizens provide information about cultural resources within the study area. Exhibits showing the locations of documented cultural resources from the historic architecture surveys within the APE were displayed at the meetings and posted on the project website. Consulting party application forms were also provided at the public meetings and on the project website.

The *Phase II History/Architecture Survey Report: Hamilton County, Ohio* (December 2008) was submitted to OHPO for review and concurrence in January 2009. This report was circulated to consulting parties in June 2009. An *Addendum Phase II History/Architecture Survey Report: Hamilton County, Ohio* (September 2009) was submitted to OHPO for review and concurrence in September 2009. This addendum report was circulated to Ohio consulting parties in October 2009.

KHC provided comments on the revised *History/Architecture Survey Report: Kenton County, Kentucky* (November 2008) in May 2009. The study area in Kentucky was extended south to Dixie Highway Interchange and a historic architecture survey was conducted in this new area in August 2009. The *History/Architecture Survey Report: Kenton County, Kentucky* was revised to include the results of the survey in the extended study area in November 2009.

5.7.4.5 2010 Activities

The study area in Ohio in the vicinity of the WHV was widened and a historic architecture survey was conducted in this expanded portion of the APE in March 2010. The *Addendum Phase I History/Architecture Survey Report for the Western Hills Viaduct* (July 2010) was submitted to OHPO for review in August 2010. This report was distributed to Ohio consulting parties in September 2010.

ODOT, OHPO, and FHWA met on July 15, 2010 to discuss impacts to Longworth Hall and the Harriet Beecher Stowe School. Information about the impacts to these resources was sent to Ohio consulting parties for comment and posted on the project website. A consulting parties meeting was held on October 7, 2010 to discuss impacts to Longworth Hall and the Harriet Beecher Stowe School and possible mitigation measures.

KYTC, the city of Covington, and FHWA held meetings to discuss impacts to the Lewisburg Historic District on April 1 and June 28, 2010.

The *History/Architecture Survey Report: Kenton County, Kentucky* (April 2010) was reviewed by FHWA and KHC in May and June 2010. KHC concurred with the report findings in July 2010. This report was distributed to consulting parties in September 2010. One Kentucky consulting parties meeting was held on October 15, 2010 to discuss impacts to the Lewisburg Historic District and possible mitigation measures.

5.7.4.6 2011 Activities

The *Phase I History/Architecture Survey Addendum Report for the Western Hills Viaduct Interchange* (November 2010) was submitted to OHPO for review and concurrence in January 2011. The OHPO concurred with the findings of the report on February 25, 2011. OHPO's concurrence letter was circulated to Ohio consulting parties in March 2011.

The *Determination of Effects Report* (February 2011) was submitted to KHC for review in April 2011. This report was revised in accordance with KHC comments and resubmitted to KHC in June 2011. The *Determination of Effects Report* (June 2011) was also submitted to OHPO and FHWA for review and concurrence in June 2011 and July 2011, respectively. KHC concurred with the findings of the report on August 12, 2011.

ODOT notified the Advisory Council on Historic Preservation (ACHP) of the adverse effects of the project on Longworth Hall and the Lewisburg Historic District in August 2011. ODOT submitted to ACHP the draft Memorandum of Agreement (MOA) between ODOT, FHWA and OHPO, the *Determination of Effects Report* (June 2011), and the *Longworth Hall Impact Analysis Report – Part One: Physical Impact* (June 2011), and the *Longworth Hall Impact Analysis Report – Part Three: Potential Mitigation Measures* (June 2011). ACHP reviewed this documentation and notified ODOT that their participation in the consultation to resolve adverse effects of the project was not warranted.

ODOT distributed the ACHP correspondence, draft MOA concerning adverse effects to Longworth Hall, *Determination of Effects Report* (June 2011), and the *Longworth Hall Impact Analysis Report – Part One: Physical Impact* (June 2011), and the *Longworth Hall Impact Analysis Report – Part Three: Potential Mitigation Measures* (June 2011) to Ohio consulting parties in August 2011.

The *Phase I Intensive Archaeological Survey - Kenton County, Kentucky* (April 2011) was submitted to KHC for review in April 2011. This report was revised in accordance with KHC comments and resubmitted to FHWA and KHC in May 2011. FHWA provided conditional clearance of the Phase I archaeological survey on July 15, 2011. Additional archaeological surveys were completed at the request of KHC within the APE and documented in the *Phase I Intensive Archaeological Survey - Kenton County, Kentucky* (September 2011). KHC concurred with the survey results and report findings on September 22, 2011.

KYTC distributed the *Determination of Effects Report* (June 2011) to Kentucky consulting parties in October 2011. A Kentucky consulting parties meeting was held on November 16, 2011 to discuss potential mitigation measures for impacts to Lewisburg Historic District. These mitigation measures are discussed in Section 6.5.

In correspondence dated October 28, 2011, ODOT notified OHPO of FHWA's determination that the Brent Spence Bridge Replacement/ Rehabilitation Project will have an *Adverse Effect* on Longworth Hall. This letter also documented FHWA's effect findings for 16 other historic resources. OHPO concurred with FHWA's determinations of effect on October 31, 2011. A copy of the letter is included in Appendix E.

An Ohio consulting parties meeting was held on November 2, 2011 to discuss impacts to Longworth Hall and proposed mitigation measures. The details of the measures, their advantages and disadvantages, and estimated costs were discussed. Following the Ohio consulting parties meeting, OHPO prepared a prioritized list of proposed mitigation measures for Longworth Hall. This list was submitted to ODOT in correspondence dated November 21, 2011. A copy of this letter is included in Appendix E.

A second meeting was held with the Ohio consulting parties on December 8, 2011 to further discuss impacts and mitigation for Longworth Hall. An MOA among the FHWA, ODOT, OHPO and other consulting parties was prepared to address the adverse effects to Longworth Hall resulting from the project. Mitigation measures for Longworth Hall are presented in Section 6.6.5.4 and the MOA provided in Appendix E.

Representatives from FHWA, KYTC and KHC met on December 19, 2011, to discuss mitigation measures for impacts to the Lewisburg Historic District. KHC stated that they approved of the mitigation options presented at the November 16, 2011 consulting parties

meeting. Other potential mitigation options were also discussed during the meeting. FHWA and KHC agreed that a Façade Program and vibration testing during construction are the options that would most directly mitigate actual impacts to the historic district.

5.7.5 Parkland Section 4(f) and Section 6(f) Coordination

Section 4(f) coordination with local government officials was initiated in 2008 for Goebel Park in Kentucky and the Queensgate Playground and Ball Fields in Ohio. Section 6(f) coordination was also initiated in 2008 for Goebel Park. The following coordination meetings were held with ODOT, KYTC and representatives of each facility.

- September 30, 2008: representatives from KYTC and the city of Covington conducted a field review of Goebel Park and discussed potential impacts.
- November 3, 2008: representatives from the Project Team and the Cincinnati Recreation Commission conducted a field review of the Queensgate Playground and Ball Fields and discussed potential impacts.
- April 1, 2010: KYTC and FHWA met with the city of Covington concerning mitigation opportunities for impacts to Goebel Park and the Lewisburg Historic District.
- June 28, 2010: representatives from the Project Team and ODOT met with the Cincinnati Recreation Commission to discuss impacts of the feasible alternatives to the Queensgate Playground and Ball Fields and potential mitigation.
- June 28, 2010: representatives from the Project Team, KYTC and FHWA met with the city of Covington concerning mitigation opportunities for impacts to Goebel Park and the Lewisburg Historic District.
- October 5, 2010: representatives from the Project Team and KYTC met with the city of Covington concerning mitigation opportunities for impacts to Goebel Park.
- November 22, 2010: representatives from the Project Team and ODOT met with the Cincinnati Recreation Commission to discuss mitigation opportunities for impacts to the Queensgate Playground and Ball Fields.
- April 19, 2011: representatives from the Project Team and ODOT met with the Cincinnati Recreation Commission to discuss impacts and mitigation for the Queensgate Playground and Ball Fields.
- January 6, 2012: representatives from KYTC and city of Covington met to discuss mitigation measures for Goebel Park.

The city of Covington provided the following Section 6(f) and Section 4(f) documentation:

- July 19, 2011: the city of Covington submitted correspondence to the Department for Local Government, Office of Federal Grants requesting that land adjacent to Goebel Park along KY 5th Street owned by KYTC replace the 1.9 acres of Goebel Park that would be impacted by the project.
- November 28, 2011: the city of Covington submitted correspondence to KYTC, which stated that the City acknowledges the project will impact the Goebel Park. However, the impacts will not adversely affect the park if the mitigation process that has been outlined is followed.
- February 17, 2012: the City of Covington concurred with FHWA's this determination that the project with the KYTC committed mitigation will have a *de minimis* impact, as defined in 23 CFR 774.17, on Goebel Park.

5.8 Utility Coordination

Coordination with Kentucky and Ohio utility companies was initiated in 2006. The following 13 utility companies have been identified as having facilities in the study area:

- AT&T Fiber Optics,
- Cincinnati Bell (telephone),
- Cincinnati Water Works,
- Duke Energy (gas and electric),
- Insight Communications,
- Level 3 Communications, LLC,
- MCI/Verizon Fiber Optic,
- Metropolitan Sewer District (Greater Cincinnati),
- Northern Kentucky Water District,
- Qwest National Network Services,
- Sanitation District Number 1 (Northern Kentucky),
- Sprint Fiber Optic, and
- Time Warner Cable.

