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East Urban Area Corridor Analysis Daviess County, Kentucky

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EAST URBAN AREA CORRIDOR ANALYSIS
DAVISS COUNTY, KENTUCKY

A Thesis
Presented to
the faculty of the Department of Geography and Geology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Urban and Regional Planning

by
Laura P. Pace
April 1991

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EAST URBAN AREA CORRIDOR ANALYSIS

DAVISS COUNTY, KENTUCKY

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EAST URBAN AREA CORRIDOR ANALYSIS
DAVISS COUNTY, KENTUCKY

Laura P. Pace

April 1991

65 Pages

Directed by James Davis, Wayne Hoffman and Mark Lowry

Department of Geography and Geology Western Kentucky University

The need for improved highway facilities in the east urban area of Daviess County, Kentucky, is analyzed in this study. The study focuses upon the need for alternative highway routes, due to the increased travel demands generated by a new Ohio River Bridge in eastern Daviess County. Also, the east urban area is forecasted to experience population and employment growth in the next decade, further necessitating the need for improving existing highways or constructing new corridors in the area.

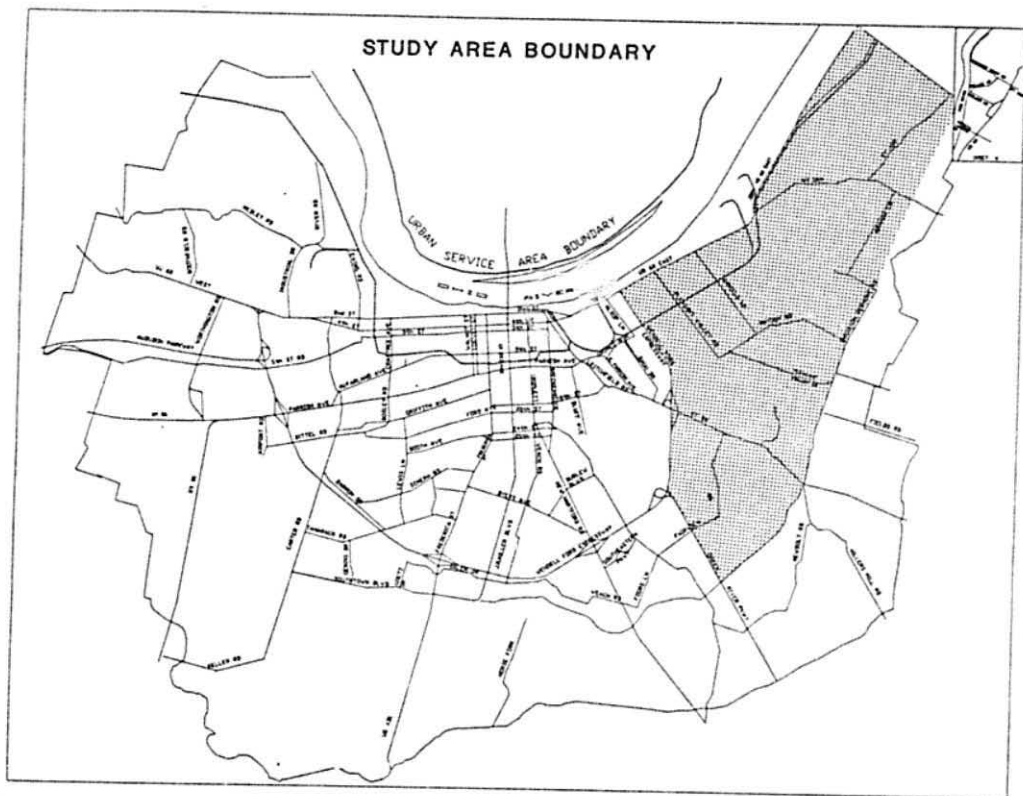
Various alternative alignments for an expressway are examined. The feasibility of upgrading existing highways in the east urban area is also analyzed. The study utilizes numerous transportation planning techniques, including the development of traffic projections, highway capacity analysis, cost estimates and land use and environmental impacts. The study includes original research and data collection in analyzing five alternatives. An alternative for constructing a new expressway in the east urban area of Daviess County is recommended.

EAST URBAN AREA HIGHWAY CORRIDOR ANALYSIS
DAVIESS COUNTY, KENTUCKY

INTRODUCTION

This paper will seek to analyze the need for improved highway facilities in eastern Daviess County, Kentucky. The purpose of the study is twofold--to determine the need for additional highway facilities in the east urban area of the county due to increased travel demands generated by a new Ohio River bridge which will be located approximately 12 miles east of Owensboro and also due to population growth in the east urban area, the fastest growing quadrant of Daviess County. The east urban area has experienced considerable population and employment growth in the past ten years. New subdivisions and businesses have developed in the area, increasing the demand for an improved highway system. The 1990 preliminary population for Daviess County is 86,790 according to the U.S. Census Bureau (2). The 1980 population for Daviess County was 85,949 (2). Population has increased by only one percent during the past ten years. However, much of this population growth has occurred in the east urban area. The final objective of the study is to develop a recommended alternative(s) for highway improvements in the east urban area, to accommodate through as well as intra-county travel. The location of the study area is shown on the map on the following page.

The construction of a new Ohio River Bridge and access route, connecting Owensboro and southern Indiana to I-64 and the Green River Parkway, will have a substantial impact on the highway network, particularly US 60 East. This project, combined with the anticipated population and employment growth, requires analyzing the existing



highway system to determine the need to develop new facilities or to upgrade existing highways in the east urban area. This study will utilize various transportation planning techniques, such as highway capacity analysis; traffic projections; and land use and environmental analysis to analyze alternatives for upgrading existing highways and for building a new expressway in the east urban area.

In the next two chapters, "Study Need" and "Review of Literature," a detailed description of the need to examine the highway system in the east urban area and various study techniques utilized in this analysis will be provided.

STUDY NEED

Population and Employment Growth

Population and employment are major determinants of traffic demand. For this reason, it is important to analyze existing and projected population and employment data for the study area. In 1984, the transportation planning staff of the Green River Area Development District collected population and employment data for each traffic zone in the urban area. This analysis found that the population for the east urban area of Daviess County was 12,084 within the 21 traffic zones in the eastern quadrant. Projections were prepared, by traffic zone, based upon such factors as existing trends, vacant residential lots and projected development patterns. Population in the study area is projected to increase to 18,335, an increase of 52 percent, by 2000 (GRADD 22-27).

Table 1 illustrates population and employment data in the study area. Employment is projected to increase by 24 percent in the east urban area in the next ten years. The east urban area includes such major employers as Ragu Foods (200 employees); Green River Steel (100 employees); Green Coal Company (250 employees); and W. R. Grace Chemical Company (300 employees) (GRADD 21). As the East Industrial Park continues to develop, employment will increase in the study area.

TABLE 1
POPULATION AND EMPLOYMENT DATA, BY TRAFFIC ZONE, IN STUDY AREA

Traffic Zone	1984 Population	Projected Population Year 2000	% Inc.	1984 Employment	Projected Employment Year 2000	% Inc.
27	1,087	1,120	3	339	393	16
28	428	470	10	514	673	31
54	470	748	59	0	10	1,000
55	240	343	43	444	557	25
67	103	107	4	29	44	52
68	366	358	-2	43	73	70
69	27	25	-7	81	94	16
70	0	0	0	1,456	1,593	9
71	47	49	4	41	46	12
72	919	1,456	58	403	520	29
73	1,085	1,361	25	117	136	16
74	371	933	151	4	4	0
75	1,508	1,812	20	19	38	100
76	464	1,132	144	0	10	1,000
77	1,293	2,157	67	98	148	51
78	528	844	60	0	36	3,600
79	267	823	208	201	329	64
80	498	889	79	0	0	0
81	405	858	112	64	72	8
82	1,946	2,661	37	201	241	20
83	32	189	491	0	0	0
	12,084	18,335	52	4,054	5,017	24

The east urban area is the fastest growing quadrant of the county. The expansion of existing subdivisions and the development of new residential areas is ongoing. As stated earlier, employment also will increase with the expansion of existing industries and the potential for location of new industry in the East Industrial Park. Neighborhood business centers are anticipated to expand with the increased population growth. Population and employment in the east urban area is projected to grow at a faster rate than the urban area as a whole as shown in Table 2. With population and employment forecasted to increase even more during the next ten years, routes must be improved to accommodate, as well as enhance, growth and development in the east urban area.

