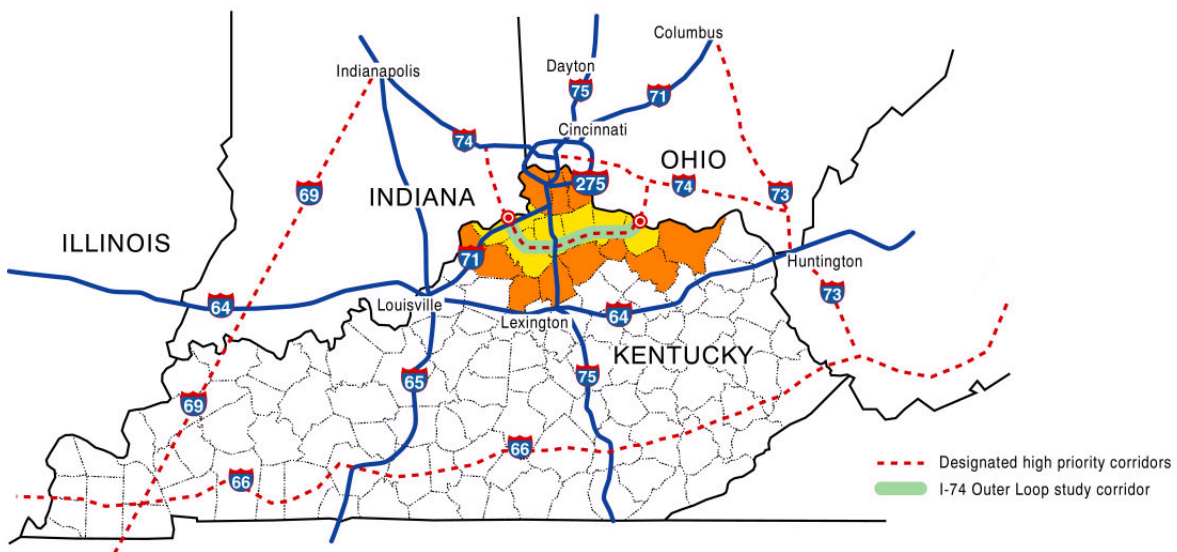


# CONCEPTUAL FEASIBILITY OF NORTHERN KENTUCKY OUTER LOOP (I-74)



## FINAL REPORT

Prepared For

*Kentucky Transportation Cabinet*

by:



AMERICAN CONSULTING ENGINEERS, PLC

March 2003

# Northern Kentucky Outer Loop (I-74)

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## **INTRODUCTION**

The purpose of this report is to determine if a new highway across Northern Kentucky is conceptually feasible from both an economical and financial perspective.

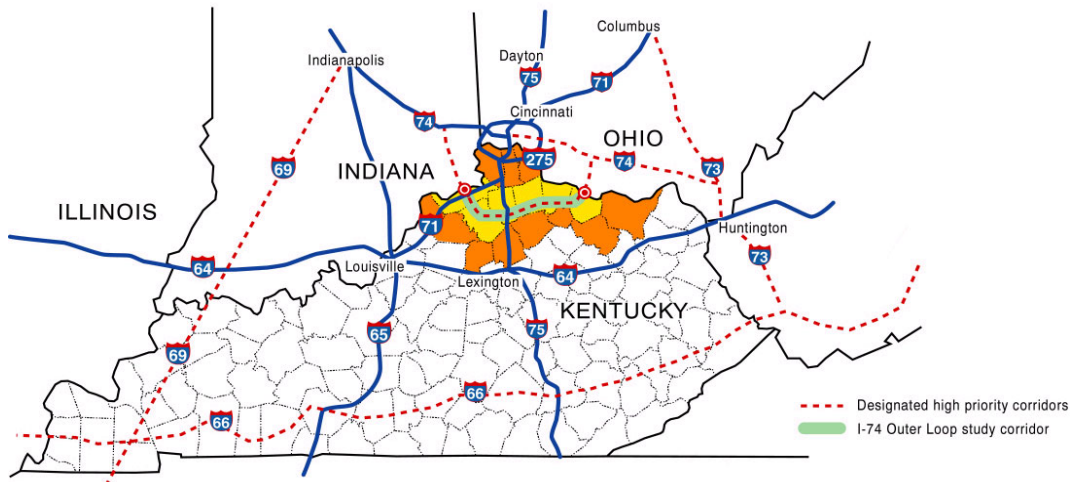
### **Legislative History**

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) established 21 high priority corridors on the National Highway System (NHS). The purpose of establishing these corridors of national significance was to allow the Secretary of Transportation, in cooperation with the States, to prepare long-range plans and feasibility studies; to allow the States to give priority to funding the construction of these corridors; and provide increased funding for segments of these corridors that have been identified for construction. This created a new discretionary funding category for the conduct of feasibility and design studies. Section 1105(c)5 of that act defined a “I-73/74 North-South Corridor from Charleston, South Carolina through Winston-Salem, North Carolina to Portsmouth, Ohio to Cincinnati, Ohio and Detroit, Michigan.” This corridor conceptual feasibility study was authorized by Public Law 105-178, dated June 9, 1998, of the 105<sup>th</sup> United States Congress. This act is cited as the “Transportation Equity Act for the 21<sup>st</sup> Century”, more commonly known as TEA-21. This act, under section 1602, defines 1,850 specific “high priority projects” that can be undertaken by the States and funded at a rate of 80% Federal, 20% State. Numbers 1226 and 1580, identify the project as “conduct feasibility study for Northern Kentucky high priority corridor (I-74).” Federal funds for this study project are available for fiscal years 1998 through 2003.

### **Kentucky Segment (I-74) Study**

State and Federal Funding became available in early 2000 and work began shortly thereafter. The Kentucky study had the following guiding principles:

- The general study purpose is to determine the economic justification, financial feasibility, and need for a possible Kentucky segment of the I-74 corridor.
- The general corridor location is across seven Northern Kentucky Counties extending from near the Markland Dam to the Masyville Bridge. The corridor is approximately 80 miles in length and 5 to 10 miles in width.
- The name of the study is the Northern Kentucky Outer Loop (I-74) Study. This name will appear frequently in this text as I-74 or Outer Loop (I-74). Refer to Figure A the study location map.



**Figure A: Study Location Map**

## Study Approach and Issues

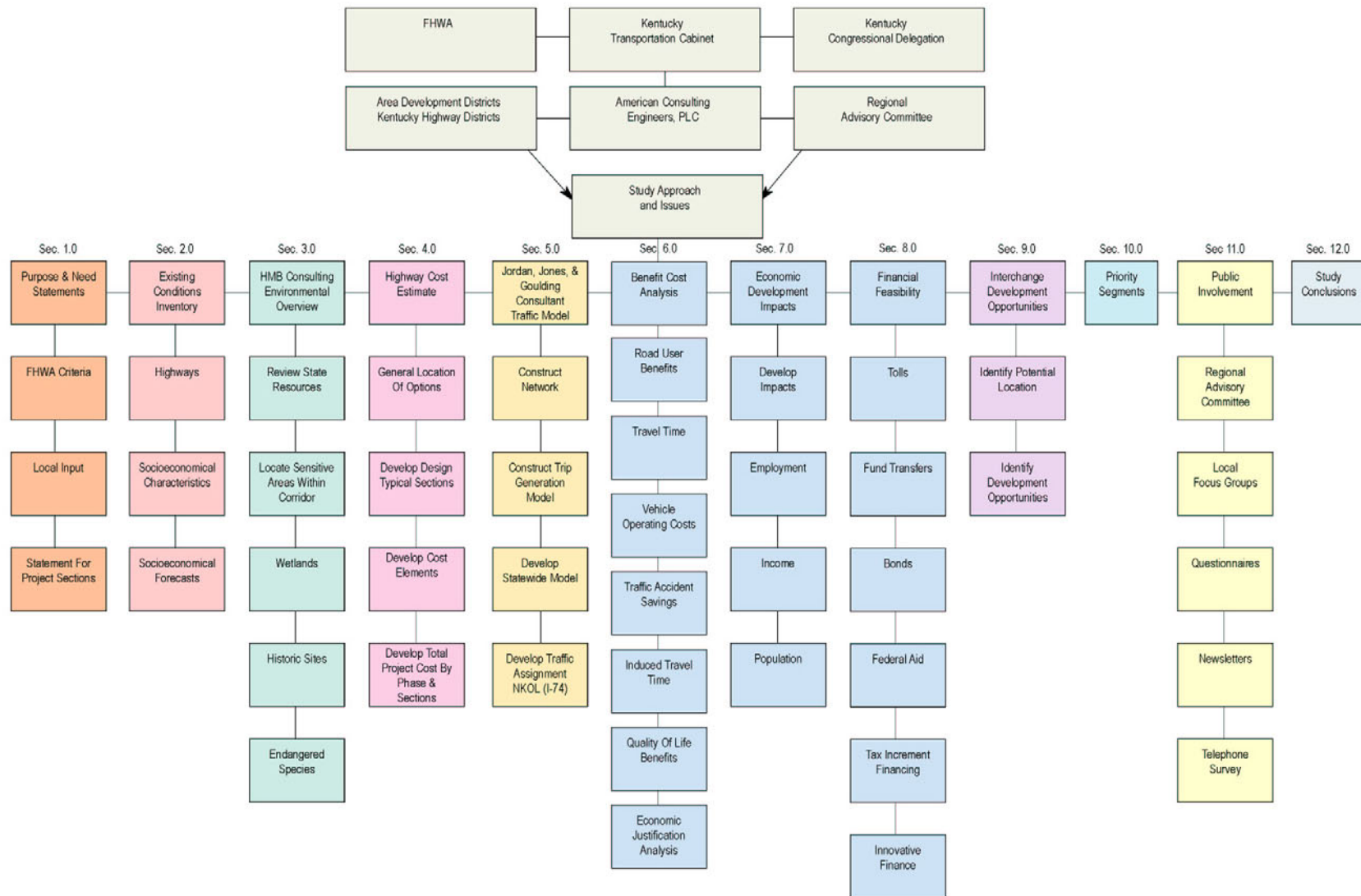
### Study Approach

The study approach consisted of the development of an overall study scope and the integration of basic information gathering, developing and sharing modules or chapters as outlined below:

- 1) Purpose and Need
- 2) Existing Conditions
- 3) Environmental Overview
- 4) Project Cost Estimates
- 5) Traffic Forecasting
- 6) Benefit Cost Analysis
- 7) Economic Development
- 8) Financial Feasibility
- 9) Interchange Development Opportunities
- 10) Priority Segments
- 11) Public Involvement
- 12) Study Conclusions

Each of the above modules or chapters is presented in more detail in the subsequent sections. General work flow of this study is identified in Figure B.





**Figure B: Workflow Chart for I-74 Feasibility Study**

## **Pertinent Study Scoping Issues**

Several pertinent issues need to be discussed in order to better understand the limits and scope of the study.

- *Limits of the Project* – The Kentucky Transportation Cabinet set the limits of the project corridor as Markland Dam Bridge over the Ohio River in Gallatin County and the new cable stayed bridge just west of Maysville over the Ohio River. These locations were picked because Ohio River bridge crossings are very expensive and the existing bridges could serve as possible interim or long-term links with the adjoining states. In addition, Indiana was beginning to evaluate the conceptual feasibility of providing improved access in the State Route 101 north-south corridor that connected Markland Dam with I-74 west of Cincinnati, Ohio.
- *Width of Corridor* – The Kentucky Transportation Cabinet determined that in a feasibility study such as this, a corridor width of at least 5 miles is needed to avoid encumbering the feasibility study with unnecessary right-of-way issues. If the corridor proves feasible, then the right-of-way issues can be discussed at later stages of project development.
- *Committed Highway System* – In order to obtain the most accurate answers from the traffic forecasting model, numerous highway improvements were incorporated within the regional highway network. Committed highway improvements were all the high priority corridor improvements identified in the 1991 and 1998 Federal Transportation Acts and all major projects in the Kentucky Six-Year Highway Plan.
- *Public Involvement Program* – There is not a set answer to a public involvement program, so the Kentucky Transportation Cabinet working with the Northern Kentucky and Buffalo Trace Area Development Districts proposed an effort consisting of regional meetings and local meetings supplemented with news media coverage. The results of the public involvement program are described in detail within the report.

***The information in the following sections of this report is provided as a summary of findings. The information from Sections 1.0 through 10.0 is more extensively detailed in the individual reports which are included in their entirety on the enclosed Compact Disc. Information from section 11.0 was derived from the public involvement folder which is available at the Kentucky Transportation Cabinet, Division of Planning.***

### **1.0 PURPOSE AND NEED**

The purpose and need statement for a project is very important because it identifies the reason the project is taking place, and what is intended to be accomplished by implementing the project. The purpose and need statements should focus on the factors which have led to the proposal, that is, what problem exists that needs to be solved. Examples of these factors include safety, capacity, legislative directive, economic development, and roadway deficiencies.

A purpose and need statement defines the conditions against which alternative possible solutions will be measured for efficacy and effectiveness. The purpose and need statement is the legacy that carries on from this phase of the project into possible future phases. The purpose and need statement is the measuring stick by which all future roadway development activities will be evaluated. As the purpose and need statement transitions through the various project phases, it is usually expanded and enhanced as more is known about the project and its inputs.

### **1.1 Purpose and Need Statements**

After meeting with the Regional Advisory Committees, County Judge Executives, Chambers of Commerce, Local Focus Groups, and receiving numerous comments via newsletters the following purpose and need statements were developed:

- *To open new economic development and job growth opportunities for this depressed agrarian region via improved accessibility and reduced travel times.*
- *To provide a new alternate route that will accommodate both large trucks and commercial vehicles, mitigate geometric deficiencies of current facilities, and improve safety.*
- *To provide a high level east-west roadway that would facilitate better access to: community services, existing high level north-south roadways, and communities.*

### **1.2 Secondary Goals for the Priority Segments**

In addition to the purpose and need statements for the I-74 corridor, there were also secondary goals or benefits that would come from a new route. These goals would not justify the project by themselves, but could be considered secondary criteria to judge alternates and the benefits they provide to the communities throughout the corridor. The secondary goals are identified for a few of the priority segments listed in Section 10.0 PRIORITY SEGMENTS. These secondary goals are listed below:

#### *US 127 to I-75 (Owen and Grant Counties)*

- ◆ To use the proposed roadway fill as an impoundment structure to create additional drinking water and recreational opportunities for both Owen and Grant Counties.

#### *I-71 to US 127 (Carroll/Gallatin and Owen Counties)*

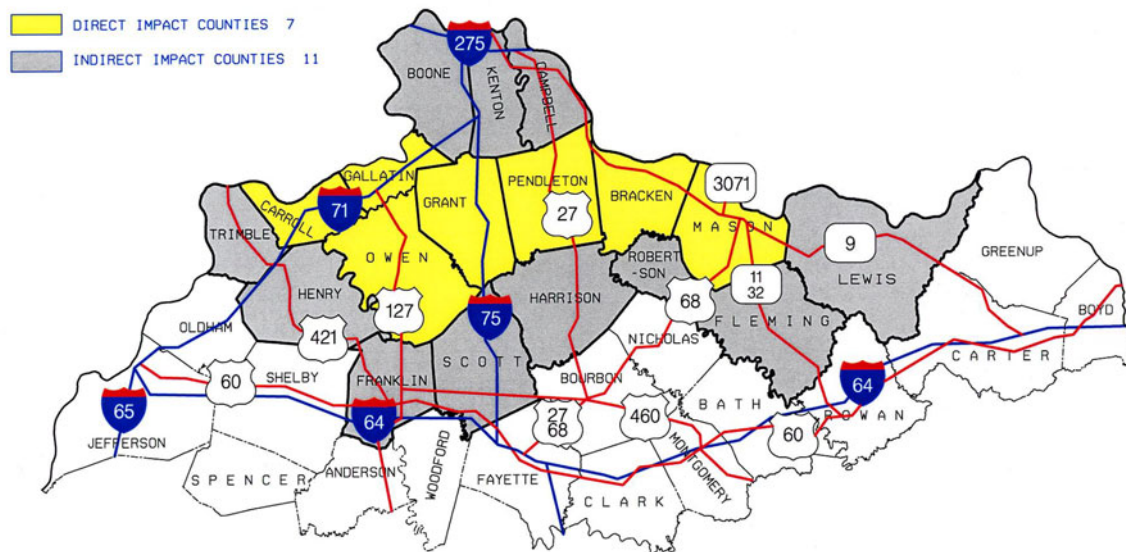
- ◆ To provide better access to the Kentucky Speedway.
- ◆ To use the proposed roadway fill as an impoundment structure to create additional drinking water and recreational opportunities for Owen County.

#### *I-75 to US 27 (Grant and Pendleton Counties)*

- ◆ To use the proposed roadway fill as an impoundment structure for a reservoir in both Grant and Pendleton Counties.
- ◆ To provide better access to existing recreational facilities, such as local lakes and state parks.

## 2.0 EXISTING CONDITIONS

Information was gathered on the transportation infrastructure, the socioeconomic conditions, goals and objectives, and priorities for each of the direct impact counties in the Northern Kentucky Outer Loop (I-74) Corridor. There were two categories of counties in the I-74 study area: direct impact and indirect impact counties. Direct impact counties are those in which a new Northern Kentucky Outer Loop (I-74) Corridor might be located. The indirect impact counties are adjacent counties that feel the effects of the improved accessibility, within approximately 30 miles of the corridor. There are 7 direct impact counties and 11 indirect impact counties for a total of 18 counties that would be affected by the proposed new highway. This information was documented in the “Existing Conditions Report” and distributed for comment. The existing conditions data provided the basis for identifying transportation system deficiencies and conducting economic impact analysis for other phases of the I-74 study. The base year for data compilation was established in 2000. Figure 2.0 illustrates the direct and indirect impact counties in the Northern Kentucky Outer Loop (I-74) Corridor.



**Figure 2.0: Direct and Indirect Impact Counties**

### 2.1 Major Highways

The proposed Northern Kentucky Outer Loop (I-74) is an east-west route approximately 30 miles south of Cincinnati. With the exception of I-275 around Cincinnati, there are very few existing east-west routes in this region of Kentucky. East-west routes in this area are narrow and do not meet current geometric guidelines. As a result, the current east-west roadways provide poor connectivity to the main north-south routes.

