FINAL REPORT

SOUTHERN KENTUCKY CORRIDOR

I-66

Economic Justification and Financial Feasibility

To attain excellence, you must care more than others think is wise, risk more than others think is safe and dream more than others think is practical.
-author unknown

Prepared by

Kentucky Transportation Center
for
Kentucky Transportation Cabinet

MAY 1997

SOUTHERN KENTUCKY CORRIDOR (I-66) STUDY

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Executive Summary
Southern Kentucky Corridor (I-66) Study

Study Purpose and Name

The purpose of this corridor study is to determine the economic justification and financial feasibility of the Kentucky segment of the Transamerica Transportation Corridor (I-66) initiative. In order to simplify the reference to this Kentucky segment, this study has been titled the *"Southern Kentucky Corridor (I-66) Study."*

Background

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) provided funding for an "Interstate 66 Feasibility Study." The study was also referred to as the Transamerica Transportation Corridor Feasibility Study. That study concluded that a new transportation corridor from the West Coast to the East Coast was not economically feasible because the highway construction costs were greater than the travel benefits. However, the study went on to say that individual segments providing "Linkage to the National Highway System and/or key elements of a state's transportation system" may be economically feasible. This executive summary presents the results of an economic justification and financial feasibility study conducted for the Southern Kentucky Corridor (SKC) portion of the proposed I-66 Corridor.

Corridor Definition

The I-66 Corridor was originally defined in the 1991 ISTEA, and the 1995 National Highway System Designation Act amended Section 1105 (c) of ISTEA, describing the corridor as:

- Beginning on the Atlantic Coast in the Hampton Roads area;
- Going westward across Virginia to the vicinity of Lynchburg, Virginia;
- Continuing west to serve Roanoke;
- To a West Virginia corridor centered around Beckley;
- To Welch as part of the Coalfields Expressway described in Section 1069 (v);
- To Williamson sharing a common corridor with the I-73/74 Corridor;
- To a Kentucky Corridor centered on the cities of Pikeville, Jenkins, Hazard, London, Somerset, Columbia, Bowling Green, Hopkinsville, Benton, and Paducah;

Southern Kentucky Corridor (I-66)

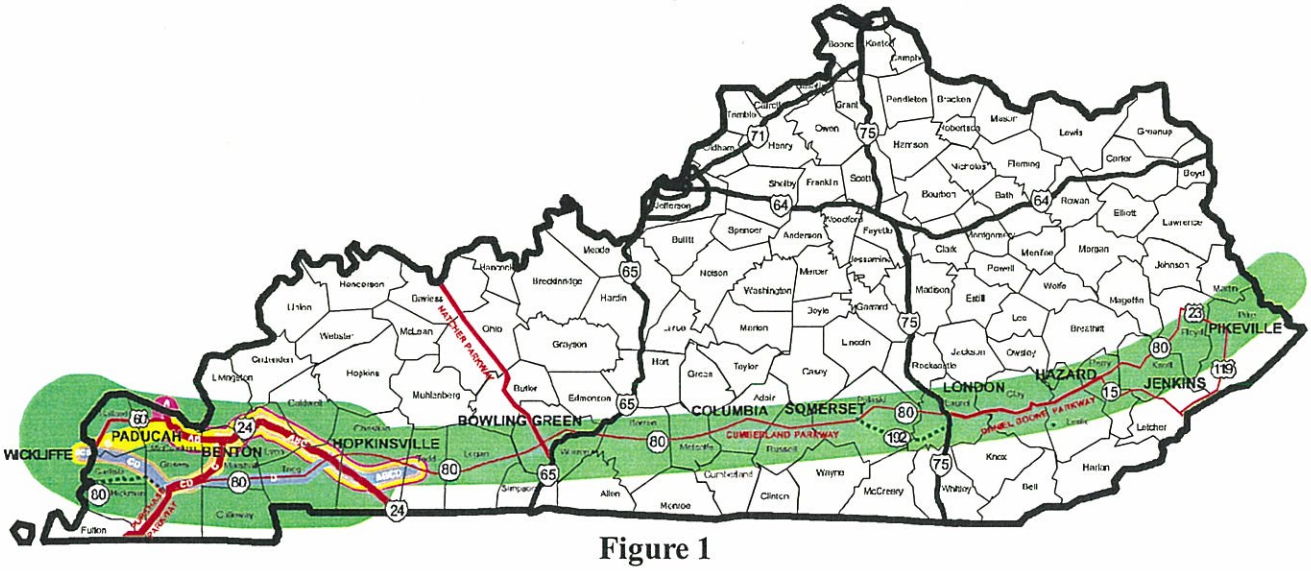

Figure 1

Kentucky Per Capita Income
By County

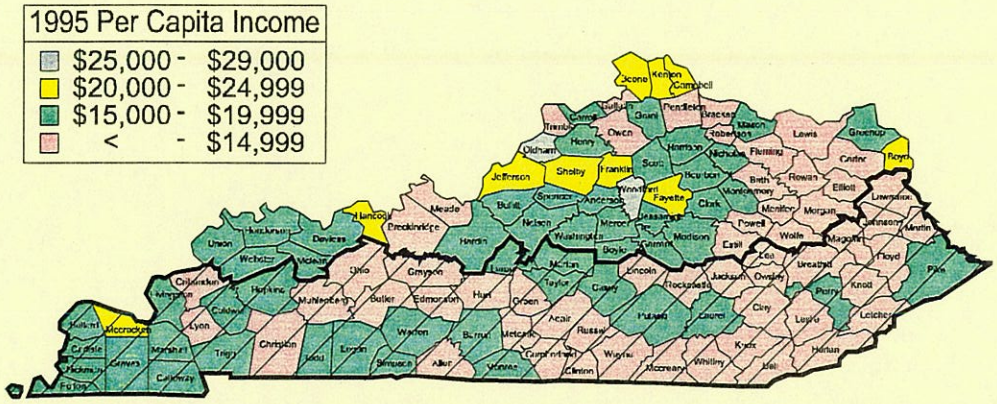

Figure 2

- Into Illinois and into Missouri and moving westward across southern Kansas.

For the purpose of the Kentucky segment, the corridor study used the above description plus additional alternatives at the western terminus as illustrated in Figure 1.

The Southern Kentucky Corridor is approximately 676 kilometers (420 miles) in length and 80 kilometers (50 miles) in width. The 80-kilometer-wide (50-mile-wide) band includes a "direct impact" county through which the route is likely to pass as well as adjacent "indirect impact" counties that could also realize economic development benefits from access to this proposed new interstate highway. This corridor contains 63 impact counties, with 28 being directly impacted where highway construction may occur. The 63 counties within the SKC (I-66) are of particular sociopolitical interest since many are economically distressed, as shown in Figure 2. The per capita income in the corridor region is nearly $4,500 below levels in other parts of the state. Also, the unemployment rate in the corridor region is 6.8 percent, well above the rate in other parts of the state and the nation. As shown in Table 1, the region along this corridor is clearly a place in Kentucky and the nation which could benefit from more economic growth and application of underutilized resources.

Table 1
Socioeconomic Characteristics of SKC (I-66)

	U.S.	Kentucky	SKC (I-66)	Non-Corridor
Population (1995)	261,755,000	3,846,186	1,456,740 (38%)	2,389,444 (62%)
Employment (CLF*)		1,861,315	622,519 (33%)	1,238,796 (67%)
Per Capita Income	$22,059	$17,854	$13,924	$18,481
Unemployment Rate (1995)	5.6%	5.4%	6.8%	4.7%

* Civilian Labor Force

Study Administration

The study was conducted by the Kentucky Transportation Center along with the University of Kentucky Department of Civil Engineering and College of Business and Economics Research Center in partnership with the Kentucky Transportation Cabinet. An organizational chart depicting the study administration is shown in Figure 3.

Organizational Chart

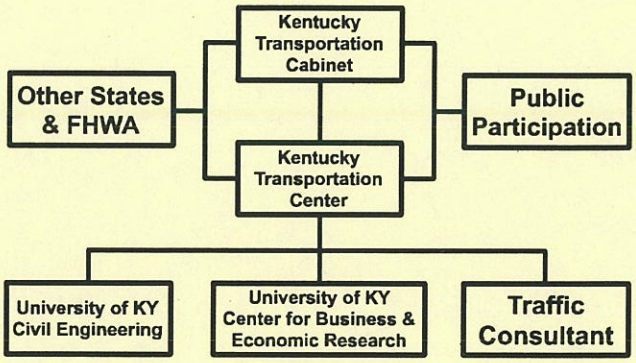

Figure 3

Public Participation

Press releases and newsletters were used to inform the public of the development of this study. An advisory committee comprised of representatives from the area development districts, federal and state government agencies, elected local officials, three adjacent states, and other interests held regional meetings to keep the public informed of the study activities and progress. Presentations were also made to the transportation committees of each area development district along the corridor.

Southern Kentucky Corridor (I-66) Cost Estimates

Conceptual cost estimates were developed based on the corridor alignment shown in Figure 1, which included alternate design speed concepts and four alternate alignments in Western Kentucky. The total project cost includes the construction cost (mainline facility with structures, interchanges, and rest areas) plus the cost of planning/design, right-of-way, and utilities. Table 2 illustrates the cost of this project (in 1995 dollars) by design speed and alternate corridor alignment locations in Western Kentucky.

Travel Demand

Traffic volumes were developed using a national/regional trip generation model and the Kentucky Statewide Traffic Model. The models provided the volume of traffic expected for the study corridor by design speed for each of the alternates. They also illustrated that a significant amount of traffic would be diverted from major

Table 2

Cost Estimates By Route Options					
DESIGN SPEED		Alternate A	Alternate B	Alternate C	Alternate D
100 km/h (60 mph)	KILOMETERS (MILES)	692 (430)	719 (447)	742 (461)	724 (450)
	COST	$3.3 billion	$3.8 billion	$3.6 billion	$4.0 billion
110 km/h (70 mph)	KILOMETERS (MILES)	647 (402)	674 (419)	693 (431)	676 (420)
	COST	$4.4 billion	$4.9 billion	$5.0 billion	$5.7 billion
130 km/h (80 mph)	KILOMETERS (MILES)	645 (401)	673 (418)	692 (430)	674 (419)
	COST	$6.3 billion	$6.7 billion	$6.8 billion	$7.4 billion

existing facilities such as I-40 and I-64. This diverted traffic is important when determining road user cost savings. Horizon year (2025) traffic assignments for 100 and 110 km/hr (60 and 70 mph) design speed are shown in Figure 4.

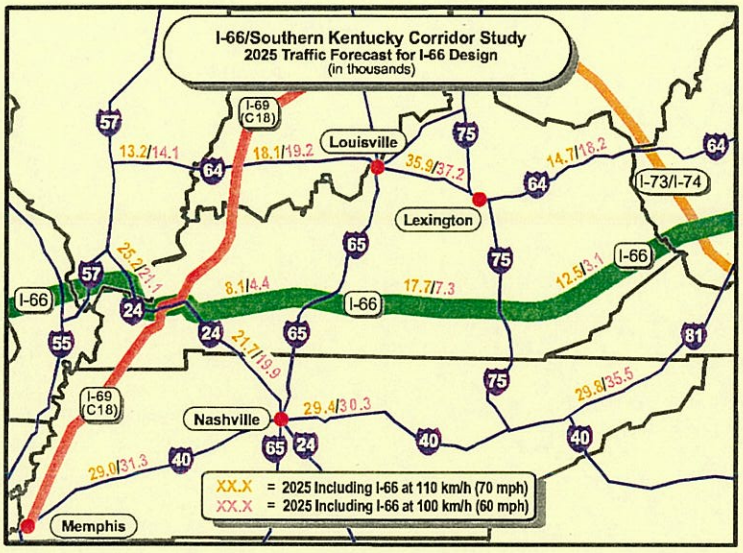

Figure 4

Economic Development

Economic development impacts include the increase in earnings, jobs, income, and population which would result from the improved accessibility of SKC. These impacts are particularly important for the corridor because the economy of the region along the corridor is distressed, as illustrated in Figure 2. Quality-of-life benefits are also improved by increased access to key institutions such as employment centers, schools, medical care, recreation facilities, and governmental services. As shown in Table 3, a major highway improvement in the SKC (I-66) corridor would be expected to generate from 48,300 to 63,800 person-years of work per year. This represents a 5.9-percent to 7.9-percent increase in expected employment for the 20-year period after the SKC (I-66) is open to traffic. New manufacturing jobs alone are expected to account for 30 percent of all new jobs. This is a large share considering that less than 20 percent of the jobs in Kentucky are currently in manufacturing. Personal earnings in this corridor, on the average, are expected to increase between $1.4 billion to $1.9 billion per year. This represents a 6.4 percent to 8.7 percent increase in expected earnings per year for the 2005 to 2025 time period if the SKC is built. Similarly, the popula-

Table 3
Average Annual Employment, Earnings, Total Income, and Output Impacts of Interstate 66
By Speed and Design Option: 2005-2025

Highway Corridor Region					
Speed km/h (mph)	Route[1]	Employment	Earnings (Billions of 1995 $s)	Total Personal Income (Billions of 1995 $s)	Output (Billions of 1995 $s)
100 (60)	A	51,906	$1.60	$2.20	$3.54
100 (60)	B	51,646	1.58	2.21	3.51
100 (60)	C	48,362	1.47	2.09	3.36
100 (60)	D	51,333	1.55	2.14	3.54
110 (70)	A	58,171	1.78	2.35	3.93
110 (70)	B	57,323	1.75	2.35	3.89
110 (70)	C	54,798	1.65	2.24	3.77
110 (70)	D	55,653	1.68	2.24	3.82
130 (80)	A	62,524	1.91	2.47	4.23
130 (80)	B	63,873	1.94	2.52	4.29
130 (80)	C	60,700	1.83	2.40	4.16
130 (80)	D	60,520	1.82	2.37	4.15

[1] Routes A-D are the same east of Hopkinsville. Route A exits Kentucky at Paducah. Route B travels south of Paducah and crosses the Mississippi River at Wickliffe. Route C passes through Mayfield before exiting Kentucky at Wickliffe. Route D passes through Land Between the Lakes and Mayfield before exiting Kentucky at Wickliffe.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky.

Table 4
Rates Used in Benefits Determination

	ACCIDENT COST VKmT (VMT)	VEHICLE OPERATING COST VKmT (VMT)		VALUE of TIME	
Highway System	Comprehensive Crash All Vehicles	Autos	Trucks	Autos	Trucks
INTERSTATE	$0.047 ($0.076)	$0.107 ($0.172)	$0.397 ($0.639)	$9.143* $15.565**	$22.344
ARTERIAL	$0.143 ($0.231)	$0.114 ($0.184)	$0.519 ($0.835)	$9.143* $15.565**	$22.344

Note: * Auto Commuters — Vehicle Occupancy 1.2
** Auto Others — Vehicle Occupancy 2.1
Cost is per Vehicle Kilometers of Travel (VKmT)
(Vehicle Miles of Travel (VMT)

tion growth varies between 75,400 to 80,600 additional people in the region over the same time period, an increase of about 4.6 percent to 4.8 percent along the SKC. Improved transportation enhances regionalism by reducing the driving time between communities. Improved regionalism is a crucial factor in improving incomes, poverty rates, and overall quality of life.

Cost Benefit Analysis

The economic justification of the SKC has been examined by comparing the benefits and costs. For some projects, the economic development impacts are so large they mask road user benefits. Both economic development and road user benefits were used in the SKC analysis. Also, the closeness and sensitivity of benefits to costs are very important conditions and can be used in justification and feasibility efforts and decisions. When the benefits to road users (time saving, greater safety, and reduced vehicle operating cost) exceed the cost of providing the SKC facility, the project is determined to be justified. Rates used in the benefits determination and the accident cost are shown in Tables 4 and 5. These rates are applied to vehicles that were diverted from other highways to the SKC. At a 4-percent discount rate, the benefit/cost ratio exceeds 1.00 for all alternates having a 110 km/h (70 mph) design speed as shown in Table 6. A 4-percent discount rate is considered to be reasonable since, historically, 4 percent has been the real rate of return on investments after inflation for adjustment. However, a 7-percent discount rate was also used in the justification analysis. When the increase in wages in the corridor region is compared to the cost of building the highway, the ratio of the benefits to the costs is over 4.0 using a 4-percent discount rate. This means benefits are four times greater than costs when considering economic development impacts for Kentucky resulting from the construction of a 110 km/hr (70 mph) facility in the SKC.