TABLE 2

POPULATION AND EMPLOYMENT IN EAST URBAN AREA AS COMPARED TO ENTIRE URBAN AREA

POPULATION					
East Urban Area			Entire Urban Area		
1984 Population	Projected Population (2000)	Inc.(%)	1984 Population	Projected Population (2000)	Inc. (%)
12,084 (15.4)	18,335	6,251(52)	69,326	80,000	10,674

EMPLOYMENT					
East Urban Area			Entire Urban Area		
1984 Employment	Projected Employment (2000)	Inc.(%)	1984 Employment	Projected Employment (2000)	Inc. (%)
4,054	5,017	953 (24)	29,024	33,520	4,496 (15.5)

Source: Population and Employment Base Data and Projections for Traffic Model, GRADD, September 1984

Impact From Area Highway Projects

The construction of a new Ohio River Bridge in eastern Daviess County near the community of Maceo will have a significant impact on the average daily traffic volumes on existing highways in the study area. US 60 East, the principal arterial and major corridor in the study area, currently averages between 20,000 to 27,000 vehicles daily according to traffic counts completed in August 1990 by the Green River Area Development District. US 60 East will be reconstructed from KY 144 to the new Ohio River Bridge by 1994. This upgrading of US 60 East, combined with the construction of the new bridge, will increase average daily traffic volumes on US 60 East to 30,000 to 39,000 vehicles daily according to traffic projections made by the Kentucky Transportation Cabinet (3). Highways that intersect with US 60 East also will experience additional traffic demands generated by the new bridge and US

60 East reconstruction. Eastern Daviess County will experience significant impact from these two major transportation projects. The impact of planned highways projects in the east county, as well as anticipated population and employment growth, requires that new alternative routes and improvements to existing highway facilities be examined. This study will focus upon the need for such highway improvements and the analysis of various alternatives for highway improvements.

REVIEW OF THE LITERATURE

Several transportation planning studies, which focus upon analyzing new routes or improving existing highway facilities, were reviewed to determine the planning techniques utilized in conducting similar types of traffic studies. One study reviewed was the South Central Louisville Transportation Study, prepared by Presnell Associates, Inc. in 1985. This study analyzed alternative east-west corridors in south Louisville to connect south central neighborhoods to I-65. Each alternative was evaluated according to criteria such as transportation objectives, cost, environmental impact and economic development. Nine major alternatives were examined. Based upon the study's findings, several phase improvements were recommended, including the extension of an existing street; the reconstruction of an existing east-west thoroughfare; and a new extension of this street to serve neighborhood areas (I-4-5). The objectives of the selected alternatives, which involve phase improvements over a 20-year period, include minimum adverse impact on area neighborhoods, low traffic volume increases on local streets, and minimal land use changes in residential zones (II-51).

A second transportation planning study reviewed was the analysis of a cross-county connector route in Gwinnett County, Georgia, prepared by the RBA Group consulting firm. This study analyzes the need for a new multi-lane arterial between US 78 and I-85 in Gwinnett County. The study addresses the need for a better east-west corridor due to the rapid growth of the area and the need for a safer, more direct route.

In the Gwinnett County study, the levels-of-service on the existing highways in the study area were examined and determined to be operating

at congested, over-capacity conditions. Since the alternatives analyzed were in a developed urban area, the environmental and land use impacts were assessed, and various mitigation techniques were recommended. For example, several types of acoustical barriers for noise impact mitigation were discussed. Other measures recommended for preserving the residential character of the area include buffer zones, access controls and multiple uses of the corridor right-of-way, such as stormwater basins and jogging paths (13).

Another study researched, which focused on the land use effects of planned highways, is the Snyder Freeway Corridor Study, developed by the Louisville-Jefferson County Planning Commission. The goal of this study was to analyze highway needs along the Snyder Freeway corridor. The study anticipates land use development, as a result of the recently completed freeway, and associated demands on the area's existing highways network(I-4). Thirty highway projects were recommended, ranging from developing new routes to traffic operational improvements on existing thoroughfares. A unique feature of the study is the development guidelines recommended to limit future land use along the corridor.

A subarea highway analysis, prepared by the Kentucky Transportation Cabinet, was also reviewed. This analysis focused upon the I-24/US 60 interchange in west Paducah. Commercial development has increased in the area with the completion of I-24 (1). The study analyzed three alternatives for reconstructing the existing interchange. The study also developed two alternatives for diverting traffic from the area through constructing a new connector route between US 60 and US 45, the two principal arterials in the study area.

Several transportation planning guidebooks, that are considered as standards in the field, were utilized to determine the warrants for constructing alternative routes and for geometric and design recommendations on arterials and expressways. The document, Planning Urban Arterial and Freeway Systems, prepared by the Institute of Traffic Engineers, provides information on determining the demand for highway expansions on alternative routes, based upon traffic conditions, development and land use (17-22). The relationships between highways and land use are discussed. A Policy on Geometric Design of Highways and Streets, authored by the American Association of State Highway and Transportation Officials, was used as a guideline for recommended design standards for ~~arterials~~ arterials and expressways (629-719).

Several transportation planning techniques used in the above-referenced studies will also be utilized in this corridor study.

The preceding chapters have focused upon the study need, purpose and background. The next chapter will describe existing traffic conditions in the study area.

EXISTING TRAFFIC CONDITIONS

Area Highway Facilities

The principal roadways in the eastern Daviess County study area are US 60 East, the Wendell Ford Expressway (US 60 Bypass), KY 54 and the Green River Parkway. The new Ohio River Bridge will be located at Maceo, 4.4 miles northeast of US 60 East near the Iceland Road Spur. The new bridge will be located approximately 12 miles east of the city of Owensboro. US 60 East is proposed for reconstruction from KY 144 to the new bridge access route, a distance of 6.5 miles. Four other state secondary routes serve the study area --KY 144 from US 60 East to KY 405; KY 405 from KY 144 to US 60 East; KY 1456 (Thruston-Dermont Road and ~~Reed~~ Road) and KY 3143 (Fairview Drive). Major county roads in the east urban area include Pleasant Valley Road, Hayden Road and Daniels Lane.

Traffic Volumes on Highways in the Study Area

Table 3 provides information on the average daily traffic volumes in the study area, and notes the changes in these counts over a ten-year period.

US 60 East currently averages between 23,500 to 27,200 vehicles per day (vpd) between the Wendell Ford Expressway and KY 144. From KY 144 to KY 405, US 60 East averages between 7,600 to 10,900 vpd. Traffic volumes on the Wendell Ford Expressway have increased by 7 to 18 percent in the past ten years. Volumes currently average 11,000 to 14,300 vpd. On KY 54, traffic volumes currently average 6,400 to 11,700 vpd. Green River Parkway currently averages 3,800 vpd.

Pleasant Valley Road, Daniels Lane, Fairview Drive, Thruston-Dermont Road and KY 405 all carry between 2,100 to 4,700 vpd. Although

traffic volumes have increased on these facilities, the increases have not been extremely significant. Reid Road has decreased in volume; although KY 144 has substantially increased (35-65 percent) in the past five years.

TABLE 3
AVERAGE DAILY TRAFFIC VOLUMES
ON STUDY CORRIDORS, 1979-1990

HIGHWAY	AVERAGE DAILY TRAFFIC VOLUMES, BY YEAR			
	1979	1985	1988-1990	% Increase 1979-1990
<u>US 60 East</u>				
Wendell Ford Xway- Pleasant Valley Rd.	24,700	27,400	27,200	10%
Pleasant Valley Rd.-KY 144	20,400	21,100	23,500	15%
KY 144-Wrights Landing Rd.	11,400	9,900	10,900	10%
Wrights Landing Rd.-KY 405	6,400	7,300	7,600	19%
<u>Wendell Ford Expressway (US 60 Bypass)</u>				
US 60 East-KY 54	10,300	10,900	11,000	7%
KY 54-Green River Pkwy.	12,100	14,200	14,300	18%
<u>KY 54</u>				
Parrish Ave.-Wendell Ford Xway	9,100	10,500	6,400	-30%
Wendell Ford Xway- Thruston Dermont Rd.	10,600	13,900	11,700	10%
Thruston Dermont Rd.-KY 142	6,660	7,700	8,600	30%
<u>Green River Parkway</u>				
Wendell Ford Xway-KY 142	2,700	3,100	3,800	41%
<u>Pleasant Valley Road</u>				
US 60 East-Hayden Rd.		3,500	3,700	6%
Hayden Rd.-Thruston Dermont Rd.		300	900	200%
<u>Daniels Lane</u>				
US 60 East-Hayden Rd.		600	600	-0-
<u>Fairview Drive</u>				
Green River Pkwy.-KY 54	1,900	2,400	2,100	10%
<u>Thruston Dermont Road</u>				
KY 54-Pleasant Valley Rd.		4,000	4,700	18%
<u>Reid Road</u>				
Thruston Dermont Rd.-KY 144		2,400	2,300	-4%