A utility coordination meeting was held on March 16, 2006. The purpose of the meeting was to provide initial project information and to begin coordination between the Project Team and utility companies. The result of the meeting led to the formation of a utility coordination team consisting of utility and Project Team representatives that will continue to coordinate preliminary engineering to ensure that no loss of service occurs during construction or operation. Letters were sent to all Ohio utility companies in March 2009 and March 2012, depicting potential utility impacts. In both letters, ODOT requested the utility companies provide back an estimate of the cost to relocate their facilities.

The Project Team has continued coordination with the utility companies since the March 16, 2006 meeting. A listing of the utility coordination is provided in Table 64.

Table 64. Utility Coordination

Date	Description
August 21, 2009	Meeting with Sanitation District Number 1
October 16, 2009	Meeting with Duke Energy
October 26, 2009	Meeting with Duke Gas
November 16, 2009	Meeting with Metropolitan Sewer District
December 9, 2009	Meeting with Duke Energy
March 14, 2010	Meeting with Duke Energy
April 6, 2010	Meeting with Duke Energy
April 12, 2010	Meeting with Sanitation District Number 1
April 14, 2010	Meeting with Duke Energy

5.9 Railroad Coordination

The existing rail lines in the project area include:

- CSX Transportation,
- Norfolk Southern,
- Indiana and Ohio (I&O), and
- Amtrak (passenger rail).

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 the Indiana and Ohio Railway 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 to rail congestion issues in this corridor.

Initial coordination with railroad companies provided the following clearance information:

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

No additional railroad coordination has been conducted throughout the project development process because the railroads will not be impacted by the project.

6.0 COMPARISON OF ALTERNATIVES AND RECOMMENDATIONS

The following sections present summary discussions of the No Build Alternative and the feasible alternatives and provides a summary of design features and impacts of the No Build Alternative, Alternatives E and I, and the Western Hills Viaduct interchange alternatives. A recommendation for a Preferred Alternative to be carried forward and studied in Step 8 of the Ohio Department of Transportation's (ODOT) Project Development Process (PDP) is also presented.

6.1 No Build Alternative

The No Build Alternative is retained as a baseline for evaluation of the feasible alternatives. 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 address any of the Purpose and Need elements. It would not improve traffic flow or level of service (LOS), improve safety, correct geometric deficiencies, or improve connections to key local, regional, and national transportation corridors. Because the No Build Alternative would not correct the geometric deficiencies that currently exist throughout the corridor, congestion would continue to worsen, causing traffic flow problems. Additionally, safety concerns would remain since the areas that have high crash rates would not be improved. Most segments of the No Build Alternative would have a failing LOS (E or F) in 2035 or sooner. While the No Build Alternative would allow for existing connections to local, regional and national transportation corridors to be maintained, these connections would not be upgraded to current design standards, and therefore would leave the majority of ramp connections with a failing LOS.

No additional right-of-way is needed for the No Build Alternative. The No Build Alternative would not impact any wetlands, streams, woodlots, or threatened and endangered species. The Ohio River is not impacted by this alternative. The No Build Alternative would not impact cultural or Section 4(f) resources.

The No Build Alternative would not impact community cohesion and community resources. The No Build Alternative would not impact any social clusters in the study area. The No Build Alternative would not have an impact on environmental justice populations. Land use would remain unchanged and future land use plans would not be affected with the No Build Alternative. The No Build Alternative would not result in any residential, business, or utility displacements and would not change any patterns or accessibility.

No public or agency comments in support of the No Build Alternative have been received to date.

There are no right-of-way acquisition or construction costs associated with the No Build Alternative.

6.2 Alternative E

Alternative E utilizes the existing I-71/I-75 alignment from the southern study area to the Kyles Lane Interchange (Exhibits 3A and 3B and Appendix C). The Dixie Highway and Kyles

Lane interchanges will be modified slightly to accommodate a collector distributor (C-D) roadway, which will be constructed along both sides of I-71/I-75 between the two interchanges. North of the Kyles Lane Interchange, the alignment shifts to the west to accommodate additional I-71/I-75 travel lanes. Between Kyles Lane and KY 12th Street, six lanes will be provided in each direction for a total of 12 travel lanes.

Near KY 12th Street, the northbound alignment separates into two routes; one for interstate traffic and one for a local C-D roadway. Between Pike Street and KY 9th Street, the interstate separates into I-71 and I-75 only routes. The C-D roadway will carry local traffic northbound and provide access to Covington at KY 12th and 5th streets and access from KY 9th and 4th streets. The southbound C-D roadway will carry traffic from Ohio and cross over I-71 and I-75 and provide access to both the interstate and into Covington at KY 9th Street.

A portion of Crescent Avenue will be closed with a new connection to Bullock Street. Access from Covington for southbound interstate traffic is located at KY 12th Street. Bullock Street will be extended north from Pike Street to KY 9th, 5th, and 4th streets and Jillians Way will be extended north from Pike Street to KY 9th, 5th, and 4th streets. Bullock Street and Jillians Way will function as one way local frontage roadways.

A new double deck bridge, the new Ohio River Bridge, will be built just west of the existing Brent Spence Bridge to carry northbound and southbound I-71 and I-75 traffic. On the upper deck, I-71 southbound will have be striped to have three lanes and I-71 northbound will have two lanes. On the lower deck, I-75 will have three northbound and three southbound lanes. The existing Brent Spence Bridge will be rehabilitated to carry northbound and southbound local traffic with two lanes in the southbound direction and three lanes in the northbound direction.

In Ohio, Alternative E reconfigures I-75 through the I-71/I-75/US 50 Interchange and eliminates some of the existing access points along I-75. Existing ramps to I-71, US 50 and downtown Cincinnati will be reconfigured. The existing direct connections between I-75 to westbound and from eastbound US 50 will be maintained in Alternative E. US 50 will be reconfigured to eliminate left-hand entrances and exits. The OH 5th Street overpass will be eliminated and the OH 6th Street Expressway will be reconfigured as a two-way, six-lane elevated roadway with a new signalized intersection for US 50 access and egress. Access between southbound I-71 (Fort Washington Way) and northbound I-75 will be provided near OH 9th Street as a direct connection. Both I-75 southbound and US 50 (OH 6th Street Expressway) will have access to northbound I-71 (Fort Washington Way).

A local C-D roadway will carry local traffic northbound from the existing Brent Spence Bridge and provide access to OH 2nd, 5th, and 9th streets, Winchell Avenue and access from OH 4th Street before reconnecting to I-75 just south of the Linn Street overpass. The northbound ramps from OH 6th and 9th streets to I-75 will be removed requiring traffic from these points to utilize a new local roadway parallel to I-75 connecting to Winchell Avenue and access the interstate at Bank Street. Southbound I-75 traffic will separate from the local C-D roadway near Ezzard Charles Drive. The southbound C-D roadway will carry traffic over I-75 to OH 7th Street, allowing traffic to either; access downtown at 7th Street, travel south to OH 5th and 2nd streets, or travel across the existing Brent Spence Bridge into Covington. Access to the local southbound C-D roadway will be provided at Western Avenue and at OH 4th and 8th streets.

Alternative E also improves Western and Winchell avenues to facilitate traffic flow and increase capacity. The ramps to Western Avenue and from Winchell Avenue just north of Ezzard Charles Drive will be removed. The ramp from Freeman Avenue to I-75 northbound and the ramp from I-75 southbound to Freeman Avenue will remain. Between Ezzard Charles Drive and the Western Hills Viaduct (WHV), southbound I-75 will have six lanes, northbound I-75 will have five lanes. The WHV Interchange will be reconfigured to provide improved connections. The improved interchange will be a single point urban interchange (SPUI) design, however a tight urban diamond interchange (TUDI) is compatible with the Alternative E design.

6.2.1 Design Features

In Kentucky, Alternative E would provide a southbound service road on which traffic from I-71, I-75, and the local C-D roadway would be funneled into it from the north. This service road would provide access to all of Covington's city streets from south of KY 9th Street, but would require traffic to utilize KY 9th Street to the new northbound service road to gain access to KY 5th Street, which is currently available by direct access. In the northbound direction, Alternative E would provide a service road which would provide access to all of Covington's city streets beginning at KY 12th Street. Alternative E would also provide a C-D system for traffic bound for Cincinnati. Direct ramp access to northbound I-75 and to northbound I-71 from Covington would be provided near the KY 9th Street area in Covington utilizing the new service roads. Additional access to northbound I-75 would be available at the KY 4th Street entrance ramp.

In Ohio, the southbound C-D roadway lane configuration is located west of I-75 north of Ezzard Charles Drive. Upon passing under Ezzard Charles Drive, the southbound C-D roadway would cross over I-75 on structure, which allows it to be located adjacent to the northbound C-D roadway. The intent of this design is to separate I-75 from the C-D roadways.