Financial Feasibility Analysis

At present, the state is severely challenged to maintain and preserve its existing transportation infrastructure. With only existing funding sources and the other minor revenue sources available, a project of this magnitude would be difficult to fund within the financial resources of the Commonwealth. To finance this project, it would be necessary to receive special designated funds from the federal government, and/or raise additional revenues for the Kentucky Road Fund. If this major commitment of future transportation revenues occurred, the SKC project would be financially possible.

Table 5
Accident Costs by Type of Incident

Incident	Cost Per Incident (in 1995 Dollars)	
	Interstate	Other Primary Arterial
Fatality	$3,038,782	$3,038,782
Injury	$69,240	$60,317
Property Damage Only Accident	$5,701	$5,701
Unreported Accident	$5,263	$5,263

Source: Calculated by the Center for Business and Economic Research, University of Kentucky, based on Miller (1991)

Priority Segments

The financial analysis was based upon the assumption that all parts of SKC would be built at the same time during the 1998 to 2004 period. Identification of priority segments for construction is appropriate because of the large financial

Table 6

Benefit Cost Ratio Sensitivity of Interstate 66 By Route and Speed Options for Alternative Scenarios

Speed km/h (mph)	Route	Benefit Cost Ratio[1]						
		Economic Development		Road Users				
		4% Discount Rate	7% Discount Rate	Costs 15% Lower	Costs 15% Higher	Benefits 15% Lower	4% Discount Rate	7% Discount Rate
100 (60)	A	5.76	4.17	0.98	0.72	0.71	0.83	0.47
100 (60)	B	4.90	3.54	0.95	0.71	0.69	0.81	0.46
100 (60)	C	4.74	3.43	0.96	0.71	0.69	0.82	0.46
100 (60)	D	4.63	3.34	0.97	0.72	0.70	0.83	0.47
110 (70)	A	4.71	3.42	**1.68**	**1.24**	**1.21**	**1.43**	0.80
110 (70)	B	4.14	3.00	**1.53**	**1.13**	**1.11**	**1.30**	0.73
110 (70)	C	3.83	2.77	**1.45**	**1.07**	**1.05**	**1.23**	0.69
110 (70)	D	3.48	2.51	**1.36**	**1.01**	0.99	**1.16**	0.65
130 (80)	A	3.47	2.47	**1.19**	0.88	0.86	**1.01**	0.55
130 (80)	B	3.22	2.32	**1.20**	0.89	0.87	**1.02**	0.56
130 (80)	C	2.95	2.13	**1.06**	0.79	0.77	0.90	0.49
130 (80)	D	2.70	1.94	**1.06**	0.78	0.77	0.90	0.50

[1] Based on the present value of benefits and costs earned during the years 2005 through 2054.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky.

commitment required to build the SKC. One strategy would be to build smaller segments which could link major existing highways. The advantage to this strategy would be that large continuous segments of SKC could be quickly created using limited funds initially available. The highest priority using this strategy would be to build the segment between Somerset and London connecting the Cumberland and Daniel Boone Parkways. This would provide a continuous interstate-type highway linking I-75 and I-65. The second priority would be to improve access from the Daniel Boone Parkway eastward to the state line. The third priority would be to build the segment from I-24 at Paducah to Wickliffe (Alternate B on Figure 1), although, to adequately serve its purpose, a short section of I-66 would have to be constructed in Missouri to connect to I-55. The next group of priorities would be to upgrade existing parkways to interstate standards. The highest priority of this group would be to upgrade the Daniel Boone and Cumberland Parkways.

Conclusions

The construction of the Southern Kentucky Corridor using a normal 110 km/hr (70 mph) interstate design speed and either the Alternate A or B alignment in Western Kentucky through Paducah and Wickcliffe would cost approximately $5 billion. Building the roadway would deliver substantial economic development and quality-of-life benefits to this economically distressed region. The economic analysis indicates that employment gains of around 55,000 jobs per year could be created by the construction of I-66 through Southern Kentucky. In addition to economic gain, the interstate-type roadway would also save approximatley 250 lives during the first 20 years of the project because of improved design standards. Therefore, Alternate A or B using the 110 km/hr (70 mph) design option would be preferred from a benefit/cost, economic development, and financial justification perspective.

SOUTHERN KENTUCKY CORRIDOR (I-66) STUDY
ECONOMIC JUSTIFICATION AND FINANCIAL FEASIBILITY

1.0 INTRODUCTION

This report is the culmination of 1½ years of research into conditions related to a new highway corridor across Southern Kentucky that was an integral part of the proposed Transamerica Transportation Corridor (TTC). The purpose of the research and investigation was to determine if such a highway would be economically justified and financially feasible.

1.1 Legislative History

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) of the U.S. Department of Transportation provided funding for an "Interstate 66 Feasibility Study" which was also referred to as the Transamerica Transportation Corridor (TTC). The TTC was defined as a transcontinental route extending from the East Coast to the West Coast, generally located between I-70 and I-40. In Kentucky, the Corridor was to traverse the southern tier of counties. Recently the National Highway System Designation Act of 1995 was very specific in defining this Corridor. This legislation amended Section 1105 (c) of ISTEA by describing the Corridor as "Commencing on the Atlantic Coast in the Hampton Roads area going westward across Virginia to the vicinity of Lynchburg, Virginia, continuing west to serve Roanoke and to a West Virginia Corridor centered around Beckley and Welch as part of Coalfields Expressway described in Section 1069 (v), then to Williamson sharing a common corridor with the I-73/74 Corridor, then to a Kentucky Corridor centered on the cities of Pikeville, Jenkins, Hazard, London, Somerset, Columbia, Bowling Green, Hopkinsville, Benton, and Paducah, into Illinois, and into Missouri and moving westward across Southern Kansas."

1.2 National Transamerica Transportation Corridor (I-66) Study

The National TTC Feasibility Study was initiated by the Federal Highway Administration in 1992 and the final report was produced in September 1994. This national study concluded that "The TTC does not meet economic feasibility criteria because of its high cost and low travel demands in some segments." However, the study did indicate that additional analysis of individual segments providing linkage to the National Highway System or key elements of a state's transportation system could find that some of the segments are economically feasible. This statement was the stimulus for initiating and conducting the Kentucky segment study for I-66.

1.3 Kentucky Segment (I-66) Study

Funding for Kentucky's segment of the I-66 Study was approved in 1995 and the work was started in June 1995. The Kentucky study was framed within the following context:

- The general study purpose was to determine the economic justification and financial feasibility of the Kentucky segment of I-66 from both a state and national perspective.
- The general corridor location was across the southern tier of counties and defined as a corridor 80 kilometers (50 miles) wide that was centered on the communities outlined in the 1995 National Highway System Designation Act (refer to Figure 1.3). The Corridor is approximately 676 kilometers (420 miles) in length.
- The name of the study was the **Southern Kentucky Corridor (I-66) Study**. This name will appear frequently in this text as SKC (I-66).

SOUTHERN KENTUCKY CORRIDOR

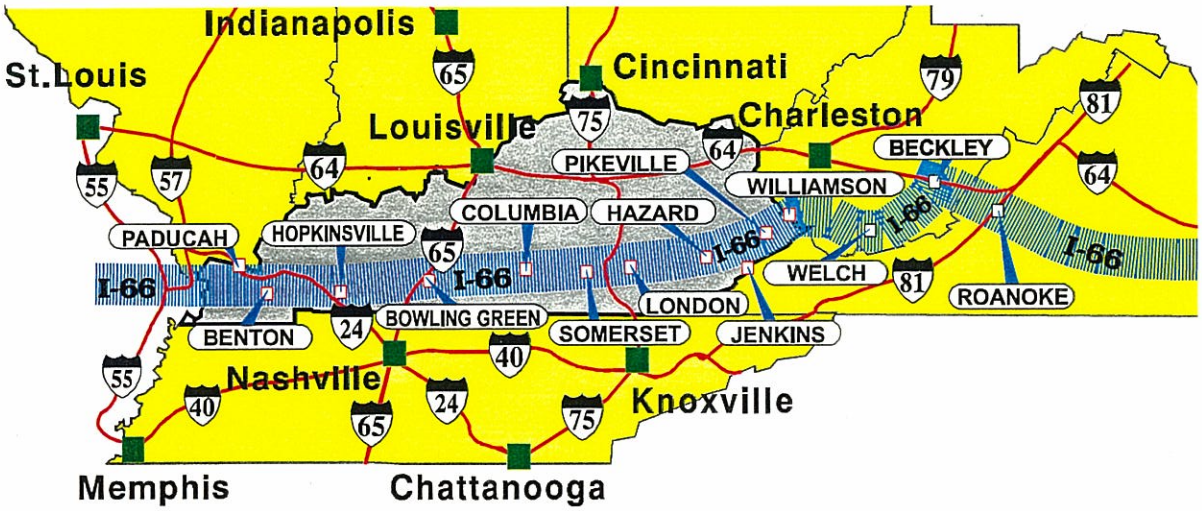

Figure 1.3

2.0 STUDY APPROACH AND ISSUES

The general study approach and pertinent study issues are presented below.

2.1 Study Administration

The Kentucky Transportation Cabinet (KYTC) contracted with the Kentucky Transportation Center (KTC) for the Southern Kentucky Corridor (I-66) Study. The study team consisted of KYTC, the Kentucky Transportation Center (KTC), and the Center for Business and Economic Research (CBER). Both centers are part of the University of Kentucky.

2.2 Study Approach[1]

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

1) Scoping Issues
2) Existing Conditions Module
3) Highway Options/Cost Estimates Module
4) Traffic Model Development Module
5) Econometric Model Development Module
6) Economic Analysis Module
7) Financial Feasibility Module
8) Priority Segment Module
9) Public Participation Module
10) Study Conclusions Module

Each of the above modules is presented in more detail in the subsequent report sections. Figure 2.2 illustrates the general work flow of this study.

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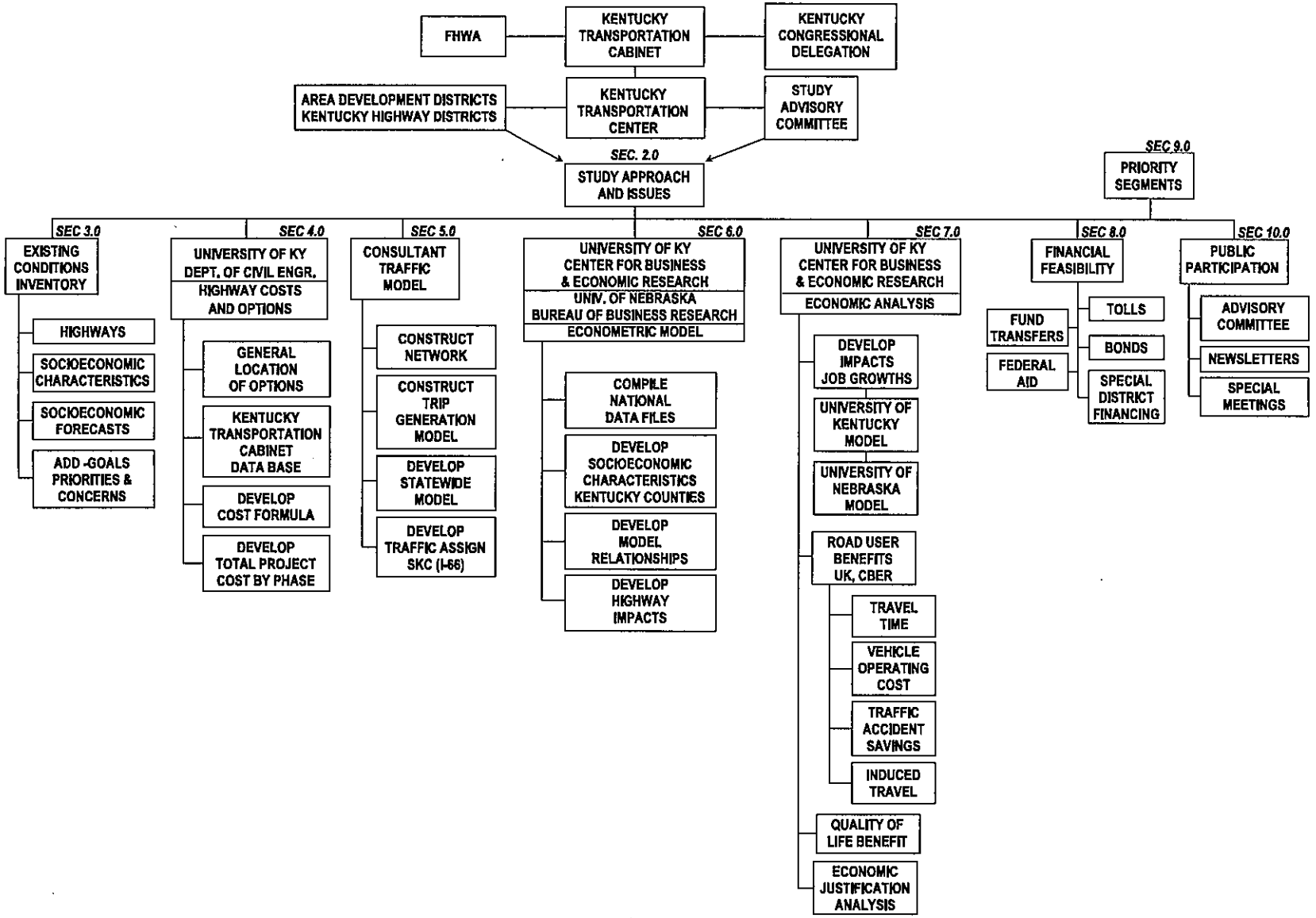
[1]Study Approach and Issues, Southern Kentucky Corridor (I-66), prepared by Kentucky Transportation Center, September, 1995.

Figure 2.2

STUDY APPROACH AND WORK FLOW



2.2.1 Pertinent Study Scoping Issues

A number of pertinent issues were raised during initial scoping so that reasonable limits and definitions could be placed on the study. Each issue is briefly presented.

2.2.1.1 Corridor Alignment - The corridor alignment is generally defined by the National Highway System Designation Act of 1995. Several corridor deviations were discussed due to input from interest groups and other initiatives. The result of these alignment discussions was a proposal for four alternatives (A thru D) on the western end of the corridor as shown in Figure 4.2. Alternative A would follow the legislative intent. Alternative B would maximize the use of the existing highway system and also accommodate the interest of the "Close the Gap" advocacy group that supports a U.S. 60 connection between Missouri and Kentucky. Alternative C would maximize the use of the existing system and get closer to the underdeveloped sections of far Western Kentucky, and Alternate D is a new route location in Western Kentucky that generally follows KY 80 providing improved transportation service and economic stimulus to several counties in Western Kentucky.

The eastern end of the Kentucky segment had two general options: to leave Kentucky from Pike County and connect to the proposed I-73/74 Corridor in West Virginia south of Williamson (this alignment follows the general legislative intent) or to leave Kentucky from Letcher County in the vicinity of Jenkins and connect to the Coalfields Expressway extension near Pound, Virginia. However, discussions involving transportation and elected officials from Kentucky, West Virginia, and Virginia resulted in the removal of the Jenkins to Pound, Virginia, connection as an option. Therefore, this study proceeded with only one corridor option on the east end of the Kentucky segment.

2.2.1.2 System Continuity - For study purposes it was assumed that the national I-66 route was complete across the nation and the Kentucky segment was evaluated from the western to the eastern state line. This allowed the costs and economic impact to be developed on state line conditions.

2.2.1.3 Committed Highway System - The highway network used in the traffic model and in the analysis of the proposed Southern Kentucky Corridor consisted of a multi-state area (Kentucky and portions of the surrounding states). The network of highways also included all of the top priority Highway Corridors designated in ISTEA

that were part of this multi-state region. Two of these priority corridors had significant impact on Kentucky travel, namely Corridor 5 (I-73/74 through West Virginia) and Corridor 18 (I-69 through Western Kentucky, which begins in Canada and terminates in Mexico).