HIGHWAYAVERAGE DAILY TRAFFIC VOLUMES, BY YEAR

	<u>1979</u>	<u>1985</u>	<u>1988-1990</u>	<u>% Increase 1979-1990</u>
<u>KY 144</u>				
US 60 East-KY 405		5,900	9,600	65%
KY 405-KY 142	3,400	4,500	4,600	35%
<u>KY 405</u>				
US 60 East-KY 662	600		900	50%
KY 662-Wrights Landing Rd.	600	1,300	1,300	117%
Wrights Landing Rd.-KY 144	1,900	2,600	2,900	53%

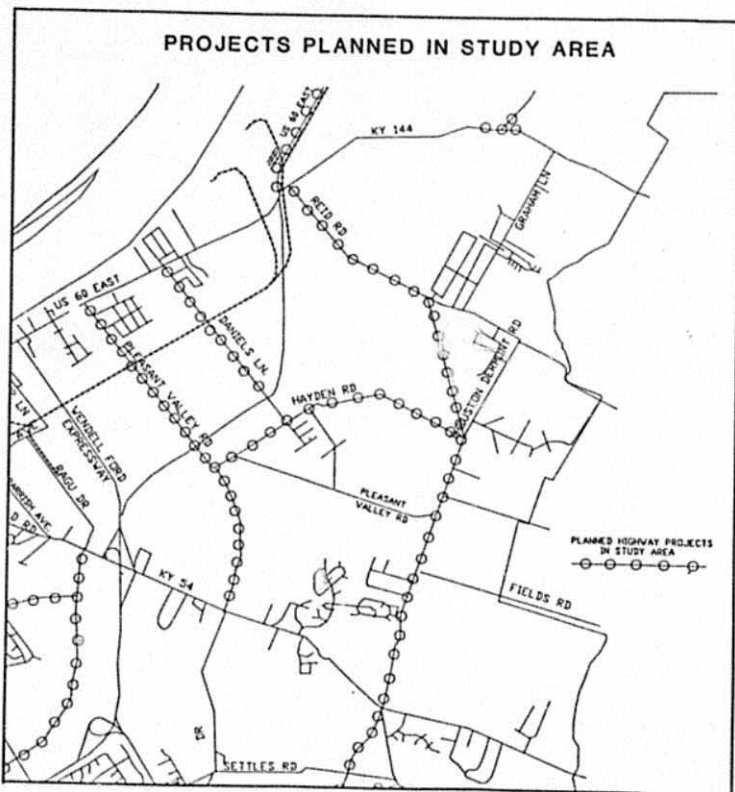
Projects Planned for Study Area

Several highway projects are currently planned in the corridor study area. These projects are described in Table 4 below:

TABLE 4
HIGHWAY PROJECTS PLANNED FOR STUDY AREA

<u>Project</u>	<u>Beginning</u>	<u>Ending</u>	<u>Description</u>	<u>Est. Cost</u>	<u>Timetable</u>
Ohio River Bridge & Access Route	Ohio River	US 60 E	Construction of 4 lane bridge and access route	\$102,824,000	FY 1992*
US 60 E	KY 144	Bridge Access Route	Relocation of US 60 East (distance = 6.5 miles)	\$20,050,000	FY 1993*
Outer Blvd.	KY 54	US 60 E Area	Construction of circumferential minor arterial in growth area outside Wendell Ford Expressway	\$11,512,750	As development warrants
Pleasant Valley Rd.	US 60 E	Hayden Road	Reconstruction as urban section	\$2,198,000	FY 1994
Hayden Rd.	Pleasant Valley Rd. Road	Thruston-Dermont	Reconstruction as urban section	\$2,411,000	FY 1995
Daniels Lane	US 60 E	Two miles south	Reconstruction as urban section	\$1,592,000	FY 1996
Fairview Dr. Extension	Fairview Dr	Pleasant Valley Road	Extension of Fairview Drive northeast to Pleasant Valley Road	\$N/A	As development warrants
KY 144/ KY 405	N/A		Realignment of intersection	\$181,000	

The information shown in Table 4 was obtained from the Transportation Improvement Program, Owensboro-Daviess County Urban Area, Green River Area Development District: Owensboro: 1990 (1-11). Projects included in Kentucky Transportation Cabinet, Strategic Six-Year Highway Plan (17) are noted with asterisks in Table 4.



Capacity/Level-of-Service Analysis

Definitions

Capacity analysis is a set of procedures used to estimate the traffic-carrying capacities of highway facilities, based upon a range of operating conditions. Capacity is generally defined as the maximum hourly rate which a particular segment of roadway can accommodate.

Level-of-service analysis is a qualitative measurement used to describe operational conditions within a traffic stream. Level-of-service for intersections is defined in terms of delay. For arterials, level-of-service analysis is based on average travel speed for the segment analyzed. The average travel speed is computed from the running time on the arterial segment and the intersection approach delay.

Capacity and level-of-service are affected by numerous physical and operating characteristics, including traffic conditions, such as vehicle distributions and pedestrian crossings; roadway conditions, such as the number and width of lanes; and signalization conditions, such as timing and phasing.

Intersection Analysis

Utilizing a software package developed by the Transportation Research Board (TRB software), major intersections on US 60 East were analyzed to determine level-of-service conditions. Data was collected in the field on peak hour traffic counts at major intersections on US 60 East and the US 60 Bypass. These counts were conducted in July and August 1990. Geometric data, such as lane widths and traffic signal timings, were also collected in the field. Level-of-service is defined in increments from A to F. According to the Highway Capacity Manual, Transportation Research Board, these levels-of-service for intersections

may be defined as follows (9-4-9-5):

Level-of-service A--free flow operations with average running speeds; very low delay.

Level-of-service B--reasonably unimpeded operations at average travel speeds about 70 percent of the free flow speed; delays in the range of 5 to 15 seconds per vehicle.

Level-of-service C--stable, but slightly more restricted conditions; travel speeds about 50 percent of average free flow speed; delays in the range of 15 to 25 seconds per vehicle.

Level-of-service D--average travel speeds about 40 percent of average free flow speed; delays in the range of 15 to 25 seconds per vehicle.

Level-of-service E--significant delay and low travel speed; delays in the range of 40 to 60 seconds per vehicle; congestion and unfavorable progression.

Level-of-service F--flow at extremely low speeds; delay in excess of 60 seconds per vehicle; poor progression and high volume/capacity ratios.

The findings of the intersection analysis on US 60 East and the US 60 Bypass are summarized in Table 5, below.

TABLE 5

EXISTING LEVEL-OF-SERVICE/CAPACITY ANALYSIS ON MAJOR CORRIDORS
IN STUDY AREA

<u>Intersection</u>	<u>LOS</u>	<u>V/C</u>	<u>Delay (Sec/Veh)</u>
US 60 East/Bypass	*	0.80	*
US 60 East/Commerce Plaza	A	0.50	4.3
US 60 East/Pleasant Valley Road	B	0.49	6.4
US 60 East/Daniel's Lane	A	0.44	3.0
US 60 East/KY 144	B	0.32	6.9
US 60 Bypass/KY 54	B	0.42	7.8

* Results with extremely overloaded conditions (poor traffic progression, excessive delay, low travel speeds).

Segment Analysis

Additionally, an arterial segment analysis was conducted on US 60 East from the Wendell Ford Expressway to KY 144, to determine levels-of-service for defined segments on the two corridors. As was discussed earlier, arterial level-of-service is based on the average travel speed for the segment under consideration. It is influenced by factors such as the number of signals per mile and the average intersection delay. Factors such as poor progression and increasing traffic flows will lower the level-of-service.

Level-of-service for segments is also defined in increments from A to F. According to the Highway Capacity Manual, the levels-of-service for segments, may be defined, as follows (11-4):

Level-of-service A--free flow operations with average travel speeds about 90 percent of free flow speed (45-25 mph).

Level-of-service B--reasonably unimpeded operations with average travel speeds about 70 percent of free flow speed.

Level-of-service C--stable operations, although maneuvers are more restricted; average travel speeds are about 50 percent of free flow speed.