### 2.2 Socioeconomic Characteristics

To provide some insight into the potential of this Northern Kentucky Outer Loop (I-74), several statewide socioeconomic condition maps were prepared that illustrate existing unemployment by county, average personal income by county, population by

county, etc. Figures 2.2.1 through 2.2.3 illustrate the socioeconomic conditions of the region.

## 2000 Kentucky Population

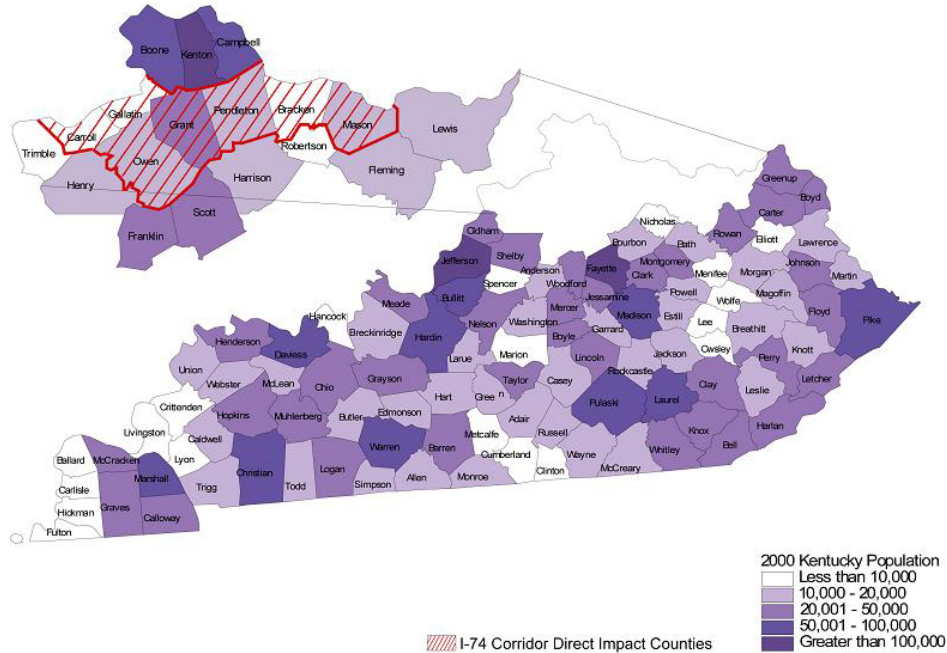


Figure 2.2.1: 2000 Kentucky Population by County

## 2000 Per Capita Income

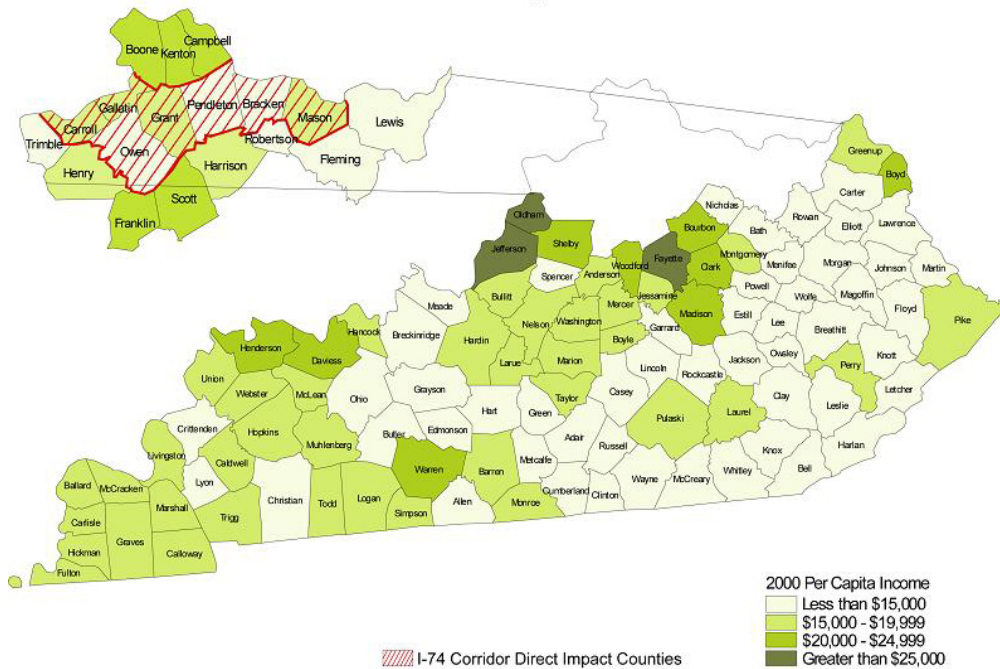
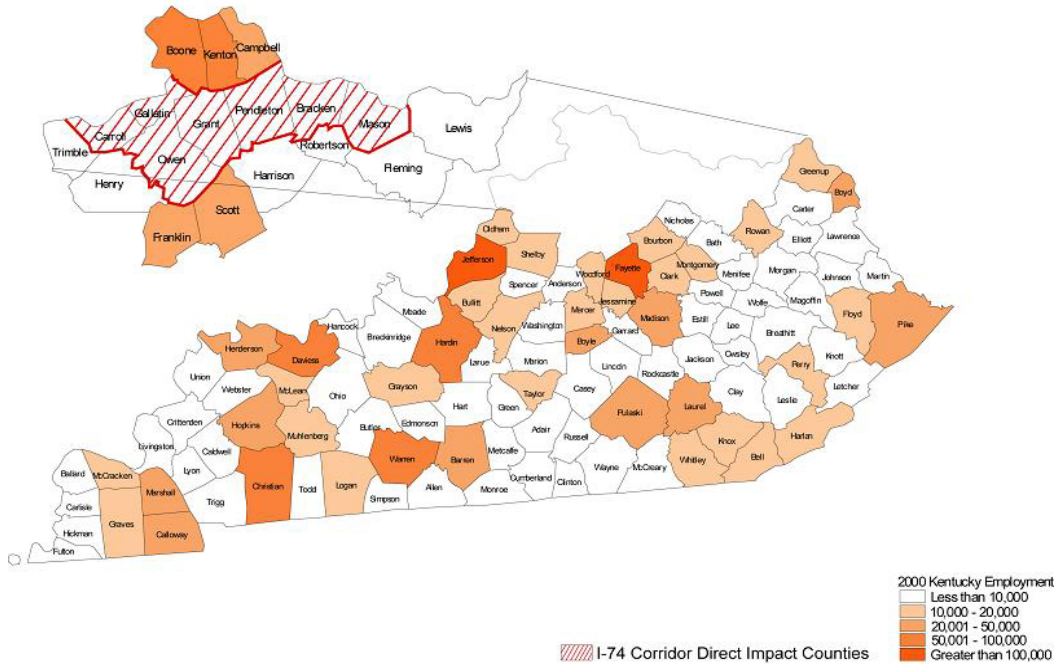


Figure 2.2.2: 2000 Kentucky Per Capita Income by County

# 2000 Kentucky Employment



**Figure 2.2.3: 2000 Kentucky Employment per County**

As Table 2.2 indicates, the direct impact counties lag the State and Nation in per capita income, jobs, and population density, even though bounded on the north and south by urban regions that exceed the State and National averages in these categories.

**Table 2.2: Comparison of Socioeconomic and Travel Characteristics**

	United States	Kentucky	Direct I-74 Counties	Indirect I-74 Counties	Non-Corridor KY Counties
<b>Population (2000)</b>	275,205,752	4,000,427	88,202 (2%)**	469,975 (12%)**	3,442,250 (86%)**
<b>Employment (2000)</b>	166,657,025	2,322,416	43,145 (2%)***	282,502 (12%)***	1,996,769 (86%)***
<b>Per Capita Income (2000)*</b>	\$24,205	\$19,564	\$16,228	\$21,387	\$19,400
<b>Jobs Per Persons (2000)</b>	0.606	0.581	0.489	0.601	0.58
<b>Population Density (2000) per sq. mile</b>	73	101	56	172	97

\* 1992 Dollars; \*\* Percent of 2000 Kentucky population; \*\*\* Percent of 2000 Kentucky employment.

Source for Socio-Economic Data: Woods & Poole Economics, Inc.

Source for Square Mileage: 1998 Statistical Abstract of the United States (Table 1) and 1999 Kentucky Deskbook of Economic Statistics (Page 7).

### 3.0 ENVIRONMENTAL OVERVIEW

The proposed Northern Kentucky Outer Loop (I-74) corridor stretches across northern Kentucky near the Markland Dam in Carroll/Gallatin Counties to the Maysville Bridge in Mason County. The corridor is approximately 80 miles in length and 5 to 10 miles in width. Along this route many environmental resources have the potential to be impacted.

#### 3.1 Types of Environmental Resources in the Project Corridor

There are numerous types of environmental resources that could impact the project corridor. Resources that have files readily available and have been compiled on this project to determine potential impacts are:

- *Wild and Scenic Rivers* - The Wild and Scenic Rivers Act was enacted in 1968 to recognize the inherent value of preserving wild rivers in their free-flowing condition. Kentucky recognizes only three surface streams as Wild and Scenic Rivers, none of which occur within the proposed project corridor.
- *Outstanding Resource Waters and High Quality Streams* – These water sources are defined as: “1) waters designated under the Kentucky Wild Rivers Act; 2) waters designated under the Federal Wild and Scenic River Act; 3) waters identified under the Kentucky Nature Preserves Act and; 4) waters that support federally recognized endangered or threatened species under the 1973 Endangered Species Act. Other surface waters may also be included in this category if they meet certain other criteria. There are many water crossings within the project corridor. Each of these impacts will have to be mitigated according to the standards of the Clean Water Act.
- *Federal Superfund Sites* - Information was secured from the United States Environmental Protection Agency and Kentucky Natural Resources and Environmental Protection Cabinet, regarding Superfund sites within the proposed project impact area. Records indicate that no federal Superfund sites occur directly within the proposed project boundaries.
- *U.S. Fish and Wildlife Federally Protected Species* – Several species that are federally listed as threatened/endangered are known to occur and have been recorded within the counties potentially affected by the proposed project. There are a few varieties of mussel species known to be located in the larger streams throughout the corridor.
- *State Listed Species* – Kentucky Department of Fish and Wildlife Resources documents numerous State listed species that occur in the counties through which the proposed corridor crosses, and may occur within the project boundaries. These species of plants and animals receive no legal protection but are considered rare within the State and the local area where they occur.
- *Listed National Register Sites* – The State Historic Preservation Officer (SHPO) through the Kentucky Heritage Council reports a number of National Register sites within the proposed corridor. There are also numerous sites within the project area that

meet national register criteria but have not yet been listed on the National Register of Historic Places. Many cemeteries are also located within the project impact area.

- *State/National Parks/Nature Preserves/Wildlife Management Areas* - General Butler State Park near Carrollton occurs near the project impact area in Carroll County. Blue Licks Battlefield State Park Resort is located in Robertson County, but is located outside the proposed corridor. Quiet Trails Nature Preserve is located in Harrison County outside of the project corridor. There are no Wildlife Management Areas maintained by the Kentucky Department of Fish and Wildlife Resources occurring within the proposed project boundaries.
- *Areas of Significant Recharge/Sinkholes* – There are some sinkholes located within the project corridor. Groundwater is also a concern that will need to be addressed during later stages of this project.
- *Wetlands* – National Wetlands Inventory Maps indicate large numbers of wetlands in the proposed project area. Because of the many streams within the area, there are large numbers of Palustrine Forested and Riverine wetland systems. Emergent vegetation wetlands and scrub-shrub wetlands also occur throughout the project corridor.

None of these readily available resource materials identified any “fatal flaws” in the corridor. However, as the project moves through additional study phases, such as corridor refinement and full environmental assessment, additional impacts and environmental sensitivities will be investigated and noted.

## **4.0 PROJECT COST ESTIMATES**

Cost estimates were developed by selecting a general location and preparing an estimated cost of the Northern Kentucky Outer Loop (I-74). The focus of this effort was to develop costs for about 80 miles of highway for each of three highway types. The actual corridor recommended was chosen by the County Judge Executives in the seven (7) direct impact counties.

### **4.1 Cost Study Objectives**

The specific objectives of the cost study effort were twofold. The first was to identify general route locations for three highway types within the approved corridor: 1) a 70 mph Interstate; 2) a 60 mph 4 lane arterial; and 3) a 60 mph 2 lane arterial (Section 4.3 will discuss specifics of the three designs). The second objective of the cost study was to develop conceptual cost estimates for the alternative routes, including planning, environmental, design, right-of-way, utilities, and construction, so that, if needed, cost estimates for consideration in the Kentucky Transportation Cabinet’s Six-Year Highway Plan development process would be available.

Due to the fact that existing east-west routes in the area do not meet current geometric guidelines, this cost estimate will only consider new construction and not the rehabilitation of existing facilities. Alignment locations were developed for the three designs varying mostly at the western termini of the project.



## 4.2 Corridor Location

The corridor for the Northern Kentucky Outer Loop (I-74) traverses from Carroll/Gallatin County near the Markland Dam through Owen, Grant, Pendleton, Bracken and into Mason County near the Maysville Bridge. The corridor is 80 miles in length and is 5 to 10 miles in width. In order to estimate costs associated with the various study alternates, study centerlines were developed using the software packages Microstation and Inxpress. These study centerlines were used for estimation purposes only and followed basic design principles based on highway design speeds.

## 4.3 Study Alternates

There were basically three different study options: a 70 mph Interstate, a 60 mph 4 lane arterial, and a 60 mph 2 lane arterial. The general roadway features for each of the three alternates are defined in Table 4.3 and Figure 4.3.

**Table 4.3: Roadway Features for Study Alternates**

<b>NORTHERN KENTUCKY OUTER LOOP (I-74)</b>			
<b>DESIGN FEATURES</b>	<b>HIGHWAY DESIGN FACILITY</b>		
	CONVENTIONAL INTERSTATE	4 LANE RURAL ARTERIAL	2 LANE RURAL ARTERIAL
	70 mph DESIGN SPEED	60 mph DESIGN SPEED	60 mph DESIGN SPEED
<b>Shoulder Widths</b>			
Inside:	12 ft	8 ft	N/A
Outside:	12 ft	12 ft	10 ft
<b>Minimum Lane Widths</b>	12 ft	12 ft	12 ft
<b>Number of Lanes (each direction)</b>	2	2	1
<b>Clear Zones</b>	30 ft	30 ft	30 ft
<b>Median Widths</b>	60 ft	40 ft	N/A
<b>Minimum Radius</b>	1820 ft	1205 ft	1205 ft
<b>Maximum Grade</b>			
Level Terrain	3%	3%	3%
Rolling Terrain	4%	4%	4%
Mountainous Terrain	5%	6%	6%
<b>Average Right-of-Way Width</b>	410 ft	330 ft	205 ft
<b>Control of Access</b>	Full	Partial	Partial

NORTHERN KENTUCKY OUTER LOOP (I-74)

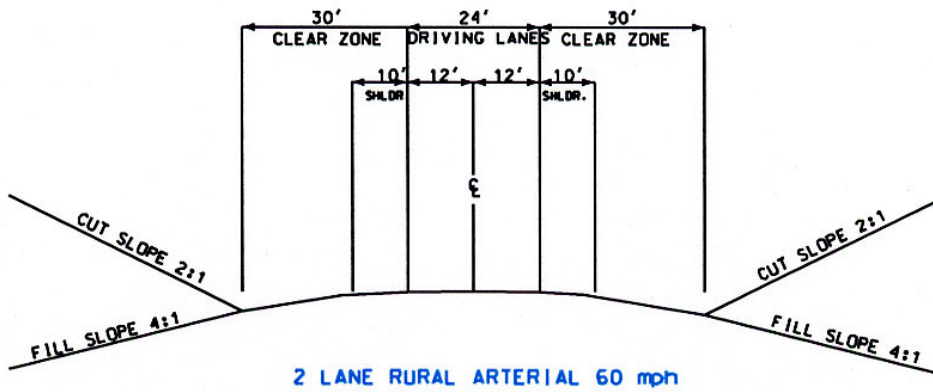
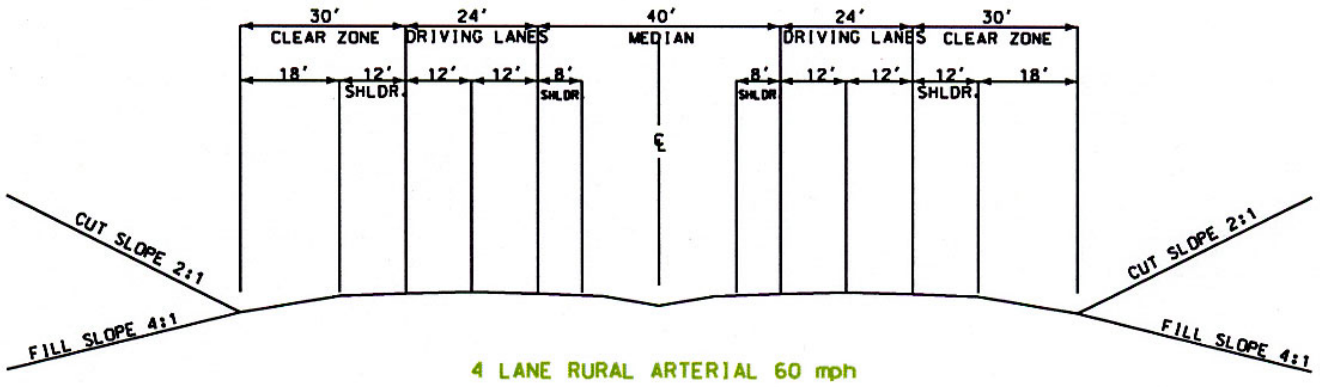
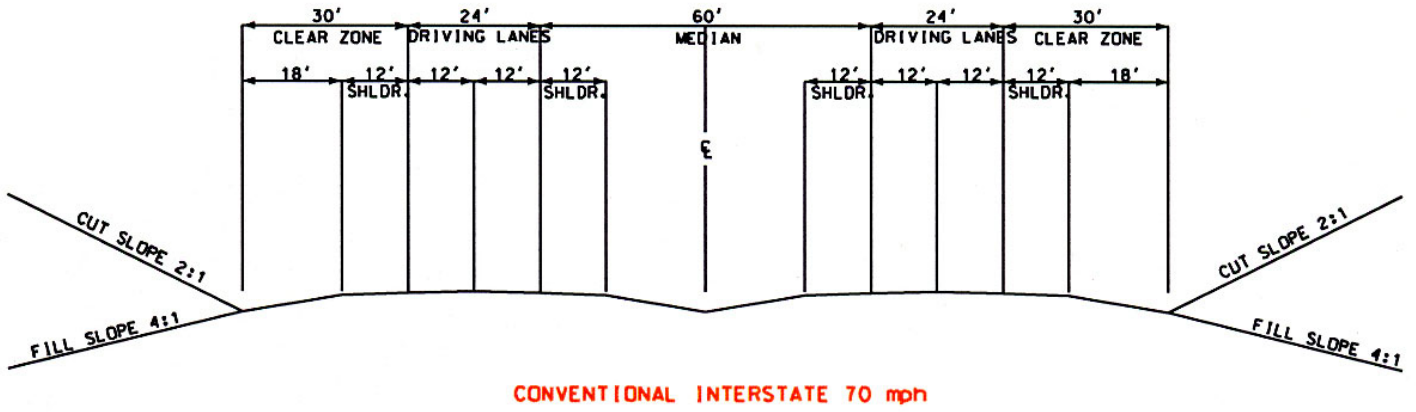


Figure 4.3: Typical Sections for Study Alternates

#### 4.4 Cost Estimating Procedure

The purpose of the cost estimating portion of this study was to develop a conceptual cost estimate for each of the study alternatives. A conceptual estimate is an approximate estimate based on minimal information about a project and can vary significantly depending on the final location and design of the project. The estimates were based on 2000 highway construction prices for Kentucky.