2.2.1.4 Route Design Options - It was determined that as a result of recent national studies (I-66 and I-69) several design speeds should be used in the Southern Kentucky Corridor (I-66) study. The selected design speeds were 100, 110, and 130 kilometers (60, 70, and 80 miles) per hour. These speeds were selected because: the 100 kilometers (60 miles) per hour design would afford the opportunity to utilize the existing highway system to the maximum extent possible, especially the Parkway System; the 110 kilometers (70 miles) per hour design would provide insight into the opportunities of a conventional interstate highway; and the 130 kilometers (80 miles) per hour design would provide a high-speed segment of interstate highway that could enhance freight movement by trucks, attract special industries, and create special benefits to Kentucky and a segment of the national system.

2.2.1.5 Environmental Overview - It was determined that an environmental overview was unnecessary since this study effort was concerned with economic justification and financial feasibility and the corridor being evaluated was 676 kilometers (420 miles) in length and 80 kilometers (50 miles) in width. The environmental overview will be conducted during the preliminary location study phase of the project. Although the SKC traverses many sensitive areas within Kentucky (wetlands, Karst topography, deep ravines, etc.), the corridor limits are too general to make a conclusive evaluation of possible impacts in this phase of the project development process.

2.2.1.6 Public Participation - It was determined that public review and comment could be accomplished by working through the Area Development Districts and an Advisory Committee. All pertinent information was shared with other interested concerns and individuals by way of newsletters and news releases.

2.2.2 Existing Conditions / Data Gathering Module

This task, performed by KTC staff, consisted of gathering and presenting data concerned with the principal highways, population, socioeconomic conditions and opinions/goals/priorities in the direct and indirect SKC (I-66) impact counties. A more detailed discussion of this activity is presented in Section 3.0.

2.2.3 Highway Options Costs Module

This task, performed by the Department of Civil Engineering, University of Kentucky, included analysis of the principal routes in the Southern Kentucky Corridor, the selection of various design options, and the development of conceptual cost estimates of each design option. A more detailed discussion of this activity is presented in Section 4.0.

2.2.4 Traffic Model Module

This task, performed by a national consultant, determined the traffic volume impacts and diversions to the Southern Kentucky Corridor. The work effort included: update/refinement of the Kentucky Transportation Cabinet's existing Statewide Traffic Model network, development of the vehicular trip model, and a determination of the traffic conditions on each highway link and the highway network in general (transportation efficiency measures) for the three design speed route options and the four alternate corridor routings in Western Kentucky. A more detailed discussion of this activity is presented in Section 5.0.

2.2.5 Econometric Model Module

This work element was performed by the University of Kentucky Center for Business and Economic Research (CBER). It included development and documentation of an economic model appropriately tailored to analyze highway economic impacts and the future needs of the Kentucky Transportation Cabinet. This model determines the economic impacts of the various route options by producing such indicators as employment gains, industry relocation/new industry (by type), and personal income, etc. A more detailed discussion of this activity is presented in Section 6.0.

2.2.6 Economic Analysis Module

The CBER conducted this phase of the study. It involved determination of the benefit/cost ratio with appropriate rates of return. The benefit/cost ratio was analyzed separately for road users benefits and economic impact benefits. Also, sensitivity tests were performed to determine economic justification of the alternate routes. A more detailed discussion of this activity is presented in Section 7.0.

2.2.7 Financial Feasibility Module

The CBER conducted this phase of the study. It involved an evaluation of various and potential funding sources including the present road user funding arrangements in Kentucky. Funding sources for SKC (I-66) vary

from bond issues to special assessments to redistribution. A more detailed discussion of this analysis is presented in Section 8.0.

2.2.8 Priority Segment Module

This study module was developed by KTC after discussions were held with KYTC and CBER. A more detailed presentation of the priority process is located in Section 9.0

2.2.9 Public Participation Module

This phase of the study was performed jointly by the Kentucky Transportation Cabinet and the Kentucky Transportation Center. It consisted of advisory committee meetings, newsletters, technical reports, and technical meetings with KYTC and KTC staff. Also included were press releases and meetings with transportation committees of the affected area development districts. A more detailed discussion of this activity is presented in Section 10.0.

3.0 EXISTING CONDITIONS [2]

Information was gathered on the transportation infrastructure, the socioeconomic conditions, area goals and objectives, and priorities for each of the impact counties in the Southern Kentucky Corridor (I-66). There were two categories of counties in the SKC (I-66) study area: Direct Impact and Indirect Impact counties. Direct impact counties are those in which a new or improved SKC (I-66) highway might be located. The indirect impact counties are adjacent counties that would be impacted by the improved accessibility. There are 28 direct impact counties and 35 indirect impact counties for a total of 63 counties that would be affected by the proposed new highway. This information was documented in a 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 SKC (I-66) study. The base year for data compilation was established as 1995. Figure 3.0 illustrates the Direct and Indirect Impact Counties in the Southern Kentucky Corridor.

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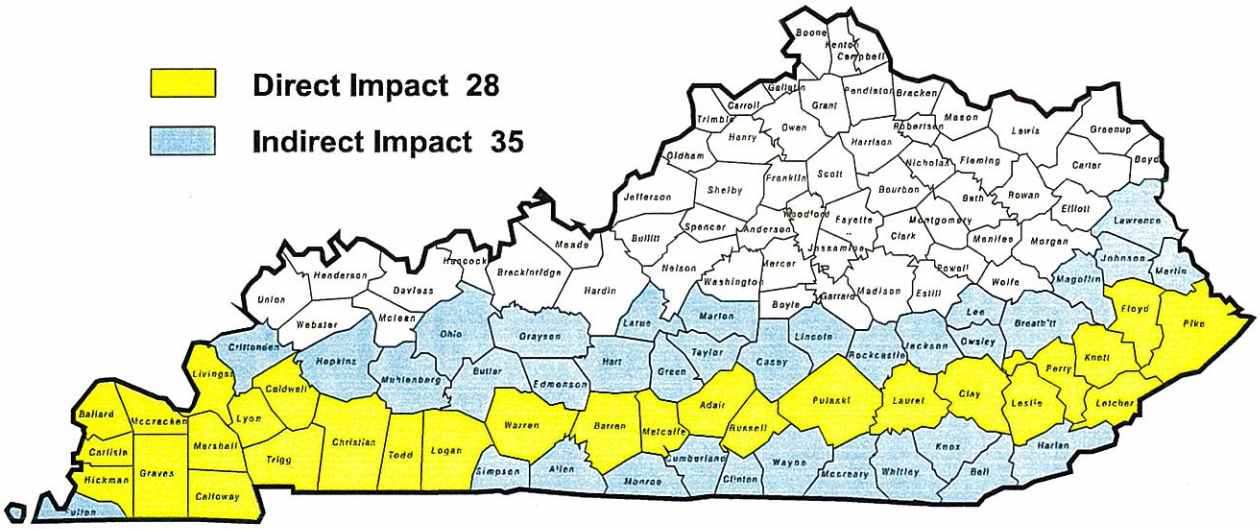
[2] Existing Conditions, Southern Kentucky Corridor (I-66), prepared by Kentucky Transportation Center, April, 1996.

Figure 3.0

SOUTHERN KENTUCKY CORRIDOR (I-66)
DIRECT and INDIRECT IMPACT COUNTIES



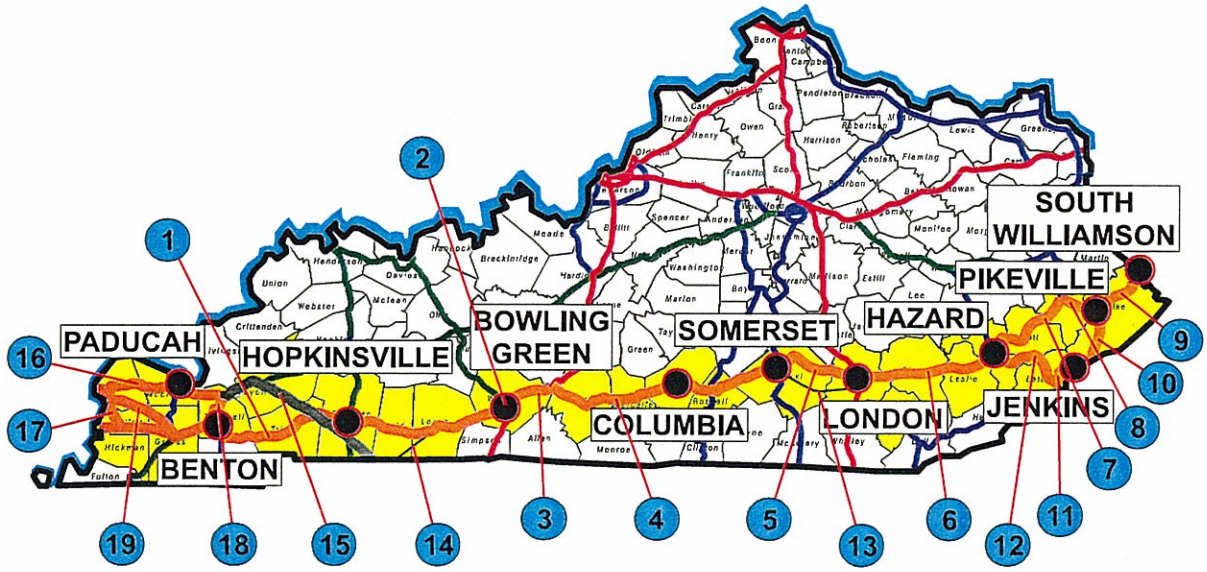
3.1 Major Highways

In order to establish some comparison between the existing highway system and the proposed SKC (I-66) highway, the major east-west routes within the corridor were reviewed for general operating characteristics, including: (1) roadway geometric conditions, lane and shoulder width, and terrain type; (2) traffic volumes, including percent trucks and number of truck terminals; (3) highway operating conditions, such as level of service and accident rates; and (4) highway functional classification (major collectors, minor arterials, principal arterials, parkways, and interstates). The major highways in the SKC (I-66) study area are shown in Figure 3.1.

The existing east-west routes in the SKC (I-66) are: US 68/KY 80 from Western Kentucky to east of Bowling Green; the Cumberland Parkway and the Daniel Boone Parkway to Hazard; KY 15, US 23, and US 119 to Williamson, West Virginia. Table 3.1 summarizes some of the roadway characteristics on this existing system of roadways within the corridor.

Fig. 3.1

ROUTES TENTATIVELY SELECTED TO BE A PART OF THE SOUTHERN KENTUCKY CORRIDOR STUDY



Proposed Route Description for Southern Kentucky Corridor (I-66)

1. KY 80/US 68 from Kentucky-Missouri State Line to the intersection with William Natcher Parkway at Bowling Green.
2. William Natcher Parkway from KY 80/US 68 intersection to I-65.
3. I-65 from William Natcher Parkway to the Cumberland Parkway.
4. Cumberland Parkway from I-65 to US 27 (Somerset).
5. KY 80 from US 27 at Somerset to I-75.
6. Daniel Boone Parkway from I-75 to KY 15 at Hazard.
7. KY 80 from KY 15 at Hazard to US 23 and US 460 in Floyd County.
8. US 23 and US 460 from KY 80 to US 119 at Pikeville.
9. US 119 from US 23 and US 460 at Pikeville to South Williamson (Kentucky-West Virginia State Line).
10. US 23 and US 119 from Pikeville (intersection of US 119 and US 23/460) to Jenkins and Jenkins to Virginia State Line.
11. US 119 from Jenkins to KY 15 at Whitesburg.
12. KY 15 from US 119 (Whitesburg) to the intersection of KY 80 and Daniel Boone Parkway at Hazard.
13. KY 192 from I-75 at London to US 27 at Somerset
14. US 79 from KY 80, US 68 at Russellville to Kentucky-Tennessee State Line.
15. I-24 from Kentucky-Tennessee State Line to US 60 interchange at Paducah.
16. US 60 from I-24 in Paducah to US 51/62 at Wickliffe.
17. US 51/62 from US 60 at Wickliffe to Kentucky 80 in Carlisle County.
18. Purchase Parkway from KY 80 interchange at Mayfield to I-24.
19. KY 121 from Purchase Parkway interchange at Mayfield to Wickliffe in Ballard County.

Table 3.1
Existing Route Characteristics

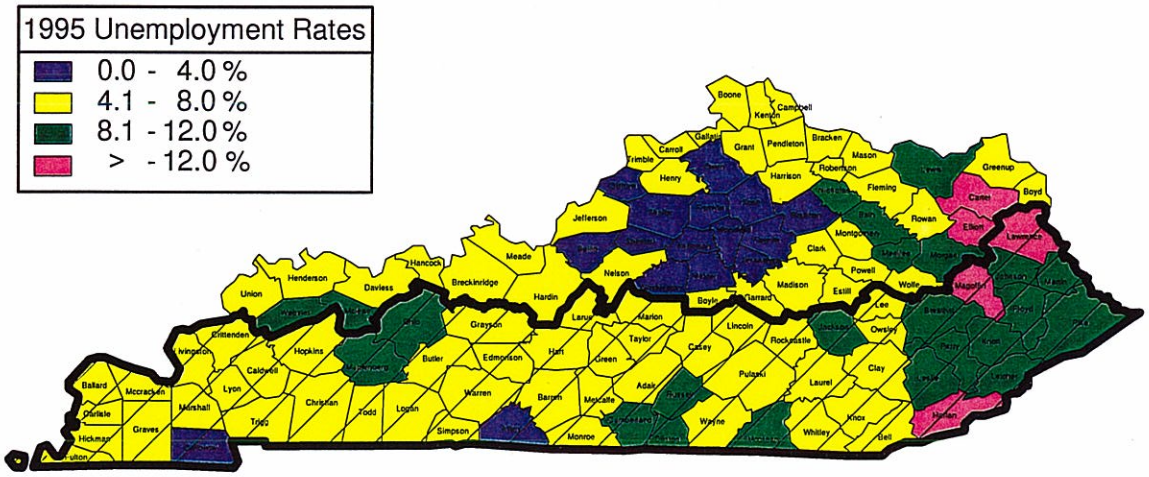
Characteristic	US 68/KY 80 Mayfield to Bowling Green	Bowling Green to Somerset	Somerset to Hazard	Hazard to Pikeville	Pikeville to Williamson
Average ADT	1,500 - 3,500	3,000 - 5,000	6,000 - 7,500	4,500 - 22,000	5,000 - 12,000
Average No. of Lanes	2 lanes/4 lanes in select areas	4 lanes	2 lanes/4 lanes in select areas	2 lanes/4 lanes	2 lanes/4 lanes
Average Operation (service level)	B-C	A-C	A-D	A-E	A-E
Critical Accident Rate	0.15 - 0.68	0.54 - 0.74	0.50 - 0.83	0.58 - 0.87	0.72 - 0.76
Total Kilometers (Miles)	161 (100)	196 (122)	161 (100)	129 (80)	48 (30)
Grand Total of Kilometers (Miles) = 695 (432)					

3.2 Socioeconomic Characteristics

To provide some insight into the potential impact of the SKC (I-66), two statewide socioeconomic maps are presented dealing with unemployment and average personal income. The geographic area represented by the direct and indirect impact counties regarding SKC (I-66) is outlined in Figures 3.2.a and 3.2.b.