Level-of-service D--increase in approach delay, decreasing arterial speed; average travel speeds about 40 percent of free flow speed.

Level-of-service E--significant approach delays, average travel speeds about one-third of free flow speed.

Level-of-service F--arterial flow at extremely low speeds about 25 percent of free flow speed.

The results of the segment analysis are shown in Table 6.

TABLE 6

ARTERIAL SEGMENT ANALYSIS ON US 60 EAST
EXISTING TRAFFIC CONDITIONS

<u>Segment</u>	<u>LOS</u>	<u>Average Speed</u> <u>(mph)</u>
Wendell Ford Expressway to KY 144 (eastbound)	A	36.0
KY 144 to Wendell Ford Expressway (westbound)	B	31.5

Analysis and Summary of Intersection and Segment Analysis

The intersection of US 60 East and the Wendell Ford Expressway is the only signalized intersection within the study area not operating at an acceptable level-of-service. For the purpose of this study, an acceptable level-of-service may be defined as level-of-service A, B or C, where stable traffic operations exist. Overcapacity conditions are those operating below level-of-service C. The intersection of US 60 East and the Wendell Ford Expressway operates overcapacity during the peak periods, due to the volume of westbound traffic attempting to turn left onto the Wendell Ford Expressway which creates excessive delay. Excessive delay occurs when average travel speeds are below 50 percent of free flow travel speed conditions.

US 60 East has only one arterial segment, Wendell Ford Expressway to KY 144. This segment was analyzed in the eastbound and westbound direction, and was found to operate at an acceptable level-of-service; however, both the eastbound and westbound traffic flow operates at average travel speed below the posted speed limit of 45 mph.

The arterial segment analysis also indicates that the northbound and southbound approaches of intersecting streets at Pleasant Valley Road, Daniels Lane and KY 144 are experiencing high delays per vehicle.

Level-of-Service/Capacity Analysis on Two-Lane Section

Two-lane highway analysis was conducted on US 60 East from KY 144 to KY 405 in Maceo, to determine levels-of-service. Level-of-service for two-lane highway analysis is influenced by truck percentage, lane widths, shoulder widths, percent of no passing zones along the segment and traffic volume.

As Table 7 indicates, the level-of-service on the two-lane highway segment of US 60 East from KY 144 to Wrights Landing Road is LOS D. The segment from Wrights Landing Road to KY 405 is also operating at LOS D. The results indicate that the reconstruction planned on this segment of US 60 East is warranted, especially considering the impact of the new Ohio River Bridge. Two-lane highway analyses were also conducted for other facilities in the study area, also shown in Table 7.

Reid Road is currently operating at LOS B with no apparent capacity problems. KY 144 and Pleasant Valley Road are currently operating at LOS C. Daniels Lane operates at LOS A on both segments analyzed, indicating free flow traffic conditions. Thruston-Dermont Road, from KY 54 to Pleasant Valley Road, is operating at LOS C, but is borderline for LOS D conditions, indicating potential capacity problems. The segment of Thruston-Dermont Road from Pleasant Valley Road to Reid Road operates at LOS C. Fairview Drive operates at LOS B and C on the segments analyzed.

TABLE 7

SEGMENT ANALYSIS, FACILITIES IN STUDY AREA,
EXISTING TRAFFIC CONDITIONS

<u>Segment</u>	<u>LOS</u>
<u>US 60 East</u>	
KY 144 to Wrights Landing Road	D
Wright's Landing Road to KY 405	D
<u>Reid Road</u>	
KY 144 to Thruston-Dermont Road	B
<u>KY 144</u>	
US 60 East to KY 405	C
<u>Pleasant Valley Road</u>	
US 60 East to Hayden Road	C
Hayden Road to Thruston-Dermont Road	B
<u>Daniels Lane</u>	
US 60 East to CSX Rail Line	A
CSX Rail Line to Hayden Road	A
<u>Thruston-Dermont Road</u>	
KY 54 to Pleasant Valley Road	C
Pleasant Valley Road to Reid Road	C
<u>Fairview Drive</u>	
KY 54 to Settles Road	B
Settles to Old Hartford Road	C

Summary of Capacity/Level-of-Service Analysis

Both the major intersections and arterial segments on US 60 East and other principal routes in the study area have been analyzed to determine existing traffic conditions. In summary, the intersection of US 60 East with the Wendell Ford Expressway is congested and creates traffic delays. This lowers the average travel speed for motorists on US 60 East near the expressway. Furthermore, while US 60 East traffic

at other major intersections between the expressway and KY 144 is operating within capacity, due to the lack of an alternative route, average travel speeds of 32-36 mph are considerably below the posted 45 mph speed limit. The existing two-lane segment of US 60 East from KY 144 to KY 405 operates at level-of-service D, with congestion, low travel speeds and traffic delays.

Problems currently exist on traffic flow on US 60 East as the capacity/level-of-service analysis indicates. Obviously, the additional traffic generated from the new Ohio River Bridge and increased population and employment growth will worsen existing traffic flow. For these reasons, US 60 East must either be improved or an alternative route to US 60 East must be developed.

Origin-Destination Surveys

Origin-destination surveys were conducted on the Owensboro and Cannelton, Indiana, bridges, as part of the Ohio River Bridge Feasibility Study, prepared by the Green River Area Development District. The surveys were conducted to determine the origins and destinations of the motorists using both bridges (37-46). The results of these surveys may be summarized, as follows:

TABLE 8
ORIGIN-DESTINATION SURVEY RESULTS
OWENSBORO BRIDGE

<u>Origin/Destination</u>	<u>No. in Survey</u>	<u>% of Total</u>
Owensboro	1,097	32
North	1,578	46
South	74	2
East	160	5
West	533	15

TABLE 9
ORIGIN-DESTINATION SURVEY RESULTS
CANNELTON BRIDGE

<u>Origin/Destination</u>	<u>No. in Survey</u>	<u>% of Total</u>
Owensboro	896	48
Hancock County	69	4
North	370	20
South	10	1
East	511	27
West	24	1

An analysis of the origin-destination survey results indicates that the Owensboro area generates a significant portion of trips occurring on both bridges -- 32 percent on the Owensboro Bridge and 48 percent on the Cannelton Bridge. This implies that any new facilities should be located so that traffic may conveniently access arterials within the city of Owensboro, i.e. Wendell Ford Expressway and US 60 East.

Accident Analysis of Study Area

Traffic accidents were analyzed for the period of January 1, 1988, through May 31, 1990. This data was obtained from the Kentucky Transportation Cabinet, Division of Traffic (1-26). Accident rates were calculated using a formula recommended by the Institute of Traffic Engineers (551). This formula compares the number of accidents in a given time period to the average daily traffic volumes to determine an accident rate. Generally, those segments with rates of five or above are considered as high accident rate areas.

On US 60 East, accident rates were highest on the two-lane segment from Yellow Creek to Wrights Landing Road and from Wrights Landing Road to Sacra Drive. Intersections with the US 60 Bypass and Pleasant Valley Road have a high number of accidents, although accident rates are not

high, when the number of accidents is compared to the daily traffic at these intersections. On the US 60 Bypass between KY 54 and US 60 East, the intersection at KY 54 has a high accident rate. On KY 54, the segment from Fairview Drive to Bold Forbes Way has a high accident rate, as does the intersection with Thruston-Dermont Road. Some of these accidents, however, occurred prior to the reconstruction of KY 54 to five lanes. KY 144 has a high accident rate from Reid Road to KY 405.

The accident history in the study area is summarized in Table 10, on the following page.