Alternative E would replace all ramp connections which currently exist in Ohio. The US 50 eastbound ramp to OH 5th Street and the westbound OH 8th Street entrance ramp to I-75 southbound would be eliminated. A northbound ramp from the C-D system to westbound OH 8th Street would be added. Since the access points have existed for many years and Cincinnati has developed around these traffic patterns, departing from these patterns could have consequences on local city streets and their intersections where motorists would be required to adjust their travel movements to reach their destinations.

6.2.2 Design Exceptions

In Kentucky, five design exceptions involving grade, lane width, and shoulder width are anticipated (Appendix C). In Ohio, 37 design exceptions are anticipated. These design exceptions are classified as degree of curve, horizontal stopping sight distance, vertical stopping sight distance, and shoulder width.

6.2.3 Traffic Operations

Operationally, Alternative E and Alternative I provide similar levels of service on the freeway main line throughout most of the project corridor with Alternative I operating better than Alternative E overall. At the south end of the project, both Alternatives E and I have the same level of service for the segments which are below the recommended design criteria of LOS D. This is a result of connecting to existing conditions at this location. At the north end of the project, both Alternatives E and I have similar LOS due to connecting to existing

conditions at this location. At the east end of Fort Washington Way (FWW), both Alternatives E and I have the same LOS at the tie-in interchange of I-71 and I-471 which is outside the study limits. Within the middle segments between KY 12th street and Ezzard Charles Drive in Ohio, Alternative E additionally contains four freeway locations where the LOS is below the recommended design criteria of LOS D:

- Southbound I-71, south of local C-D (Kentucky) - LOS F,
- Northbound I-71/I-75, north of 12th Street exit ramp (Kentucky) – LOS E,
- Northbound I-71, north of I-71/I-75 split (Kentucky) – LOS E, and
- Northbound I-71, north of Bullock Street loop ramp entrance (Kentucky) to south of Fort Washington Way (FWW) – LOS F.

The ramp junctions and intersections in Alternative E operates slightly worse than Alternative I. Due to the difference in configurations between the two alternatives, it is hard to do direct comparisons between them for ramp junctions and intersections.

6.2.4 Costs

The total estimated project costs for Alternative E are construction costs, which include a design contingency, a construction inflation factor based on median construction date for each construction contract, right-of-way for roadway and utility relocations, major utility, and project development costs (Table 65). The associated costs for the new Ohio River Bridge, rehabilitation of the existing Brent Spence Bridge, and the WHV Interchange are also include in the costs for Alternative E. The total cost for Alternative E with the SPUI design is $2,745.1 million and the costs of Alternative E with the TUDI design is $2,617.3 million.

Table 65. Total Cost Estimates for Mainline Alternative E in Projected Build Year Dollars

Component	Construction Costs (millions)	Construction Costs Inflation (59.5%) (millions)	Real Estate Costs (millions)	Utility Costs (millions)	Project Development Costs (millions)	Total Estimated Costs (millions)
Kentucky	$393.4	$222.3	$25.3	-	$59.2	$700.2
Ohio	$518.8	$278.2	$21.4	$93.0	$60.2	$971.6
WHV-SPUI	$160.1	$82.1	$4.6	$0.2	$22.6	$269.6
WHV-TUDI	$84.8	$43.5	$1.3	$0.2	$12.0	$141.8
Existing Bridge	$40.6	$26.6	-	-	$6.3	$73.5
New Bridge[1]	$474.2	$194.4	-	-	$61.6	$730.2
Totals						
Alternative E with SPUI	$1,587.1	$803.6	$51.3	$93.2	$209.9	$2,745.1
Alternative E with TUDI	$1,511.8	$765.0	$48.0	$93.2	$199.3	$2,617.3

1. The new bridge total cost estimates range from $624.5 to $730.2 million, depending on the bridge alternative. Additionally, the construction costs with inflation range from $570.7 to $668.6 million and the project development costs range from $53.8 to $61.6 million. The new bridge cost estimates shown in the table are the highest cost of the bridge alternatives.

6.2.5 Environmental Impacts

Alternative E would be compatible with existing land use plans, would support the Queensgate redevelopment plans, and help Cincinnati facilitate its economic renewal goals.

The total new right-of-way required is 36.90 acres for Alternative E. Alternative E is estimated to result in 109 displacements (92 residential and 17 commercial). Alternative E would have displacements in the Lewisburg and West McMicken neighborhoods. Alternative E would have an impact on Goebel Park and the Queensgate Playground and Ball Fields.

Alternative E would result in the use of four Section 4(f) resources: Goebel Park; Lewisburg Historic District; Queensgate Playground and Ball Fields; and Longworth Hall. These impacts include:

- Directly impact 3.7 acres or 25 percent of the total park area along the western edge of Goebel Park.
- Acquisition of 5.1 acres of land within the boundary of the Lewisburg Historic District. Land from 53 properties that are contributing elements to the historic district would be affected. A total of 38 parcels would be fully acquired with demolition of associated residential structures and land from 15 others would also be acquired for right-of-way without impact to any structures. Additionally, the historic district would experience changes in access, approximately 1,800 feet of Crescent Avenue would be eliminated between 826 Crescent Avenue and the Cork 'N Bottle (501 Crescent Avenue).
- Acquisition of 0.6 acres of land from the Queensgate Playground and Ball Fields, extending into the outfield areas of the two baseball fields from the existing Winchell Avenue right-of-way.
- Removal of 204 feet of the Longworth Hall building.

In addition, Alternative E would impact approximately 3,335 linear feet of streams, 1.38 acres of wetlands, and habitat for the Indiana bat and running buffalo clover. However, no impacts to significant ecological resources are anticipated from this project. Alternative E also impact 10 sites that require Phase II ESAs and potentially impacts 57 utilities, 46 below ground and 11 aboveground.

6.3 Alternative I

Alternative I is a combination of Alternatives C and D with certain design elements of Alternative G (Exhibit 4A and 4B, and Appendix C). Alternative I utilizes the existing I-71/I-75 alignment from the southern study area to the Kyles Lane Interchange. The Dixie Highway and Kyles Lane interchanges will be modified slightly to accommodate a C-D roadway, which will be constructed along both sides of I-71/I-75 between the two interchanges. North of the Kyles Lane Interchange, the alignment shifts to the west to accommodate additional I-71/I-75 travel lanes. Between Kyles Lane and KY 12th Street, six lanes will be provided in each direction for a total of 12 travel lanes. Near KY 12th Street, the northbound alignment separates into two routes; one for interstate traffic and one for a local C-D roadway. Between Pike Street and KY 9th Street, the interstate separates into I-71 and I-75 only routes.

In Alternative I, access into Covington from the interstate will be provided by the local C-D roadway; at KY 12th Street for northbound traffic and at KY 5th and 9th streets for southbound

traffic. Access from Covington for northbound traffic will be provided by a ramp located between Pike Street and KY 9th Street from Jillians Way. The ramp will provide direct access to I-71 from Covington and provide access to I-75 northbound using the C-D roadway through downtown Cincinnati and connecting at the merge near Ezzard Charles Drive. Access from Covington will also be provided at KY 4th Street to the northbound C-D roadway. Access from Covington for southbound interstate traffic is located at KY 12th Street. Bullock Street will be extended north from Pike Street to KY 9th and 4th streets and Jillians Way will be extended north from Pike Street to KY 9th and 5th streets. Bullock Street and Jillians Way will function as one-way local frontage roadways.

A new double deck bridge will be built just west of the existing Brent Spence Bridge to carry northbound and southbound I-75 (three lanes in each direction), two lanes for southbound I-71 and three lanes for southbound local traffic. The existing Brent Spence Bridge will be rehabilitated to carry two lanes for northbound I-71 and three lanes for northbound local traffic.

Alternative I reconfigures I-75 through the I-71/I-75/US 50 Interchange and eliminates all access to and from I-75 from KY 12th Street to the Freeman Avenue overpass in the northbound direction. Alternative I eliminates access to I-75 southbound between the Freeman Avenue exit and KY 9th Street. Alternative I also eliminates access from I-75 southbound between the US 50/6th Street overpass and Kyles Lane.

In Ohio, a local C-D roadway will be constructed along both sides of I-75. The local northbound C-D roadway will carry local traffic from the existing bridge and provide access ramps to OH 2nd Street, I-71 northbound, US 50 westbound, OH 5th Street, and Winchell Avenue before reconnecting to I-75 just south of Ezzard Charles Drive. The northbound ramps from OH 4th Street will utilize the new local northbound C-D roadway for access to I-75. The northbound ramps from OH 6th and 9th streets to I-75 will be removed requiring traffic from these two points to utilize a new local roadway parallel to I-75 connecting to Winchell Avenue and access the interstate at Bank Street. The southbound C-D roadway begins near the Ezzard Charles Drive overpass and carries both downtown Covington and Cincinnati traffic. The southbound C-D roadway will provide access to OH 7th, 5th and 2nd streets, as well as connecting to access ramps from Western Avenue, OH 9th Street, and US 50 eastbound. The C-D roadway will continue south over the new bridge into Covington.

Between Ezzard Charles Drive and the Western Hills Viaduct, northbound I-75 will have five lanes and southbound I-75 will have six lanes, for a total of 11 travel lanes. The ramps to Western Avenue and from Winchell Avenue just north of Ezzard Charles Drive to the interstate will be eliminated. The southbound ramp to Freeman Avenue and the northbound ramp from Freeman Avenue to I-75 will remain. Alternative I also improves Western and Winchell avenues to facilitate traffic flow and increase capacity. Ramps to Western Avenue and from Winchell Avenue will be provided around the Western Hills Viaduct Interchange, which will be reconfigured to be either a SPUI or a TUDI.