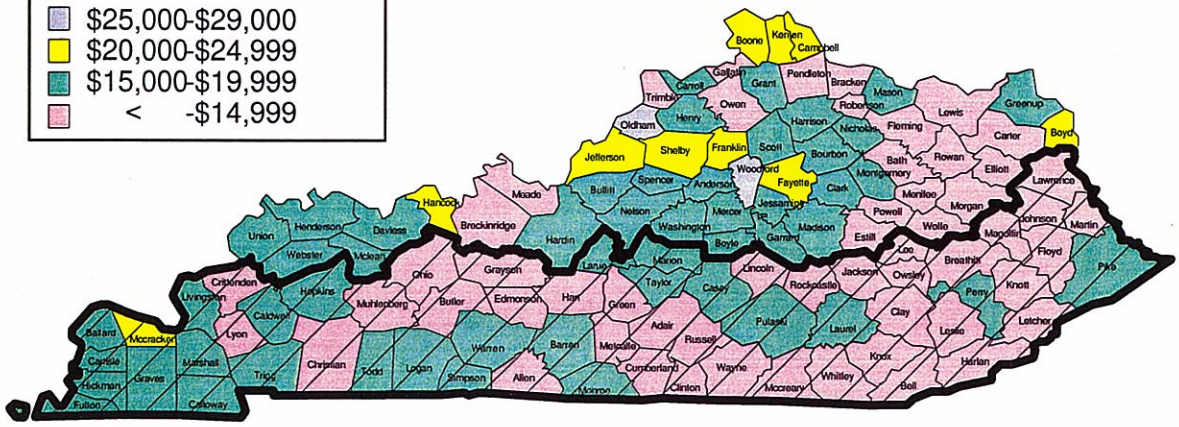
These statewide maps (Figures 3.2.a and 3.2.b) illustrate those areas of Kentucky that seem to be economically distressed. Almost 38 percent of the statewide population and 35 percent of employment are within the SKC (I-66) study area. The average 1995 unemployment rate in the study area is about 6.8 percent compared to the statewide average of 5.4 percent and the U.S. rate of 5.6 percent. The average per capita income in the study area in 1995 was $13,924 compared to the statewide average of $17,854 and the national average of $22,059. Comparisons of socioeconomic statistics are shown in Table 3.2.

Fig. 3.2.a
Kentucky Unemployment Rate
By County



50 Mile-Wide Southern Kentucky Corridor (I-66)

Fig. 3.2.b
Kentucky Per Capita Income
By County



50 Mile-Wide Southern Kentucky Corridor (I-66)

Table 3.2
Socioeconomic Characteristics of SKC (I-66)

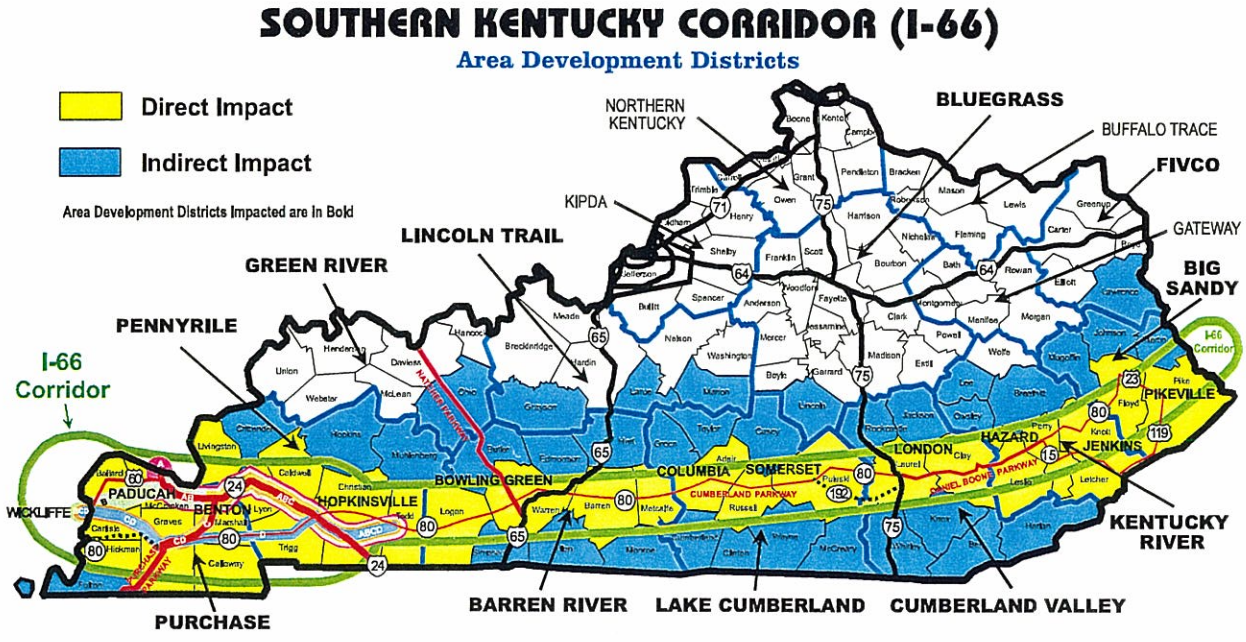
	U.S.	Kentucky	SKC (I-66)	Non-Corridor
Estimated Population (1995)	261,755,000	3,846,186	1,456,740 (38%)	2,389,444 (62%)
Employment (CLF*)	(Not Applicable)	1,861,315	622,519 (33%)	1,238,796 (67%)
Per Capita Income	$22,059	$17,854	$13,924	$18,481
Unemployment Rate (1995)	5.6%	5.4%	6.8%	4.7%

* Civilian Labor Force

3.3 Area Development District Comments

Of the 15 Area Development Districts in Kentucky, all or part of 11 are located within the study corridor as shown in Figure 3.3. A questionnaire and individual county statistics (socioeconomics/highway) were provided to each affected area development district (ADD) within the corridor for review. Further, the SKC (I-66) Management Team attended a transportation committee meeting of each affected ADD to present the study approach and to solicit data review comments and concerns. Most of the ADDs provided valuable review comments and information about natural resources, local development concerns, desired location preference of the SKC (I-66), and area priorities. Each item was identified and documented for each of the 63 SKC (I-66) impact counties.

Figure 3.3



4.0 HIGHWAY (SKC I-66) COST ESTIMATES [3]

Researchers in the University of Kentucky, Department of Civil Engineering, assisted in this study by selecting a general location and preparing an estimated cost of the Southern Kentucky Corridor (I-66). The research effort was to develop costs for about 676 kilometers (420 miles) of highway for each of three design speeds and for four corridor alignments that lie within Western Kentucky.

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 different highway design speeds: (a) an arterial/freeway with a 100 km/hr (60 mph) design utilizing as much of the existing roadway across Kentucky as possible and incorporating full and/or partial control of access; (b) a conventional interstate highway with a 110 km/hr (70 mph) design and full control of access; and (c) a high-speed interstate highway with a 130 km/hr (80 mph) design that eliminates many of the hazardous roadway obstacles, such as guardrails and ditches, and has safer, wider medians and wider clear zones. The second objective of the cost study was to develop conceptual cost estimates for the alternative route locations, including construction, planning/environmental/design, right-of-way, utilities, maintenance, and possible toll operation phase costs.

4.2 Corridor Location

The initial research was to evaluate and establish a corridor across the state for the proposed SKC (I-66). The general corridor runs from the Mississippi River across the state to Williamson, West Virginia. The corridor location is generally described in the 1995 National Highway System Designation Act, "Centered on the communities of Paducah, Benton, Hopkinsville, Bowling Green, Columbia, Somerset, London, Hazard, Jenkins, and Pikeville." The routes selected for analysis are absolutely not to be considered the final location of the corridor, but are intended only for purposes of developing reasonable cost estimates for the project. Unit costs used in the study for estimating purposes were based on the historical cost data on file in the Kentucky Transportation Cabinet and were related to actual construction projects. Unit costs are based on 1995 rates.

Once the general corridor was chosen, several alternates were marked on topographic maps to provide general route location for the three alternate highway design speeds 100 km/h, 110 km/h, and 130 km/h (60 mph, 70 mph, and 80 mph). In all, there were four alternates (A, B, C, and D) selected for each design speed resulting in 12 total alternative routes which became the

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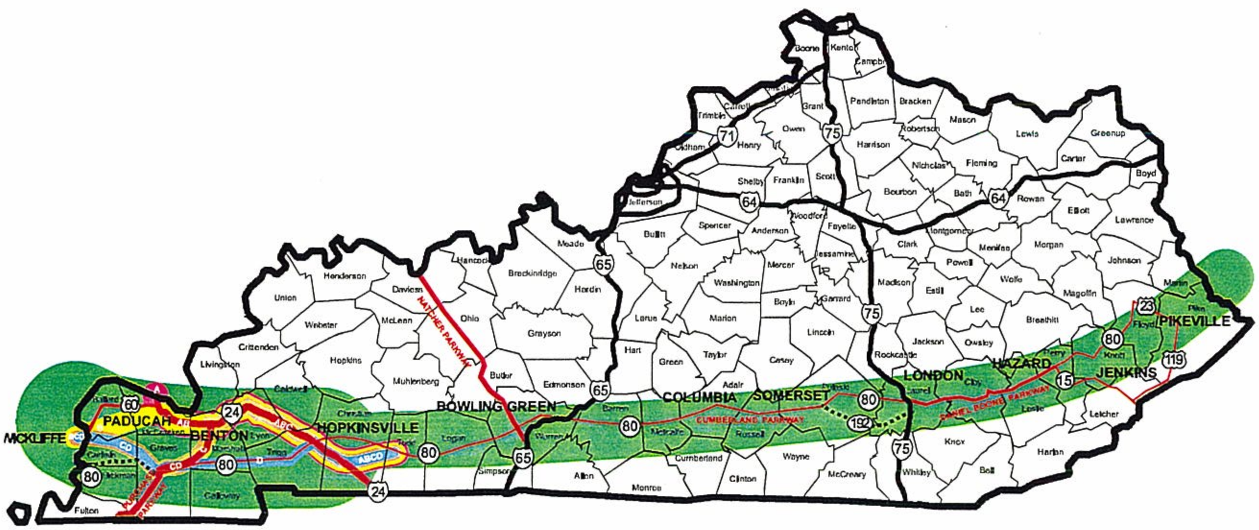
[3] Highway Cost Study, Southern Kentucky Corridor (I-66) Study, prepared by the University of Kentucky, Department of Civil Engineering, January, 1997.

basis for all subsequent engineering and cost-estimating activities. The general location of a corridor with four alternates is shown in Figure 4.2.

Figure 4.2

SOUTHERN KENTUCKY CORRIDOR (I-66)



4.3 Cost Estimating Procedure

The 12 alternative locations were subclassified into the following divisions: (a) design speed 100 km/h, 110 km/h, and 130 km/h (60, 70, and 80 mph); (b) road type (new, reconstruction, upgrade, or existing); (c) terrain type (flat, rolling, or mountainous).

Using the topographic maps and typical roadway sections (Figure 4.3) for different design speeds, the volume of earthwork and the amount of pavement material for each roadway section was estimated for all "new construction."

Unit costs were then applied to the excavation and pavement quantities to obtain the roadway portion of the project cost. These costs were then factored to represent total roadway costs. The estimated costs for all the bridgework, overpasses, interchanges, railroad structures, intersections, and rest areas were combined with the roadway subtotal to arrive at a total cost of construction. Based on historical data from the Kentucky Transportation Cabinet, the estimated cost for construction was extended to estimate the total project cost, including design, utilities, and right-of-way costs. For "reconstruction" or "upgrade" sections, the roadway costs were estimated as cost per kilometer (per mile) based on historical cost data.

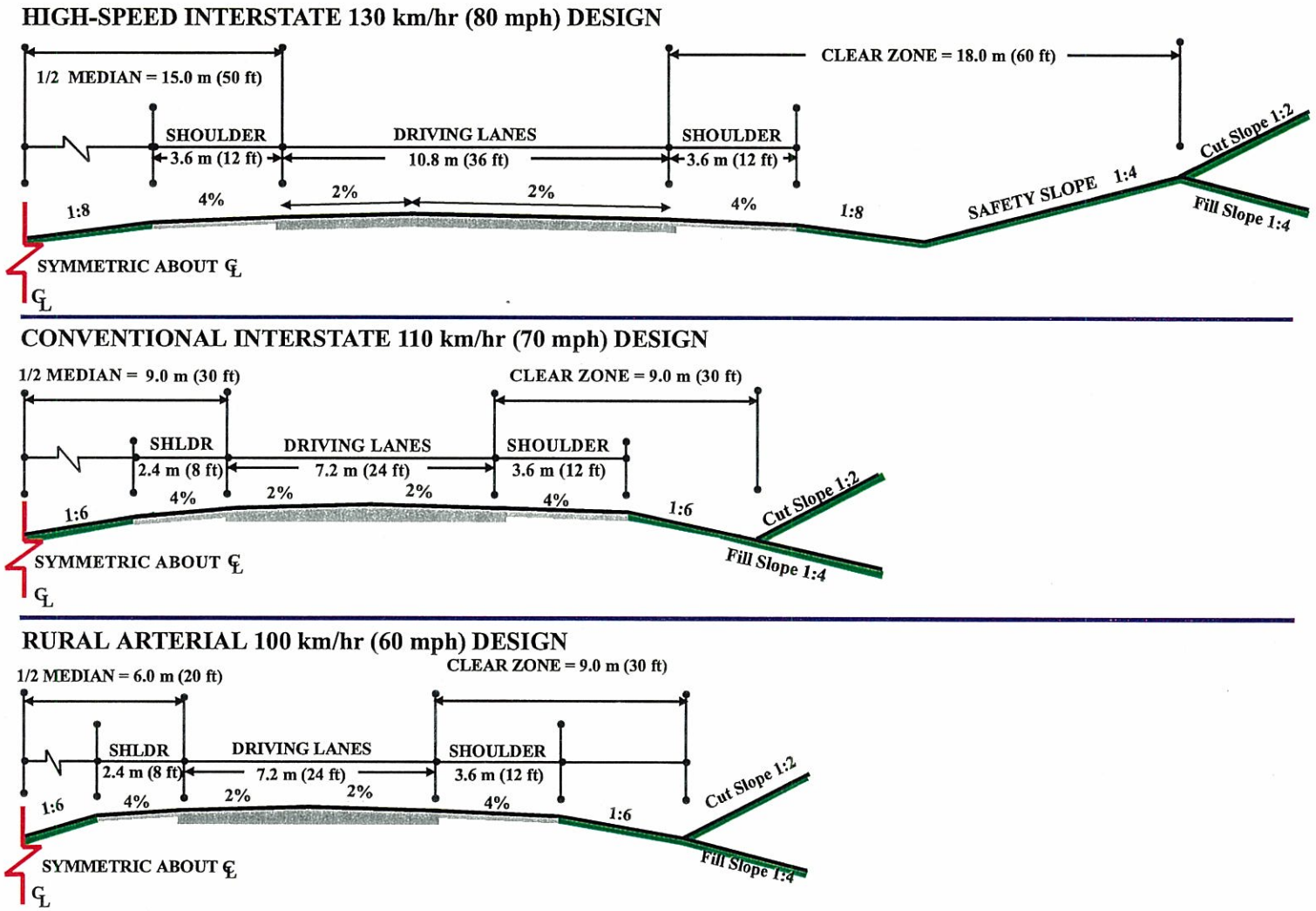


Figure 4.3. Comparison of Typical Sections for the Design Alternates

It should be noted that the design geometrics in mountainous areas was limited to 100 km/hr (60 mph) to avoid excessive excavations for grade requirements for the 110 km/h and 130 km/h (70 mph and 80 mph) design conditions. Also, six lanes of roadway were included in the mountainous areas for the 130 km/h (80 mph) design for safety purposes due to the high percentage of trucks and differential lane speeds. Total cost and mileage for each alternate by design speed are shown on Table 4.3

Table 4.3

Cost Estimates
By Route Options

DESIGN SPEED		Alternate A	Alternate B	Alternate C	Alternate D
100 km/h (60 mph)	KILOMETERS (MILES)	692 (430)	719 (447)	742 (461)	724 (450)
	COST	$3.3 billion	$3.8 billion	$3.6 billion	$4.0 billion
110 km/h (70 mph)	KILOMETERS (MILES)	647 (402)	674 (419)	693 (431)	676 (420)
	COST	$4.4 billion	$4.9 billion	$5.0 billion	$5.7 billion
130 km/h (80 mph)	KILOMETERS (MILES)	645 (401)	673 (418)	692 (430)	674 (419)
	COST	$6.3 billion	$6.7 billion	$6.8 billion	$7.4 billion

4.4. Toll Conditions

Toll sections can be included at special locations on the Southern Kentucky Corridor roadway by eliminating certain interchanges and constructing toll plazas. There would be a savings involved in the initial construction cost of the SKC (I-66) with the toll option because the removal of the interchanges would be a greater cost savings than the cost of the toll plazas. A review of several lengthy sections of the SKC (I-66) revealed that a net initial cost savings of around $4 million for an 80-kilometer (50-mile) section may be possible but, when considering annual operating costs, the savings would be insignificant. Consequently, in the cost-effectiveness evaluation, overall construction cost estimates were not adjusted for toll conditions.