TABLE 10
ACCIDENT HISTORY IN STUDY AREA
(January 1988 -May 1990)

Highway	Segment or Intersection	Accidents			Accident Rate*	
		Total	Injury	Fatality		
US 60 East	US 60 Bypass	23	10	0	3.30	
	Bypass-Hubert Ct.	1	1	0	.14	
	Hubert Ct.	5	2	0	.71	
	Commerce Dr.	4	3	0	.57	
	Commerce Dr.-Glenn Ct.	11	2	0	1.57	
	Glenn Ct.	5	1	0	.71	
	Glenn Ct.-Pleasant Valley Rd.	8	1	0	1.14	
	Pleasant Valley Rd.	26	4	0	4.30	
	Pleasant Valley Rd.-Isaac Shelby Dr.	2	0	0	.33	
	Isaac Shelby Dr.	1	0	0	.17	
	Isaac Shelby Dr.-Daniels Ln.	17	7	0	2.80	
	Daniels Ln.	1	0	0	.17	
	Eastwood Dr.	4	2	0	.66	
	Riverside Dr.	1	3	0	.17	
	Riverside Dr.-KY 144	23	18	1	3.80	
	KY 144	14	13	0	2.30	
	KY 144-Yellow Creek	6	1	0	2.10	
	Yellow Creek-Wrights Landing Rd.	31	22	0	11.00	
	Wrights Landing Rd.	2	0	0	.71	
	Wrights Landing Rd.-Gaddis Excavating	11	5	0	5.62	
	Gaddis Excavating-Sacra Dr.	12	0	0	6.13	
	Sacra Dr.	1	0	0	.51	
	Sacra Dr.-KY 405	2	0	0	1.02	
	US 60 Bypass	KY 54	16	5	0	5.31
		KY 54-US 60 East	5	2	0	1.77
	KY 144	US 60 East-Reid Rd.	8	6	0	3.24
		Reid Rd.	6	3	0	2.43
Reid Rd.-KY 405		17	11	3	6.88	
KY 54	Wimsatt Ct.	16	5	0	1.33	
	Alvey Park Dr.	8	2	0	2.66	
	Villa Point	12	3	0	3.98	
	Fairview Drive	9	8	0	2.99	
	Fairview-Bold Forbes Way	17	7	0	5.64	
	Wood Trace-Thurston-Dermont Rd.	8	4	0	2.66	
	Thurston-Dermont Rd.	19	13	0	6.31	

*Accident Rates were calculated, based upon the formula recommended in the Transportation & Traffic Engineering Handbook, as follows:

$$\frac{2 \times \text{Total No. of Accidents} \times 1,000,000 \text{ Vehicles}}{(\text{Days}) \times \text{Average Daily Traffic Volume}} \quad 515$$

The existing traffic conditions, including traffic volumes and levels-of-service on the major corridors; accident history; travel patterns; and planned improvements have been described in this chapter. The next chapter, "Analysis of Alternatives," will describe the methodology and analysis for various alternatives for improving the highway network in the study area.

ANALYSIS OF ALTERNATIVES

Several alternatives are discussed below for improving the highway network in the east urban area. The options discussed include making no improvements in the area; upgrading existing US 60 East; and constructing a new expressway facility in the study area. Five potential alignments for an east county expressway will be analyzed.

The analysis of each alternative includes traffic projections; level-of-service analysis; land use and environmental impact information; and cost estimates.

Methodology

Since it is necessary to assess the traffic conditions in the study area with the increase in traffic projected from the new bridge and connector route, the first alternative examined is "Do-nothing." This provides a description of the impact of the new bridge and connector route on the existing highway network.

For each alternative presented, traffic volumes were projected based upon a computer traffic modeling system maintained by the Kentucky Transportation Cabinet (1-12). A level-of-service/capacity analysis was also conducted for each alternative, utilizing the same methodology described earlier. The level-of-service analysis analyzes the impact of each alternative on the traffic flow on US 60 East, since one of the main objectives of this project is to relieve traffic congestion on US 60 East.

The land use impact of each alternative is assessed through information found in the land use element of the Owensboro-Daviess County Comprehensive Plan, as prepared by the Owensboro Metropolitan Planning Commission (12). Aerial photographs, obtained from the Daviess

County Property Valuation Administration office, were utilized to determine the number of properties affected. Each route was sketched onto the aerial photographs and affected properties were identified to determine potential relocations.

In conducting the environmental analyses, Flood Insurance Rate Maps, produced by the U. S. Department of Housing and Urban Development, were used to identify floodplain and wetland areas. Data on archeological sites was obtained from the University of Kentucky, Department of Anthropology. Historical site information was obtained from the Kentucky Heritage Council (1-7). Soils were identified through the use of geologic quadrangle maps developed by the United States Geological Survey.

The cost estimate for each alternative involved estimating costs for the design and construction of the alternative; the cost of acquiring the necessary right-of-way to construct the alternative; and the cost of relocating existing utilities to construct the alternative.

Properties that would be impacted were identified for each alternative. For homes and businesses that would be "taken" for construction, assessed values were obtained from the Daviess County PVA. Based upon discussions with local realtors and appraisers, it was assumed that appraised values are about 80% of current market values. Market values were then developed accordingly. For land values, a cost per sq. ft. was utilized, as recommended by the Kentucky Transportation Cabinet.

The Kentucky Transportation Cabinet also provided cost estimates for utility relocations for each alternative (Interview 1990). Relocation costs were also provided by the Kentucky Transportation

Cabinet.

Construction costs were then developed, based upon a unit cost, per mile, on each alternative. These unit costs were recommended by the Kentucky Transportation Cabinet. Additional costs were added for bridges and interchanges, as per Kentucky Transportation Cabinet specifications. A design cost was also developed for each alternative. The design cost was assumed to be approximately five percent of the total construction cost for each alternative.

DO NOTHING ALTERNATIVE

Description

With the "Do-Nothing" no improvements would be made to US 60 East, and no alternative route would be constructed.

Projected Traffic Volumes

Even without any improvement on US 60 East, daily traffic volumes would average between 30,000 to 39,000 vehicles per day on US 60 East. This is due to the additional trips generated by the new Ohio River Bridge and the reconstruction of US 60 East, as well as normal yearly traffic growth from development in the area.

The daily traffic volumes on streets and highways intersecting with US 60 East would also increase. Pleasant Valley Road would increase from 3,500 to 8,000 vehicles per day (vpd). The US 60 Bypass would increase from 14,300 to 17,000 vpd. Daniels Lane would increase from 600 to 2,300 vpd, and KY 144 would increase from 9,600 to 14,800 vpd. Traffic projections were developed by the Kentucky Transportation Cabinet as referenced under the section "Methodology."

As can be seen, the increase in traffic volumes is substantial. For example, daily traffic on US 60 East would increase by 43 percent.

Additionally, daily traffic on major intersecting streets and highways is projected to increase substantially, as discussed above.

Level-of-Service Analysis

Intersection and segment capacity/level-of-service analysis was conducted on the Do-Nothing alternative, as shown in Table 11 and 12.

TABLE 11

INTERSECTION ANALYSIS-US 60 EAST DO-NOTHING ALTERNATIVE

<u>Intersection</u>	<u>LOS</u>	<u>V/C</u>	<u>Delay (sec/veh)</u>
US 60 East/US 60 Bypass	*	1.69	*
US 60 East/Commerce Plaza	*	2.66	*
US 60 East/Pleasant Valley Rd.	E	.92	48.7
US 60 East/Daniels Lane	B	.75	7.0
US 60 East/KY 144	D	0.69	35.4

*Results with extremely overloaded conditions (poor traffic progression, excessive delay, low travel speeds).

TABLE 12

SEGMENT ANALYSIS - US 60 EAST DO-NOTHING ALTERNATIVE

<u>Segment</u>	<u>LOS</u>	<u>Average Speed (mph)</u>
US 60 East - KY 144 (Eastbound)	D	20.7
US 60 East - KY 144 (Westbound)	B	32.8

The level-of-service analysis on the Do-Nothing alternative indicates that all of the intersections, with the exception of Daniels Lane, would operate at poor levels-of-service. The delay time per vehicle is significant or above 25 seconds per vehicle, as defined by LOS D conditions.

The segment analysis indicates that US 60 East would operate at LOS D for eastbound travel. For both eastbound and westbound travel, average travel speeds are significantly lower than the 45 mph posted

speed limit.

In comparing the projected level-of-service conditions to the current conditions, as shown in Table 4, it can be noted that the increase in daily traffic volumes will create measurable traffic problems on US 60 East and intersecting streets and highways. Considering the above mentioned factors, the Do-Nothing alternative does not appear feasible. With the completion of the new Ohio River Bridge and the reconstruction of US 60 East, highway improvements will be necessary in the study area.

The following narrative will describe alternatives for upgrading existing US 60 East, as well as will present options for constructing a new expressway to accommodate projected traffic in the study area.

ALTERNATIVE 1: RECONSTRUCTION OF US 60 EAST TO SEVEN LANES WITH
CONSTRUCTION OF A PARTIAL INTERCHANGE

Description

This option would involve the widening of US 60 East to a seven lane cross-section from the intersection with the Wendell Ford Expressway (US 60 Bypass) to KY 144. A partial interchange would be constructed at the intersection with the US 60 Bypass to accommodate the high volume of left turns. The intersection of US 60 East with KY 144 would be reconstructed.