6.3.1 Design Features

Alternative I is functionally similar to Alternative E in providing access to and from I-71/I-75 in Kentucky at KY 12th Street. All of the traffic bound for Covington from I-71 and I-75 in Ohio would utilize the C-D roadway to connect to KY 5th Street and the local frontage roadway, which has access to all of Covington's city streets from KY 5th Street southward. In the northbound direction, all traffic exiting I-71/I-75 bound for Covington would exit to local

frontage roadway which connects with every Covington city street from KY 12th Street to KY 5th Street. Motorists bound for Cincinnati would exit to a C-D roadway south of KY 12th Street. Access to the C-D roadway northbound from Covington would be available by a slip ramp from Jillian's Way just north of Pike Street and by the entrance ramp from KY 4th Street. Access to I-75 northbound would be from the C-D roadway in Ohio.

6.3.2 Design Exceptions

In Alternative I, there are 43 design exceptions anticipated. In Kentucky, three design exceptions involving grade, lane width, and shoulder width are anticipated. In Ohio, 40 design exceptions are anticipated. These design exceptions are classified as degree of curve, horizontal stopping sight distance, vertical stopping sight distance, grade, shoulder width, taper rate, and curve widening.

6.3.3 Traffic Operations

Operationally, Alternative I would provide a better LOS on the freeway main line compared to Alternative E even though they both have similar levels of service. At the south end of the project, both Alternatives E and I have the same level of service for the segments which are below the recommended design criteria of LOS D. This is a result of connecting to existing conditions at this location. At the north end of the project, both Alternatives E and I have similar LOS due to connecting to existing conditions at this location. At the east end of Fort Washington Way (FWW), both Alternatives E and I have the same LOS at the tie-in interchange of I-71 and I-471 which is outside the study limits. Within the middle segments between KY 12th street and Ezzard Charles Drive in Ohio, Alternative I contains four freeway locations where the LOS is below the recommended design criteria of LOS D:

- Northbound I-71, north of Pike Street entrance ramp (Kentucky) – LOS E,
- Northbound I-71, north of C-D roadway entrance ramp (Ohio) – LOS E,
- Northbound I-71, north of eastbound US 50 entrance ramp (Ohio) – LOS E, and
- Southbound I-75, south of C-D roadway diverge (Ohio) – LOS E.

The ramp junctions and intersections in Alternative I operates slightly better than Alternative E. Due to the difference in configurations between the two alternatives, it is hard to do direct comparisons for ramp junctions and intersections.

Alternative I would provide interstate access to both Covington and Cincinnati and a separation of local and regional traffic in both downtown areas through the use of C-D roadways. Since Alternative I's design utilizes a C-D system that is "free-flow", delays would not exist on this system until after a motorist reaches the ramp intersection with the intended crossroad.

6.3.4 Costs

The total estimated project costs for Alternative I are construction costs which include a design contingency, a construction inflation factor based on median construction date for each construction contract, right-of-way for roadway and utility relocations, major utility, and project development costs (Table 66). The associated costs for the new Ohio River Bridge, rehabilitation of the existing Brent Spence Bridge, and the Western Hills Viaduct TUDI are also included in the costs for Alternative I. The total cost for Alternative I with the TUDI design at the WHV is $2,483.6 million and $2,611.4 million with a SPUI design.

Table 66. Total Cost Estimates for Mainline Alternative I in Projected Build Year Dollars

Component	Construction Costs (millions)	Construction Costs Inflation (59.5%) (millions)	Real Estate Costs (millions)	Utility Costs (millions)	Project Development Costs (millions)	Total Estimated Costs (millions)
Kentucky	$362.3	$204.4	$20.2	-	$54.5	$641.4
Ohio	$474.5	$255.8	$18.3	$93.0	$55.1	$896.7
WHV-SPUI	$160.1	$82.1	$4.6	$0.2	$22.6	$269.6
WHV-TUDI	$84.8	$43.5	$1.3	$0.2	$12.0	$141.8
Existing Bridge	$40.6	$26.6	-	-	$6.3	$73.5
New Bridge[1]	$474.2	$194.4	-	-	$61.6	$730.2
Totals						
Alternative I with SPUI	$1,511.7	$763.3	$43.1	$93.2	$200.1	$2,611.4
Alternative I with TUDI	$1,436.4	$724.7	$39.8	$93.2	$189.5	$2,483.6

1. The new bridge total cost estimates range from $624.5 to $730.2 million, depending on the bridge alternative. Additionally, the construction costs with inflation range from $570.7 to $668.6 million and the project development costs range from $53.8 to $61.6 million. The new bridge cost estimates shown in the table are the highest cost of the bridge alternatives.

6.3.5 Environmental Impacts

Alternative I would be compatible with existing land use plans, would support the Queensgate redevelopment plans, and help Cincinnati facilitate its economic renewal goals.

The total new right-of-way required is 31.37 acres for Alternative I. Alternative I is estimated to result in 54 displacements (40 residential and 14 commercial). Alternative I would not displace residents in Ohio.

Alternative I would result in the use of four Section 4(f) resources: Goebel Park; Lewisburg Historic District; Queensgate Playground and Ball Fields; and Longworth Hall. These impacts include:

- Directly impact 1.9 acres or 12.8 percent of the total park area along the western edge of Goebel Park.
- Acquisition of 2.8 acres of land within the Lewisburg Historic District, affecting 28 contributing elements to the district. Twenty-one parcels would be acquired as total right-of-way acquisitions with demolition of structures; seven additional parcels would be affected through partial right-of-way acquisition. Additionally, the historic district would experience changes in access.
- Acquisition of 0.9 acres of land from the Queensgate Playground and Ball Fields, extending into the outfield area from the existing Winchell Avenue right-of-way.
- Removal of 204 feet of the Longworth Hall building.
- Reconstruction of 1,108 feet of the WHV eastern approach ramps connecting to I-75 for the TUDI design.

- Reconstruction of the WHV structure from approximately 900 feet west of Spring Grove Avenue to just east of I-75 for a SPUI option.

In addition, Alternative I would impact approximately 3,340 linear feet of streams, 1.38 acres of wetlands, and habitat for the Indiana bat and running buffalo clover. However, no impacts to significant ecological resources are anticipated from this project. Alternative I also impacts one site that requires a Phase I ESA and 11 sites requiring Phase II ESAs. Alternative I also has 57 utility impacts, 46 below ground and 11 aboveground.

6.4 Western Hills Viaduct Interchange

A SPUI alternative and a TUDI alternative with restricted access to and from the west were developed for the WHV Interchange. The geometric layout of either interchange will work with Alternative E or Alternative I. Table 67 provides a summary comparison of the interchange options for the WHV interchange.

6.4.1 Single Point Urban Interchange (grade-separated with Central Parkway)

The SPUI alternative is a full movement interchange (Exhibit 3B). For the SPUI alternative, WHV was realigned to intersect West McMillan Street at the existing West McMillan Street/West McMicken Avenue intersection. This realignment also includes grade separating the intersection of the WHV and Central Parkway. A new bridge would replace the existing WHV structure from approximately 900 feet west of Spring Grove Avenue to just east of I-75. An additional structure would be required to carry the WHV over Central Parkway. The WHV would be connected to Central Parkway by a new two-way Connector Road. The addition of this new road would provide storage between the WHV and Central Parkway necessary for acceptable traffic operations at this interchange. In several locations multi-lane turning movements are required including one triple left turn movement from I-75 southbound to WHV eastbound.

The WHV Interchange SPUI alternative would have an adverse effect on the West McMicken Avenue Historic District. The SPUI would result in the demolition of eight of the 21 residences that are contributing elements to the historic district. The WHV, also a historic property, would be affected by the SPUI alternative. The alteration will not have an adverse effect on the viaduct because it reworks the connection to the bridge, which originally was built in 1960 with the construction of I-75.

6.4.2 Tight Urban Diamond Interchange

A TUDI has two ramp intersections like a traditional diamond but they are located much closer to each other. This configuration creates a smaller footprint than a traditional diamond interchange. The TUDI alternative is a full movement interchange to the west only (Exhibit 4B).

The TUDI alternative, in combination with either Alternative E or Alternative I, would not directly impact the West McMicken Avenue Historic District. The WHV would be affected by the TUDI alternative through reconstruction of the interchange connecting I-75 to the viaduct. The TUDI would require reconstruction of 1,108 feet of the approach ramps of the WHV to connect with the interstate reconstruction at ground level. The alteration will not have an adverse effect on the viaduct because it reworks the connection to the bridge which was originally built in 1960 with the reconstruction of I-75.