5.0 TRAFFIC MODEL AND FORECASTS[4]

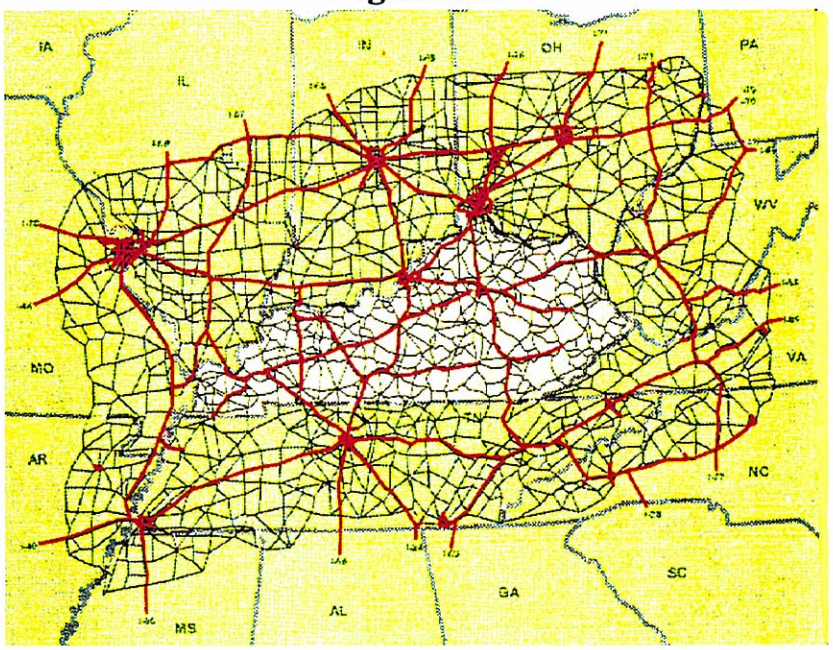
The traffic forecasts and traffic related economic impacts for the SKC (I-66) study were developed using an enhanced version of the Kentucky Statewide Traffic Model. The revisions and enhancements included:

- Expansion of the area covered by the model to make it sensitive to facilities and traffic in surrounding states;
- Redefinition of the traffic analysis system (traffic analysis zones) to make it compatible with 1990 Census geography;
- Refinement and recalibration of trip generation, distribution, and assignment components, including the capability to independently forecast work and non-work auto travel and truck travel.

5.1 Traffic Modeling Coverage Area

To make the enhanced Kentucky Statewide Traffic Model more sensitive to changes in facility characteristics and traffic outside Kentucky, the modeling area was expanded to include portions of surrounding states (Tennessee, North Carolina, West Virginia, Virginia, Ohio, Indiana, Illinois, Missouri, Arkansas, and Mississippi). As shown in Figure 5.1 the expanded modeling area includes the area generally bounded by I-40, I-81, I-70, and I-55.

Figure 5.1



[4] i) Kentucky Statewide Traffic Model Calibration Report, Southern Kentucky Corridor, by Wilbur Smith Associates, February, 1997.
ii) I-66/Southern Kentucky Corridor Study - Traffic Forecasting Procedures and Assumptions, by Wilbur Smith Associates, March, 1997.

The inclusion of other existing non-Kentucky interstate facilities and the High Priority Corridors (identified in ISTEA) as committed projects in the enhanced network was important in order to be able to investigate potential diversion of travel between these routes and the proposed SKC (I-66).

5.2 Traffic Zone System

Census tracts were used as the traffic analysis zone (TAZ) system within Kentucky. Each census tract was used as a TAZ outside the major urban areas. Within the major urban areas, census tracts were combined to form TAZs that were compatible with the urban roadway system. There are 756 census-tract-based TAZs in Kentucky. Similarly, census tracts were used to define TAZ within the expanded modeling area outside Kentucky. For non-Kentucky counties touching the state line, each census tract was used as a TAZ. For the remainder of the expanded area outside Kentucky, census tracts were combined such that each county defines a single TAZ. In total, there are 706 census-tract-based TAZs outside Kentucky. Two military bases and 40 recreational areas are also treated as non-census-tract-based special generators.

5.3 Roadway Model Network

The roadway network for the Kentucky Statewide Traffic Model includes more than 15,000 roadway segments. It includes almost all rural routes in Kentucky classified as minor arterials and higher and as many urban routes as necessary to define system connectivity. The network is coarse outside Kentucky. The National Highway Planning Network (NHPN) version 2.0 was used for the expanded modeling area outside Kentucky. The Kentucky roadway coverage network was combined with the modified NHPN roadway coverage to create a full model area roadway network. For each roadway segment, the model is given information on distance, speed, number of lanes, capacity, functional system, terrain type, and more.

5.3.1 Base Year Network

The base year is 1995. The network developed for the study area was used as the base year network to calibrate the models using the 1995 traffic volumes (actual counts/estimated) on the segments. Three design speed options--100 km/hr, 110 km/hr, and 130 km/hr (60 mph, 70 mph, and 80 mph), with each design speed having four alternates in Western Kentucky--were used to develop 12 base-year networks.

5.3.2 Existing Plus Committed Network

The existing plus committed (E+C) network is a network used with and without the SKC (I-66). The E+C network for each design speed and the four alternates consists of the base year network plus any planned or programmed highway improvements in Kentucky and the surrounding states. In addition to the I-66 Corridor, ISTEA also identified other High Priority Corridors. Corridors I-73/74 north-south from Michigan to South Carolina and I-69 from Indiana to Memphis, Tennessee, are particularly relevant because they fall within the study area and were included in the E+C network.

5.3.3 SKC (I-66) Network

The SKC (I-66) network consists of the E+C network for each design speed and the SKC (I-66) with four alternates.

5.4 Model Development and Calibration

The Kentucky Statewide Traffic Model used a three-step procedure to forecast traffic in the study area. The trip generation component of the model estimates how many auto and truck trips are produced and attracted to each of the 1,530 TAZs based on TAZ population and employment. The model estimates productions and attractions for auto work trips, auto non-work trips, and truck trips. The trip distribution component of the model estimates where the auto and truck trips are assigned based on travel time to each TAZ and the number of trip attractions in each TAZ. The traffic assignment component of the model identifies the fastest route between each pair of TAZs and adds the trips between a TAZ pair to every route segment on the fastest route between the TAZ pair.

5.5 Travel Growth Assumptions

Growth in travel can be attributed to at least two major factors: 1) increase in rate of travel and 2) increase in population and employment. The travel forecasting procedure used for the SKC (I-66) study took both factors into account. The estimates of changes in auto trips per person over time were based on two main sources of data. The first is the 1990 National Personal Transportation Survey (NPTS) and comparisons between the 1983 and 1990 NPTS results contained in *Travel Behavior Issues* in the 90s published by the U.S. Department of Transportation in July, 1992. The second source of data is the forecast of U.S. population by sex and age group from the Census Bureau (Middle Series). Tables 5.5a and 5.5b show the growth rates in auto trip rate per person, population, and employment.

Table 5.5.a
1990 NPTS Auto Travel Characteristics
Using Model Trip Purpose Definitions

Auto Trip Rates (Per Person)

KYSTM Trip Purpose	Large Urban (>50,000)	Other (<50,000)	Percent Difference	Overall Average
HB Work	0.5390	0.5326	97.14%	0.5319
HB Other	1.4014	1.4355	102.43%	1.4179
Non Home Based	0.6041	0.6122	101.34%	0.6079
Total	2.5445	2.5714	101.06%	2.5572

Auto Trip Length (Minutes)

KYSTM Trip Purpose	Large Urban (>50,000)	Other (<50,000)	Percent Difference	Overall Average
HB Work	17.8	19.0	106.74%	18.4
HB Other	14.8	17.0	115.50%	15.9
Non Home Based	14.0	15.5	110.71%	14.7
Total	15.2	17.1	112.50%	16.1

Table 5.5.b
Kentucky Statewide Traffic Model
Population & Employment Assumptions (in thousands)
For The SKC (I-66) Study

	1990		1995		2025	
State	Population	Employment	Population	Employment	Population	Employment
MO	2,312	1,387	2,368	1,461	2.863	1,800
IL	1,497	665	1,519	720	1,679	843
IN	3,385	1,873	3,553	2,094	4,451	2,669
OH	5,299	2,906	5,529	3,127	6,969	4,046
WV	1,142	481	1,154	517	1,250	638
VA	568	265	579	275	684	343
AR	312	145	311	158	339	196
TN	4,350	2,469	4,676	2,790	6,301	3,724
NC	317	169	332	180	434	244
MS	137	50	152	60	211	83
KY	3,692	1,913	3,880	2,131	4,665	2,718
Total	23,011	12,323	24,053	13,513	26,986	17,304
% Increase from 1990:			104.5%	109.7%	117.3%	140.4%
% Increase from 1995:					112.2%	128.1%

Note: Population and employment figures for States outside Kentucky pertain to only those portions of the States that fall within the KYSTM area.

Data Source: Woods and Poole without SKC (I-66) Adjustments

Between 1990 and 1995, population in the Statewide Traffic Model (STM) area increased almost 5 percent, while employment increased by almost 10 percent. Population and employment increases in Kentucky were slightly higher than the averages for the entire STM area. Between 1995 and 2025, population in the STM area was forecast to increase by almost 24 percent, while employment was forecast to increase by 28 percent. Population and employment increases in Kentucky were slightly lower than the averages for the entire STM area.

These data were used to generate an initial set of 1995 and 2025 travel forecasts for each of the 13 roadway networks (E+C and E+C with SKC (I-66) and design speeds with alternates). The Econometric Model development (Section 6.0) revealed that traffic on a major new highway within the SKC (I-66) would increase the population and employment within the corridor. This accessibility-induced increase in population and employment would in turn generate more traffic on the new highway. Economists at the University of Kentucky Center for Business and Economic Research (CBER) used the initial set of traffic forecasts to estimate the redistribution of population and employment that would result for each of the 12 SKC (I-66) design options/ alignment alternatives. The redistributions were significant at the TAZ level particularly in the SKC (I-66) corridor. The redistributed population and employment forecasts were used to generate a final 1995 and 2025 traffic forecast for each of the 12 design speed/alignment alternatives. The Vehicle Kilometers of Travel (VKmT) (Vehicle Miles of Travel (VMT)) and Vehicle Hours of Travel (VHT) summaries from the final forecasts were used in the Economic Justification Analysis in Section 7.0.

The truck model for the Kentucky Statewide Traffic Model was derived from the truck model developed in the Corridor 18 (I-69) study. The commodity flow data from Reebie Associates' Transearch Database were disaggregated to Kentucky (TAZ) level. The Transearch Database presents information at the U.S. Bureau of Economic Analysis (BEA) zone level. Daily inbound/out-bound tonnage was divided by 15.2 metric TONNE (16.8 ton) per truck, yielding an estimated number of trucks. MINUTP gravity model setup was used to develop both auto and truck trip tables for the base year and the forecast year (2025).

5.6 Traffic Assignments

Horizon year (2025) traffic assignment results (traffic volumes) with the SKC for design speeds of 100 km/h and 110 km/h (60 mph and 70 mph) are shown in Figure 5.6. Daily travel summaries DVKmT (DVMT) and DVHT for conventional interstate, Alternates A and B, and for the base and horizon years (1995/2025) are shown in Tables 5.6a and 5.6b, respectively. It is important to note that the traffic volumes depicted are outside the influence of urbanized areas.

Table 5.6.a
VEHICLE KILOMETERS (VEHICLE MILES) OF TRAVEL
ALTERNATES A and B [110 km/h (70 mph)]
SOUTHERN KENTUCKY CORRIDOR (I-66)

NETWORKS	DAILY VEHICLE KILOMETERS (VEHICLE MILES) OF TRAVEL										% CHANGE
	YEAR 1995					YEAR 2025					
	FREEWAY		ARTERIAL		TOTAL	FREEWAY		ARTERIAL		TOTAL	
	KY	NON-KY	KY	NON-KY		KY	NON-KY	KY	NON-KY		
1995 Existing DVKmT (DVMT)	69.7 (43.3)	360.2 (223.7)	107.5 (66.8)	388.0 (241.0)	922.4 (574.8)	103.4 (64.2)	531.8 (330.3)	156.9 (97.5)	575.3 (357.3)	1,367.4 (849.3)	+47.8
Existing & Committed	71.0 (44.1)	380.9 (236.6)	106.9 (6)6.4	369.2 (229.3)	928.0 (576.4)	105.5 (65.5)	562.9 (349.6)	156.3 (97.1)	547.1 (339.8)	1,371.8 (852.0)	+47.8
Option 110 km/h (70 mph): Alt A	77.1 (47.9)	380.4 (236.3)	104.6 (65.0)	367.2 (228.1)	929.3 (577.3)	114.6 (71.2)	561.7 (348.9)	152.6 (94.8)	544.3 (338.1)	1,373.2 (853.0)	+47.8
Option 110 km/h (70 mph): Alt B	77.3 (48.0)	380.6 (236.4)	104.6 (65.0)	367.1 (228.0)	929.6 (577.4)	114.8 (71.3)	562.1 (349.1)	152.6 (94.8)	544.0 (337.9)	1,373.5 (853.1)	+47.7

Note: DVKmT = Daily Vehicle Kilometers of Travel (Millions) DVMT = Daily Vehicle Miles of Travel (Millions)

Table 5.6.b
VEHICLE HOURS OF TRAVEL
ALTERNATES A and B [110 KPH (70 MPH)]
SOUTHERN KENTUCKY CORRIDOR (I-66)

NETWORKS	VEHICLE HOURS OF TRAVEL (DVHT)										% CHANGE
	YEAR 1995					YEAR 2025					
	FREEWAY		ARTERIAL		TOTAL	FREEWAY		ARTERIAL		TOTAL	
	KY	NON-KY	KY	NON-KY		KY	NON-KY	KY	NON-KY		
1995 Existing	705.1	3,699.0	1,393.9	4,759.1	10,557.1	1,047.3	5,460.7	2,034.7	7,054.1	15,596.8	+47.7
Existing & Committed	720.0	3,900.4	1,385.6	4,535.9	10,541.9	1,068.0	5,760.3	2,024.4	6,722.5	15,575.2	+47.7
Option 110 km/h (70 mph):	768.8	3,890.2	1,356.3	4,513.4	10,528.7	1,142.3	5,743.8	1,978.5	6,690.5	15,555.1	+47.7
Option 110 km/h (70 mph):	772.5	3,892.0	1,355.5	4,509.6	10,529.6	1,147.5	5,746.1	1,977.6	6,685.5	15,556.7	+47.7

Note: DVHT = Daily Vehicle Hours of Travel (Thousands)