Projected Traffic Volumes

US 60 East widened to seven lanes is projected to carry 34,400 to 40,800 vehicles per day. From the US 60 Bypass to Pleasant Valley Road, US 60 East would carry the higher traffic volume of 40,800. Pleasant Valley Road to KY 144 would carry the lower volume of 34,400.

Level-of-Service Analysis

An arterial analysis was conducted on US 60 East by using traffic projections provided by the Kentucky Transportation Cabinet. US 60 East was analyzed in the eastbound and westbound directions, from the US 60 Bypass to KY 144, as shown in Table 13, below.

TABLE 13

SEGMENT ANALYSIS - US 60 EAST
ALTERNATIVE 1

<u>Segment</u>	<u>LOS</u>	<u>Average Speed (mph)</u>
US 60 Bypass to KY 144 (Eastbound)	D	20.6
KY 144 to US 60 Bypass (Westbound)	A	35.8

The level-of-service analysis indicates that Alternative 1 would

provide an acceptable level-of-service for westbound travel, but a moderate to poor level-of-service for eastbound travel. The Ohio River Bridge project and the reconstruction of US 60 East will significantly impact traffic flow on US 60 East.

Land Use Impacts

US 60 East presently has a mixture of residential, commercial and industrial land uses. The corridor is almost fully urbanized, with most urban services available, such as water and sewer service. The present land use plan for the urban area does not anticipate drastic changes in land use along US 60 East. Full development, with expansion of additional commercial and industrial facilities, is expected. US 60 East is designed as an urban growth area.

Alternative 1 would involve massive relocation of homes and businesses. Widening US 60 East to two additional lanes would have a negative impact on existing development along US 60 East. Alternative 1 would involve the relocation of 40 homes and 14 businesses.

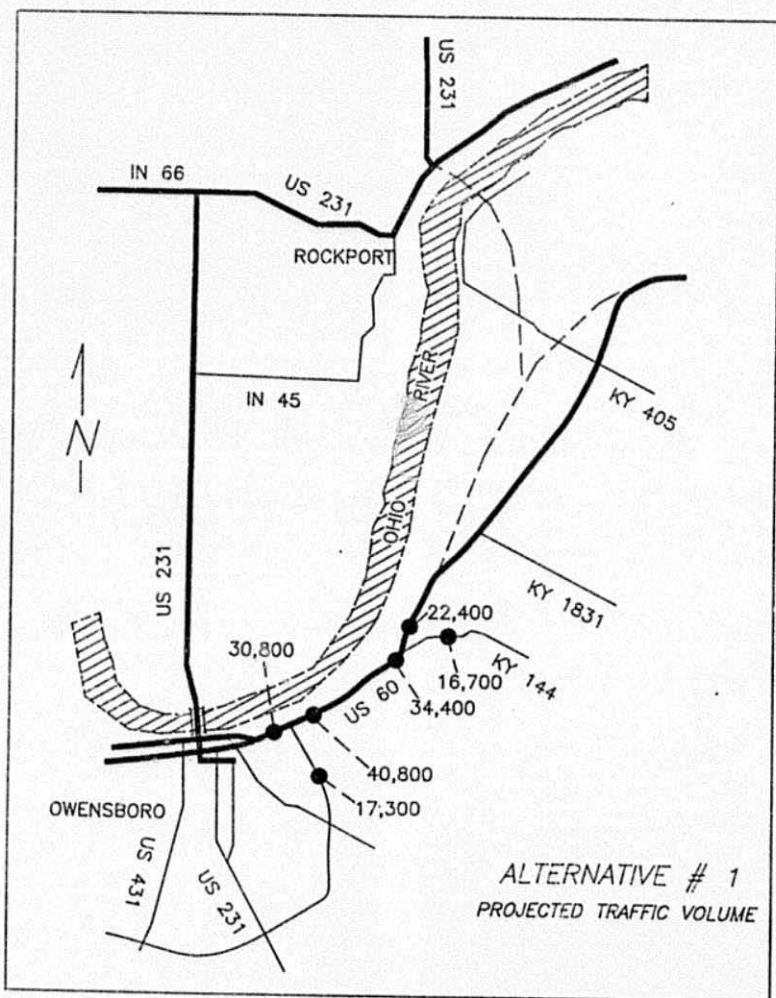
Environmental Analysis

Alternative 1 does not contain any floodplain or wetland areas. There are no stream crossings along Alternative 1; and no identified archaeological sites. Alternative 1 is underlain by alluvium that was deposited by glacial out-wash material. There are no faults located within the area of Alternative 1, consequently standard structures and highway design may be utilized.

Design and Cost Estimate

Alternative 1 would be designed as an urban arterial with seven 12-ft. driving lanes. A partial interchange would be constructed at the intersection of the US 60 East with the US 60 Bypass to accommodate

high left turning volumes. The intersection with KY 144 would be reconstructed to improve operations. The total estimated cost for Alternative 1, based upon 120 ft. of right-of-way and a distance of two miles, is \$23,441,575.



ALTERNATIVE 2: CONSTRUCTION OF EXPRESSWAY FROM US 60 EAST/KY 144 TO
US 60 BYPASS/KY 54

Description

Alternative 2 involves the construction of a new, limited access expressway facility. The expressway would be constructed from the intersection of US 60 East/KY 144 to the interchange of KY 54/US 60 Bypass. An interchange would be constructed at US 60 East/KY 144. The existing interchange with KY 54/US 60 Bypass would be reconstructed.

Projected Traffic Volumes

Alternative 2, as a new expressway facility, would carry 17,200 vpd. With the construction of Alternative 2, the projected traffic volumes on US 60 East would decrease to 28,000 vpd near the intersection of US 60 Bypass and 18,300 vpd near the intersection of KY 144.

Level-of-Service Analysis

An arterial analysis was conducted on US 60 East using traffic projections provided by the Kentucky Transportation Cabinet. The analysis on US 60 East was performed from the intersection with the US 60 Bypass to the intersection with KY 144. US 60 East was analyzed for eastbound, as well as westbound traffic.

The findings of the segment analysis are shown in Table 14.

TABLE 14

SEGMENT ANALYSIS - US 60 EAST
ALTERNATIVE 2

<u>Segment</u>	<u>LOS</u>	<u>Average Speed (mph)</u>
US 60 Bypass to KY 144 (Eastbound)	C	26.6
KY 144 to US 60 Bypass (Westbound)	A	35.0

Alternative 2 would achieve acceptable levels-of-service on US 60 East.

Land Use Impacts

Currently, the land use in the vicinity of Alternative 2 is primarily agricultural. This includes prime agricultural land in the Yellow Creek basin from Pleasant Valley Road to US 60 East. Alternative 2 is located in a planned growth area. Urban services available include water service. Sewer service is not currently available, but is planned for the corridor area.

The interchange proposed with US 60 East and KY 144 and the reconstruction of the interchange with KY 54 and the US 60 Bypass will involve considerable right-of-way acquisition. Wimsatt Court subdivision would be negatively impacted, with the necessary construction of an interchange ramp. It is estimated that approximately 50-100 acres of right-of-way will be required for each interchange. Alternative 2 would involve the relocation of 43 homes and two businesses.