Cost estimates for this project were developed to the standards of a highway design project. Earthwork was estimated in 200-foot intervals much in the same way that earthwork costs are developed for final design. These estimates were made using digital terrain data of the ground surfaces, from USGS mapping, within the project corridor. The typical sections for each of the alternates were modeled with the existing ground surface in order to get the most accurate earthwork costs. Pavement designs, based on assumed pavement depths for the typical sections, and prices reflect that of projects let within the past year. Bridge costs were developed by structural engineers on a dollar per square foot basis. In the case of a twin structure for the Maysville Bridge the actual construction cost for the original structure was used. An appraiser who is currently purchasing right-of-way in the Commonwealth of Kentucky assisted in the development of right-of-way costs. Furthermore, a professional who specializes in utility relocations for Kentucky helped estimate utility costs. The complete package of costs for this project has been monitored by a former employee of the Kentucky Transportation Cabinet with over 25 years work experience in District 6 (6 out of the 7 direct impact counties are in District 6).

The cost for each of the three study alternatives was broken down to a cost by county. The cost breakouts are identified on a county basis since the feasibility analysis is developed around an economic model that uses socioeconomic data based on county summaries. In addition, preliminary sections of independent utility have been defined and their associated costs estimated. Table 4.4 shows the cost breakouts by county for each of the three study alternatives.

**Table 4.4: Summary of Cost Estimates for Three Study Alternative Highway Project Concepts By County**

	COUNTY							PROJECT
	CARROLL	GALLATIN	OWEN	GRANT	PENDLETON	BRACKEN	MASON	
<b>INTERSTATE</b>								
TOTAL*	\$247,600,000		\$161,200,000	\$348,400,000	\$ 362,200,000	\$324,900,000	\$263,300,000	\$1,707,600,000
<b>4 LANE ARTERIAL</b>								
TOTAL*		\$171,900,000	\$109,600,000	\$232,700,000	\$ 278,100,000	\$238,800,000	\$184,400,000	\$1,215,500,000
<b>2 LANE ARTERIAL</b>								
TOTAL*		\$ 17,700,000	\$ 63,700,000	\$142,100,000	\$ 165,400,000	\$142,000,000	\$ 91,100,000	\$ 621,900,000

\* Includes costs for planning, design, right-of-way, utilities, and construction.

## **5.0 TRAFFIC FORECASTING**

The traffic forecasts and traffic related economic impacts for the Northern Kentucky Outer Loop (I-74) were developed using the 1997 Kentucky Statewide Traffic Model (updated in September 2001).

### **5.1 Traffic Model Coverage Area**

The model includes all of Kentucky, including the functional highway system for all freeways, parkways, and arterials with some major collectors. Minor collector highways and local roads are not part of the traffic model. Part of the eight surrounding states are also included in the model for the purposes of evaluating possible vehicle diversion opportunities and river crossings. However, the highway network in these surrounding states is very limited, consisting primarily of interstate and principal arterials.

### **5.2 Forecasting Methodology**

This conceptual feasibility study on the Northern Kentucky Outer Loop (I-74) requires an involved analysis of travel characteristics, road user cost and benefits, and project costs. These cost items include time savings, accident rates by functional highway classification, types of vehicle operating costs, miles traveled, induced travel, etc. The traffic model provides these needed vehicle travel summaries. The first step in developing the model is to calibrate it against existing traffic volumes to reflect as close as reasonably practical the base year's (1999) travel patterns. Travel patterns are directly tied to the socioeconomic conditions (population and employment) within the model area. This relationship between travel, population, and employment provides the means for forecasting traffic volumes and patterns.

The years selected for analysis of traffic operation for the Outer Loop (I-74) were: 1999 for the Base Year and 2030 for the future year. The socioeconomic data used to accomplish these traffic assignments were derived by the company of Woods and Poole Economics, Inc. and approved for use by the KYTC. These base-year and future-year dates were selected due to data availability and the need for performing the Benefit Cost Analysis and Economic Development Impacts.

### **5.3 Alternates Evaluated**

There were two I-74 alternatives incorporated into the model for testing and traffic summaries: the traditional interstate facility with a 70 mph speed and the National Highway System 4-lane arterial with a 60 mph speed.

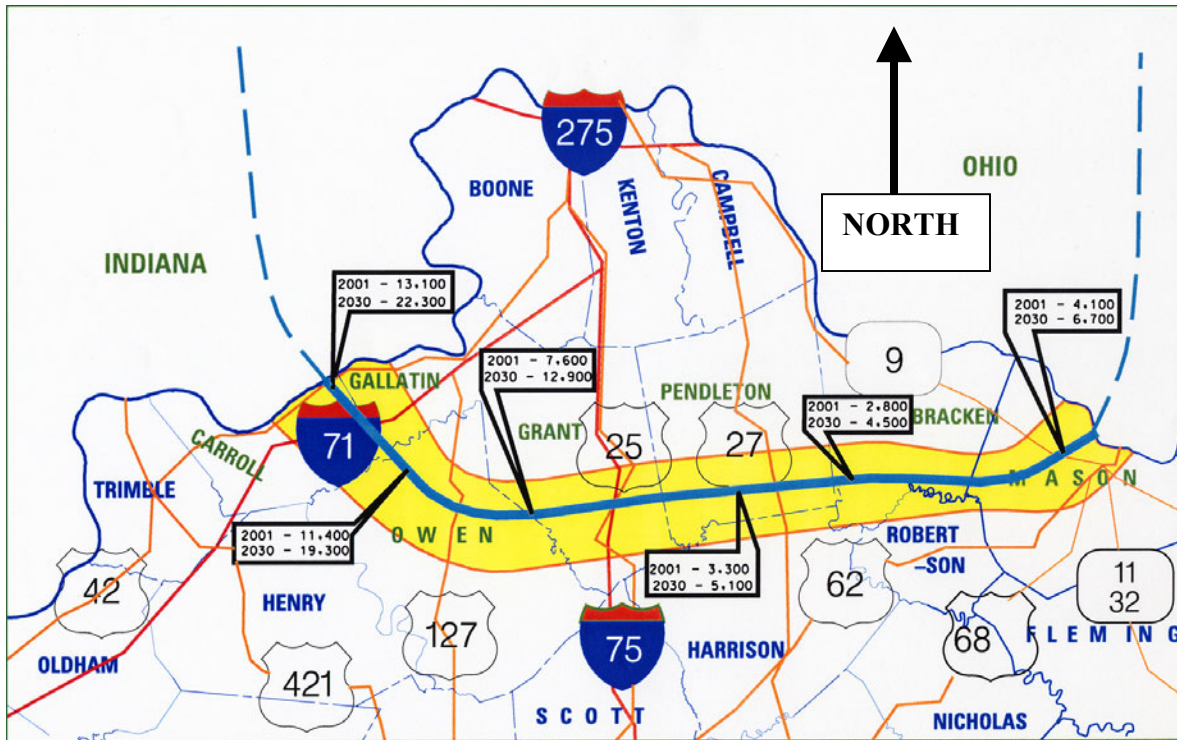
### **5.4 Percentage of Truck Traffic**

When looking at truck percentages, the proposed Northern Kentucky Outer Loop (I-74) was broken into two sections. Section 1, from I-75 west to Indiana the truck percentage was estimated to be 20%, based on classification counts on I-71 in Gallatin County and on I-75 in Grant County. Section 2, from I-75 east to Ohio, the truck percentage was estimated to be 13%, based on classification counts on KY 9 in Mason County and on I-

75 in Grant County. For 2030, the truck percentage is forecasted to increase at a rate of 1 percent per year. These truck percentages are for the peak hour traffic, not a percentage of annual daily traffic.

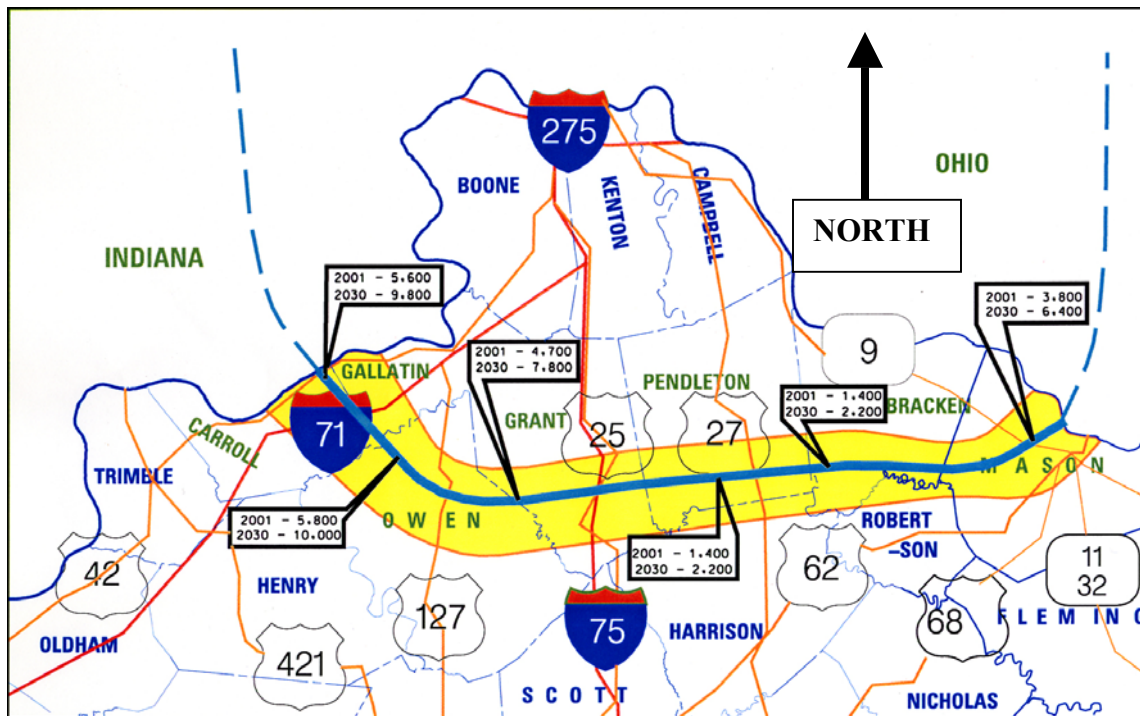
### 5.5 Traffic Forecasting Results

The traffic volumes, vehicles per day, for the Kentucky segment of the Northern Kentucky Outer Loop (I-74) are illustrated in Figure 5.5.1 and Figure 5.5.2 for the interstate alternative and 4-lane arterial alternative respectively. The Kentucky portion of the Northern Kentucky Outer Loop (I-74) was analyzed with extensions of the route into Indiana (connection to I-74) and Ohio (connection to US 50).



*Drawing not to scale*

**Figure 5.5.1 Interstate Traffic Volumes**



*Drawing not to scale*

**Figure 5.5.2 Arterial Traffic Volumes**

### 5.6 Alternate Assumptions

The Statewide traffic model consists of two sub-models: one is for trip generation and the other is for trip distribution. The trip generation model utilizes the relationship between the spatial distribution of population and employment to produce trip linkages. These linkages are calibrated when they are assigned to a computerized highway network and compared to existing traffic counts. When new highway segments are added to the network, the spatial (measured in time) relationship changes and therefore, the trip linkages change. The changes in trip linkage alter traffic patterns and thus vehicle summaries. Therefore, to eliminate this possible change in conditions the generation model was not re-run for the proposed new Northern Kentucky Outer Loop (I-74). The timesavings were reflected by placing the existing trip relationships (patterns) on the new network that contained the Outer Loop (I-74).

This methodology allowed the economic portions of the study to compare the same number of trips and resulting travel time savings with each new highway option. However, in reality this approach will reflect an under-production of vehicular trips within the new highway corridor and therefore, result in conservative traffic assignments to the new highway.

## 6.0 BENEFIT COST ANALYSIS

Benefit cost analysis is a way to evaluate the economic feasibility of transportation investments. In the case of a new highway project, benefit and cost analysis compares benefits in terms of reduced transportation costs to the cost of constructing and maintaining the new highway. If the benefits from travel savings are large compared to the costs of making the highway investment, then the project is economically feasible. If the benefits are small compared to the cost of investment, then the highway investment is considered not economically feasible. However, the benefit cost ratio is not the end all. There may be other factors that justify a project even if the benefit cost ratio is less than 1.

### 6.1 Study Alternates Being Evaluated

Benefits and costs were measured and compared for three alternatives for the Northern Kentucky Outer Loop (I-74). The three alternatives are a 2-lane arterial, a 4-lane arterial, and an interstate. The arterial options begin in Gallatin County, Kentucky and travel south and east and exit Kentucky in Mason County. The interstate option begins in Carroll County, Kentucky, and travels south and east and also exits Kentucky in Mason County. The three options are approximately 70 to 80 miles in length. Benefit and cost analyses that were conducted related to building only the Kentucky portion of the entire Outer Loop (I-74) project. Throughout the analysis, the Indiana and Ohio portions of the Outer Loop (I-74) were assumed to already be in place. This approach of considering the adjoining state's portions already constructed, is the accepted approach for conducting a benefit cost analysis.

### 6.2 Present Value of Benefits and Costs

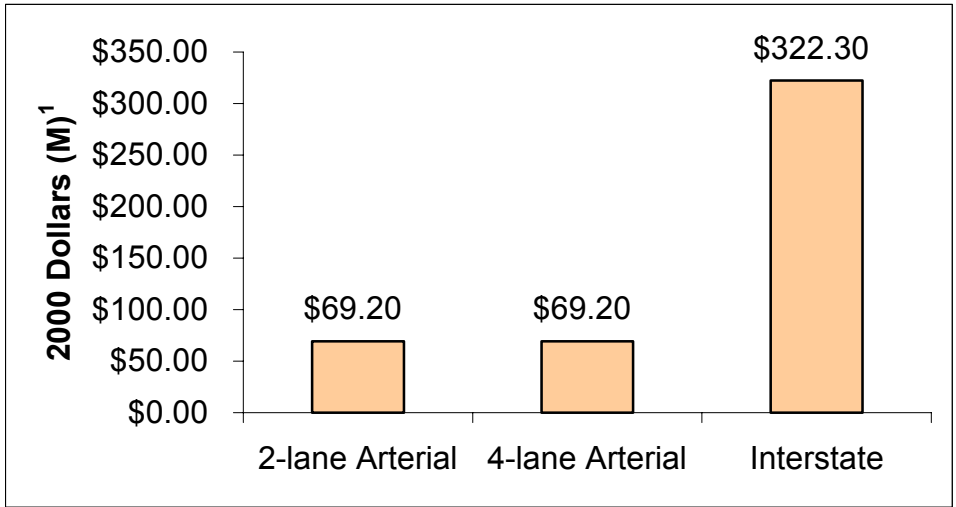
Project benefits and costs were discounted in order to facilitate comparisons. With discounting, future benefits and costs are reduced by a given interest rate, or discount rate, on an annual basis in order to yield an equivalent value in the present, which is the year 2000 in this study. The present value of future benefits in all years can be summed to get an aggregate value in the present. The same can be done for all future project costs. Then a meaningful comparison can be made between the future benefits and costs of the highway project.

### 6.3 Road-User Benefits

Road-user benefits can be divided up into three primary benefits and two secondary benefits. The benefits are described briefly below.

The three main sources of road user benefits from a new highway are:

- **Travel Time Savings:** All drivers and passengers, both auto and truck, value their time. A highway improvement that allows them to take a trip at a lower cost in terms of their own time yields an economic benefit. Figure 6.3.1 shows the present value of travel time savings, from 2010 to 2039, for the Outer Loop (I-74) for all three roadway alternatives.



<sup>1</sup> Present value of benefits earned during the years 2010 through 2039 at a 7% discount rate.