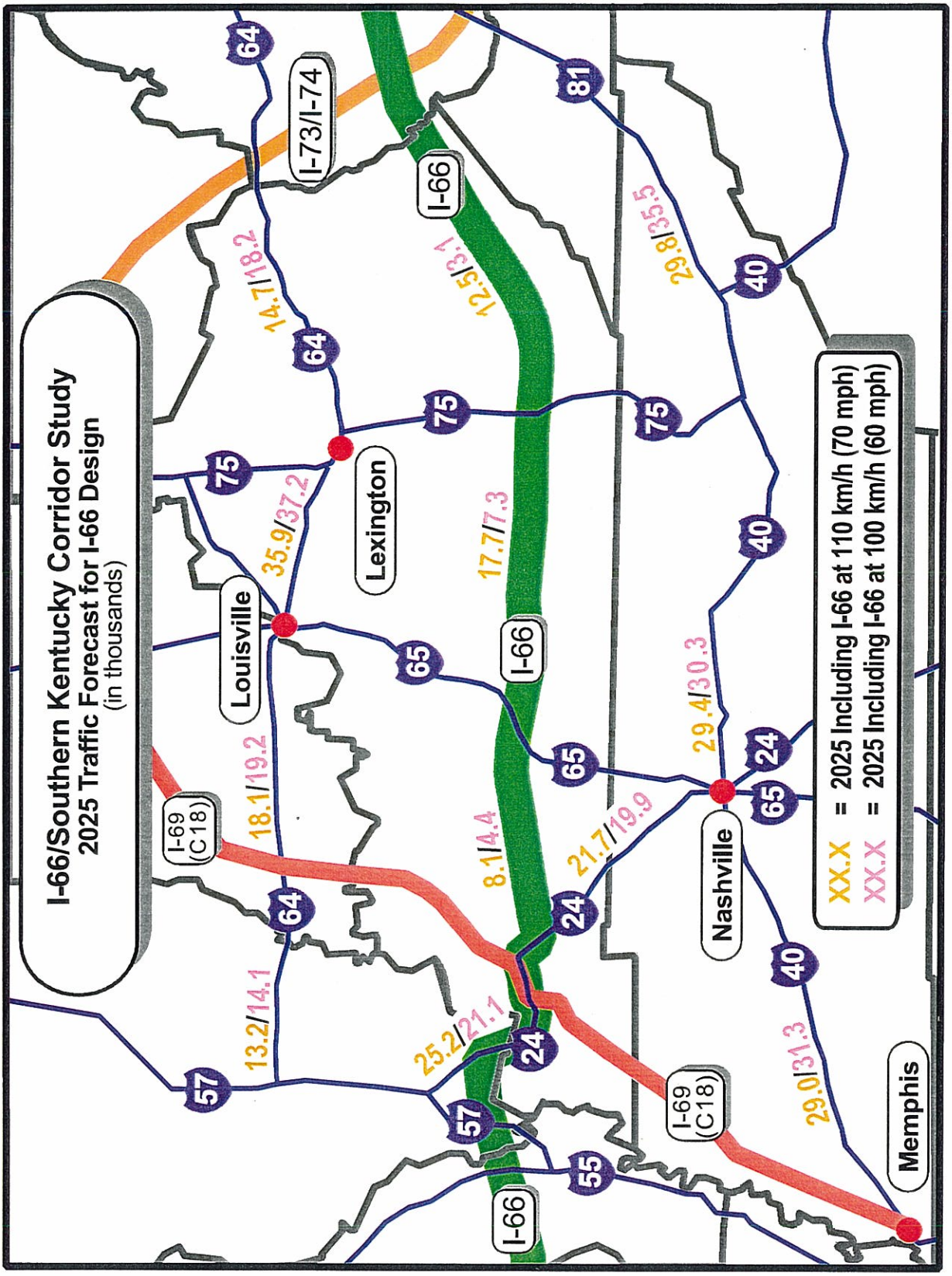

I-66/Southern Kentucky Corridor Study
2025 Traffic Forecast for I-66 Design
(in thousands)
XX.X = 2025 Including I-66 at 110 km/h (70 mph)
XX.X = 2025 Including I-66 at 100 km/h (60 mph)
Louisville
Lexington
Nashville
Memphis
I-66
I-69 (C18)
I-73/I-74
14.7/18.2
12.5/13.1
29.8/35.5
35.9/37.2
17.7/7.3
18.1/19.2
8.1/4.4
21.7/19.9
29.4/30.3
13.2/14.1
25.2/21.1
29.0/31.3

Figure 5.6

Base year and horizon year assignments were made for the three design speeds and Western Kentucky alternates for use in economic analysis. Assignment results depict that the SKC (I-66) Conventional Interstate corridor carries a daily VKmT of 6.44 to 6.76 million (DVMT of 4.0 to 4.2 million) in 1995 and 10.14 to 10.47 million (6.3 to 6.5 million) in 2025 respectively. This VKmT (VMT) is about 9 percent of the total VKmT (VMT) on freeways in Kentucky and illustrates that the SKC is a very important transportation link in Kentucky's future.

6.0 ECONOMETRIC MODEL [5]

Economic and demographic models were developed by CBER and the Bureau of Business Research at the University of Nebraska-Lincoln to assess the potential impact of the Southern Kentucky Corridor (I-66) project on the earnings, employment, and population growth within the corridor and region. These models were designed with a focus for evaluating impacts of highways in a non-metropolitan setting such as that found in the SKC (I-66) Corridor. All counties in the corridor are non-metropolitan. The models were designed to distinguish the impact of a newly constructed major highway (four-lane principal arterial, conventional interstate, etc.) on the direct and indirect impact counties.

The impact of SKC (I-66) on local economics and demographics was determined by regression analysis using national data files available through the Federal Highway Administration (FHWA) PR-511 file and the Bureau of Economic Analysis (BEA) Regional Economic Information System data. These data identified when a highway was open to traffic and provided annual economic data by Standard Industrial Code (SIC) for each direct and indirect impact county. The county data were sorted by similar socioeconomic characteristics based on the characteristics prevalent in the SKC (I-66) corridor. These national data and socioeconomic travel relationships were then formulated into econometric and demographic models. As indicated, this analysis was performed on both direct (county where the new highway or highways were located) and indirect (adjacent) impact counties.

An essential feature of the model developed for the SKC (I-66) is that it estimated the percent increase in a direct or indirect impact county's earnings by SIC that would occur if the highway were constructed. That percent increase in future levels of earnings was used to calculate the impact of a new highway on earning and employment. In Kentucky, this economic and demographic impact was calculated for 63 impact counties in the SKC (I-66) Corridor. The Standard Industrial Code methodology allows the researcher to draw conclusions regarding salary levels of the new employment opportunities. This data can then be used to predict

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[5] Economic Impact Assessment of a Southern Kentucky Corridor (I-66), University of Kentucky Center for Business and Economic Research, February, 1997.

Kentucky's future national position on personal income growth as a result of the SKC (I-66) project.

This same corridor impact analysis was performed on the counties along such major regional routes as I-64, I-81, I-40, and the Kentucky Parkways (Western Kentucky and Bluegrass). The economic and demographic models were sensitive to traffic volumes on these major routes. Therefore, traffic changes, increases in mean growth in socioeconomic conditions, and decreases (due to diversion to a new competing roadway) produce corresponding decreases in socioeconomic conditions for each impacted county.

The Bureau of Business Research, University of Nebraska, developed regional Input-Output (I/O) models that utilize the one- and two-digit Standard Industrial Code (SIC) impacts that resulted from the University of Kentucky CBER analysis and convert those inputs into complete economic impacts that reach across the entire county earnings and employment structure. For example, an increase in manufacturing sector employment will also show increases in local bank earnings, grocery earnings, automotive earnings, etc.

These regional I/O models take the direct earnings impacts from the econometric model of CBER to estimate the total economic impact of the SKC (I-66) on the regional economy.

7.0 ECONOMIC ANALYSIS

The economic analysis of a highway project requires comparing both the definable benefits and costs of the project and the difficult-to-quantify items associated with quality-of-life issues that stem from this project

The economic impacts measured for the SKC (I-66) project are those obtained from transportation efficiency and include interrelated conditions concerning road user benefits and personal income improvement benefits (employment). Transportation cost savings that result from implementation of this new SKC (I-66) corridor are true economic benefits to people in the region/state and the nation. When travelers (motorists and passengers) experience time savings, greater safety, and/or reduced vehicle operating costs, their gain is not offset by losses to others. From an economic perspective, these costs savings are the same as an increase in income which makes resources available for other purposes. If the effective increase in income brought about by the project exceeds its cost, the project is said to be economically efficient or cost justified.

7.1 Indicators of Economic Justification

There are defined conditions and procedures for determining economic justification. A project such as a highway project has a large investment initially and users of the facility save money by use of the facility over time. These future savings and costs (maintaining the facility) have to be accounted for on a time-dependent basis because a dollar saved tomorrow is not the same as a dollar in hand today. These time-dependent conditions require that certain cost accounting procedures be used to standardize the process.

7.1.1 Net Present Value

All costs and benefits in future years were discounted back to the base year (1995). When the sum of the discounted benefits is greater than the discounted cost, the net present value is positive and the SKC (I-66) is deemed to be economically justified.

7.1.2 Discounted Benefit / Cost Ratio

This economic indicator was calculated as the sum of the discounted benefits divided by the sum of the discounted costs. When the result is 1.0 or greater (i.e., benefits exceed cost), the highway is considered to be economically justified.

7.1.3 Internal Rate of Return

This calculation determines the discount rate at which the net present value is zero (sum of discounted benefits is equal to the sum of the discounted costs). If the rate of return is greater than the recommended discount rate, then the investment is deemed to be economically justified. The recommended discount rate varies between 4 percent and 7 percent depending on the information source being utilized. For example, the U.S. Office of Management and Budget (OMB) uses 7 percent, whereas, many economists and some federal agencies use 4 percent as the true discount rate. For purposes of this study both discount rates have been used for analysis even though research indicates that the real after-tax rate of return from financial markets varies between 1 and 4 percent.

7.2 Southern Kentucky Corridor (I-66) Implementation Costs

The cost estimate developed by the U.K. Civil Engineering Department (outlined in section 4.0) for each design speed option and location alternative includes the cost of planning, design, right-of-way, utilities, construction, and maintenance. The total project cost and the present value of the cost at a 4-percent discount rate is shown in Table 7.2.

Table 7.2
Costs Estimates and Present Value Costs of Interstate 66 Construction

Speed km/h (mph)	Route[1]	Cost in Billions of 1995 Dollars[2]	Present Value of Costs in Billions of 1995 Dollars[3]
100 (60)	A	3.36	2.68
100 (60)	B	3.95	3.11
100 (60)	C	3.79	2.98
100 (60)	D	4.11	3.22
110 (70)	A	4.48	3.63
110 (70)	B	5.03	4.08
110 (70)	C	5.12	4.15
110 (70)	D	5.74	4.64
130 (80)	A	6.58	5.34
130 (80)	B	7.19	5.78
130 (80)	C	7.31	5.94
130 (80)	D	7.99	6.49

[1] Routes A-D are the same east of Hopkinsville. Route A exits Kentucky at Paducah. Route B travels south of Paducah and crosses the Mississippi River at Wickliffe. Route C passes through Mayfield before exiting Kentucky at Wickliffe. Route D passes through Land Between the Lakes and Mayfield before exiting Kentucky at Wickliffe.
[2] Source: University of Kentucky Department of Civil Engineering (1997).
[3] Present value at 4% discount rate. Present value costs also include the cost of maintaining the interstate.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky.

It is assumed that planning costs are spent evenly over a two-year period from 1998 to 1999. Right-of-way purchase and utilities work are assumed to be conducted from 1998 to 2002 west of London and from 1999 to 2003 east of London. The difference in time periods is due to the increased difficulty of planning, design, and construction in the mountainous, eastern part of the state. Construction is assumed to take place over 2000 to 2004 west of London and 2002 to 2004 east of London. It is assumed that the pavement for the highway will require major reconstruction in the year 2035.

The SKC (I-66) is assumed to have an operating life of 50 years after its opening in 2005. The stream of benefits (savings in travel time/vehicle operating cost, and reduction in accident cost) is assumed to end after that time (the discounted benefits after the 50-year period are insignificant contributions to economic justification). While the benefits will cease, the SKC (I-66) will yield some additional benefits at the end of 50 years due to its salvage value. Because of the salvage value of the right-of-way, a benefit is assigned to the project in the year 2055, which is 51 years after the SKC (I-66) is completed. Similarly, the value of salvage pavement after repaving in 2035 is also added as a benefit in 2035. The total salvage value of the conventional interstate Alternate A is $0.9 billion and Alternate B is $1.0 billion, respectively. These total salvaged benefits in terms of present value are shown in Table 7.3.2.5.

7.3 Transportation Efficiency Benefits

Transportation investments contribute to economic prosperity within an area by reducing the cost and improving the efficiency of moving people and goods.

The transportation benefits the SKC (I-66) would create are of two types: Development Impact Benefits and Road User Benefits.

7.3.1 Development Impact Benefits

Economic development impact benefits are evident by new economic growth that occurs along a new or improved highway corridor. Improved quality of life is also seen in the increased access of corridor residents to nearby towns or cities. Economic development impact benefits include the increase in earnings, jobs, income, and population which can result from the new highway. These changes often are the most important manifestations of the time and cost savings of a better road system. Further, these impacts are particularly important for the SKC (I-66) region because the economy of this region has been struggling. As shown in the Existing Condition Section of this report, Table 3.2 indicates that the per capita income is nearly $4,500 below other parts of the state and the unemployment rate in the corridor is 6.8 percent, which is well above the rate in the state (5.4 percent) and the nation (5.6 percent). Overall, the SKC (I-66) region is clearly a place in Kentucky and the nation which will benefit from more economic growth. It is also a part of the nation in which greater economic growth would clearly lead to a fuller use of underutilized resources

7.3.1.1 Employment/Earnings Impacts - The average annual earnings, employment, manufacturing industries, and population are shown in Table 7.3.1.1.

This table shows that the potential impact of SKC (I-66) in the region is substantial. Depending upon the design speed options and alternatives, the SKC (I-66) is expected to bring 48,000 to 64,000 person-years of work per year to the corridor region. This represents a 5.9 percent to 7.9 percent increase in employment expected for the corridor region over the 2005 to 2025 time period. As for earnings, the highway on average is expected to increase earnings in the region by $1.4 billion to $2.0 billion each year. This represents a 6.4 percent to 8.7 percent increase in the earnings expected each year for the corridor over the 2005 to 2025 period. Growth of the manufacturing sector is a key issue because manufacturing jobs can bring the greatest economic impact to the corridor. New manufacturing jobs alone are expected to account for 30 percent of the net new jobs. This is a large share given that currently less than 20 percent of the jobs in Kentucky are in

manufacturing. It was also found from the models that counties receiving a new highway were significantly more likely to receive new manufacturing industries such as transportation equipment and plastic/wood products. Manufacturing employment generally has the highest paid employees. Therefore, it can be concluded that, as a result of the SKC (I-66) project, Kentucky's ranking on personal income should improve.

Table 7.3.1.1
Average Annual Employment, Earnings, Total Income, and Output Impacts of Interstate 66
By Speed and Design Option: 2005-2025

Highway Corridor Region					
Speed km/h (mph)	**Route[1]**	**Employment**	**Earnings (Billions of 1995 $s)**	**Total Personal Income (Billions of 1995 $s)**	**Output (Billions of 1992 $s)**
100 (60)	A	51,906	$1.60	$2.20	$3.54
100 (60)	B	51,646	1.58	2.21	3.51
100 (60)	C	48,362	1.47	2.09	3.36
100 (60)	D	51,333	1.55	2.14	3.54
110 (70)	A	58,171	1.78	2.35	3.93
110 (70)	B	57,323	1.75	2.35	3.89
110 (70)	C	54,798	1.65	2.24	3.77
110 (70)	D	55,653	1.68	2.24	3.82
130 (80)	A	62,524	1.91	2.47	4.23
130 (80)	B	63,873	1.94	2.52	4.29
130 (80)	C	60,700	1.83	2.40	4.16
130 (80)	D	60,520	1.82	2.37	4.15

[1] Routes A-D are the same east of Hopkinsville. Route A exits Kentucky at Paducah. Route B travels south of Paducah and crosses the Mississippi River at Wickliffe. Route C passes through Mayfield before exiting Kentucky at Wickliffe. Route D passes through Land Between the Lakes and Mayfield before exiting Kentucky at Wickliffe.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky.

7.3.2 Road User Benefits

There are three general types of road user benefits, namely travel time savings, vehicle operating cost savings, and accident-reduction savings. Transportation benefits were also calculated for two vehicle types, autos and trucks.