Table 67. Western Hills Viaduct Interchange Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Single Point Urban Interchange	Tight Urban Diamond
Summary Description of Interchange Alternative	The No Build Alternative maintains the existing configuration of the WHV and consists of minor, short-term safety and maintenance improvements to the interchange which would maintain its continuing operation	WHV is realigned to intersect West McMillan Street at the existing West McMillan Street/West McMicken Avenue intersection. This also includes grade separating the intersection of WHV and Central Parkway. A new bridge would replace the existing WHV structure from ~900 feet west of Spring Grove Avenue to just east of I-75. An additional structure would be required to carry WHV over Central Parkway. WHV would be connected to Central Parkway by a new two-way connector road.	This interchange alternative would provide a replacement structure in the existing structure location from just east of Spring Grove Avenue to the existing abutment location. This structure would connect to the existing upper deck of the WHV at Spring Grove Avenue. The lower deck would be realigned beginning west of the current I-75 southbound ramp diverge location and follow an alignment which crosses Spring Grove Avenue and I-75 south of the WHV upper deck location.
Future (2035) levels of service at ramp junctions	Intersections – LOS B Ramps – LOS A through F	Intersections – LOS B through D Ramps – LOS C through E	Intersections – LOS A through C Ramps – LOS B through D
Future (2035) daily hourly volumes at ramp junctions	Ranges from 293 – 1,010	Ranges from 520 – 1,410	Ranges from 320 – 1,070
Right-of-way Impacts – (acres within construction limits)	No Impact	3.9 total acres	1.9 total acres
Residential – (total estimated structures and residences displaced)	No Impact	16 total (16-60 persons)	No residential displacements
Business – (total estimated businesses and employees displaced)	No Impact	3 businesses (15-30 employees)	2 businesses (10-20 employees)
Parcels – (total estimated parcels impacted)	No Impact	63 parcels	20 parcels

Table 67. Western Hills Viaduct Interchange Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Single Point Urban Interchange	Tight Urban Diamond
Compatibility with existing community land use plans	• Not compatible with economic development plans • Does not preclude future light rail plans • No changes to existing land uses	• Supports redevelopment and economic plans • Makes provisions for future light rail plans • Impacts residential land uses	• Supports redevelopment and economic plans • Makes provisions for future light rail plans
Community Cohesion	No impact	Loss of residences in West McMicken Avenue neighborhood	No loss of residences or facilities in communities
Facilities and Services	No impact	No impact	No impact
Environmental Justice – (impacts to neighborhoods and Census tracts with high percentage of low income and minority populations)	No impact	• Impact to low-income population • Impact to minority population • No impact to facilities and services within EJ area • No disproportionate impacts	• No impact to low-income population • No impact to minority population • No impact to facilities and services within EJ area • No disproportionate impacts
Wetlands – (wetland areas impacted)	No impact	No impact	No impact
Intermittent Streams	No impact	No impact	No impact
Ephemeral Streams	No impact	No impact	No impact
Indiana Bat Habitat (Potential /Marginal)	No impact	No impact	No impact
Potential Running Buffalo Clover Habitat	No impact	No impact	No impact
Floodplains	No impact	No impact	No impact
Farmland	No impact	No impact	No impact
Individual properties eligible for listing or listed in the National Register of Historic Places (NRHP)	No impact	Western Hills Viaduct	Western Hills Viaduct
Historic Districts (HD) directly impacted	No impact	West McMicken Avenue Historic District	No impact

Table 67. Western Hills Viaduct Interchange Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Single Point Urban Interchange	Tight Urban Diamond
Number of sites recommended for Phase II Environmental Site Assessment	No impact	1	1
Number of sites recommended for Phase I Environmental Site Assessment	No Impact	1	1
Section 6(f) Parks	No Impact	No impact	No impact
Section 4(f) Resources	No Impact	Western Hills Viaduct West McMicken Avenue Historic District	Western Hills Viaduct
Utilities	No Impact	5 total	5 total
Cost Estimates (in millions)	Not applicable	$269.6	$141.8

6.5 Preferred Alternative Recommendation

Both Alternatives E and I would provide greater operational improvements over the No Build Alternative due to the operations provided by their design and the capacity expansion of the additional lanes for the freeway mainline. While both feasible alternatives are better operationally than the No Build Alternative, their design, connection points and operations are different from each other (Table 68).

In Kentucky, Alternative I would provide a ramp connection from the southbound C-D roadway to KY 5th Street in Covington, which Alternative E would not. Alternative E would provide a direct ramp connection in Covington to northbound I-71 and I-75. Alternative E would provide a ramp connection from the northbound C-D roadway to KY 5th Street.

In Ohio, Alternative I's design is based on a C-D system, which provides free-flow movements. For example, Alternative I would provide a direct connection by way of a C-D system in Ohio to northbound I-75 and I-71, which is free-flow. Alternative E's design is based on a C-D system, which provides interrupted flow due to four signalized intersections.

The primary differences between Alternatives E and I in Kentucky are that in the southbound direction, motorists in Alternative I can exit to KY 5th Street, but cannot in Alternative E. In the northbound direction motorists for Alternative E have a direct ramp access connection to I-71 and to I-75, but in Alternative I they only have direct access to I-71.

The design features of Alternative I would provide a better freeway system from the traffic operations perspective compared to Alternative E. Excluding the tie-in locations at the study area limits, Alternative I has no freeway segments with LOS F as compared to one for Alternative E.

Alternatives E and I have similar impacts to ecological resources, community resources, hazardous material sites, and utilities. While the feasible alternatives have similar property impacts, Alternative I requires less impact on the human environment through fewer residential and business relocations and requires slightly less acreage for right-of-way. Both feasible alternatives would be compatible with existing land use plans, would support the Queensgate redevelopment plans, and help Cincinnati facilitate its economic renewal goals. Alternatives E and I differ in their impacts to Section 4(f) resources. In Kentucky, Alternative I has less direct physical impacts to both Goebel Park and the Lewisburg Historic District then Alternative E. In Ohio, the feasible alternatives have similar impacts to three Section 4(f) resources. Overall, the impacts to Section 4(f) resources caused by Alternative E are more extensive than Alternative I.

The SPUI alternative at the WHV costs $269.6 million while the TUDI alternative costs $141.8 million. Alternative E or I with the SPUI and Alternative E with the TUDI at the WHV all would cost more than Alternative I with a TUDI at the WHV. The total cost for Alternative E and Alternative I with the SPUI at the WHV is $2,745.1 million and $2,611.4 million, respectively. The total cost for Alternative E and Alternative I with the Tight Urban Diamond interchange design at the WHV is $2,617.3 million and $2,483.6 million, respectively.

Alternative I is recommended as the Preferred Alternative with the inclusion of the WHV TUDI design. This recommendation is based on the design features, local access features, traffic operations, estimated costs, and environmental impacts of Alternative I.

Table 68. Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Brief Description of Alternative	The No Build Alternative maintains the existing configuration of the I-75 corridor and consists of minor, short-term safety and maintenance improvements to the interstate which would maintain its continuing operation	Alternative E utilizes the existing I-71/I-75 alignment from the southern study area to the Kyles Lane Interchange. A collector distributor (C-D) roadway will be constructed along both sides of I-71/I-75 between the two interchanges. A new double deck bridge will be build just west of the existing Brent Spence Bridge. The existing Brent Spence Bridge will be rehabilitated to carry two lanes southbound and three lanes northbound for local traffic. In Ohio, I-75 will be reconfigured through the I-71/I-75/US 50 interchange and some access points along I-75 will be eliminated. A local C-D roadway will provide local access in Ohio.	Alternative I utilizes the existing I-71/I-75 alignment from the southern study area to the Kyles Lane Interchange. A C-D roadway will be constructed along both sides of I-71/I-75 between the two interchanges. A new double deck bridge will be built just west of the existing Brent Spence Bridge. The existing Brent Spence Bridge will be rehabilitated to carry two lanes for northbound I-71 and three lanes for northbound local traffic. In Ohio, a local C-D roadway will be constructed along both sides of I-75.
Local access to/from the interstate	No changes to existing access	Provides indirect access to interstate by way of local C-D road • I-75 access between KY 12th Street and Ezzard Charles Drive Provides direct access to interstate • 1 direct access point to I-71 NB at KY 9th Street • 1 direct access point to I-75 NB in KY 9th Street • Direct access to I-71/I-75 SB at KY 12th Street • 1 direct access point to/from I-75 NB and SB at Freeman Avenue	Provides indirect access to interstate by way of local C-D road • I-75 access between KY 12th Street and Ezzard Charles Drive Provides direct access to interstate • 1 direct access point to I-71 NB in KY at Pike Street • Direct access to I-71/I-75 SB at KY 12th Street • 1 direct access point to/from I-75 NB and SB at Freeman Avenue

Table 68. Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Access to Covington from I-75	No changes to existing access	Provides direct access to Covington • I-75 SB and I-71 SB access at KY 9th Street Provides indirect access to Covington by C-D road • NB access at KY 5th and 12th Street	Provides indirect access to Covington from I-75 by a C-D road • NB access at KY 12th Street SB access at KY 5th and 9th Street
Access to I-75 in Cincinnati	No changes to existing access	Alters existing access to I-75 • Existing I-75 NB and SB access eliminated or reconfigured between KY 9th Street to just north of Western Hills Viaduct • Existing direct access to/from I-75 will remain but reconfigured at US 50	Eliminates direct access to/from I-75; Access provided by C-D road • I-75 NB access eliminated between KY 12th Street to just south of Ezzard Charles Drive • I-75 SB access eliminated between KY 9th Street and the Western Hills Viaduct • Access provided by C-D road
Separates local and regional traffic	Does not separate local and regional traffic	• A new bridge just west of the existing Brent Spence Bridge will be constructed to carry I-75 and I-71 NB and SB traffic • The existing Brent Spence Bridge will be rehabilitated to carry local NB and SB traffic	• A new bridge just west of the existing Brent Spence Bridge will be constructed to carry I-75 NB and SB, I-71 SB, and local SB traffic • Existing Brent Spence Bridge will be rehabilitated to carry I-71 NB and local NB traffic
Design Exceptions	Not applicable	42 locations in total (5 in KY; 37 in OH)	43 locations in total (3 in KY; 40 in OH)
Existing (2005) levels of service and average daily traffic	Approximately 160,000 vehicles per day LOS C to F	Not applicable	Not applicable