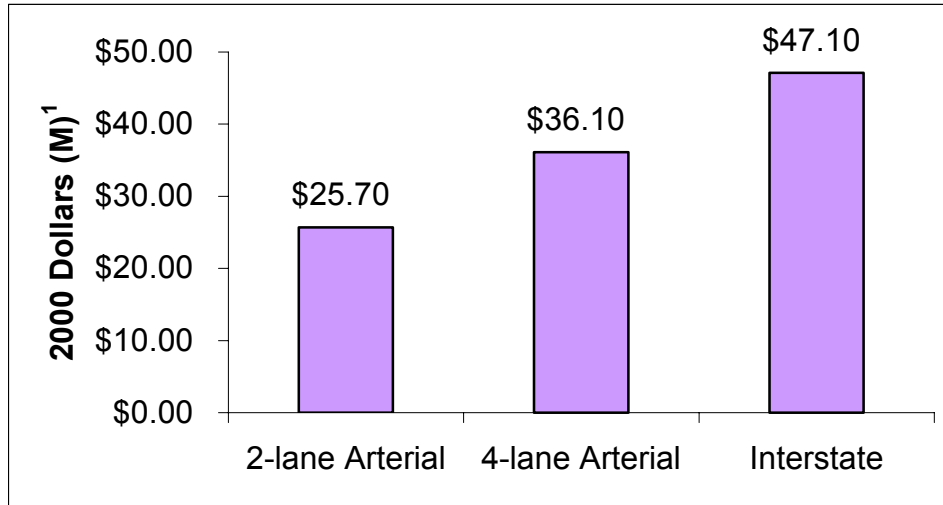
Source: Calculated by American Consulting Engineers.

\* Information about Figure 6.3.1 can be found in the Economic Analysis Report

**Figure 6.3.1: Travel Time Savings**

- Changes in Comprehensive Accident Costs:** Auto and truck passengers also face substantial costs when accidents occur. Not only will the drivers/passengers face insurance deductibles and changes in premiums, but also may incur lost wages, pain and suffering. A new highway or highway improvement that reduces accident rates yields a benefit by reducing these accident costs.
- Changes in Vehicle-operating Costs:** Auto and truck drivers also pay for the fuel, oil, tire, repair, and vehicle depreciation costs associated with driving their vehicles. A highway improvement that lowers these costs also will yield an economic benefit. Figure 6.3.2 shows the present value of vehicle operating costs savings, from 2010 to 2039, for the Outer Loop (I-74) for all three roadway alternatives.





<sup>1</sup> Present value of benefits earned during the years 2010 through 2039 at a 7% discount rate.

Source: Calculated by American Consulting Engineers.

*Note: Vehicle-operating costs differ for the two arterial options even if mileage savings are the same for each because per mile vehicle-operating costs are lower on a 4-lane arterial than on a 2-lane arterial.*

**Figure 6.3.2: Vehicle Operating Costs Savings**

There are two other sources of project benefits:

- **Benefits due to Induced Travel:** Lower travel costs resulting from the new highway may induce some drivers to travel more. This greater mobility would be a benefit for road users.
- **Salvage Value:** The highway would continue to be used after the 30-year analysis period from 2010 through 2039. A salvage value for the highway is assigned at the end of the analysis period to represent the value of this further use.

The present value of future benefits in all years can be summed to get an aggregate value in the present. The same can be done for all future project costs. Then a meaningful comparison can be made between the future benefits and costs of the highway project. Table 6.3 shows the total present value of project benefits for the Outer Loop (I-74).

<b>Table 6.3: Present Value of Benefits</b> (in Millions of 2000 Dollars) <sup>1</sup>						
	<b>Time Saving</b>	<b>Vehicle Operating Cost</b>	<b>Accident Cost</b>	<b>Induced Travel</b>	<b>Salvage Value</b>	<b>Total</b>
2-lane Arterial	\$69.2	\$25.7	\$8.4	\$0.0	\$17.6	\$121.0
4-lane Arterial	\$69.2	\$36.1	\$31.8	\$0.0	\$34.8	\$171.8
Interstate	\$322.3	\$47.1	\$225.0	\$0.6	\$51.1	\$646.0

<sup>1</sup> Present value of benefits earned during the years 2010 through 2039 at a 7% discount rate.

## 6.4 Project Costs

Project cost estimates included the initial cost of constructing the Outer Loop (I-74) in Kentucky and the annual cost of maintaining the highway. The initial construction cost included the costs of highway design, right-of-way, utility relocation, and highway construction. A number of national interstate feasibility studies have assumed that project development, for analysis purposes occurs over a 3 to 5 year period. In this study, the Kentucky Transportation Cabinet selected 10 years. Costs are assumed to occur as follows:

1. Planning and design costs will be spent evenly over the first two years in 2003 and 2004.
2. Right-of-way purchases and utility costs will be spread evenly from 2003 through 2006.
3. Construction costs will take place evenly over the period from 2005 through 2009.

Table 6.4 shows the present value of project costs for the Outer Loop (I-74) Project.

**Table 6.4: Cost Estimates and Present Value of Project Costs for the Northern Kentucky Outer Loop (I-74) Project**

Option	Construction Cost 2003 - 2009		Maintenance Costs 2010-2039	Total Costs 2003-2039
	In 2000 \$ <sup>1</sup> (Millions)	Present Value <sup>2</sup> (Millions)	Present Value <sup>2</sup> (Millions)	Present Value <sup>2</sup> (Millions)
70 mph Interstate	\$1,708	\$1,092	\$6	\$1,098
60 mph 4-lane arterial	\$1,216	\$780	\$5	\$785
60 mph 2-lane arterial	\$622	\$401	\$2	\$404

<sup>1</sup> Construction cost estimates developed by American Consulting Engineers.

<sup>2</sup> Present value at a 7% discount rate.

Source: Calculated by American Consulting Engineers.

Note: Rows may not sum to totals due to rounding.

## 6.5 Benefit and Cost Comparison

Once estimated, the present value of road user benefits and project costs were compared to assess the economic feasibility of the project. The present value of benefits and costs were compared for each alternative for the Outer Loop (I-74). The finding was that the Outer Loop (I-74) project is not economically feasible based on benefit and cost considerations. The benefit cost ratio is well below 1 for all three alternatives. The net

benefits of the project are negative in all cases, with the present value of project costs exceeding the present value of project benefits by hundreds of millions of dollars in all cases. The smallest absolute gap between benefits and costs was found for the 2-lane arterial design. This design had the fewest benefits but also the fewest costs.

Relative benefits and costs for the Outer Loop (I-74) project also were recalculated under a number of alternative assumptions in order to assess how sensitive findings about economic feasibility were to changes in underlying study assumptions and estimates. As part of this sensitivity analysis, the benefit cost ratio was recalculated assuming a longer construction period for the project, assuming the Outer Loop (I-74) is not built in the adjacent states of Indiana and Ohio, assuming higher and lower project costs and benefits, and under alternative assumptions about the appropriate discount rate for future benefits and costs. The finding of the sensitivity analyses was that the Outer Loop (I-74) project remains economically infeasible under each alternative scenario. Table 6.5 shows the benefit cost comparison for a variety of situations.

**Table 6.5: Benefit Cost Comparisons for Roadway Alternatives**

ENTIRE CORRIDOR									
Option	B/C	Construction Period		No Build in	Project Costs		Alternative Benefits		Discount Rate
	Baseline (1)	15 Years	3 Years	Adjacent States	15% More	15% Less	15% More	15% Less	4%
2-lane Arterial	0.300	0.269	0.308	0.281	0.261	0.353	0.345	0.255	0.518
4-lane Arterial	0.219	0.191	0.227	0.184	0.190	0.258	0.252	0.186	0.388
Interstate	0.588	0.536	0.598	0.227	0.512	0.692	0.677	0.500	0.973

(1) Baseline assumptions include a 7 year construction period, completed build sections in adjacent states, and a 7% discount rate.

### 6.6 Benefit Cost Comparison for the Western Segment

Economic justification was assessed for the case of building only the western portion of the Outer Loop (I-74) project, which would be a potential priority segment for the overall project. The western portion is the segment from the Kentucky-Indiana border in the West to Interstate 75. The findings were for the arterial design options the benefit cost ratio for building the western portion remained well below 1. However, for the interstate design option, the benefit cost ratio for building the western portion was slightly greater than 1 and net benefits were modestly positive, suggesting that building the western portion of the Outer Loop (I-74) as an interstate would be economically justified.

This finding of economic justification for the western portion under the interstate option, however, should be treated with some caution. Benefits were not found to exceed costs under several alternative scenarios considered in the sensitivity analysis. In particular, benefits were found to be much lower than costs if the Outer Loop (I-74) project is not also completed in adjacent states. In other words, the finding of economic justification was strongly tied to the assumed presence of the Outer Loop (I-74) in adjacent states,

especially Indiana. Table 6.6 shows the results for the benefit cost comparison for the western segment of the Outer Loop (I-74) under various circumstances.

**Table 6.6: Benefit Cost Comparisons for Roadway Alternatives for Western Segment**

WESTERN SEGMENT									
Option	Baseline (1)	Construction Period		No Build in	Project Costs		Alternative Benefits		Discount Rate
		15 Years	3 Years	Adjacent States	15% More	15% Less	15% More	15% Less	4%
2-lane Arterial	0.494	0.471	0.492	0.409	0.429	0.581	0.568	0.420	0.833
4-lane Arterial	0.255	0.234	0.263	0.163	0.222	0.300	0.294	0.217	0.442
Interstate	1.096	1.027	1.098	0.188	0.953	1.289	1.260	0.931	1.780

(1) Baseline assumptions include a 7 year construction period, completed build sections in adjacent states, and a 7% discount rate.

As a note regarding the Indiana portion of the I-74 Corridor, the Indiana Department of Transportation (INDOT) completed a feasibility study on the State Route 101 Corridor in September, 2001. The INDOT study revealed that there is a high priority need for an improvement in that corridor, which would also tie into the Northern Kentucky Outer Loop (I-74) Corridor. INDOT did not elaborate on whether their analysis was for a four-lane arterial or an interstate, but only for a “high type” facility. No funding commitment has been made by INDOT to this project.

## 7.0 ECONOMIC DEVELOPMENT

The opening of a new interstate or arterial highway in Northern Kentucky will bring a variety of road user benefits to drivers and passengers traveling in the region, as was outlined in the previous chapter. The imprint of the new highway on the economy, however, will be evident in many ways besides road user benefits. The new highway, by improving the transportation system in the region, will make the region a more attractive place to live. The highway also will improve the comparative advantage of the region as a location for nationally oriented industries, particularly manufacturing. All this suggests that the new highway may grow the regional economy. This economic development impact will be seen in varying degrees in the major indicators of regional economic growth including employment, worker earnings, income, gross regional product, and population.

### 7.1 Study Methodology

The economic development impact study estimates the potential impact of the Outer Loop (I-74) project on the regional economy. Estimates are provided for each of the major economic indicators. A statistical model is used to estimate the economic impact on worker earnings by industry and population in each of the seven Kentucky counties that the highway will pass through along its route as well as the eleven adjacent indirect impact counties. Statistical estimates of the worker earnings and population impacts in turn are used to estimate the employment, income, and gross regional production impacts. Estimates are provided for the first thirty years that the interstate will be in operation. As a note, the traffic volumes for a four-lane arterial were sufficiently low enough to

basically replicate the volumes for a two-lane arterial. Therefore, since economic development statistics are generated from traffic volumes, arterial highway economic development produces only one set of economic development conditions for both two and four lane arterials (referred to in the tables as “Arterial”).

## **7.2 Economic Impacts vs. Economic Benefits**

Throughout the impact analysis, it is important to remember the distinction between economic development impacts and economic benefits. Economic benefits are the resource savings in terms of time, avoided accidents, and lower vehicle operating costs that occur because the highway offers a better (or more productive) option for travel. Economic development impacts are the increase in economic activity in an area that receives a new highway due to the improved travel productivity in the region. Both economic benefits and economic development impacts are manifestations of the same productivity gains that a new highway affords to a regional economy. Economic benefits and economic development impacts also have a different geographic scope. Benefits are measures of the rising well-being of regional residents, and persons from throughout the nation that would utilize the new highway. Benefit calculations refer to benefits for the national economy as a whole, even if those benefits are focused on regional residents. This is why economic benefits and costs are the measure of the economic feasibility of a highway project from a national perspective. Regional economic impacts refer to growth in the regional economy and do not consider any countervailing decline in economic activity outside the Northern Kentucky region.

## **7.3 Types of Impacts**

Impacts can be divided into two basic areas depending on when they occur in relation to the construction of the new Outer Loop (I-74).

- *Construction Period Impacts* – These impact will occur in the form of jobs and income generated in the region during the highway construction period. This construction impact will be temporary, lasting only during the years required to design, site, and build each of the segments of the Outer Loop (I-74). But, the temporary construction impact will be substantial, creating thousands of jobs in higher-paying industries such as heavy construction, utilities, and design. Table 7.3.1 shows the construction period impacts for the Northern Kentucky Outer Loop (I-74).

**Table 7.3.1: Total Economic Impact of the Outer Loop (I-74) Project Construction on an Eighteen-County Northern Kentucky Region**

Design Option	Total Cost (Millions \$)	Cumulative over Entire Construction Period		Average Per Year (Assuming a 7-year Project Development Period)	
		Earnings (Millions \$)	Job-Years	Earnings (Millions \$)	Jobs
Interstate	\$1,707.6	\$784.5	27,600	\$112.1	3,900
4-lane Arterial	\$1,215.5	\$555.8	19,600	\$79.4	2,800
2-lane Arterial	\$622.0	\$282.0	10,000	\$40.3	1,400

• **Post Construction Impacts** - An open and operating highway also will generate an economic impact on the highway region. A new highway infrastructure will improve the competitive position of the region within the national economy. A new highway also will change the competitive position of counties within the regional economy, leading to a reallocation of economic activity within the region. A new highway would yield an impact on the economy that would be reflected in all economic factors illustrated in Table 7.3.1, as well as in regional income and gross regional product. These changes would be more permanent in nature, as opposed to the temporary economic impact during the construction period. Such permanent changes in the demand for workers in the region would encourage population growth. This could occur through more persons migrating to the region, or fewer persons choosing to migrate out of the region. Table 7.3.2 shows the post construction impacts for the Northern Kentucky Outer Loop (I-74).

**Table 7.3.2: Average Annual Economic Impact of the Outer Loop (I-74), 2010 to 2039, on an Eighteen-County Northern Kentucky Region**

Design Option	Gross Product (Millions of 1992 \$)	Personal Income (Millions of 2000 \$)	Worker Earnings (Millions of 2000 \$)	Jobs	Population
Interstate	\$378.4	\$227.9	\$150.9	2,900	2,400
Arterial	\$243.5	\$156.1	\$102.3	1,600	1,600

#### 7.4 Western Segment Analysis

The western portion of the Outer Loop (I-74) was identified as a potential priority segment for the highway in the benefit cost analysis. This segment that runs from the Indiana-Kentucky border to Interstate 75 was found to have a higher benefit cost ratio than other portions of the Outer Loop (I-74) in Kentucky. This resulted in large part from

the greater traffic volumes and a higher truck percentage that were predicted for this portion of the Outer Loop (I-74) route. Higher volumes also would be expected to lead to larger economic development impacts in the western portion of the Outer Loop (I-74) route. This is because traffic volumes are one of the factors that contribute to the economic development impact of a highway. Table 7.4 shows the average annual economic development impact of the Western Portion of the Outer Loop (I-74) from 2010 to 2039.

**Table 7.4: Average Annual Economic Impact of Western Portion of the Outer Loop (I-74), 2010 to 2039, on a Twelve-County Northern Kentucky Region**

<b>Design Option</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Worker Earnings</b>	<b>Jobs</b>	<b>Population</b>
	<b>(Millions of 1992 \$)</b>	<b>(Millions of 2000 \$)</b>	<b>(Millions of 2000 \$)</b>		
Interstate	\$322.1	\$179.0	\$127.2	2,300	1,200
Arterial	\$208.0	\$124.3	\$89.2	1,300	700

### 7.5 Economic Development Impact vs. Project Cost Ratio

To get one final perspective on these economic impact estimates, a ratio was calculated comparing the present value of annual earnings impacts due to the Outer Loop (I-74) with the present value of Outer Loop (I-74) project costs. The value of this ratio for the entire Outer Loop (I-74) project is 0.759 for the interstate design option and 0.684 for the 4-lane arterial design option (the 2-lane arterial would have an even greater ratio because it has the same economic development benefits as the 4-lane with even lower costs). Considering only the western portion of the Outer Loop (I-74) route, the ratio is 1.867 for the interstate option and 1.455 for the arterial design. While these ratios are not benefit cost ratios because economic development impacts are not a measure of benefits, these results do show that the worker earnings impact of the Outer Loop (I-74) project is large even in the context of the costs of the project.

## 8.0 FINANCIAL FEASIBILITY

The question of whether there are sufficient resources available to fund a highway project is referred to as the financial feasibility of the project. A financially feasible project is one for which there are identifiable and sufficient sources of revenue for the project, such as through user fees such as tolls, or outside funding from the government or private sources. Projects that are not able to generate much toll revenue, and would require too large a share of existing government transportation revenue, may not be financially feasible. Such a scenario can arise particularly in the case of large new highway construction projects, which can cost hundreds of millions of dollars or more.

Financing problems can arise even for projects that are quite beneficial. Beneficiaries of highway projects such as road users or property owners may be reluctant to pay the full value of the benefits they receive. Further, even to the extent that beneficiaries are willing to pay, an appropriate payment mechanism must be developed to ensure payment, and in a way that does

not inappropriately discourage highway use and roadside development. In particular, high user fees have the potential to discourage highway usage, and are not economically prudent unless a highway is significantly congested.

This suggests that some government funding (possibly revenues from the state gasoline tax) may be required for many highway projects. An analysis of financial feasibility therefore must consider the availability of government funds for financing a portion of highway construction costs. It also must look at whether the required government funds are large in comparison to the available transportation revenue of the state. Finally, the financial feasibility must determine if setting aside money for the proposed project would require the state to cancel or postpone a significant share of other road projects.

### 8.1 Construction Costs

As mentioned earlier in Section 4.0 the construction costs for a new route in Northern Kentucky are substantial. Table 8.1 shows the construction costs.

**Table 8.1: Construction Costs for the Outer Loop (I-74) Project by Study Alternative Cost (Millions of \$)**

Design Option	Design	Right-of-Way Purchase	Utility Relocation	Construction	Total
Interstate	\$76.3	\$80.4	\$20.7	\$1,530.0	\$1,707.6
4-lane Arterial	\$53.5	\$70.8	\$19.9	\$1,071.3	\$1,215.5
2-lane Arterial	\$26.3	\$50.7	\$18.5	\$526.4	\$621.9

### 8.2 Annual Bond Payments

To calculate annual bond payment obligations, we assume that two sets of 30-year bonds would be issued in order to fund the Outer Loop (I-74) project. The bonds would be issued during the project design and construction period from 2003 to 2009. Specifically, we assume that the:

1. First set of 30-year bonds would be issued in the year 2003 to cover design and utility costs, right-of-way purchases, and the first several years of construction costs.
2. Second set of bonds would be issued in the year 2007 to cover the remainder of construction costs from 2007 through 2009.
3. Bonds will pay a 5.6% annual nominal interest rate.