7.3.2.1 Travel Time Savings - Time savings on SKC (I-66) is due to higher speeds and reduced congestion. The magnitude of economic benefits would depend on the total reduction in vehicle hours driven and the value of those vehicle hours. The value of each vehicle hour

saved would depend on the value of time for vehicle drivers and passengers. It also varies by trip purpose for autos. The total number of vehicle hours saved each year for trucks and autos by trip type (work, non-work, and others) is shown in Table 7.3.2.1.a. This information is a summary output from the Traffic Model (outlined in section 5.0).

Table 7.3.2.1.a
Decrease in Vehicle Hours Driven Per Day
By Route and Speed Option
Year 2025

Speed km/h (mph)	Route	Decrease in Vehicle Hours Driven Per Day	Percent Decrease
100 (60)	A	-5,210	0.033
100 (60)	B	-4,202	0.027
100 (60)	C	-3,485	0.022
100 (60)	D	-4,738	0.030
110 (70)	A	-20,171	0.130
110 (70)	B	-18,659	0.120
110 (70)	C	-17,874	0.115
110 (70)	D	-17,806	0.114
130 (80)	A	-31,446	0.202
130 (80)	B	-32,397	0.208
130 (80)	C	-31,233	0.200
130 (80)	D	-29,994	0.192

Source: Wilbur Smith Associates

A value is assigned to these time savings based on the number of persons traveling and the value of each person's time. Average occupancy rates for autos were calculated to be 1.14 for commuting trips, 1.28 for work trips, and 2.08 for leisure trips. Average occupancy for trucks is assumed to be 1.2. The value of time is $22.34 for trucks, $9.14 for autos commuting, and $15.56 for auto other trips per hour. These values are in 1995 dollars. Table 7.3.2.1.b shows the present value of time savings at a 4-percent discount rate.

Table 7.3.2.1.b
Present Value Benefits Due to Time Savings if Interstate 66 is Built, by Route and Speed Option, at 4% Discount Rate

Speed km/h (mph)	Route	Present Value of Time Saved (in Billions of 1995 Dollars)[1]
100 (60)	A	0.59
100 (60)	B	0.49
100 (60)	C	0.42
100 (60)	D	0.54
110 (70)	A	2.58
110 (70)	B	2.43
110 (70)	C	2.34
110 (70)	D	2.33
130 (80)	A	3.79
130 (80)	B	4.17
130 (80)	C	4.01
130 (80)	D	3.88

[1] Present value of benefits earned during the years 2005 through 2054.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky.

7.3.2.2 Vehicle Operating Cost - The cost of operating motor vehicles can be a significant portion of the total cost of transportation. Vehicle operating costs include fuel, oil, tires, maintenance, insurance, license, etc. Vehicle operating cost is a function of two factors: average speed and frequency of speed change. These two factors influencing vehicle operation imply that it is sometimes uncertain how new highways will affect operating cost. The higher speed and less frequency of speed change on interstates or high-speed roads suggests that vehicle operating cost will be lower on those roads than on arterial highways with at-grade intersections, steeper grades, and more curves.

Based on information from the Highway Performance Monitoring System (HPMS) 1995 data analysis using the Analytical Package for Kentucky and the AASHTO's 1978 publication "A Manual of User Benefit Analysis of Highway and Bus-Transit Improvements," the vehicle operating cost for automobiles was $0.117 per kilometer ($0.189 per mile) on principal arterials and $0.106 per kilometer ($0.170 per mile) on interstates with a 110 km/h (70 mph) design. The operating cost for trucks was $0.495 per kilometer ($0.797 per mile) on principal arterials and $0.391 per kilometer ($0.63 per mile) on

interstates with a 110 km/h (70 mph) design. Table 7.3.2.2 shows the present value of vehicle operating cost by design speed and location alternatives.

Table 7.3.2.2
Present Value Benefits Due to a Change in Vehicle Operating Costs if Interstate 66 is Built By Route and Speed Option 4% Discount Rate

Speed km/h (mph)	Route	Benefits Due to a Change in Present Value of Vehicle Operating Costs (Billions of 1995 Dollars)[1]
100 (60)	A	0.44
100 (60)	B	0.60
100 (60)	C	0.59
100 (60)	D	0.65
110 (70)	A	0.43
110 (70)	B	0.49
110 (70)	C	0.42
110 (70)	D	0.62
130 (80)	A	-1.05
130 (80)	B	-1.29
130 (80)	C	-1.41
130 (80)	D	-1.09

[1] Present value of benefits earned during the years 2005 through 2054.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky

The SKC (I-66) will lead to an increase in miles driven particularly under the 130-km/h (80-mph) design option. This occurs because drivers choose to take longer routes in terms of miles driven in order to save travel time on the overall trip.

7.3.2.3 Accident Cost - The SKC (I-66) would reduce the likelihood of traffic accidents due to greater safety in roadway geometrics and access control conditions as shown in Table 7.3.2.3.a.

Estimates of comprehensive costs of traffic events (property damage, medical bills, lost wages, pain/suffering associated with various levels of accidents, e.g., fatalities, injuries, property damage only, and unreported accidents) were computed. The cost values are based upon the values calculated for the FHWA, the National Highway Traffic Safety Administration (NHTSA), and the KYTC. Comprehensive accident costs per kilometer (per mile) were calculated for interstate and other principal arterials using the information in Table 7.3.2.3.a above. Those comprehensive costs were 4.0 cents per kilometer (6.4

cents per mile) on interstate highways and 11.6 cents per kilometer (18.6 cents per mile) on other principal arterial highways. The savings in comprehensive costs in terms of the present value for each design option and alternatives are shown in Table 7.3.2.3.b.

Table 7.3.2.3.a
Accident Costs by Type of Incident

Incident	Cost per Incident (1995 Dollars)	
	Interstate	Other Primary Arterial
Fatality	$3,038,782	$3,038,782
Injury	$69,240	$60,317
Property Damage Only	$5,701	$5,701
Unreported	$5,263	$5,263

Source: Calculated by the Center for Business and Economic Research, University of Kentucky, based on Miller (1991), Blincoe (1996) and Agent and Pigman (1995).

Table 7.3.2.3.b
Present Value Benefits Due to a Change in Accident costs if Interstate 66 is Built By Route and Speed Option 4% Discount Rate

Speed km/h (mph)	Route	Benefits Due to a Change in Present Value of Accident Costs (Billions of 1995 Dollars)[1]
100 (60)	A	1.01
100 (60)	B	1.21
100 (60)	C	1.21
100 (60)	D	1.25
110 (70)	A	1.91
110 (70)	B	2.10
110 (70)	C	2.07
110 (70)	D	2.12
130 (80)	A	2.16
130 (80)	B	2.69
130 (80)	C	2.44
130 (80)	D	2.71

[1] Present value of benefits earned during the years 2005 through 2054.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky.

7.3.2.4 Benefits Due To Induced Trips - The presence of SKC (I-66) would significantly lower the cost of travel due to the reasons cited above (savings in travel time/vehicle operating cost, and reduced accident rate). This lower cost of travel causes motorists to change their decisions about the number of trips they make. This type of increase in trips leads to induced travel. Research by Dowling and Colman (1995 *Transportation Research Record 1491*) has shown that 5 minutes in travel time savings will cause an increase of 3 percent to 5 percent in the number of trips. Since many trips on rural highways are about 32 kilometers (20 miles) in length, it is likely that at least 5 minutes will be saved in driving on the 110 km/h (70 mph) conventional interstate option of SKC (I-66), rather than on the 89 km/h (55 mph) highway. Hence, the number of trips due to induced traffic is estimated to increase by 5 percent. The benefits from these induced trips were calculated and added to the total benefits in terms of present value shown in Table 7.3.2.5.

7.3.2.5 Total Transportation Efficiency Benefits - The total estimated transportation efficiency benefits over the analysis period discounted at 4 percent are presented in Table 7.3.2.5.

Table 7.3.2.5
Present Value of Each Type of Benefit if Interstate 66 is Built
By Route and Speed Option
4% Discount Rate

Speed km/h (mph)	Route	Present Value of Benefits (Billions of 1995 Dollars)[1]					
		Time Saved	Operating Costs	Accident Costs	Induced Travel	Salvage Value	Total
100 (60)	A	0.59	0.44	1.01	0.15	0.06	2.25
100 (60)	B	0.49	0.60	1.21	0.16	0.07	2.53
100 (60)	C	0.42	0.59	1.21	0.15	0.06	2.43
100 (60)	D	0.54	0.65	1.25	0.16	0.07	2.67
110 (70)	A	2.58	0.43	1.91	0.18	0.08	5.18
110 (70)	B	2.43	0.49	2.10	0.19	0.09	5.30
110 (70)	C	2.34	0.42	2.07	0.19	0.09	5.11
110 (70)	D	2.33	0.62	2.12	0.20	0.10	5.37
130 (80)	A	3.97	-1.05	2.16	0.18	0.12	5.38
130 (80)	B	4.17	-1.29	2.69	0.20	0.13	5.90
130 (80)	C	4.01	-1.41	2.44	0.19	0.14	5.37
130 (80)	D	3.88	-1.09	2.71	0.20	0.15	5.85

[1] Present value of benefits earned during the years 2005 through 2054.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky

7.3.3 Population Impacts

As discussed previously, the presence of a new SKC (I-66) highway can lead to population growth due to increased commuting opportunities to nearby cities and increased job opportunities in the corridor region. Depending upon the design option and the location alternatives, the population impact varies from 75,400 to 80,600 additional people in the corridor over the 2005 to 2025 period. This represents an increase in the corridor population of about 4.6 percent to 4.8 percent.

7.3.4 Quality of Life and Commuting Benefits

Travel time savings due to SKC (I-66) will have a major influence in increasing the quality of life to the residents of this corridor. In particular, residents' quality of life would improve by having shorter trips to nearby colleges, universities, full-service hospitals, state/national parks, and state/local offices. It allows people to visit these establishments more conveniently, and also encourages increases in the frequency of trips. Improved transportation helps encourage regionalism by reducing the distance between the communities. Enhanced regional planning and reduced commuting times are crucial to job opportunity expansion and reduced poverty rates in the SKC (I-66) corridor region, particularly counties in Eastern Kentucky.

7.4 Economic Justification Determination

The economic justification of SKC (I-66) is determined by two separate analyses of benefits (road user benefits and economic development benefits). Although these benefits stem from the same condition (i.e., improved accessibility), they can be measured in two separate ways. These two cannot be added together but have to be evaluated independently.

The benefit/cost analyses utilizing economic development and road user benefits are illustrated in Table 7.4. This table includes all of the appropriate economic justification indicators for each of the design speed options and location alternatives including: Net Present Value, Benefit/Cost Ratio, Internal Rate of Return, and Ratio of Increased Wages to Project Cost.

Table 7.4						
Benefit Cost Ratio, Net Benefits and Internal Rate of Return of Interstate 66 By Route Option 4% Discount Rate					Earnings/Cost Ratio Present Value of Earnings and Cost 4% Discount Rate	
Road User					Economic Development	
Speed km/h (mph)	Route	Benefit Cost Ratio[1]	Net Benefits[1] (Billions of 1995 $s)	Internal Rate of Return[1]	Earnings Cost Ratio[2]	Difference in Present Value of Earning/Cost (Billions of 1995 $s)[2]
100 (60)	A	0.83	-0.45	3.2%	5.76	12.7
100 (60)	B	0.81	-0.59	3.1	4.90	12.1
100 (60)	C	0.82	-0.55	3.1	4.74	11.1
100 (60)	D	0.83	-0.55	3.2	4.63	11.7
110 (70)	A	**1.43**	**1.55**	**5.7**	4.71	13.5
110 (70)	B	**1.30**	**1.23**	**5.3**	4.14	12.8
110 (70)	C	**1.23**	**0.95**	**5.0**	3.83	11.7
110 (70)	D	**1.16**	**0.74**	**4.7**	3.48	11.5
130 (80)	A	**1.01**	**0.05**	**4.0**	3.47	12.9
130 (80)	B	**1.02**	**0.12**	**4.1**	3.22	12.8
130 (80)	C	0.90	-0.58	3.6	2.95	11.6
130 (80)	D	0.90	-0.64	3.5	2.7	11.0
[1] Based on the present value of benefits and costs earned during the years 2005 through 2054.					[2] Based on the present value of earnings and costs earned during the years 2005 through 2054.	
Source: Calculated by the Center for Business and Economic Research, University of Kentucky						

7.4.1 Sensitivity Tests

Sensitivity tests were conducted to determine the extent to which the study findings might be dependent upon these approximations. These sensitivity tests are as follows:

- 15 percent reduction in capital cost
- 15 percent increase in capital cost
- 15 percent reduction in benefits
- 7 percent real discount rate

The sensitivity analysis results are shown in Table 7.4.1. These results indicate that the Conventional Interstate route option alternatives, in particular A and B, are economically justifiable. The benefit/cost ratio at a 7-percent real discount rate is close to 1.0 in spite of the capital costs being more than 15 percent higher as compared to the National Transamerica Transportation Corridor study, and almost 100 percent higher compared to Corridor 18 (I-69) capital costs.

Table 7.4.1
Benefit Cost Ratio Sensitivity of Interstate 66
By Route and Speed Options for Alternative Scenarios

Speed km/h (mph)	Route	Benefit Cost Ratio[1]						
		Economic Development		Road Users				
		4% Discount Rate	7% Discount Rate	Costs 15% Lower	Costs 15% Higher	Benefits 15% Lower	4% Discount Rate	7% Discount Rate
100 (60)	A	5.76	4.17	0.98	0.72	0.71	0.83	0.47
100 (60)	B	4.90	3.54	0.95	0.71	0.69	0.81	0.46
100 (60)	C	4.74	3.43	0.96	0.71	0.69	0.82	0.46
100 (60)	D	4.63	3.34	0.97	0.72	0.70	0.83	0.47
110 (70)	A	4.71	3.42	**1.68**	**1.24**	**1.21**	**1.43**	0.80
110 (70)	B	4.14	3.00	**1.53**	**1.13**	**1.11**	**1.30**	0.73
110 (70)	C	3.83	2.77	**1.45**	**1.07**	**1.05**	**1.23**	0.69
110 (70)	D	3.48	2.51	**1.36**	**1.01**	0.99	**1.16**	0.65
130 (80)	A	3.47	2.47	**1.19**	0.88	0.86	**1.01**	0.55
130 (80)	B	3.22	2.32	**1.20**	0.89	0.87	**1.02**	0.56
130 (80)	C	2.95	2.13	**1.06**	0.79	0.77	0.90	0.49
130 (80)	D	2.70	1.94	**1.06**	0.78	0.77	0.90	0.50

[1] Based on the present value of benefits and costs earned during the years 2005 through 2054.
Source: Calculated by the Center for Business and Economic Research, University of Kentucky.

8.0 FINANCIAL FEASIBILITY

The benefit/cost analysis presented in Section 7.4 indicated that the cost of the SKC (I-66) project would be compensated in large part by the road user benefits received by businesses, workers, and leisure travelers. In theory, the people who would receive benefits from SKC (I-66) would be willing to pay for the construction of the high-way. But, in reality, it would be difficult to get the potential beneficiaries to pay the full cost of the project. Raising money to construct SKC (I-66) will require raising money both from people who will benefit from the highway and from tapping into funds set aside for transportation projects at the state and, perhaps, at the federal level.

8.1 Financial Cost of Building SKC (I-66)

The SKC (I-66) is assumed to be constructed over the seven-year period from 1998 to 2004. Therefore, potential toll revenues and other benefits (road user savings, safety, concessions, etc.) will be collected over the life of the road from 2005 to 2054. Thus, construction dollars will have to be raised in advance of benefits. This condition can be accomplished by issuing bonds. The annual obligations needed to finance SKC (I-66) by design speed option and location alternatives are shown in Table 8.1 for selected years.