Table 68. Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Future (2035) levels of service along mainline segments (number refers to the segments for each level of service; i.e. 36 LOS D = 36 segments LOS D)	I-71/I-75: • 36 LOS D or better, 13 NB and 8 SB LOS E or worse I-75: • 62 LOS D or better, 8 NB and 8 SB LOS E or worse I-71: • 48 LOS D or better, 3 NB and 6 SB LOS E or worse	I-71/I-75: • 28 LOS D or better, 7 NB and 8 SB LOS E or worse I-75: • 50 LOS D or better, 1 NB and 0 SB LOS E or worse I-71: • 40 LOS D or better, 5 NB and 2 SB LOS E or worse	I-71/I-75: • 30 LOS D or better, 5 NB and 8 SB LOS E or worse I-75: • 42 LOS D or better, 2 NB and 3 SB LOS E or worse I-71: • 20 LOS D or better, 6 NB and 2 SB LOS E or worse
Future (2035) daily hourly volumes along mainline segments (NB = northbound; SB = southbound)	I-71/I-75: • NB ranges from 5,310 - 8,650 • SB ranges from 940 - 9,160 I-75: • NB ranges from 2,360 – 8,860 • SB ranges from 2,760 – 10,170 I-71: • NB ranges from 1,900 – 7,400 • SB ranges from 2,420 – 6,330	I-71/I-75: • NB ranges from 6,440 – 8,910 • SB ranges from 6,440 – 10,390 I-75: • NB ranges from 2,870 – 8,680 • SB ranges from 2,940 – 9,360 I-71: • NB ranges from 2,240 – 7,690 • SB ranges from 2,660 – 6,490	I-71/I-75: • NB ranges from 5,700 – 8,910 • SB ranges from 6,440 – 10,390 I-75: • NB ranges from 2,010 – 8,870 • SB ranges from 2,730 – 9,750 I-71: • NB ranges from 2,240 – 7,690 • SB ranges from 2,310 – 6,490
Right-of-way Impacts – (acres within construction limits)	No Impact	36.90 total acres KY – 24.45 acres OH – 12.45 acres	31.37 total acres KY – 21.76 acres OH – 9.61 acres
Parcels – (total estimated parcels impacted)	No Impact	KY – 162 parcels OH – 111 parcels	KY – 123 parcels OH – 68 parcels

Table 68. Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Compatibility with existing community land use plans	• Not compatible with economic development plans • Does not preclude future light rail plans • No changes to existing land uses	Compatible with plans • Supports redevelopment and economic plans in Queensgate and Cincinnati • Keeps land uses conducive with Northern Kentucky comprehensive plans • Makes provisions for future light rail plans	Compatible with plans • Supports redevelopment and economic plans in Queensgate and Cincinnati • Keeps land uses conducive with Northern Kentucky comprehensive plans • Makes provisions for future light rail plans
Community Cohesion	No impact	Loss of residences in Lewisburg neighborhood and historic district • Resident concentration on Crescent Avenue between KY 5th and 9th streets • Loss of residences in West McMicken Avenue neighborhood by SPUI	Loss of residences in Lewisburg neighborhood and historic district • Resident concentration on Crescent Avenue south of KY 5th Street and Pike Street
Facilities and Services	No impacts	• Goebel Park (3.7 acres - parking lot, portion of walking trail, and basketball court) • Queensgate Playground and Ball Fields (strip take – 0.6 acres) • Notre Dame Academy School (1.34 acres - portion of parking lot and ball field) • Beechwood Schools (strip take) • Central Church of the Nazarene (KY) (0.44 acres – portion of parking lot)	• Goebel Park (1.9 acres – basketball court, and parking lot) • Queensgate Playground and Ball Fields (strip take – 0.9 acres) • Notre Dame Academy School (1.34 acres - portion of parking lot and ball field) • Beechwood Schools (strip take) • Central Church of the Nazarene (KY) (0.44 acres – portion of parking lot)
Residential – (total estimated structures and residences displaced)	No Impact	92 Total (92 – 356 persons) KY – 76 structures (76 – 296 persons) OH – 16 structures (16 – 60 persons)	40 Total (40 – 168 persons) KY – 40 structures (40 –168 persons) OH – no residential displacements
Business – (total estimated businesses and employees displaced)	No Impact	17 Total (408 – 529 employees) KY – 8 businesses (100 – 130 employees) OH – 9 businesses (308 – 399 employees)	14 Total (341 – 382 employees) KY – 6 businesses (90 –115 employees) OH – 8 business (251 – 267 employees)

Table 68. Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Environmental Justice – (impacts to neighborhoods and Census tracts with high percentage of low income and minority populations)	No impact	• Minority population impacts in KY • Impact to low-income populations (residences displaced in Lewisburg) in KY • Impact to parking lot, basketball court, and portion of walking path in Goebel Park adjacent to environmental justice (EJ) areas • Impact to low-income population in Ohio (residences displaced on McMicken Avenue) • Strip taken of land in Queensgate Playground and Ball Fields in EJ target area • No disproportionate and adverse impacts to EJ populations	• Minority population impacts in KY • Impact to low-income populations (residences displaced in Lewisburg) in KY • Impact to parking lot and basketball court in Goebel Park adjacent to EJ target • Strip taken of land in Queensgate Playground and Ball Fields in EJ area • No disproportionate and adverse impacts to EJ populations
Intermittent Streams	No impact	3,335 linear feet	3,340 linear feet
Ephemeral Streams	No impact	0 linear feet	0 linear feet
Wetlands	No impact	1.38 acres	1.38 acres
Indiana bat habitat (Potential /Marginal)	No impact	28/27 acres	28/28 acres
Potential Running Buffalo Clover habitat	No impact	2 acres	2 acres
Floodplains	No impact	Piers for new Ohio River Bridge	Piers for new Ohio River Bridge
Farmland	No impact	No impact	No impact
Number of sites recommended for Phase II Environmental Site Assessment	No Impact	10 in total	11 in total
Number of sites recommended for Phase I Environmental Site Assessment at Western Hills Viaduct	No Impact	0	1

Table 68. Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Individual properties eligible for listing or listed in the National Register of Historic Places (NRHP)	No impact	Longworth Hall Western Hills Viaduct	Longworth Hall Western Hills Viaduct
Historic Districts (HD) directly impacted	No impact	Lewisburg Historic District (53 contributing properties)	Lewisburg Historic District (28 contributing properties)
Potential Archaeological Sites requiring additional survey	No impact	2	1
Air Quality	Conforming	Conforming	Conforming
Number of impacted noise receptor sites in 2035 for Category B land use (residential)	1,180	1,343	1,402
Number of impacted noise receptor sites in 2035 for Category C land use (industrial/commercial)	113	106	122
Section 4(f) Resources	No Impact	• Goebel Park (3.7 acres – parking lot, basketball court and portion of walking trail) • Lewisburg Historic District (53 contributing properties) • Queensgate Playground and Ball Fields (0.6 acres) • Longworth Hall (204 feet of building) • Western Hills Viaduct (alterations and reconstruction of the east end of the viaduct)	• Goebel Park (1.9 acres – basketball court and parking lot) • Lewisburg Historic District (28 contributing properties to the district) • Queensgate Playground and Ball Fields (0.9 acres) • Longworth Hall (204 feet of building) • Western Hills Viaduct (reconstruction of 1,108 feet of the approach ramps of the WHV)
Section 6(f) Parks	No Impact	Goebel Park (3.7 acres)	Goebel Park (1.9 acres)

Table 68. Feasible Alternatives Evaluation Matrix

Evaluation Feature	No Build Alternative	Alternative E (with SPUI)	Alternative I (with TUDI)
Maintenance of Traffic and Constructability	No impact	• The project will be constructed in five phases • Construction will last seven years. • I-71 will be re-shielded to I-471 • Access to the CBDs in Covington and Cincinnati will be maintained at all times	• The project will be constructed in five phases • Construction will last seven years. • I-71 will be re-shielded to I-471 • Access to the CBDs in Covington and Cincinnati will be maintained at all times
Utilities	No Impact	57	57
Cost Estimates (in millions)	Not applicable	Kentucky $700.2 Ohio $971.6 WHV with SPUI $269.6 Existing Bridge $73.5 New Bridge $730.2 Total $2,745.1	Kentucky $641.4 Ohio $896.7 WHV with TUDI $141.8 Existing Bridge $73.5 New Bridge $730.2 Total $2,483.6

6.6 Environmental Commitments and Mitigation

Throughout development of the Brent Spence Bridge Replacement/Rehabilitation Project, KYTC, ODOT, and the Federal Highway Administration (FHWA) coordinated with federal, state, and local agencies; stakeholders; consulting parties, and the public to avoid or minimize project impacts to the extent possible. The following sections provide an overview of the mitigation measures and commitments proposed for the Brent Spence Bridge Replacement/Rehabilitation Project.