The 5.6% rate is the average bond yield forecast for the 2003 through 2007 period in the DRI-WEFA publication *The U.S. Economy* for June 2001.

Table 8.2 illustrates the annual financial obligation for selected years from 2003 through 2036 for each of the three study alternatives. The financial obligations are annual bond



payments primarily but also include annual maintenance and operations costs for a new highway.

**Table 8.2: Annual Financial Obligation for Bond Payments and Maintenance Costs For Selected Years, from 2003 to 2036, By Study Alternative**

	Annual Financial Obligation <sup>1</sup> (Millions of Nominal \$)						
	2003	2007	2010	2020	2030	2033	2036
Interstate	\$64.2	\$144.1	\$145.2	\$145.5	\$145.9	\$81.8	\$82.0
4-lane Arterial	\$46.5	\$102.5	\$103.5	\$103.8	\$104.2	\$57.8	\$57.9
2-lane Arterial	\$24.8	\$52.3	\$52.8	\$52.9	\$53.0	\$28.3	\$28.3

<sup>1</sup> Assumes 30-year bonds at a 5.6% interest rate and using cost in Table 8.1.

### 8.3 Unspent Construction Funds

Unspent construction funds are one potential source of revenue to help meet annual bond obligations even before the Outer Loop (I-74) is open, during the construction period from 2003 through 2009. These unspent construction and right-of-way purchase funds are raised through the bond sale. The bonds issued in 2003 and 2007 would raise revenue to cover project costs for 3 to 4 years. A substantial amount of unspent funds would exist after the first few years as a result. These funds could earn a return before being spent on the construction project in later years. This extra money could be used to meet bond payments during the construction phase years of 2003 to 2009.

### 8.4 Land Donation

Land donations would directly reduce the annual payment obligations presented in Table 8.2. This is because these annual obligations were based on the assumption that all of the right-of-way for the Outer Loop (I-74) would need to be purchased. But, this may not be the case. Local governments or even private individuals who own right-of-way land may be willing to donate the land to ensure that the Outer Loop (I-74) is built. Local governments may be encouraged to donate land because additional industrial or commercial activity could be drawn to their area by the highway. Private landowners who own property on and near the highway right-of-way could be encouraged to donate for the same reasons.

### 8.5 User Fees

One way to fund a highway project is to impose fees on future users of the new or improved highway. Such fees refer to payments by drivers and passengers specifically for

the use of the highway in question. These highway-specific user fees such as road tolls are in contrast to general efforts to raise fees from road users such as through the gasoline tax or vehicle registration fees. The two primary types of user fees are:

1. Road tolls- drivers must pay a toll for traveling on the highway, whether that involves a monthly toll pass or a toll payment for each use.
2. Concession fees- vendors build or lease a traveler-oriented business such as a restaurant or a service station at a toll road service plaza, which is often the most convenient place for toll road users to stop for service.

## 8.6 Tax Increment Financing

Business earnings will rise in many localities and counties near the Outer Loop (I-74) as the highway brings more travelers into the area, or increases access to the Cincinnati metropolitan area. Property values will increase in the region as sites near the highway become more accessible and profitable business locations.

A highway project can capture some of this property value increase using special tax districts (Collies and Sieman, 1976; Sharpe *et. al.*, 1977). In particular, local tax revenue on the incremental increase in property values in designated districts would be dedicated to support the Outer Loop (I-74) project rather than local property taxes. Such districts naturally would require the cooperation of local government, but these governments might agree in order to ensure construction of the Outer Loop (I-74). Table 8.6 shows the Remaining Annual Financial Obligation for Bond Payments and Maintenance Costs After Utilizing Unspent Construction Funds, Receiving Donations for 20% of Right-of-Way, Collecting User Fees (Tolls and Concessions) and Special Tax District Revenue.

<b>Table 8.6: Remaining Annual Financial Obligation (Millions of Nominal \$)</b>							
	<b>2003</b>	<b>2007</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2033</b>	<b>2036</b>
Interstate	\$37.5	\$123.3	\$141.2	\$140.5	\$139.5	\$76.2	\$75.7
4-lane Arterial	\$27.2	\$87.7	\$100.7	\$100.5	\$100.3	\$54.8	\$54.7
2-lane Arterial	\$14.5	\$44.8	\$50.3	\$49.9	\$49.4	\$25.3	\$25.1

## 8.7 State Government Financing

Results in Table 8.6 indicate that revenue from highway tolls, concessions and special tax districts would not be sufficient to cover the annual construction bond payments and maintenance costs for the Outer Loop (I-74) project. A substantial annual obligation remains. The remaining funding needs for the project require an additional revenue source. The potential to fund the remaining annual costs for the Outer Loop (I-74) from state transportation revenue will be the topic of this section. The approach will be to:

1. Compare the remaining funding requirements for the Outer Loop (I-74) project with the revenue base available to the Kentucky Transportation Cabinet.
2. Examine how that comparison changes over time.

Funding requirements for the highway project will be compared with that portion of state transportation revenue that is available for supporting state highway construction and maintenance, as opposed to other expenses such as supporting the construction and maintenance of local roads and streets, and Cabinet administrative costs.

The primary measure will be to compare the project funding requirements with total available state revenue. Available revenue includes Federal grants and state gas tax revenue, license and registration fees, and miscellaneous revenue, and excludes state funds earmarked for administrative expenses, highway law enforcement, local projects, and existing bond payments. In 2000, there were approximately \$1.67 billion in revenue from federal sources, Kentucky fuel taxes, licenses and registration, and miscellaneous sources (U.S. Department of Commerce, 2001). Total disbursements to highway law enforcement, administrative costs, local road construction and maintenance, and grants-in-aid to local government accounted for approximately \$400 million in 2000. Another \$160 million annually was devoted to meeting interest and bond principal payments for existing bond liabilities. This suggests that in the year 2000 there was \$1.11 billion in remaining funds for construction, operation, and maintenance expenses. Table 8.7 shows the share of available funds needed to meet annual financial obligations for the Outer Loop (I-74) with revenue from tolls, user fees, and tax increment financing (Table 8.6).

<b>Table 8.7: Share of Current Highway Road Funds Needed to Meet Annual Financial Obligations for the Outer Loop (I-74) with Revenue from Tolls, User Fees, and Tax Increment Financing Subtracted</b>							
	<b>2003</b>	<b>2007</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2033</b>	<b>2036</b>
Interstate	3.0%	8.2%	8.2%	5.6%	3.9%	1.9%	1.7%
4-lane Arterial	2.2%	5.9%	5.9%	4.0%	2.8%	1.4%	1.3%
2-lane Arterial	1.2%	3.0%	2.9%	2.0%	1.4%	0.6%	0.6%

## **8.8 Innovative Finance**

Innovative finance techniques have been developed in order to expedite construction of highway projects, and provide alternative revenue sources to fund construction.

Alternative sources of revenue besides general transportation revenue include highway tolls and impact fees on land developed near a new highway. The alternative revenue sources can be used to pay bonds issued to fund immediate construction of a roadway.

Innovative finance techniques also have implications for how highway projects are managed and financed. Independent agencies and even private corporations may manage a highway developed using innovative finance techniques. These organizations manage design and construction, and in some cases, maintenance for new highways, consistent

with the policies of the relevant state Department of Transportation. These independent agencies also manage the collection of tolls and other revenues and the payment of construction bonds.

As with highway construction, there also are innovative finance techniques for funding the economic development that occurs near new highways. These techniques include rigorously planned, integrated communities, including privately developed green spaces located near new highway interchanges. Other innovative finance techniques include tax increment financing to fund development of specific payments in zones near highway interchanges such as industrial parks and utility infrastructure.

The potential to use innovative financing techniques for both highway construction and economic development were assessed for the specific case of the Outer Loop (I-74) highway project. The potential for innovative finance in highway construction was assessed by comparing the characteristics of the Outer Loop (I-74) with several highway projects that were constructed using innovative financing. The highways built with innovative finance techniques typically were located in more rapidly growing metropolitan areas and the highways had much higher average annual daily traffic volumes (AADT), even when operated as a toll road. A high level of traffic volume was only observed on the western most segments of the proposed Outer Loop (I-74), in the areas between the Indiana-Kentucky border and Interstate 71, and even those traffic volumes were considered modest, at best.

The potential for innovative finance of economic development was assessed based on analysis in the earlier chapter on interchange development. This analysis identified only a handful of interchanges with potential for development of regional industrial parks. The greatest development potential was identified for the interchange between the Outer Loop (I-74) and I-71, I-75, and KY 9/10 (near Maysville). This limited list of interchanges would have the greatest potential for innovative financing such as tax increment financing to support industrial parks and other local infrastructure development.

## **8.9 Priority Segments**

The financial feasibility analysis was also performed for the western portion of the Outer Loop (I-74) (from the Indiana Border to I-75 in Grant County). The share of annual funding devoted to building the western portion of the Outer Loop (I-74) would peak at approximately:

- **3 percent of current Highway Road funds for the interstate design option.**
- **2.5 percent of available funding for the 4-lane arterial design option.**
- **1 percent of available funding for the 2-lane arterial design option.**

## 9.0 INTERCHANGE DEVELOPMENT OPPORTUNITIES

Interchange Development Opportunities have been analyzed for two reasons. First, the analysis results can be used by local governments to give insights about which interchanges may be more conducive to economic development growth and what types of growth may be expected at these interchanges. Second, this analysis can provide guidance into development opportunities as a means of creating possible revenue sources to pay back the initial investment of constructing the interchanges.

### 9.1 Types of Interchange Development Opportunities

There are two basic types of interchange development opportunities: local (direct demand) or regional (regional/destination demand). Development opportunities for interchange areas correlate strongly with local and regional traffic. Traffic patterns in this seven county area of Carroll, Gallatin, Owen, Grant, Pendleton, Bracken, and Mason lack east-west connectivity between existing arterials and interstates that run north-south. This area also has low population density statistics. These conditions appear to offer limited, significant interchange real estate development opportunities, but there are a few. The review of development opportunities with the Outer Loop (I-74) will be confined totally to the full control of access alternative (Interstate Option).

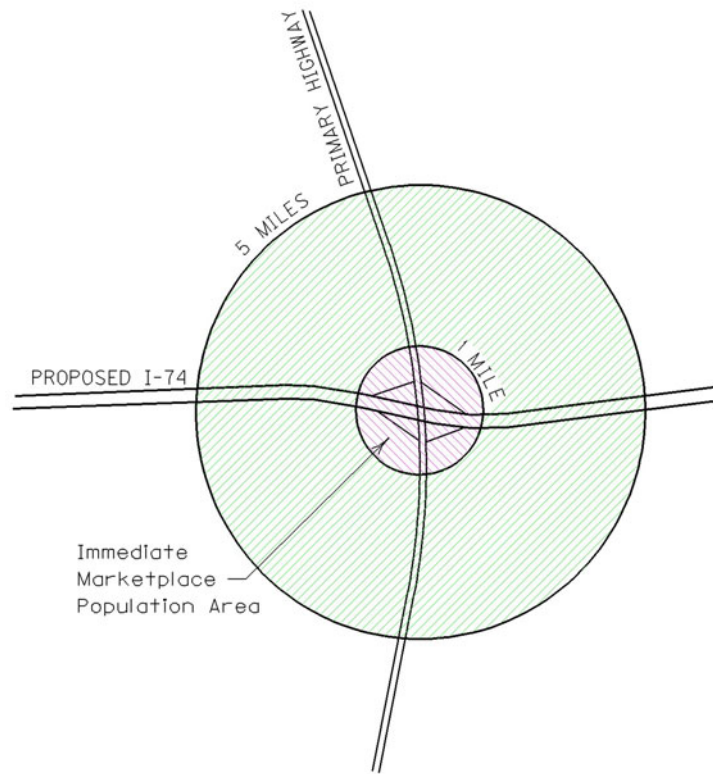
### 9.2 Direct Demand Vs. Regional Demand

- *Direct Demand* - Includes real estate development potential stemming from the local (indigenous) market: the market surrounding the proposed interchange. Direct demand also includes the potential market demand generated from traffic passing through the interchange.
- *Regional/Destination Demand* - stems from the broad-based geographic accessibility provided by the interchange and its appeal as a destination to population centers and commercial/industrial areas throughout the region.

Direct demand is potentially available to all interchanges; however, regional/destination demand is obtainable at interchanges that offer the best regional access to the largest potential population/industrial base and are well recognized by the market. This report has identified only three proposed Outer Loop (I-74) interchanges that have the potential for regional/destination demand I-71, I-75 and KY 9/10. We have also listed secondary interchanges that may offer opportunity.

### 9.3 Direct Demand

Current population and traffic counts were used to screen potential Outer Loop (I-74) intersections for direct demand real estate development opportunities. Population counts and density, more so than any other factors, regulate direct demand. Two inter-nested circular trade areas were used for population estimates. The trade areas have radii of one and five miles. See Figure 9.3.



**Figure 9.3: Trade Areas For Direct Demand Real Estate Opportunities**

The one-mile trade area reflects the population in the immediate marketplace and offers the greater opportunity. The five-mile trade area recognizes the proposed interchange's potential to redirect local traffic and the impact of a broader but nearby population base. Neither trade area anticipates a regional market.

#### **9.4 Direct Demand Population Projections**

Only a few of the potential intersections offer either the surrounding population base or traffic volume needed to support even the most basic types of real estate development.

The number of people living within one mile of almost all of the potential intersections is very low. Along I-71 and I-75, through this geographic region, the Interstates have been in place for over 30 years. The local population in these areas is still too low to support significant interchange development. At only four locations does the one-mile trade area population estimate exceed 200 people. At most of the potential new Outer Loop (I-74) intersections, the count is fewer than 100 people. The highest one-mile population trade area counts are in the east, in Mason County. Some of the lowest are in Bracken, Pendleton, Owen and Grant counties. The four potential interchanges with the highest population counts are in Mason County and are all within the one mile radius. These interchanges include KY 8, KY 596, KY 435/KY 3056, and Boone Lane.

Population estimates for the five-mile trade areas are much higher; however, few exceed 5,000. Once again, the highest population counts are in the east, in Mason County. Six potential intersections have a population of more than 5,000 people within five miles. Of these, four have more than 10,000 people. These four interchanges in Mason County include KY 8, Boone Lane, KY 435/KY 3056 and Morton Lane. Most of the interchanges outside of Mason County have five-mile trade area population counts closer to 2,000 or 3,000 people. These population counts are well below the threshold typically needed for highway- or interstate-oriented direct demand real estate development.

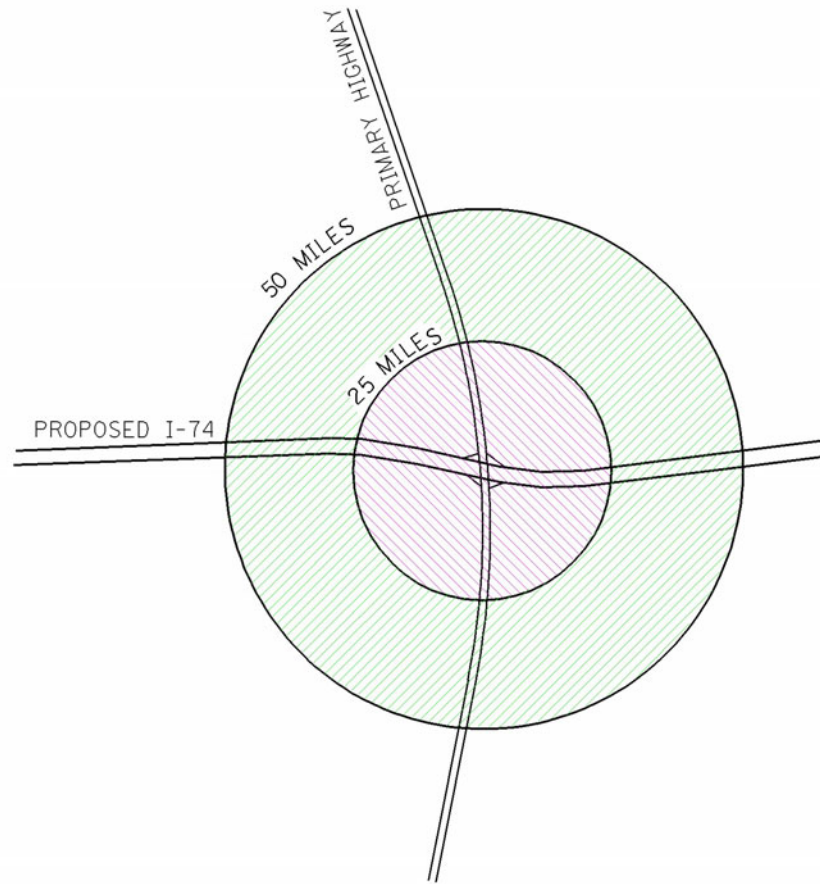
Only two intersecting roadways support relatively high traffic counts. The two roadways are Interstates 71 in Gallatin County and I-75 in Grant County. Both have average daily counts of more than 20,000 vehicles. Only one other roadway has a 10,000 plus vehicle per day count, KY 9/10 in Mason County. Two others have counts of close to 5,000 vehicles per day, US 27 in Pendleton and US 42 in Gallatin County.

## **9.5 Regional/Destination Demand**

Regional or destination based development opportunities are available to only a few of the proposed Outer Loop (I-74) interchanges. A strong destination-based site demands the best possible regional access. This type of access is generally associated with interstates and primary highways. Three of the proposed interchanges seem to fit this criteria. These are the most likely candidates for destination-based demand:

- Interstate 75 and Outer Loop (I-74) in Grant County
- Interstate 71 and Outer Loop (I-74) in Gallatin County
- Kentucky 9/10 and Outer Loop (I-74) in Mason County

Our review of destination based interchanges features market areas with radii of 25 and 50 miles. See Figure 9.5.