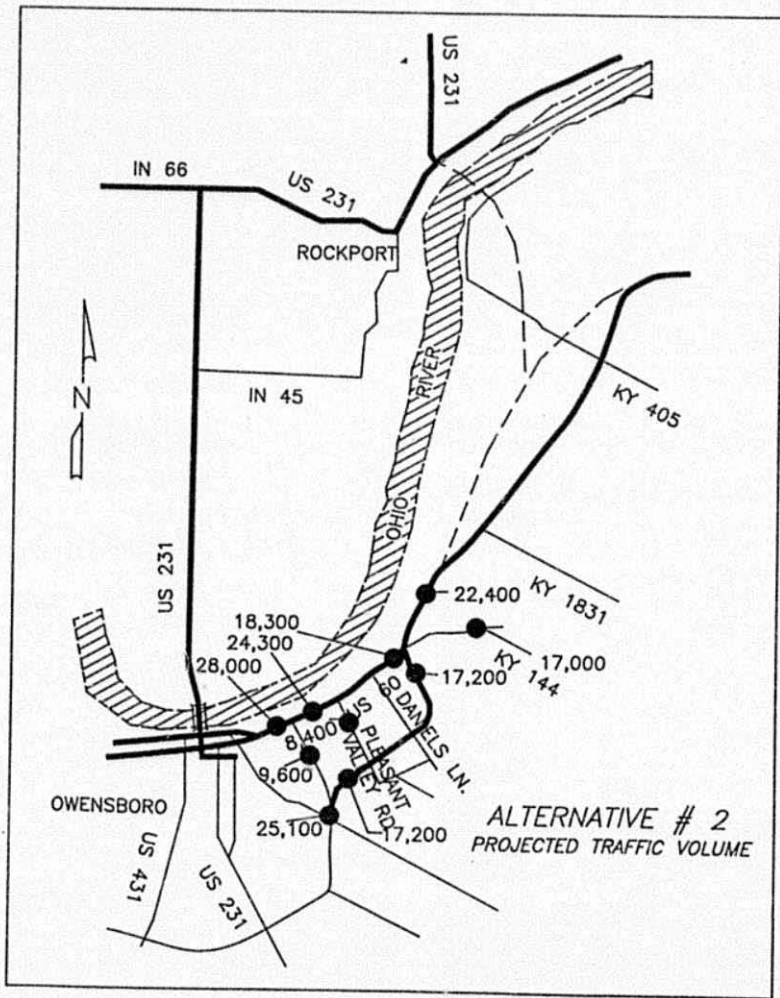
Environmental Analysis

Alternative 2 does not contain any floodplain or wetland areas. There are three stream crossings associated with Alternative 2, all of which cross Yellow Creek. There are three archaeological sites along Alternative 2. The first site, Da 130, is located just north of Hayden Road and approximately 2,700 ft. east of where Alternative 2 is proposed to cross Daniels Lane. The second site, Da 113, is approximately 500 ft. northwest of where Alternate 2 is proposed to cross Daniels Lane. The third site, Da 115, is situated approximately 2,400 ft. north of the proposed interchange of Alternative 2 with the US 60 Bypass. There is one historical site near the proposed alignment of Alternative 2, the "Fuqua" house, number 130, located east of Daniels Lane.

Alternative 2 is underlain by alluvium formed by glacial out-wash material. Exposed coal seams and bedrock dot the area of Alternative 2. There are no faults within this area.

Design and Cost Estimate

Alternative 2 would be designed as a limited access expressway facility with 350 ft. of right-of-way for four 12 ft. driving lanes and a depressed center median. Interchanges would be constructed at the intersections of KY 54 and the US 60 Bypass and at US 60 East and KY 144. The total estimated cost for Alternative 2, a distance of 2.7 miles, is \$23,630,888.



ALTERNATIVE 2A: CONSTRUCTION OF EXPRESSWAY FROM US 60 EAST/KY 144 TO US 60 BYPASS WITH AN URBAN INTERCHANGE FROM US 60 BYPASS/KY 54 TO PLEASANT VALLEY ROAD

Description

Alternative 2A involves the construction of a new limited access expressway facility. The expressway would be constructed from the intersection of US 60 East/KY 144 to the interchange of KY 54/US 60 Bypass. An interchange would be constructed at US 60 East/KY 144. The existing interchange with KY 54/US 60 Bypass would be reconstructed, and a continuous urban interchange would be constructed from this intersection to Pleasant Valley Road.

Projected Traffic Volumes

Alternative 2A, as a new expressway facility, would carry 16,800 to 22,300 vehicles per day. With the construction of Alternative 2A, the projected traffic volumes on US 60 East would decrease to 17,800 to 27,000 vehicles per day.

Level-of-Services Analysis

An arterial analysis was conducted on US 60 East using traffic projections provided by the Kentucky Transportation Cabinet. The analysis on US 60 East was performed from the intersection with the US 60 Bypass to the intersection with KY 144. US 60 East was analyzed for eastbound, as well as, westbound traffic.

The findings of the segment analysis are shown in Table 15, below.

TABLE 15
SEGMENT ANALYSIS - US 60 EAST
ALTERNATIVE 2A

<u>Segment</u>	<u>LOS</u>	<u>Average Speed (mph)</u>
US 60 Bypass to KY 144	B	31.9 (Eastbound)
KY 144 to US 60 Bypass	A	35.2 (Westbound)

Alternative 2A would achieve acceptable levels-of-service on US 60 East.

Land Use Impacts

Currently, the land use in the vicinity of Alternative 2A is primarily agricultural. This includes prime agricultural land in the Yellow Creek basin from Pleasant Valley Road to US 60 East. Alternative 2A is located in a planned growth area. Urban services available include water service. Sewer service is not currently available, but is planned for the corridor area.

The interchange proposed with US 60 East and KY 144 and the reconstruction of the interchange with KY 54 and the US 60 Bypass will involve considerable right-of-way acquisition. As with Alternative 2, the Wimsatt Court subdivision would be negatively impacted, with the necessary construction of an interchange ramp. Alternative 2A would also impact existing residential and agricultural uses at Pleasant Valley Road. It is estimated that approximately 50-100 acres of right-of-way will be required for each interchange. Alternative 2A would involve the relocation of 44 homes and two businesses.

Environmental Analysis

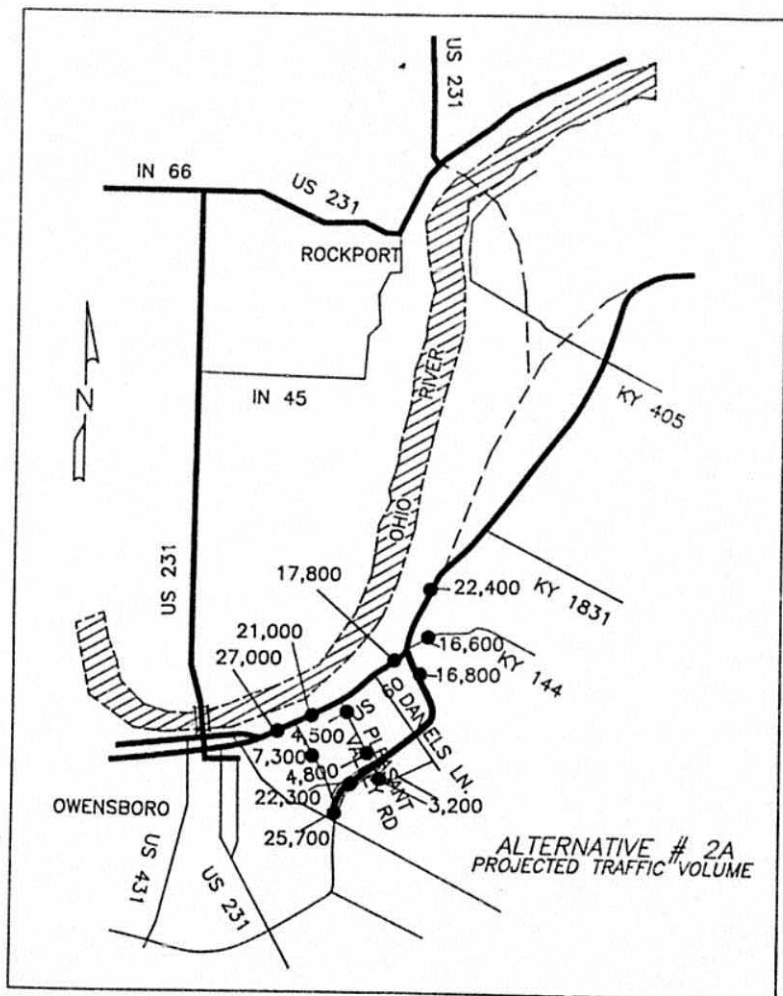
Alternative 2A does not contain any floodplain or wetland areas. There are three stream crossings associated with Alternative 2A, all of which cross Yellow Creek. There are three archaeological sites adjacent to Alternative 2A. The first site, Da 130, is located just north of Hayden Road and approximately 2,700 feet east of where Alternative 2A is proposed to cross Daniels Lane. The second site, Da 113, is approximately 500 feet northwest of where Alternative 2A is proposed to cross Daniels Lane. The third site, Da 115, is situated approximately 2,400 ft. north of the proposed interchange of Alternative 2A with the

US 60 Bypass. There is one historical site near the proposed alignment of Alternative 2A, the "Fuqua" house, number 130, located east of Daniels Lane.

Alternative 2A is underlain by alluvium formed by glacial out-wash material. Exposed coal seams and bedrock dot the area of Alternative 2A. There are no faults within this area.