6.6.1 Social and Economic Resources

6.6.1.1 Displacements

The acquisition of property for right-of-way would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646). This Act was enacted by congress in 1971 to assist residents, organizations, and businesses displaced by public agencies in relocating without suffering a disproportionate loss. Whenever federal funds are utilized in a project and residential or business displacement occurs, then relocation advisory and financial assistance must be offered to those occupants being displaced as a direct result of the project.

Reimbursement benefits include just compensation at fair market value for displaced property. Displaced property owners are due compensation for real property to be acquired, fees incidental to the transfer of the property, mortgage prepayment penalties, and appraisal expenses. In addition, a person displaced from his or her dwelling is eligible to receive compensation for the relocation of their personal property. Affected owners and tenants are eligible to receive residential relocation assistance. Every person or business being displaced by the project is eligible to receive advisory assistance in relocating to a replacement dwelling.

When certain eligibility requirements are met, displaced persons are entitled to financial assistance in relocating their personal property and the increased costs of buying or renting a comparable replacement dwelling. These services and benefits would be in addition to the compensation received by the property owner for the acquisition of real property. The Uniform Relocation Act provides that adequate replacement housing is available before requiring an individual to vacate the dwelling being acquired.

Each business displaced by the project is eligible to receive advisory assistance in relocating personal property. These services and benefits would be in addition to the compensation received by the property owner for the acquisition of real property. Displaced businesses are also entitled to compensation for the relocation of their business property, based on actual and reasonable cost. A displaced business may also be entitled to reimbursement for miscellaneous expenses incurred for such items as storage or searching for a replacement site. The Uniform Relocation Act also provides an option to businesses to receive a payment in lieu of actual moving costs. This payment is based on average annual net income of the operation for the two taxable years prior to displacement.

As project development continues, efforts will be made to continue minimization and avoidance of impacts to business properties. A Relocation Assistance Program would be established to help property owners displaced by construction of the Preferred Alternative. The program will follow the procedures set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and the Uniform Relocation

Assistance and Real Property Acquisition Regulations for Federal and Federally Assisted Programs dated March 2, 1998. The Relocation Assistance Program would be administered by KYTC and ODOT. KYTC and ODOT representatives would contact individual property owners in advance of construction activities to begin negotiations for the purchase of the property.

6.6.1.2 Access

During construction, access to all neighborhoods and community facilities would be maintained to the extent practical through controlled construction scheduling and/or provisions of alternate routes of entry. Any access changes would be mitigated by providing adequate signage for the access changes and, where necessary, by working with the facility throughout the construction period to provide advanced notification to the community regarding the changes.

To reduce temporary impacts to the economy with the feasible alternatives, KYTC and ODOT would ensure that access to businesses is maintained at all times. Maintenance of Traffic during construction is discussed in Section 4.12.10.1.

6.6.1.3 Outreach

A regional outreach program would be established to inform the public about major traffic delays associated with the construction phases. This outreach will also be posted on the project website. The local news media would be notified in advance of road closures, diversions, and other construction activities. The program's objective would be to create awareness of the potential problems and provide alternate travel routes for drivers, including transit options. The outreach program could include a transit voucher program to encourage drivers to use public transportation, thereby reducing congestion. The combination of identifying alternative routes with the regional outreach program should ensure that effective traffic operations could be maintained throughout all phase of construction.

6.6.2 Ecological Resources

Construction of the project will not commence until the necessary permits have been completed for Water Quality Certification through the Ohio Environmental Protection Agency (OEPA) and Kentucky Division of Water, United States Army Corp of Engineers Section 404, and US Coast Guard (USCG) Section 9.

Potential stream mitigation measures could include payment into the Kentucky Department of Fish and Wildlife Resources (KDFWR) In-lieu Fee Program or a stream restoration project within the watershed using natural channel design.

The US Army Corps of Engineers requires mitigation for impacts greater than 0.1 acres of jurisdictional wetland. Potential wetland mitigation measures for small impacts could be accomplished through purchase of wetland mitigation bank credits (if applicable) or creation of wetland within similar dry detention basins along the proposed corridor.

An effect determination on the Indiana bat will be made once a Preferred Alternative is selected. This determination will be based on impacts to the potential summer roosting and foraging habitats and through coordination with the United States Fish and Wildlife Service (USFWS). Committing to seasonal tree cutting restrictions or payment to the Indiana Bat Conservation Fund could be used as mitigation for any impacts to potential Indiana bat habitat areas.

Since a new bridge will be constructed adjacent to the existing bridge in either alternative, best management practices would be used during placement of bridge piers to minimize impacts to aquatic life. In addition, in stream work within the Ohio River would be restricted between March 15 and June 30.

During construction, best management practices would be used to ensure minimization of silt entering nearby headwater streams. Best management practices could include use of silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches.

A detailed mussel survey will be completed after a Preferred Alternative has been selected. An effects determination on these mussel species will be based on the results of the survey and the proposed level of disturbance.

Areas within the right-of-way limits of the feasible alternatives would be disrupted due to construction activities. At the completion of construction, disturbed areas will be re-vegetated to provide some level of restoration.

Coordination with the Kentucky Department of Fish and Wildlife Resources would occur in the spring prior to the rehabilitation of the existing Brent Spence Bridge or the demolition of the bridge approaches to address nesting of peregrine falcons.

Construction activities will disturb soils and possibly cause erosion and sedimentation. KYTC's and ODOT's standard specifications for sediment and erosion control would be implemented during all phases of construction. An amendment to the Clean Water Act broadened the definition of point source pollutants to include stormwater discharge from industrial activities and construction sites. A Stormwater Management Plan, which includes erosion and sediment control measures would be developed and implemented. Kentucky and Ohio Point Discharge Elimination System Construction Stormwater permits will be required.

6.6.3 Hazardous Materials

The Phase II ESA will be conducted after the Preferred Alternative is chosen and only on the sites that are impacted by the Preferred Alternative. A Phase I ESA will be conducted for the Harrison Terminal site at 1220 Harrison Avenue in Cincinnati if Alternative I is selected as the Preferred Alternative.

Based on known information about the following sites, if dewatering is necessary for construction purposes plan notes for petroleum contaminated soil (PCS) and contaminated groundwater will be developed and placed into plans:

- Site 52 – city of Cincinnati, 351 John Street,
- Site 54 – city of Cincinnati, 514 West Third Street, and
- Site 57 – city of Cincinnati, 302-304 Central Avenue.

6.6.4 Archaeological Resources

Coordination will be undertaken with the Kentucky Heritage Council (KHC) and Section 106 consulting parties to develop and define actual mitigation and minimization measures for archaeological resources. These measures will be specified in a Section 106 Memorandum

of Agreement (MOA) to be developed for this project. Potential mitigation measures could include the following:

- Completion of Phase I archaeological surveys on 26 individual parcels that could not be previously accessed.
- Conduct archaeological monitoring of those areas that are currently inaccessible due to coverage from parking lots or other impediments.
- Conduct geoarchaeological deep testing at Site 15KE160 to assess the potential for deeply buried cultural deposits at the site.
- Conduct a remote sensing survey to determine if any submerged targets are located within the Ohio River crossing portion of the project.

If warranted, a Phase I archeological survey will be completed within the right-of-way limits of the Preferred Alternative in Ohio in the next phase of the project development process.

6.6.5 Section 4(f)/6(f) Resources

Mitigation measures and commitments specific to each resource have been developed. The following is a summary of those measures and commitments.

6.6.5.1 Goebel Park

To mitigate the impact to Goebel Park from the project, KYTC will vacate 2.6 acres of land immediately adjacent to the park along KY 5th Street and transfer the land to the city of Covington for the purpose of mitigating the loss of parkland. Additionally, KYTC will reimburse the city of Covington $77,600 for the reconstruction of the basketball court and associate resources. These funds will be used for the replacement and enhancement of the basketball courts or for other outdoor recreational facilities within Goebel Park. A memorandum of agreement (MOA) among FHWA, KYTC and the city of Covington will be prepared to address impacts and mitigation commitments for Goebel Park.

Additionally, mitigation of impacts to the Goebel Park resource includes reduction of stormwater impacts on the area also used by Sanitation District 1 for the Willow Street stormwater overflow. The KYTC is working with Sanitation District 1 to develop a management plan that reduces stormwater runoff from I-71/I-75 onto Goebel Park property.

Recreational areas within two miles of Goebel Park are available for use by the public to compensate for the potential loss of amenities. Parks with similar amenities include:

- Randolph Park, located approximately one mile from Goebel Park at 8th and Greenup streets. Park facilities include a pool, basketball courts, baseball field, and picnic shelter.
- Devou Park, located approximately one mile from Goebel Park on the west side of I-71/I-75. This regional park has several amenities including picnic shelters, a bandshell, pavilion, golf course, and museum.
- Senator Gus Sheehan Park, located on Parkway Avenue near Devou Park. This park includes a pool and basketball courts.