**Figure 9.5: Trade Areas For Regional Demand Real Estate Opportunities**

There are several other proposed Outer Loop (I-74) interchanges that may offer opportunities for destination-based development. They include US 42 (Gallatin County), US 25 (Grant County), US 27 (Pendleton County) and KY 8 (Mason County). The character of the extended trade areas for the three primary interchanges is much different than the character of their direct-demand trade areas. Not surprisingly, these marketplaces include a much larger population base, reaching well over one million people at their greatest size. Table 9.5 gives a closer look.



**Table 9.5: 2001 Population Estimates  
By Trade Areas Surrounding Select Interchanges**

Area Radius	-----Outer Loop (I-74) Interchanges-----		
	I-71	I-75	KY 9/10
One-mile	112	102	154
Five-mile	2,567	3,695	9,430
25-mile	144,547	128,953	102,509
50-mile	2,098,848	2,084,779	1,249,799

**9.6 Specific Development Opportunities at Direct Demand Interchanges**

Interstate-to-interstate interchange areas have the best potential to attract direct demand (Regional) traffic-based real estate development. Traffic counts at these interchanges are high. Traffic-based development at these interchanges can include, but is not limited to, traveler and commuter service-oriented businesses, for example:

- Truck stop/convenience
- Auto/gas/convenience
- Motels.
- Chain restaurants

**9.7 Specific Development Opportunities at Regional Demand Interchanges**

The regional markets for these selected interchanges have the potential to support a much wider range of real estate development. These uses could encompass both commercial and residential development. Commercial opportunities could include, but are not limited to:

- Regional industrial park
- Regional shopping center
- Corporate office park
- Conference center/resort

Residential development opportunities could include, but are not limited to:

- Senior satellite or new communities
- Non-metropolitan area new community
- Retirement community
- Planned unit development

These uses are in addition to any direct demand potential. They will actually promote, not diminish, direct demand.

## 10.0 PRIORITY SEGMENTS

Though the road-user benefits and economic development opportunities technical analysis indicate that the entire route is not economically feasible from a road-user benefit perspective, the study did indicate that the western portion (with connectivity to I-74 in Indiana) of the route satisfied the road-user benefit cost condition if connecting systems are in place. Furthermore, the entire route showed considerable economic development (job creation) potential.

The purpose of developing priority sections is to identify the priority segments of the Outer Loop (I-74), so the Kentucky Transportation Cabinet can place the segments in the project listing for possible future funding consideration and possible inclusion in the KYTC Six-Year Highway Plan.

### 10.1 Criteria for Developing Priority Segments

In determining priority segments, it is important to define them in terms that satisfy the three criteria utilized by the Federal Highway Administration (FHWA) for policy guidance, i.e. 23 CFR 771.111 (f) (1) (2) (3). These criteria, which are used in determining if a priority section has “logical termini” for proper evaluation and can stand-alone, are to:

1. Connect logical termini and be of sufficient length to address environmental matters on a broad scope,
2. Have independent utility or independent significance, i.e. be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made, and
3. Does not restrict consideration of alternatives for other reasonably foreseeable improvements.

### 10.2 Priority Segments

From a priority segment perspective only, the western portion has been economically justified from a road-user benefit cost analysis if there is connectivity to I-74 in Indiana. But, from an economic development opportunity (potential job creation and access perspective) analysis, both the eastern and western segments showed considerable economic opportunity due to the increased accessibility of the area to the region, state and nation.

Keeping in mind the need to identify corridor segments that have the highest priority and logical termini, the order of segment priority, starting with the highest, is:

- *US 127 to I-75 – 15.1 miles (Owen and Grant Counties)*

The western segment of the proposed corridor meets all of the economic feasibility tests and this segment provides the important connection of this economically depressed region to the interstate system (I-75).

- *I-71 to US 127 – 6.8 miles (Gallatin/Carroll and Owen Counties)*

This segment is part of the economically justified portion of the Outer Loop (I-74). It connects I-71, and Carroll and Gallatin counties, with I-75 to the south. This connection will allow southern Indiana trips to have much greater access to I-75 to the south. In addition, according to the traffic analysis, the increased accessibility could stimulate considerable road-user savings and economic development opportunities in Gallatin, Carroll, Owen and Grant counties.

- *I-75 to US 27 – 17.6 miles (Grant and Pendleton Counties)*

Although from a road-user benefit cost analysis, this section did not appear to be economically feasible, from an economic development (job creation) potential this road section has considerable economic merit. The lack of east-west connectivity in this economically disadvantaged area has resulted in high unemployment and high out-migration. This route extension could stimulate economic opportunities for a multi-county area.

- *US 27 to KY 9 – 29 miles (Pendleton, Bracken, and Mason Counties)*

This is the second section of the eastern portion of the Outer Loop (I-74) that does not appear to be economically feasible from a road-user benefit cost analysis, but as with the other section (Priority #3 from I-75 to US 27), an improved roadway for this section will contribute greatly to the job creation potential in this economically disadvantaged area. This highway extension provides the east-west connectivity to the Interstate System (I-75) that is needed to attract businesses to the region.

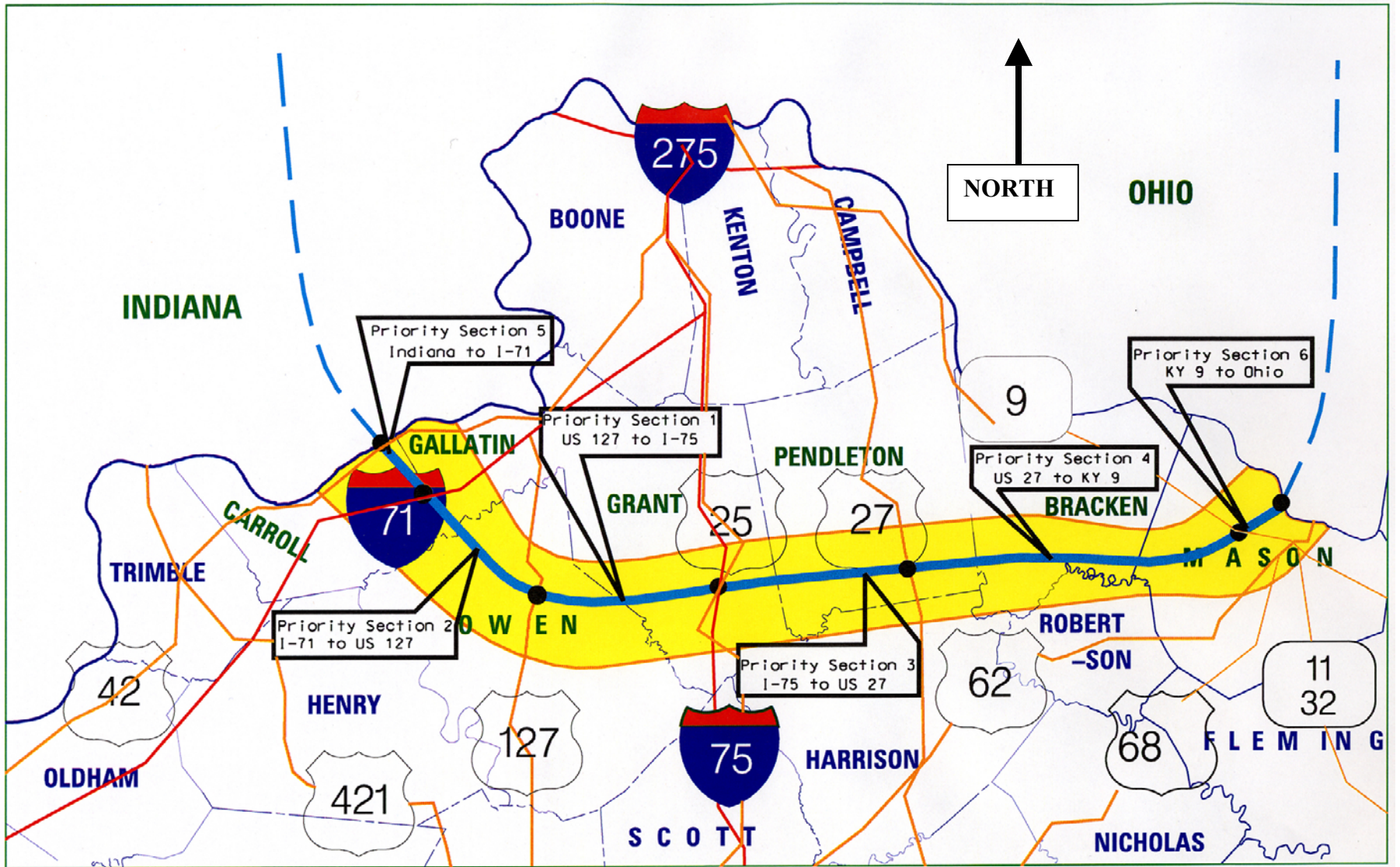
- *Indiana to I-71 – 7 miles (Carroll/Gallatin Counties)*

If a connective route (across the river and to Interstate 74 in Indiana) has not been constructed, then the merits of this section would be greatly reduced. There are a variety of reasons for this segment. First, KY 39 is under construction and connects I-71 with Indiana across a 2-lane Markland Dam bridge. A new interchange was recently constructed on I-71 to serve the new road, KY 39. The 4-lane and 2-lane arterial alternates can be adequately serviced by this existing route and would need only minor upgrades. The only reason for an interstate to be constructed for this section would be if the ultimate connection between I-74 in Indiana and I-75 in Kentucky became a reality.

- *KY 9 to Ohio – 2.9 miles (Mason County)*

If a connective route (across the river to a proposed interstate facility in Ohio) has not been constructed, then the merits of this section would be greatly reduced. A new river crossing has been recently constructed and would accommodate a 2-lane arterial facility. The existing routes handle the traffic volumes adequately so a new route would not be justified from that perspective. The only reason for an interstate to be constructed for this section would be if the ultimate connection between the I-74 corridor in Ohio and I-75 in Kentucky became a reality.

The connector segments are prioritized last because they depend on connectivity to both Indiana and Ohio. Obviously, if routes are built in these adjacent states then a connector route would move up the line of priority segments. Figure 10.2 shows a map with the priority segments.



*This drawing is not to scale.*

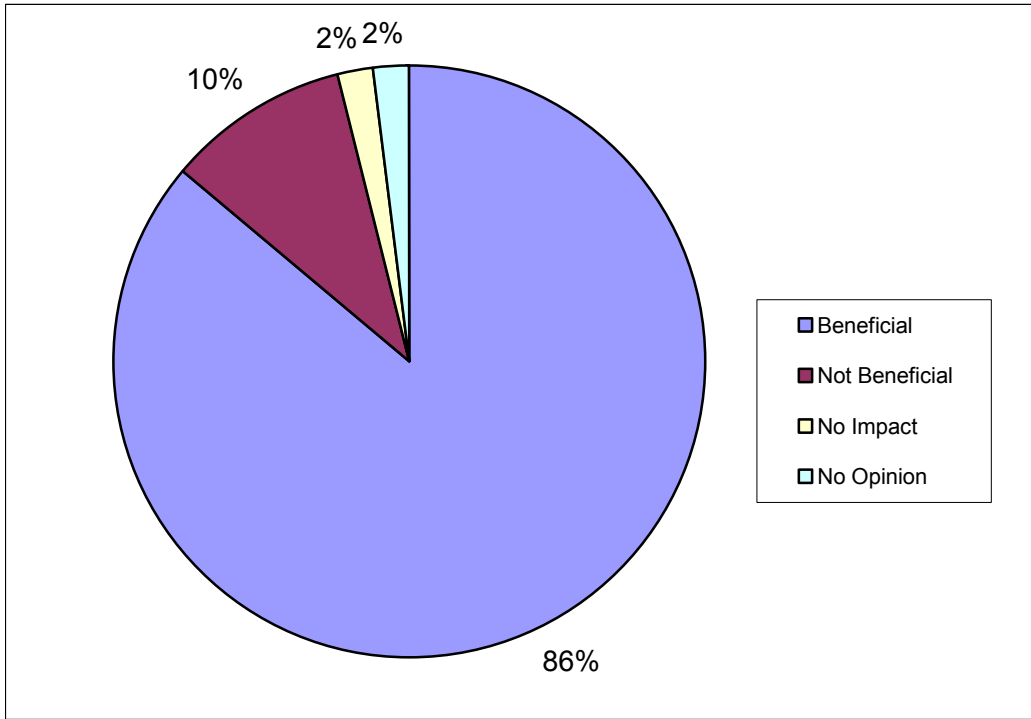
**Figure 10.2: Northern Kentucky Outer Loop (I-74) Priority Segments**

## **11.0 PUBLIC INVOLVEMENT**

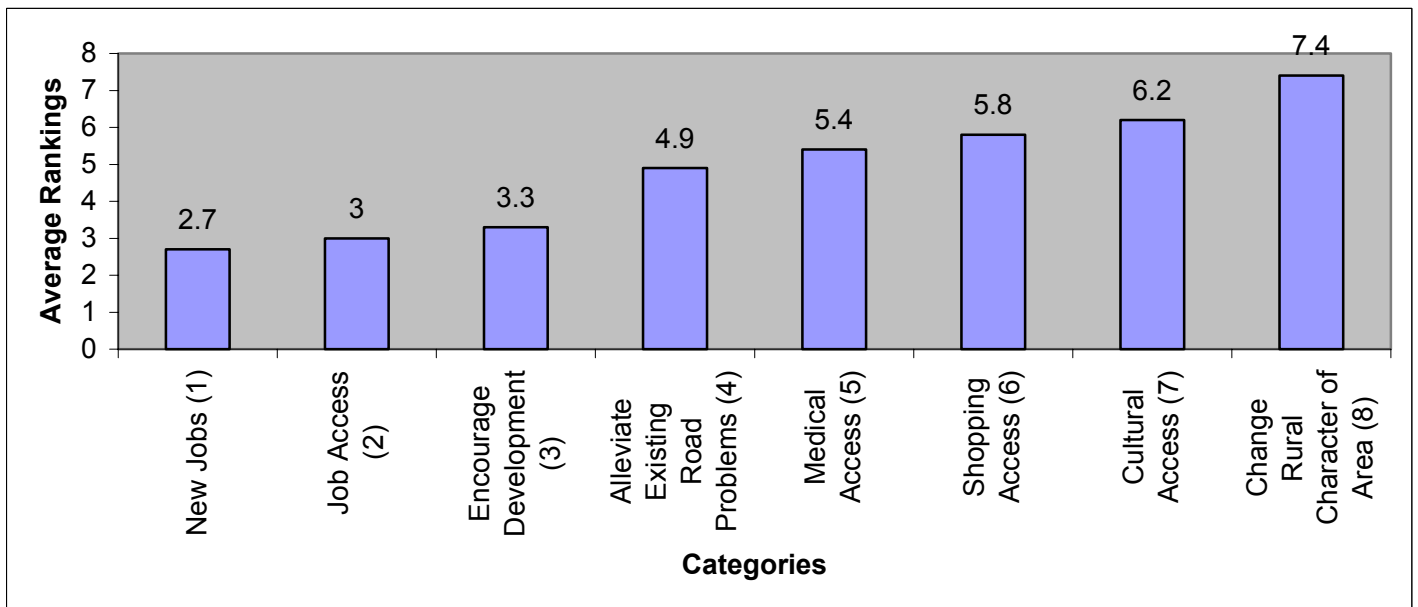
From the outset, Public Involvement was one of the focus points for this project. Public involvement is essential to effective decision-making, and the Kentucky Transportation Cabinet is committed to getting project ideas and studies in front of people, to listen and consider their comments. The process began with initial meetings with each of the County Judge Executives from all of the direct impact counties. Informational meetings were then set up with the three Area Development Districts (Northern Kentucky, Buffalo Trace and Bluegrass) to familiarize these organizations with the project. The County Judge Executives were also charged with nominating citizens to a Regional Advisory Committee as well as Local Focus Groups (one for each direct impact county). These two groups met independently with different goals. Many members of the Regional Advisory Committee were also members of their county's Local Focus Group. The Regional Advisory Committee met on 4 separate occasions providing insights from a regional perspective and acted as a review board for the documents before they were submitted to the general public. The Local Focus Groups met independently with the exception of Mason and Bracken Counties, who met jointly, and provided local views on the Northern Kentucky Outer Loop (I-74). The insights and information from these two groups led to the formation of the purpose and need statements for the project as well as other helpful information. Meetings were also held with most of the direct impact county's Chambers of Commerce. In addition to meeting with the various groups, information was also disseminated by sending out newsletters (over 1000 individuals on final mailing list), articles or ads with the various media outlets (both local and regional), an internet website, and an appearance at the Owen County RECC annual meeting. Over 25 meetings were held with the various agencies and committees over the two-year period.

### **11.1 Questionnaire**

In order to solicit the public's opinion on the Northern Kentucky Outer Loop (I-74) questionnaires were made available via mailings with the first newsletter, placement in local businesses, handouts by Regional Advisory Committee Members and Local Focus Group Members, and direct mailings to special interest groups (1000 in one instance). The questionnaire was available to fill out on the state website referenced in the newsletter. The questionnaire asked a variety of questions to get a general feeling of the public perception of the project, the proposed highway types, and the impacts they saw for their community. Almost 200 completed questionnaires were returned. The results for two of the written questionnaire questions are shown in figures 11.1.1 and 11.1.2.