Table 8.1
Total Construction Costs
Annual Bond Service and Highway Maintenance Cost for SKC (I-66) for Selected Years
By Route and Speed Option
(Millions of Nominal Dollars)

Speed km/h (mph)	Route[1]	Cost in Billions of 1995 $s	1998	2002	2005	2010	2015	2020	2025	2031
100 (60)	A	$3.36	$102	$389	$296	$297	$299	$301	$303	$204
100 (60)	B	3.95	128	334	341	342	344	346	348	224
100 (60)	C	3.79	120	321	327	328	330	332	335	218
100 (60)	D	4.11	132	348	354	355	357	359	361	232
110 (70)	A	4.48	152	384	394	396	398	401	404	257
110 (70)	B	5.03	178	431	440	442	445	448	452	279
110 (70)	C	5.12	181	438	448	450	453	456	460	284
110 (70)	D	5.74	210	490	500	502	505	508	511	307
130 (80)	A	6.58	243	561	572	574	577	580	584	347
130 (80)	B	7.19	269	607	618	620	623	626	631	368
130 (80)	C	7.31	277	623	634	637	640	643	647	377
130 (80)	D	7.99	309	680	691	693	696	699	703	400

[1] Routes A-D are the same east of Hopkinsville. Route A exits Kentucky at Paducah. Route B travels south of Paducah and crosses the Mississippi River at Wickliffe. Route C passes through Mayfield before exiting Kentucky at Wickliffe. Route D passes through Land Between the Lakes and Mayfield before exiting Kentucky at Wickliffe.
Source: Department of Civil Engineering, University of Kentucky Source: Calculated by the Center for Business and Economic Research, University of Kentucky

These figures in Table 8.1 include both annual bond service payments and maintenance costs for the highway. It is assumed that one bond is issued in 1998 and another in 2002. The figures in the above table are based on issuing 30-year bonds for the SKC (I-66) construction. The bonds are estimated to pay a 5.9-percent annual nominal interest. The bonds are expected to have a 2.0-percent issuance cost and a 0.5-percent insurance cost.

8.2 Funding From Toll Sources

After 2005, some of the funds to cover annual bond payments for SKC (I-66) could come from toll collections. Potential revenues from toll collections are illustrated in Table 8.2.a.

Table 8.2.a
Average Annual Revenue for Proposed Toll Barriers for Interstate 66
By Speed Option
2005 - 2025 (in Nominal Dollars)

Barrier	Speed		
	100 km/h (60 mph)	110 km/h (70 mph)	130 km/h (80 mph)
Mississippi River	$1,174,844	$2,314,961	$4,045,724
Land Between The Lakes	3,740,877	6,890,902	11,677,220
Cumberland	2,839,776	6,473,607	19,286,691
Big Sandy River	4,373,275	6,773,595	11,688,598
Total Route Option A	7,213,052	13,247,203	30,975,289
Total Route Option B & C	8,387,896	15,562,163	35,021,012
Total Route Option D	12,128,773	22,453,065	46,698,233

Source: Calculated by the Center for Business and Economic Research, University of Kentucky, using data provided by Wilbur Smith Associates.

The revenues in Table 8.2.a do not reflect revenues from making the entire SKC (I-66) route a toll road. Rather, these figures reflect revenues from making toll roads in selected short portions of SKC (I-66) that would be used most heavily and have few alternative routings. These toll roads will raise approximately $13 million to $22 million per year for the Conventional Interstate option. It is evident that toll revenues will not be able to raise a substantial share of the revenue to meet annual bond service payments for SKC (I-66) as shown in Table 8.2.b.

Most of the money to meet the obligations would need to come from an alternative source: primarily transportation revenues.

8.3 Other Sources of Funding

It will be possible to meet a modest portion of the remaining annual bond service payments from three other revenue sources: donated land, concessions, and value capture.

8.3.1 Land Donation

Based on many precedents for right-of-way donation in Kentucky, it is assumed that about 20 percent of the right-of-way cost could be obtained by land donations. This means reduced annual bond service payments by about $20 million for the Conventional Interstate option of the SKC (I-66) project.

Table 8.2.b
Annual Bond Service and Highway Maintenance Cost for SKC (I-66)
Which Cannot be Met by Toll Revenues for Selected Years
By Route and Speed Option
(Millions of Nominal Dollars)

Speed km/h (mph)	Route[1]	1998	2002	2005	2010	2015	2020	2025	2031
100 (60)	A	$77	$263	$291	$291	$291	$292	$293	$193
100 (60)	B	98	303	335	335	335	336	337	211
100 (60)	C	91	291	321	321	322	322	323	205
100 (60)	D	101	316	346	345	345	344	345	213
110 (70)	A	117	349	385	385	385	385	386	237
110 (70)	B	138	391	430	430	429	430	431	255
110 (70)	C	141	397	438	437	437	438	439	260
110 (70)	D	164	444	486	484	482	481	481	272
130 (80)	A	90	509	552	549	546	544	542	298
130 (80)	B	211	549	596	591	588	585	583	313
130 (80)	C	218	564	612	608	605	602	600	322
130 (80)	D	244	615	661	655	649	644	640	327

[1] Routes A-D are the same east of Hopkinsville. Route A exits Kentucky at Paducah. Route B travels south of Paducah and crosses the Mississippi River at Wickliffe. Route C passes through Mayfield before exiting Kentucky at Wickliffe. Route D passes through Land Between the Lakes and Mayfield before exiting Kentucky at Wickliffe.
Source: Department of Civil Engineering, University of Kentucky Source: Calculated by the Center for Business and Economic Research, University of Kentucky

8.3.2 Leased Concessions

Revenue from leased concessions on SKC (I-66) can be used to make part of the bond service payments. Leased concessions occur when businesses pay a rent to the government to use land or buildings on a highway's right-of-way. Following the revenue pattern from New York, estimated concessions revenues from the Conventional Interstate option would be $6 million per year in year 2015, which is the midpoint year in the bond service period from 1998 to 2031.

8.3.3 Value Capture

Special tax districts offer a method to capture value in a variety of industries and services. These districts are composed of towns and areas where property values will increase if a public investment such as a new SKC (I-66) highway is undertaken. The idea is to help pay for the public investment by capturing some of the tax revenue increases which occur as property values increase.

Assuming that property values will increase at the rate of inflation, the revenue from special tax districts is estimated to be about $8 million in nominal dollars in year 2015, a midpoint year during the bond-service period from 1998 to 2031.

8.4 Remaining Cost of Building SKC (I-66)

Even with these alternative sources of revenue, the construction of SKC (I-66) would require a substantial payment from transportation revenue to meet annual bond service payments over the next 35 years. Annual payments of $320 million to $420 million would be required to service bonds for the 110 km/h (70 mph) Conventional Interstate design option. This amount represents a substantial share of any state's annual transportation revenue. As for Kentucky, this amount would represent a significant share of both the Kentucky Transportation Cabinet's annual revenues and of its planned spending on the construction program. Thus, financing the Conventional Interstate option of SKC (I-66) would probably require special federal funding to increase revenue available to the state, or some dedicated tax such as a special fuel tax to raise the state's revenue.

Two other possible strategies to raise revenue for the SKC (I-66) would be to: (1) begin to transfer coal severance taxes from the general fund to the road fund (the reverse was done in the late 1970s and early 1980s); and (2) support the budget for the State Police out of the General Fund rather than the Road Fund (this transfer from road funds was initiated in the late 1980s). Together, returning these two funding sources to the Road Fund would increase road fund revenues available for the SKC (I-66) by at least $100 million per year. Table 8.4 shows one possible scenario for meeting the remaining financial needs for annual bond service payments for this project.

SOUTHERN KENTUCKY CORRIDOR (I-66)

One Possible Financing Option

Alternate B - Conventional Interstate

Bond Service Payment / Maintenance Cost (Year 2005)

		$440 M
(1)	Toll Revenues	-10 M
	Remaining	$430 M
(2)	Land Donations / Concessions / Special Tax Districts	-20 M
	Remaining	$410 M
(3)	Redirect Road Funds	
	From Resource Recovery Bonds & State Police	-100 M
	Remaining	$310 M
(4)	Targeted Fuel Tax	-110 M
	5¢ to 6¢ per gallon	
	Remaining	$200 M

(5) Federal & State Funding

Six Year Plan - New Construction = $600 M

State Portion = $290 M

Federal Portion = $310 M

} $200 M

Federal Portion Could Increase to 382 M with Step 21 Redistribution (77% to 95%)

Table 8.4

Although the financing scenario as shown in Table 8.4 should be considered as only one option for financing the Southern Kentucky Corridor (I-66), it does illustrate that financing the facility is plausible and feasible.

9.0 PRIORITY SEGMENTS

The preceding section on financial feasibility analysis was based upon the assumption that all parts of SKC (I-66) would be built at roughly the same time during the 1998 to 2004 period. However, given the large financial costs identified for building this project, priority sections would seem appropriate. In particular, it may make sense to identify some relatively low cost but important parts of SKC (I-66) which could be completed first and which would provide necessary linkage within the existing highway system.

One priority group would be to build smaller segments which would link existing parkways together. The advantage to this would be to create long continuous segments of SKC (I-66) quickly and within the limited funds presently available. To implement this logic, the highest priority of this type would be to build the portion of highway between Somerset and London connecting the Cumberland Parkway with the Daniel Boone Parkway. The second priority would be to construct the segment east of Hazard to the eastern state line to provide increased mobility and accessibility for moving people and goods into and out of this region from the East Coast. The third priority would be to build the segment from I-24 west of Paducah to Wickliffe, if Alternative B is selected. The short Missouri portion of I-66 would then connect SKC (I-66) to I-55, assuming Missouri has completed or will complete a connecting segment of roadway.

A second group of priorities would be to upgrade and/or reconstruct the existing parkways to interstate standards. The highest priorities in this case would be the Cumberland Parkway and the Daniel Boone Parkway. These priority sections are illustrated in Figure 9.0.

10.0 PUBLIC PARTICIPATION

The public awareness effort was performed through advisory committee meetings, press releases, newsletters, and presentations to the affected area development districts' transportation planning committees. The involvement of the affected area development districts (ADDs) and local elected officials was obtained by visiting each ADD and making presentations about the study approach and seeking their input. Special meetings were also held with concerned local officials and special interest groups, such as the Close the Gap advocacy group that supports a U.S. 60 connection between Missouri and Kentucky.

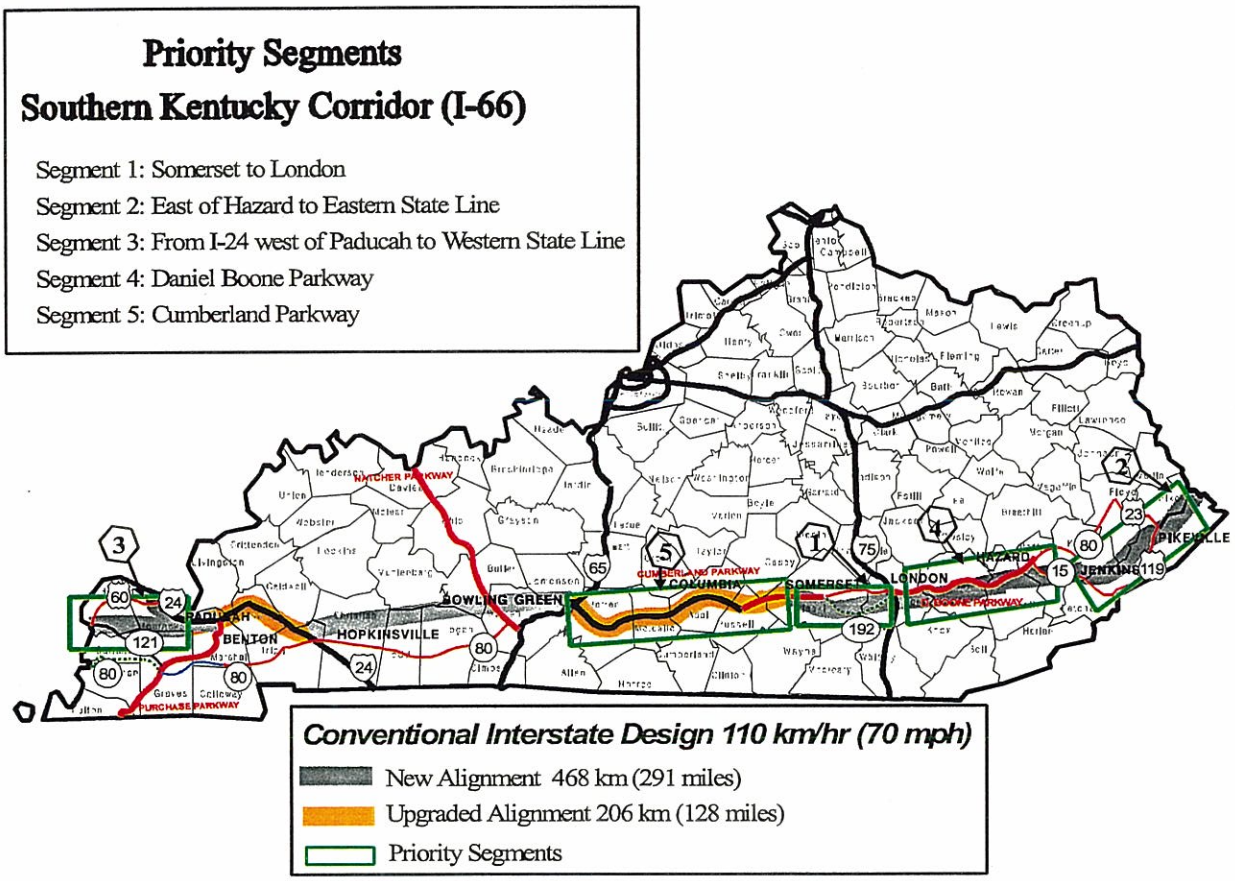

Figure 9.0. Priority Segments for the Southern Kentucky Corridor (I-66)

Three newsletters were published during the course of this study. Each newsletter had a circulation of more than 700 persons and/or organizations, including local media. Four meetings of the Advisory Committee, comprised of representatives from the area development districts, federal and state government agencies, elected local officials, three adjacent states, and other interests, were held to provide members with information on the study process, progress of various study modules, the analysis of results, and the gathering of comments. The first Advisory Committee meeting was on October 12, 1995, at the Lake Cumberland Area Development District in Russell Springs, Kentucky, to brief committee members on the study approach and to get comments and feedback. On April 30, 1996, the second meeting of the Advisory Committee was held at the Barren River Area Development District in Bowling Green, Kentucky. An existing condition report and the status of various work modules were shared with the members. The third meeting of the Advisory Committee was on October 17, 1996, at the Cumberland Valley Area Development District in London, Kentucky. Preliminary results of the cost estimates, traffic assignments, economic analysis and impacts were presented to members. On February 18, 1997, the fourth and last meeting was held at the

Center for Rural Development in Somerset, Kentucky, to present the final results of the study. A Draft Executive Summary and Economic Impact Assessment report were provided to the members for review/comments. The advisory committee meetings and the presentations to the ADDs transportation planning committees gave the participants many opportunities to express their opinions and to provide constructive comments that were useful during this important study.

11.0 STUDY CONCLUSIONS

Based upon the study's analyses, a number of important conclusions emerged, as follows:

- ***The Conventional Interstate design option Alternatives A and B are economically justifiable and financially feasible projects.***

- ***The road users benefits are greater than the cost of the project at a 4-percent discount rate. In fact, the internal rate of return where benefits equal costs is approximately 5.7 percent. Recent increases in the value of travel time for autos and trucks indicate that the internal rate could approach or exceed 7 percent.***[6]

- ***A comparison of the increase in the present value of earnings to the cost of the project yields ratios of 4.71 for Alternate A and 4.14 for Alternate B at a 4-percent discount rate for the Conventional Interstate option. This indicates that every dollar invested in this highway could yield a return of over four dollars.***

- ***The SKC (I-66) project would help development in economically distressed areas in the corridor region. It is estimated that approximately 55,000 jobs per year could be created by the SKC (I-66) project.***

- ***It would have positive benefits in terms of job creation, wage increase, enhanced quality of life, and accessibility to vast natural resources.***

- ***Since 30 percent of the expected job growth would be in the manufacturing sector, the personal income growth should improve Kentucky's national ranking.***

- ***Approximately 250 lives would be saved in the first 20 years of the project.***

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[6] The Federal Highway Administration is in the process of releasing revised travel time saving costs for autos and trucks. The revised rate documentation was unavailable at the completion of this study.