6.6.5.2 Lewisburg Historic District

Mitigation measures for the Lewisburg Historic District include:

- Completion of photographic documentation of buildings to be demolished.
- Completion of Kentucky Individual Buildings Survey Forms for contributing resources within the Lewisburg Historic District (430 contributing buildings are listed in the National Register of Historic Places (NRHP) nomination).
- Revision of the 1993 NRHP nomination form to include contributing buildings that were not yet 50 years old at the date of nomination and to note which buildings are no longer extant due to recent residential development in the area.
- Creation of a Historic Preservation Plan for Lewisburg to preserve the history of the district.
- A Façade Grant Program: This program will be developed and implemented to improve and rehabilitate the façades of homes and businesses within the Lewisburg Historic District. This program will be funded by FHWA and administered by the city of Covington. This program will require matching funds by property owners. Specific details of the program, including additional funding sources, review authority, and timeframes for approval and completion of projects will be determined through consultation between FHWA, KYTC, and the city of Covington.
- Vibration Testing During Construction: KYTC will monitor a number of historic resources within the Lewisburg Historic District to determine the effects of construction vibration. Construction plans will include provisions for pre-and post-construction surveys, installation of vibration monitoring devices and visual inspection during construction. As appropriate, KYTC will observe the vibration monitors and make determinations as to whether vibration from construction activities could damage the resources. If vibration damage occurs to historic resources, repairs will be coordinated in advance with KHC to ensure they are carried out in accordance with the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.*

Additional coordination will be undertaken with the KHC and other Section 106 consulting parties to further develop and define mitigation measures for the Lewisburg Historic District. These measures will be specified in a Section 106 MOA to be developed for this project.

6.6.5.3 Queensgate Playground and Ball Fields

ODOT will compensate the Cincinnati Recreation Commission for land and property acquired and the following:

- Compensation for the relocation of the two existing ball fields.
- Compensation for the relocation of the 435 feet of the walking path.
- Compensation for the loss of trees due to the relocation of ball fields.
- Compensation for the need to relocate field lighting due to the relocation of ball fields.
- Compensation for the need to prepare final mitigation plans and monitor construction of the mitigation project.

The total mitigation compensation to be provided in addition to land and property acquisition is $198,050 as agreed upon in the MOA. In addition, limited access right of way fencing along the park and highway boundary will be installed. The fence will be 10-foot high chain link fencing.

During construction at the Queensgate Playground and Ball Fields, three recreational areas within 1.5 miles of the park will be available for use by the public:

- Dyer Park located at 2110 Freeman Avenue is 1.3 miles from the Queensgate Playground and Ball Fields. Park facilities include a water sprayground, playground, basketball court, football and baseball fields, and picnic area.
- Lincoln Community Center located at 1027 Linn Street is 0.14 miles from the Queensgate Playground and Ball Fields. The community center has a playground, basketball and tennis courts, picnic area, swimming pools, computer center, game room, fitness center and meeting rooms.
- Washington Park located at 1225 Elm Street is 0.65 miles from the Queensgate Playground and Ball Fields. Currently this park is being renovated. In the future, it will have a playground, performance stage, event plaza, dog park and green space.

6.6.5.4 Longworth Hall

ODOT and FHWA propose the following mitigation measures for Longworth Hall. These measures are based on recommendations provided by consulting parties:

- Masonry repair, which will include repair or replacement of bricks as warranted; tuck-pointing; and brick cleaning of the west, north and south walls.
- Installation of exterior storm windows.
- Restoration of the east wall, to an approximation of its original appearance. This will include materials salvaged during demolition in accordance with the Secretary of Interior's Standards
  - Plans will be developed for review and comment by the building owner, Cincinnati Preservation Association and OHPO.
  - Windows removed to accommodate the new roadway construction, will be restored and used in the east wall reconstruction.
  - Windows removed and not used in the east wall reconstruction will be restored and returned to the owner.
  - A cornerstone commemorating the date of construction (1904) on one side and the date of the renovation on the other side will be included in the east wall reconstruction design.
- Plaque/Interpretive signage will be constructed:
  - The original location of the east wall prior to construction of the Brent Spence Bridge will be outlined by bricks and stone work.
  - An interpretive plaque describing changes to the property that have occurred over time will be placed near the original location of the east end wall.
- The original lettering across the top of the building will be refurbished.
- All materials removed that retain a historic integrity and nature will be returned to the building owner to be reused in future repairs or future expansion.
- ODOT will have follow up discussions with the owner regarding contracting methods and their request to either perform the construction themselves or provide project management control. If ODOT concurs in this approach, details will be outlined in a separate agreement.

A MOA among FHWA, ODOT and the Ohio Historic Preservation Office (OHPO) was prepared to address the adverse effect to Longworth Hall. The MOA is provided in Appendix E.

6.6.6 Air Quality

State and local regulations regarding dust control and other air quality emission reduction controls would be followed to minimize air impacts during construction. In order to minimize the amount of construction dust generated, the following mitigation measures below could be implemented:

- Minimize land disturbance
- Use watering trucks to minimize dust
- Cover trucks when hauling dirt
- Stabilize the surface of dirt piles if they are not removed immediately
- Use windbreaks to prevent accidental dust pollution
- Limit vehicular paths and stabilize these temporary roads
- Pave all unpaved construction roads and parking areas to road grade for a length no less than 50 feet from where such roads and parking areas exit the construction site. This prevents dirt from washing onto paved roadways.
- Cover trucks when transferring materials
- Use dust suppressants on unpaved traveled paths
- Minimize unnecessary vehicular and machinery activities
- Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road.
- Re-vegetate any disturbed land not used
- Remove unused material
- Remove dirt piles
- Re-vegetate all vehicular paths created during construction to avoid future off-road vehicular activities

6.6.7 Noise

ODOT and KYTC require that noise abatement measures be considered at locations where traffic related noise impacts are identified. Noise walls will be constructed along the I-71/I-75 corridor to mitigate noise impacts. The final locations of the noise walls will be determined through a public involvement process.

6.6.8 Maintenance of Traffic Plan

A Maintenance of Traffic (MOT) plan would be developed and implemented to maintain traffic operations throughout the corridor and minimize disruption to the surrounding communities. KYTC and ODOT would work together to implement a seamless MOT plan through all phases of construction. The first phase of construction would involve modifications to interstates east of the study area to support detour and lane shifts. The construction of the I-75 corridor would be initiated in the western portion of the corridor, including the new Ohio River Bridge.

In order to reduce the volume of traffic using the I-75 corridor, I-71 traffic would be diverted to I-471 utilizing I-275 in Kentucky. To support this detour, the ramp from southbound I-71 to southbound I-471 and the ramp from southbound I-471 to westbound I-275 would be reconfigured to provide two travel lanes. Similarly, the ramp from eastbound I-275 to northbound I-471 and the ramp from northbound I-471 to northbound I-71 would be widened to two lanes. I-471 would be widened to four lanes in each direction to enhance capacity on this interstate.

The second phase of construction includes replacement of overpass bridges to accommodate the widening of the I-75 corridor. The proximity of the existing bridge piers to the proposed bridge piers requires that the existing structures be removed from service to allow construction of the new structures. Access to some existing ramps would be temporarily prohibited. I-71 traffic in both directions could be closed through downtown Cincinnati, with traffic diverted to I-275 and I-471. This would enable a large and cost efficient work area for construction of the many structures in this area.

The third and fourth phases of construction would include the new Ohio River Bridge and the approaches in Kentucky and Ohio. Access to Covington would be modified to provide only one entrance and one exit in the southbound and northbound directions. Access from southbound I-71/I-75 will be maintained via the Pike Street exit and access to southbound I-71/I-75 from Covington will be maintained via the KY 12th Street entrance ramp. In Cincinnati, I-75 would be reduced to two travel lanes in each direction where possible. Three travel lanes would be provided in the northbound direction on I-75 north of Freeman Avenue and in the southbound direction north of OH 9th Street in Cincinnati.

Once the southbound C-D system in Ohio, new Ohio River Bridge and the approaches in Kentucky and Ohio are completed, southbound I-75 traffic would be diverted to the new, widened interstate, crossing the new bridge on the bottom deck, and utilizing the widened portion of the interstate in Kentucky. The new southbound I-71/I-75 connections to Covington would open. Northbound I-75 traffic would remain in its current location, leaving a large work area available to the contractor to construct new I-75 pavement and available ramp areas.

The final phase involves shifting northbound I-75 to its final location on the new Ohio River Bridge, which would allow the connections to Fort Washington Way and Ohio 2nd Street to be constructed. The rehabilitation of the existing Brent Spence Bridge would also occur during this phase. During this phase, most of the existing northbound I-75 ramps in Ohio and Kentucky would be accessible; however, all Ohio southbound I-75 exit ramps south of 7th Street would be closed. These include the ramps to 5th Street, Fort Washington Way, and 2nd Street. Ramps would be re-opened to traffic whenever possible as the work progresses.

6.6.9 Utilities

To mitigate temporary utility impacts, KYTC and ODOT would coordinate closely with the various utility owners in the study area throughout the design and construction phases of the project. Early coordination will decrease the chance of surprises during construction and will enable efficient phasing of the roadway, bridges, and utility work.

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