**Figure 11.1.1: Public Response to Question – Do you think the proposed Outer Loop (I-74) would be:**

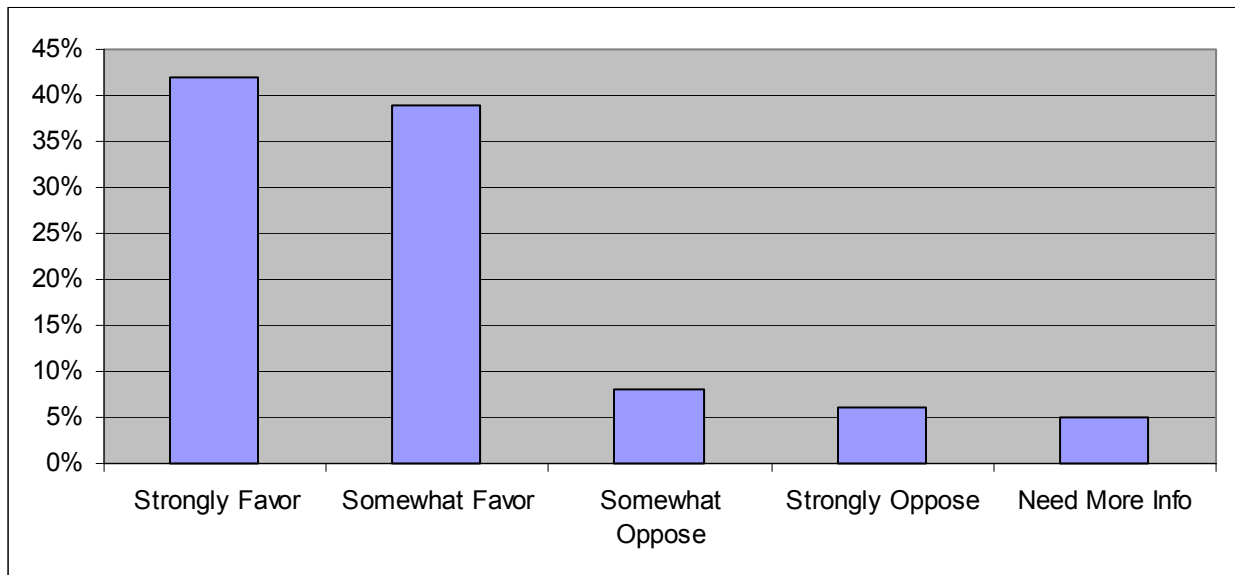


**Figure 11.1.2: Public Response to Question – What would the most important impact of this proposed route be?** (The lower the average the higher the ranking. For example 1 is best and 8 is worst.)

## 11.2 Telephone Survey

A telephone survey was conducted to see how aware the citizens of the seven county corridor were of the Northern Kentucky Outer Loop (I-74). This survey consisted of 401 telephone interviews conducted October 7-12, 2002. Interviews were conducted with residents of the direct impact counties. The number of interviews conducted in each county was proportionate to that county's percentage of the total population of the seven counties combined. This sample derives a maximum margin of error of +/- 4.9 percentage points at the 95 percent confidence level.

Though, the survey primarily focused on how well the information on the project was spread, it did ask some of the same questions initially asked in the written questionnaire. For example, when asked what issue was most pressing in their communities, more respondents listed the lack of jobs or the need for better jobs than any other concern. This correlates strongly with the results from the written questionnaire also seen in figure 11.1.2. Furthermore, when asked whether they favor or oppose the Northern Kentucky Outer Loop (I-74); 81% were in favor. This closely mirrors the 86% in favor of the route in the questionnaire. Figure 11.2 shows the results of one question of the telephone survey.



**Figure 11.2: Percent of Population in Favor or Opposed to Outer Loop (I-74)**

Additional insight into the public involvement process was provided by a finding concerning the number of people within the seven county corridor actually hearing about the project. Overall, 4 out of 10 people said they were at least "somewhat" familiar with the Northern Kentucky Outer Loop (I-74) feasibility study, Table 11.2 shows the breakdown of familiarity by county.

**Table 11.2: Percentage of Population Familiar with Project**

Response	Total	Bracken	Carroll	Gallatin	Grant	Mason	Owen	Pendleton
Very	8%	8%	11%	17%	6%	3%	11%	5%
Somewhat	33	30	29	34	27	37	36	39
Not Very	18	14	16	14	12	23	23	23
Not at All	42	49	44	34	55	38	30	33

Word of mouth information was the primary means by which people familiar with the project learned of it. However, most people rely on the local newspaper for information about local happenings. This is also the avenue by which they prefer to receive information about the Northern Kentucky Outer Loop (I-74) proposal. Direct mail was also mentioned as a good way to provide information about the project. For direct mail to be effective, it needs to be incorporated into a local utility billing system or as a special flyer to the occupant.

## 12.0 STUDY CONCLUSIONS

Based upon the study’s analyses, a number of important conclusions emerged, from the study research and the public involvement:

- **Study Parameters** - *The County Judge Executives initiated this conceptual feasibility study idea through their congressional delegation because they felt the area needed a project to stimulate economic development and the creation of jobs. As the Judge Executives have mentioned frequently, the area is slow to transition from a farm-based economy to a manufacturing/service-based economy. As a result, unemployment is relatively high and wages are relatively low. This concern of the Judge Executives has been borne out through the public involvement program associated with the project. Economic development and the need for more jobs and improved wages are the most important concerns of the local populace. A random telephone survey validated these concerns. The Northern Kentucky Outer Loop (I-74) project is forecast to provide the desired result according to the project research and analysis by creating 2,900 job years of work per annum for an interstate type project or 1,600 job years of work per annum for an arterial type highway project. These jobs create approximately \$150M and \$100M in worker earnings per year, respectively.*

- **Benefit Cost Analysis** - *The benefit cost analysis revealed that for the entire corridor the project costs greatly outnumbered the road-user benefits. Additionally, if the connecting extensions of the project into the adjoining states were not constructed then the benefits were even less. However, if the Indiana portion of the project (SR 101 Corridor) is implemented, the Kentucky portion of the project from the Markland Dam eastward to I-75 has a benefit cost ratio*



*greater than 1.0, which means the benefits of the project exceed the cost of the project. The western portion of the project under these conditions would be expected to serve future traffic volumes in the order of over 20,000 vpd in Gallatin and Carroll Counties to over 12,000 in Grant and Owen Counties.*

● **Financial Feasibility** - *The financial feasibility portion of the study revealed that even though the western portion of the corridor possesses positive indicators for economic justification, the financial feasibility is a matter of concern. The possibility of raising revenues by making the roadway a toll facility does not solve the financial conditions. Only about \$1M of revenue per year is expected if the toll facility is used. Also, right-of-way donations and special taxing districts were other methods of raising revenue that proved inadequate for such a challenging project. The only revenue source that seems capable of accomplishing the project is a bond issue backed by the General Road Fund. The major problem with the commitment of these funds is it would require a significant commitment of the statewide transportation funds and would greatly alter the project priorities in the KYTC Six-Year Highway Plan. The implementation of the western portion of this project would require a 3% commitment of the General Road Fund dollars for an interstate type improvement or approximately \$50 million per year for twenty years, the life of the bonds.*

● **Public Involvement** - *The extensive public involvement program primarily used two basic means of soliciting public opinion, questionnaires and telephone surveys. The distributed questionnaire, with approximately 200 responses, received an 86% beneficial rating regarding the proposed Northern Kentucky Outer Loop (I-74), and the telephone survey, with approximately 400 responses, found that 42% strongly favored and 40% somewhat favored the proposed highway. This level of responses from the citizens in the project corridor illustrates there is a strong acceptance for such a project. The telephone survey also revealed that the extensive public involvement program for the Northern Kentucky Outer Loop (I-74) reached approximately 58% of the population.*

## **REFERENCES**

The text for this final report comes directly from the individual reports for each section.

# Executive Summary

## Northern Kentucky Outer Loop (I-74)

### Study Purpose and Name

The purpose of this corridor study is to determine the conceptual feasibility, which includes both economic justification and financial feasibility of the Kentucky Segment of an I-74 High Priority corridor around the greater Cincinnati and northern Kentucky area. In order to simplify the reference to this Kentucky Segment, this study has been titled the “*Northern Kentucky Outer Loop (I-74) Study.*”

### Background

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) established 21 high priority corridors on the National Highway System (NHS). Section 1105(c)5 of that act defined a “I-73/74 North-South Corridor from Charleston, South Carolina through Winston-Salem, North Carolina to Portsmouth, Ohio to Cincinnati, Ohio and Detroit, Michigan.” The Kentucky segment of Corridor was part of Public Law 105-178, dated June 9, 1998, of the 105<sup>th</sup> United States Congress. This act is referred to as the “Transportation Equity Act for the 21<sup>st</sup> Century”, more commonly known as TEA-21. This act, under section 1602, defines 1,850 specific “high priority projects” that can be undertaken by the States and funded at a rate of 80% Federal, 20% State. Numbers 1226 and 1580, identify the project as “conduct feasibility study for Northern Kentucky high priority corridor (I-74).”

There are many sections that summarize the findings of the final conceptual feasibility report, only a brief summary of each is included in this executive summary.

### Purpose and Need Statements

The purpose and need statement for a project is very important because it identifies the reason the project is taking place, and what is intended to be accomplished by implementing the project. The purpose and need statements should focus on the factors which have led to the proposal, that is, what problem exists that needs to be solved. Examples of these factors include safety, capacity, legislative directive, economic development, and roadway deficiencies.

Some factors included in the purpose and need statements for all of the project segments are:

- *To open new economic development and job growth opportunities for this depressed agrarian region via improved accessibility and reduced travel times.*
- *To provide a new alternate route that will accommodate both large trucks and commercial vehicles, mitigate geometric deficiencies of current facilities, and improve safety.*
- *To provide a high level east-west roadway that would facilitate better access to: community services, existing high level north-south roadways, and communities.*

### Existing Conditions

An Existing Conditions Report was prepared to review the project history and establish baseline information on the corridor.

The study corridor is approximately 80 miles in length and 5 to 10 miles in width. The corridor, identified by County Judge Executives, traverses through seven direct impact counties; Carroll, Gallatin, Owen, Grant, Pendleton, Bracken and Mason. There are eleven indirect counties that border the direct impact counties

throughout the corridor. The purpose of this project is to improve transportation access by providing a major arterial to stimulate economic development and job creation. These counties are going through a difficult transition from an agricultural based economy to a manufacturing/service-based economy. Jobs are limited and so is accessibility to other areas for jobs and services, especially in the east-west direction. Their economic concerns are illustrated in Table 1.

**Table 1: Comparison of Socio-Economic and Travel Characteristics**

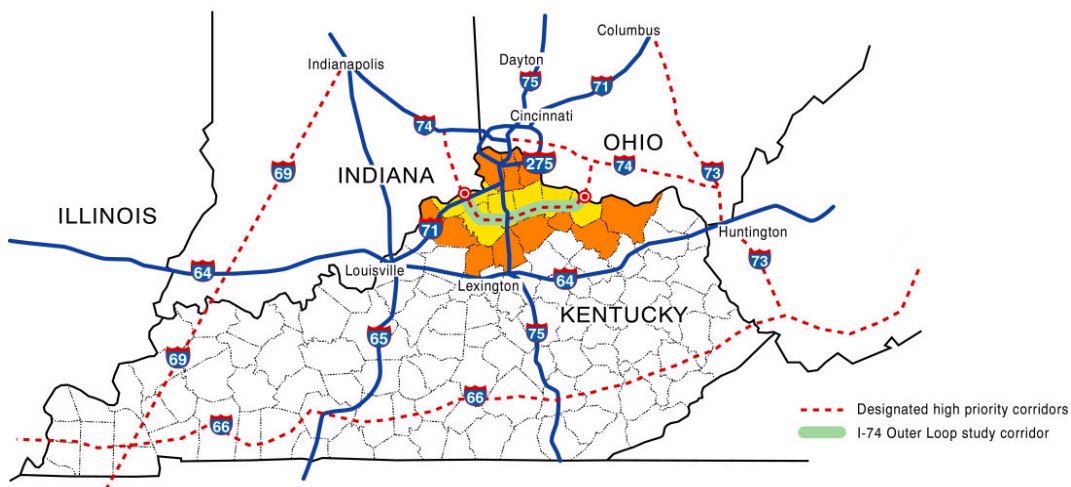
	United States	Kentucky	Direct I-74 Counties	Indirect I-74 Counties	Non-Corridor KY Counties
<b>Population (2000)</b>	275,205,752	4,000,427	88,202 (2.2%)**	469,975 (11.7%)**	3,442,250 (86.0%)**
<b>Employment (2000)</b>	166,657,025	2,322,416	43,145 (1.9%***)	282,502 (12.2%***)	1,996,769 (86.0%***)
<b>Per Capita Income (2000)*</b>	\$24,205	\$19,564	\$16,228	\$21,387	\$19,400
<b>Jobs Per Persons (2000)</b>	0.606	0.581	0.489	0.601	0.58
<b>Population Density (2000) per sq. mile</b>	73	101	56	172	97

\* 1992 Dollars; \*\* Percent of 2000 Kentucky population; \*\*\* Percent of 2000 Kentucky employment.

Source for Socio-Economic Data: Woods & Poole Economics, Inc.

Source for Square Mileage: 1998 Statistical Abstract of the United States (Table 1) and 1999 Kentucky Deskbook of Economic Statistics (Page 7).

The Kentucky Transportation Cabinet was responsible for conducting the Conceptual Feasibility Study and contracted with a consultant to perform the services in early 2000. The initial activities were to gather data and information on the existing highway system and to identify the highway corridor to be evaluated. Meetings were held with all of the County Judge Executives and a highway corridor, 80 miles long and 5-10 miles wide was identified. The corridor travels through seven counties and extends from Markland Dam Bridge in Gallatin County to the new bridge at Maysville in Mason County.



**Figure 1: Corridor Map**

### Environmental Overview

The purpose of the environmental overview is to identify any potential major issues that may influence the project alignment, should the conceptual feasibility study indicate the route to be feasible and placed in the Kentucky Transportation Cabinet Six-Year Highway Plan, in the future. Basically, the summary includes data

and information that is readily available in resource documents contained within state government. The investigation revealed wetlands, conservation districts, cultural historic sites and endangered species locations within the study corridor. The data revealed that many environmentally sensitive areas exist, but nothing identified could be considered a “fatal flaw” at this time without further investigation.

**Project Alternatives and Cost Estimates**

Initially, the conceptual feasibility study was scoped to evaluate just two alternatives: a four-lane freeway and a four-lane arterial. After considerable discussion with the County Judge Executives and the Citizens Advisory Committee, another alternative was identified, a two-lane arterial.

The study scope was revised to reflect three different concepts:

- a) A 70 mph, traditional highway constructed to Interstate Highway standards
- b) A 60 mph, four-lane arterial highway constructed to National Highway System standards with control of access limited to major highway intersections
- c) A 60 mph, two-lane arterial highway constructed to National Highway System standards with control of access limited to major highway intersections

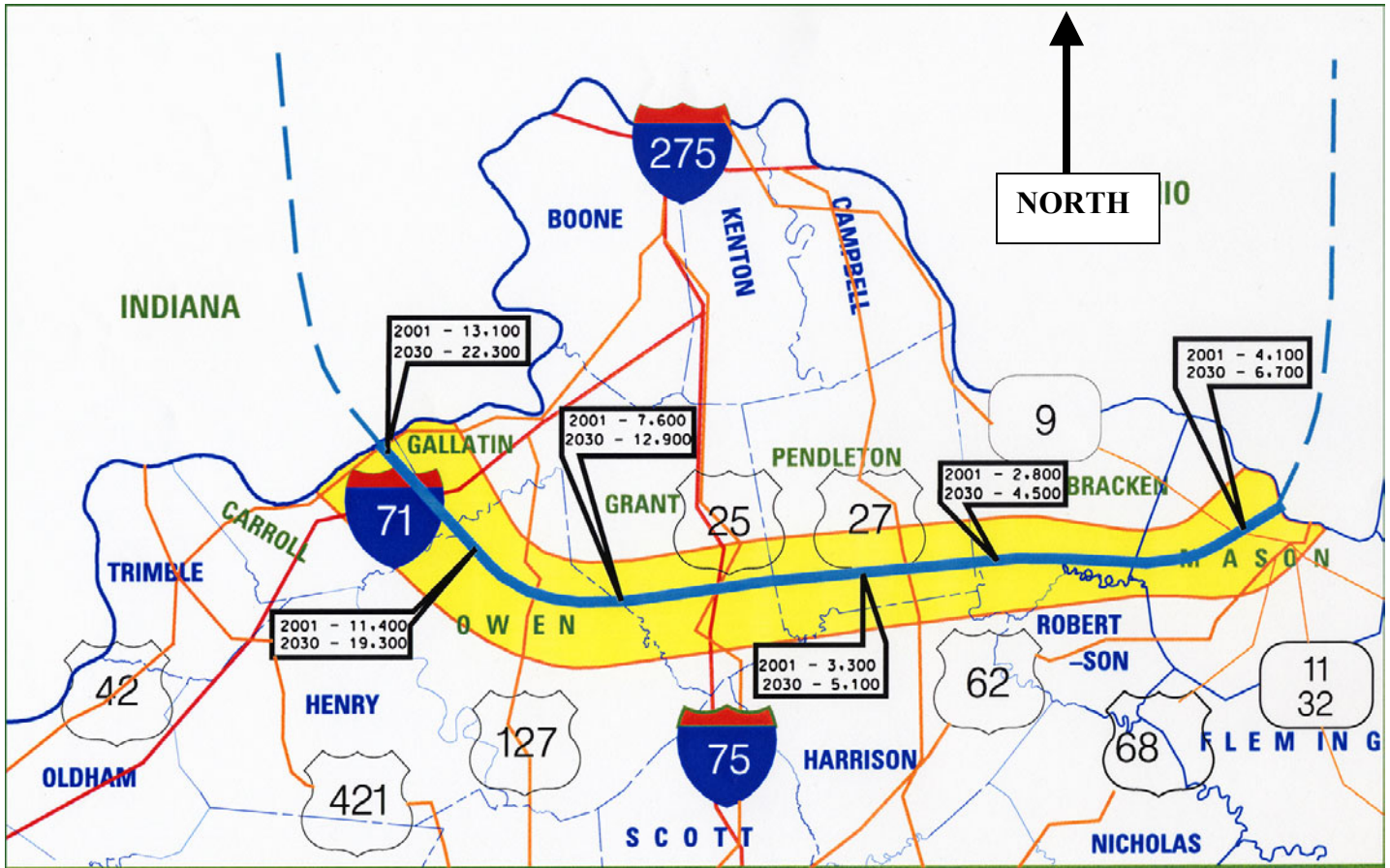
Cost estimates for these three concepts are illustrated in the table below. Additional cost breakouts are also provided in the report for cost per mile, structures, interchanges and useable sections.

**Table 2: Summary of Cost Estimates For Three Alternative Highway Project Concepts, By County**

	COUNTY							PROJECT
	CARROLL	GALLATIN	OWEN	GRANT	PENDLETON	BRACKEN	MASON	
<b>INTERSTATE</b>								
LENGTH	10		10	16.7	17.4	14	11.9	80
CONST.	\$217,700,000		\$144,700,000	\$310,700,000	\$ 329,600,000	\$297,000,000	\$230,300,000	\$1,530,000,000
R-O-W	\$ 13,000,000		\$ 8,100,000	\$ 18,500,000	\$ 14,000,000	\$ 11,300,000	\$ 15,500,000	\$ 80,400,000
UTILITY	\$ 6,000,000		\$ 1,200,000	\$ 3,700,000	\$ 2,100,000	\$ 1,700,000	\$ 6,000,000	\$ 20,700,000
DESIGN	\$ 10,900,000		\$ 7,200,000	\$ 15,500,000	\$ 16,500,000	\$ 14,900,000	\$ 11,500,000	\$ 76,500,000
TOTAL	\$247,600,000		\$161,200,000	\$348,400,000	\$ 362,200,000	\$324,900,000	\$263,300,000	\$1,707,600,000
<b>4 LANE ARTERIAL</b>								
LENGTH		8	9.8	16.7	17.4	14	11.9	77.8
CONST.		\$149,700,000	\$ 96,400,000	\$202,800,000	\$ 250,700,000	\$216,000,000	\$155,700,000	\$1,071,300,000
R-O-W		\$ 9,900,000	\$ 7,200,000	\$ 16,100,000	\$ 12,800,000	\$ 10,300,000	\$ 14,500,000	\$ 70,800,000
UTILITY		\$ 4,800,000	\$ 1,200,000	\$ 3,700,000	\$ 2,100,000	\$ 1,700,000	\$ 6,400,000	\$ 19,900,000
DESIGN		\$ 7,500,000	\$ 4,800,000	\$ 10,100,000	\$ 12,500,000	\$ 10,800,000	\$ 7,800,000	\$ 53,500,000
TOTAL		\$171,900,000	\$109,600,000	\$232,700,000	\$ 278,100,000	\$238,800,000	\$184,400,000	\$1,215,500,000
<b>2 LANE ARTERIAL</b>								
LENGTH		1.5	9.8	16.7	17.4	14	11.9	71.3
CONST.		\$ 15,100,000	\$ 53,800,000	\$116,800,000	\$ 145,300,000	\$125,400,000	\$ 70,000,000	\$ 526,400,000
R-O-W		\$ 1,300,000	\$ 5,800,000	\$ 14,500,000	\$ 10,300,000	\$ 8,300,000	\$ 10,500,000	\$ 50,700,000
UTILITY		\$ 500,000	\$ 1,400,000	\$ 5,000,000	\$ 2,500,000	\$ 2,000,000	\$ 7,100,000	\$ 18,500,000
DESIGN		\$ 800,000	\$ 2,700,000	\$ 5,800,000	\$ 7,300,000	\$ 6,300,000	\$ 3,500,000	\$ 26,300,000
TOTAL		\$ 17,700,000	\$ 63,700,000	\$142,100,000	\$ 165,400,000	\$142,000,000	\$ 91,100,000	\$ 621,900,000

## Traffic Forecasts

Traffic estimates were generated for the Northern Kentucky Outer Loop (I-74) for various conditions using the Statewide Traffic Model. This model was developed and managed by the Kentucky Transportation Cabinet, Division of Multimodal Programs, and was updated in September 2001. Figure 2 shows a sample of the traffic volumes for the free (no toll) interstate option. Traffic volumes were also generated for an arterial option and a toll interstate option and can be found in the report.



*This drawing is not to scale.*

**Figure 2: Estimated Traffic Forecasts, Year 2001 and 2030 for Interstate Option**

## Benefit Cost Analysis

The purpose of the Benefit Cost Analysis is to evaluate the economic feasibility of the proposed transportation investment. This report addresses whether the resource savings from the highway project (in terms of reduced travel time, increased safety, and reduced costs) are large enough to compensate for the economic resources that must be invested to implement the project. For major changes to the Interstate Highway System, the Federal Highway Administration outlines the procedures to follow in performing the Benefit Cost Analysis.

Three highway types were evaluated: 2-lane arterial, 4-lane arterial, and interstate. The Federal Highway Administration utilizes a 7% discount rate for baseline conditions in determining B/C ratios. To understand the sensitivity of the B/C ratio in relation to changes in project costs, benefits, construction period, discount rates, etc. a separate sensitivity analysis was performed on each. Table 3 gives the baseline benefit cost ratio as well as ratios under the various alternative assumptions. The baseline benefit cost ratio was derived assuming a 7 year construction period, completed sections in adjacent states, and a 7% discount rate.

**Table 3: Benefit Cost Comparisons Using Benefit Cost Ratios for the Northern Kentucky Outer Loop (I-74) Project For Arterial and Interstate Options Under Alternative Assumptions**

Option	B/C	Construction Period		No Build in	Project Costs		Alternative Benefits		Discount Rate
	Baseline	15 Years	3 Years	Adjacent States	15% More	15% Less	15% More	15% Less	4%
2-lane Art.	0.300	0.269	0.308	0.281	0.261	0.353	0.345	0.255	0.518
4-lane Art.	0.219	0.191	0.227	0.184	0.190	0.258	0.252	0.186	0.388
Interstate	0.588	0.536	0.598	0.227	0.512	0.692	0.677	0.500	0.973

The benefit cost analysis also looked at the B/C ratios for two major sections of the corridor, i.e. east and west of I-75. The Western Portion of the corridor was deemed to be economically feasible because it had a benefit cost ratio of greater than one for the interstate alternate. Like most other federally funded studies, we are looking at only the Kentucky portion of the multi-state I-74 corridor. Thus, this study assumes interstate connectivity on both sides of the Kentucky Corridor. The assumption for connectivity is predicated on the need to evaluate the Kentucky portion only. This means that extensions of the Interstate are completed in Indiana and Ohio. In Indiana, the assumed completed section extends from I-74 south to the Ohio River, and in Ohio, the assumed completed section extends from the proposed I-74 corridor (generally State Route 32) to the new bridge over the Ohio River. This connectivity was the driving force behind why the western portion of the roadway has a positive benefit cost ratio. The following table shows the results:

**Table 4: Benefit and Cost Comparisons Using Benefit Cost Ratios for the Northern Kentucky Outer Loop (I-74) Project for Arterial and Interstate Options Under Alternative Assumptions for the Western Segment (Indiana Border to Interstate 75)**

Option	B/C	Construction Period		No Build in	Project Costs		Alternative Benefits		Discount Rate
	Baseline	15 Years	3 Years	Adjacent States	15% More	15% Less	15% More	15% Less	4%
2-lane Art.	0.494	0.471	0.492	0.409	0.429	0.581	0.568	0.420	0.833
4-lane Art.	0.255	0.234	0.263	0.163	0.222	0.300	0.294	0.217	0.442
Interstate	1.096	1.027	1.098	0.188	0.953	1.289	1.260	0.931	1.780

### Economic Development Impact

Economic Development Impacts for the proposed new highway were analyzed for the region from both an economic and demographic perspective. These impacts included changes in employment, income and population in the corridor region. Impacts occur because accessibility is improved and the cost of travel in the area is reduced. This savings in travel cost reduces the cost of a product and, therefore, increases profits and the competitive value of the product. The competitive value of the product can result in increased production (employment), which results in growth in local businesses and encourages the relocation of businesses and households into the region. Table 5 summarizes the impacts for the proposed Northern Kentucky Outer Loop (I-74) for both the interstate and arterial options. As a note, the traffic volumes for a four-lane arterial were sufficiently low enough to basically replicate the volumes for a two-lane arterial. Therefore, since economic development statistics are generated from traffic volumes, arterial highway economic development produces only one set of economic development conditions for both two and four lane arterials (referred to in the table as “Arterial”).

**Table 5: Average Annual Economic Impact of the Northern Kentucky Outer Loop (I-74), 2010 to 2039, on an Eighteen-County Northern Kentucky Region**

<b>Design Option</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Worker Earnings</b>	<b>Jobs</b>	<b>Population</b>
	<b>(Millions of 1992 \$)</b>	<b>(Millions of 2000 \$)</b>	<b>(Millions of 2000 \$)</b>		
Interstate	\$378.4	\$227.9	\$150.9	2,900	2,400
Arterial	\$243.5	\$156.1	\$102.3	1,600	1,600

Analysis also was conducted for a scenario where only the western portion of the Outer Loop is built, refer to Table 6. The western portion would run from the Indiana-Kentucky border to Interstate 75. The economic development impacts analysis assumes connectivity to I-74 in Indiana. Also, note that these economic benefits from the western portion are at least 75% as large as the benefits from building the entire length of the Outer Loop in Kentucky. This suggests that the economic development impact of the Outer Loop project will be concentrated in the western portion of the route.

**Table 6: Average Annual Economic Impact of Western Portion of the Northern Kentucky Outer Loop (I-74), 2010 to 2039, On a Twelve-County Northern Kentucky Region**

<b>Design Option</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Worker Earnings</b>	<b>Jobs</b>	<b>Population</b>
	<b>(Millions of 1992 \$)</b>	<b>(Millions of 2000 \$)</b>	<b>(Millions of 2000 \$)</b>		
Interstate	\$322.1	\$179.0	\$127.2	2,300	1,200
Arterial	\$208.0	\$124.3	\$89.2	1,300	700

**Interchange Development Report**

For the proposed interstate option, there are two types of interchange development opportunities: local (direct demand) or regional (regional/destination demand). Direct demand is derived from proximity to the proposed interchange (local indigenous population), and regional/destination demand stems from the broad-based geographic accessibility provided by the interchange and its appeal as a destination to population centers and commercial/industrial areas throughout the region. Though direct demand opportunities are potentially available to all interchanges, regional/destination demand is obtainable at only a few. Only three proposed Outer Loop (I-74) interchanges were identified that have the potential for regional/destination demand: I-71, I-75 and KY 9/10.

Traffic based development at these regional/destination interchanges can include, but is not limited to, traveler and commuter service-oriented businesses, for example:

- Truck stop/convenience
- Auto/gas/convenience.
- Retiree communities/ residential development
- Motels.
- Chain restaurants.
- Industrial parks



These regional/destination interchanges require high traffic volumes that provide high levels of exposure to the motoring public/consumers.

**Sections of Independent Utility**

The Benefit Cost Analysis indicates that the entire route is not economically feasible from a road user benefit perspective. However, the study analysis indicates that the western portion of the route (with connectivity to I-74 in Indiana) satisfies the road user benefit cost condition, and the entire route shows considerable economic development (job creation) potential.

It is necessary to break the Northern Kentucky Outer Loop (I-74) into priority sections of independent utility that the Kentucky Transportation Cabinet can place in the project listing for possible future funding consideration.

The proposed sections (in order from highest priority to lowest) for the Northern Kentucky Outer Loop (I-74) are as follows:

- US 127 to I-75 – 15.1 miles (Owen and Grant Counties)
- I-71 to US 127 – 6.8 miles (Gallatin/Carroll and Owen Counties)
- I-75 to US 27 – 17.6 miles (Grant and Pendleton Counties)
- US 27 to KY 9 – 29 miles (Pendleton, Bracken, and Mason Counties)
- Indiana to I-71 – 7 miles (Carroll/Gallatin Counties)
- KY 9 to Ohio – 2.9 miles (Mason County)

These segment priorities, based on benefit cost analysis, economic development potential, and system connectivity, were shared with the regional advisory committee and local focus groups. The local media also discussed the project feasibility and priorities in several articles.

**Financial Feasibility**

Financial feasibility exists when there are identifiable and sufficient sources of revenue to fund a highway project. Sufficient revenue must be raised in order to fund the construction of a highway project, either as the project is taking place or over time to pay off the bonds used to fund construction. Potential revenue sources include public funds, user fees, or private funding. One or all of these sources may be tapped in order to pay for the construction of a particular highway. Table 7 is shown for the entire corridor and reflects revenue from tolls, user fees, and tax increment financing.

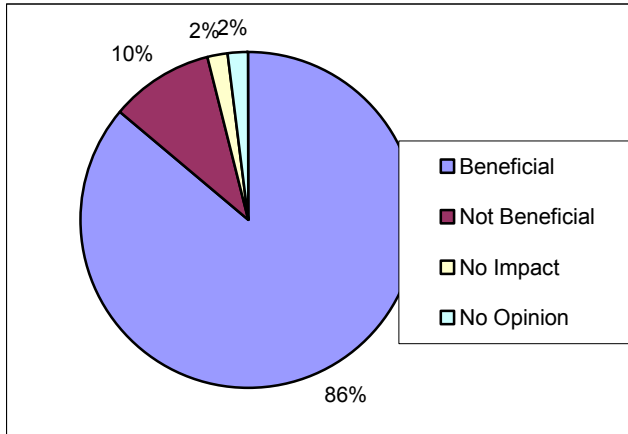
**Table 7: Share of Available Funds<sup>1</sup> Needed to Meet Annual Financial Obligations for Outer Loop With Revenue from Tolls, User Fees, and Tax Increment Financing**

	2003	2007	2010	2020	2030	2033	2036
Interstate	3.0%	8.2%	8.2%	5.6%	3.9%	1.9%	1.7%
4-lane Arterial	2.2%	5.9%	5.9%	4.0%	2.8%	1.4%	1.3%
2-lane Arterial	1.2%	3.0%	2.9%	2.0%	1.4%	0.6%	0.6%

<sup>1</sup> Available funds are assumed to be transportation Cabinet revenue less disbursements for administration, law enforcement, local road projects, grants-in-aid to local government, and bond obligations.

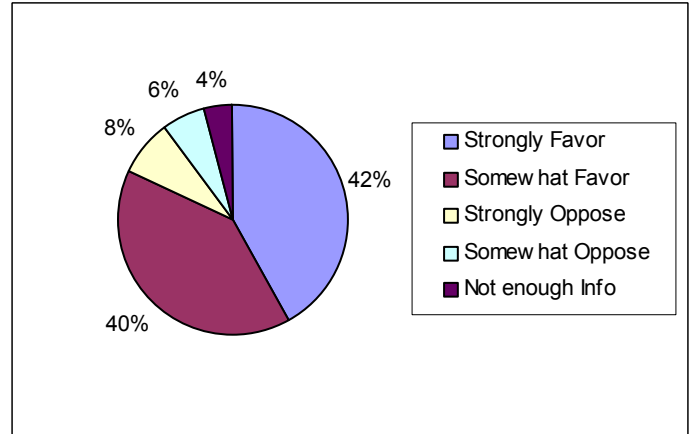
**Public Involvement**

This task consisted of regional advisory committee meetings, local focus group meetings, chamber of commerce meetings, meetings with county officials and Area Development Districts. Questionnaires were given to the public, and almost 200 were filled out. Newsletters and news releases were also used to give the public information on the project. A telephone survey was conducted at the conclusion of the project to evaluate how well information was distributed on the project. Both the written surveys and telephone surveys yielded a strong public backing and need for the new road. Figures 3 and 4 show the opinions of the public from both surveys.



*Do you think the proposed Northern Kentucky Outer Loop (I-74) would be?*

**Figure 3: Written Survey Results (200 Responses)**



*How strongly do you favor or oppose the construction of the Northern Kentucky Outer Loop (I-74)?*

**Figure 4: Telephone Survey Results (400 Responses)**

**Study Conclusions**

Based upon the study’s analyses, a number of important conclusions emerged from the study research and the public involvement:

- Study Parameters** - *The County Judge Executives initiated this conceptual feasibility study idea through their congressional delegation because they felt the area needed a project to stimulate economic development and the creation of jobs. As the Judge Executives have mentioned frequently, the area is slow to transition from a farm-based economy to a manufacturing/service-based economy. As a result, unemployment is relatively high and wages are relatively low. This concern of the Judge Executives has been borne out through the public involvement program associated with the project. Economic development and the need for more jobs and improved wages are the most important concerns of the local populace. A random telephone survey validated these concerns. The Northern Kentucky Outer Loop (I-74) project is forecast to provide the desired result according to the project research and analysis by creating 2,900 job years of work per annum for an interstate type project or 1,600 job years of work per annum for an arterial type highway project. These jobs create approximately \$150M and \$100M in worker earnings per year, respectively.*

- Benefit Cost Analysis** - *The benefit cost analysis revealed that for the entire corridor the project costs greatly outnumbered the road-user benefits. Additionally, if the connecting extensions of the project into the adjoining states were not constructed the benefits were even less. However, if the Indiana portion of the project (SR 101 Corridor) is implemented, then the Kentucky portion of the project from the Markland Dam eastward to I-75 has a benefit cost ratio greater than 1.0, which means the benefits of the project exceed the cost of the project. The western portion of the project under these conditions would be expected to serve future traffic volumes in the order of over 20,000 vpd in Gallatin and Carroll Counties to over 12,000 in Grant and Owen Counties.*

● **Financial Feasibility** - *The financial feasibility portion of the study revealed that even though the western portion of the corridor possesses positive indicators for economic justification, the financial feasibility is a matter of concern. The possibility of raising revenues by making the roadway a toll facility does not solve the financial conditions. Only about \$1M of revenue per year is expected if the toll facility is used. Also, right-of-way donations and special taxing districts were other methods of raising revenue that proved inadequate for such a challenging project. The only revenue source that seems capable of accomplishing the project is a bond issue backed by the General Road Fund. The major problem with the commitment of these funds is it would require a significant commitment of the statewide transportation funds and would greatly alter the project priorities in the KYTC Six-Year Highway Plan. The implementation of the western portion of this project would require a 3% commitment of the General Road Fund dollars for an interstate type improvement or approximately \$50 million per year for twenty years, the life of the bonds.*

● **Public Involvement** - *The extensive public involvement program primarily used two basic means of soliciting public opinion, questionnaires and telephone surveys. The distributed questionnaire, with approximately 200 responses, received an 86% beneficial rating regarding the proposed Northern Kentucky Outer Loop (I-74), and the telephone survey, with approximately 400 responses, found that 42% strongly favored and 40% somewhat favored the proposed highway. This level of responses from the citizens in the project corridor illustrates there is a strong acceptance for such a project. The telephone survey also revealed that the extensive public involvement program for the Northern Kentucky Outer Loop (I-74) reached approximately 58% of the population.*