Design and Cost Estimate

Alternative 2A would be designed as a limited access expressway facility with 350 ft. of right-of-way for four 12 ft. driving lanes and a depressed center median. A continuous urban interchange would be constructed at the intersections of KY 54 and the US 60 Bypass and would extend to Pleasant Valley Road. Another interchange would be constructed at US 60 East and KY 144. The total estimated cost for Alternative 2A, a distance of 2.7 miles, is \$28,680,888.



ALTERNATIVE 3: CONSTRUCTION OF EXPRESSWAY FROM US 60 EAST TO
US 60 BYPASS/KY 54

Description

Alternative 3 involves the construction of an expressway facility from US 60 East, approximately one mile east of KY 144, to KY 54/US 60.

Projected Traffic Volumes

Alternative 3, as a new expressway facility, would carry 7,900 vpd. Alternative 3 would not substantially reduce traffic volumes on US 60 East. Daily traffic volumes would average 14,500 to 33,000 vpd.

Level-of-Service Analysis

An arterial analysis was conducted on US 60 East from KY 144 to the US 60 Bypass using traffic projections provided by the Kentucky Transportation Cabinet. The analysis on US 60 East was performed from the intersection with the US 60 Bypass to the intersection with KY 144. US 60 East was analyzed for eastbound, as well as westbound traffic.

The findings of the segment analysis are shown in Table 16, below.

TABLE 16

SEGMENT ANALYSIS - US 60 EAST

ALTERNATIVE 3

<u>Segment</u>	<u>LOS</u>	<u>Average Speed (mph)</u>
US 60 Bypass to KY 144	C	23.4 (Eastbound)
KY 144 to US 60 Bypass	A	35.4 (Westbound)

The level-of-service analysis indicates that Alternative 3 would achieve acceptable levels-of-service on US 60 East.

Land Use Impacts

Alternative 3 is located in a primarily agricultural area, with impact on less prime farmland than Alternative 2. The project would impact existing industrial uses at the proposed interchange with US 60

East, including the relocation of two businesses. As with Alternative 2, additional right-of-way would be required to reconstruct the KY 54/US 60 Bypass interchange, with impact on the Wimsatt Court subdivision.

There would also be some impact on an existing farm residence near Daniels Lane. From Daniels Lane west, the impact would be the same as Alternative 2, in that the proposed land use is primarily low-density residential and agricultural.

The northeast portion of Alternative 3, where the route would interchange with US 60 East, lies outside the urban growth area, with water service available, but no sewer service anticipated in the near future. Alternative 3 involves the relocation of 46 homes and three businesses.

Environmental Analysis

This alternative contains approximately 0.3 miles of floodplain, which is 8.3 percent of the total length of Alternative 3. The floodplain area is located at the point where US 60 East and Alternative 3 would intersect. Alternative 3 crosses Yellow Creek twice just east of Daniels Lane.

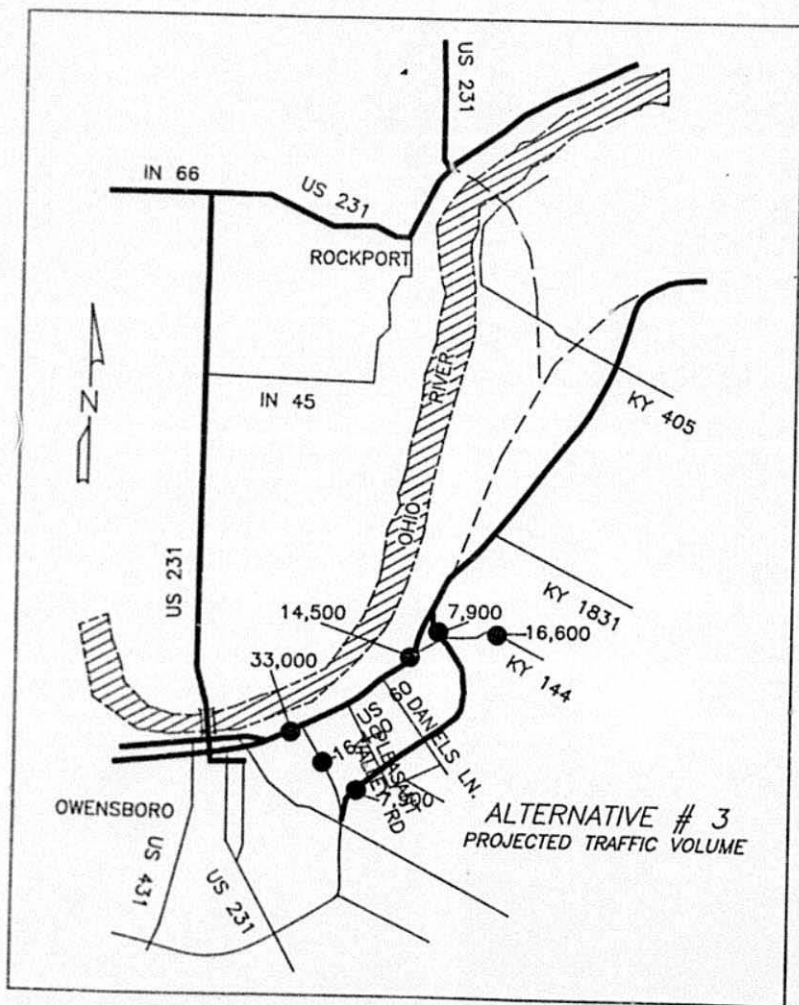
There are a total of five archaeological sites near the proposed alignment of Alternative 3. The first site, Da 144, is located west of Yellow Creek and approximately 1,800 ft. east of Alternative 3. The second site was surveyed by Dr. Jack Schock, Western Kentucky University, in 1987. This site is situated along Yellow Creek, 2,000 ft. east of the proposed route of Alternate 3. The third site, Da 113, is located approximately 500 ft. northwest of where Alternative 3 would cross Daniels Lane. The fourth site, Da 130, is located north of Hayden Road and approximately 2,700 ft. east of where Alternative 3 is proposed

to cross Daniels Lane. The fifth site, Da 115, is approximately 2,000 ft. north of the proposed interchange of Alternative 3 with the US 60 Bypass. There is one historical site near the proposed alignment of Alternative 3, the "Fuqua" house, # 130, located east of Daniels Lane.

Alternative 3 is underlain mainly by alluvium formed by glacial out-wash material. Exposed coal seams and bedrock dot the area. There are no faults within this area.

Design and Cost Estimate

Alternative 3 would be designed as a limited access expressway facility with four 12 ft. lanes and a depressed median. Interchanges would be constructed at KY 54 and the US 60 Bypass and at US 60 East. Right-of-way would be 350 ft. and the total distance is 3.6 miles. The estimated cost of Alternative 3 is \$28,672,018.



ALTERNATIVE 4: CONSTRUCTION OF EXPRESSWAY FROM US 60 EAST TO US 60 BYPASS/GREEN RIVER PARKWAY

Description

Alternative 4 involves the construction of an expressway facility from US 60 East, approximately one mile east of KY 144, to US 60 Bypass/Green River Parkway.

Projected Traffic Volumes

Alternative 4, as a new expressway facility, would carry 15,300 vpd between KY 54 and the Green River Parkway and 8,000 vpd between KY 54 and US 60 East. Alternative 4 would reduce traffic volumes on US 60 East to 14,500 to 33,000 (near the US 60 Bypass).

Level-of-Service Analysis

An arterial analysis was conducted on US 60 East from KY 144 to the US 60 Bypass using traffic projections provided by the Kentucky Transportation Cabinet. The analysis on US 60 East was performed from the intersection with the US 60 Bypass to the intersection with KY 144. US 60 East was analyzed for eastbound, as well as westbound traffic.

The findings of the segment analysis are shown in Table 17, below.

TABLE 17
SEGMENT ANALYSIS - US 60 EAST
ALTERNATIVE 4

<u>Segment</u>	<u>LOS</u>	<u>Average Speed (mph)</u>
US 60 Bypass to KY 144 (Eastbound)	D	20.1
KY 144 to US 60 Bypass (Westbound)	B	34.7

Alternative 4 would achieve acceptable levels-of-service on US 60 East for westbound travel; however, there would be a poor level-of-service on eastbound travel.

Land Use Impacts

This alignment would impact existing prime agricultural land uses in the Horse Fork Basin, which lies between Green River Parkway and KY 54. There would be a significant impact on existing commercial land uses at KY 54, where an interchange is proposed. Alternative 4 would also involve relocation of several businesses on Fairview Drive, as well as the Kentucky Transportation Cabinet's maintenance garage.

There would be some impact on existing residential land uses near Pleasant Valley Road and Hayden Road. Alternative 4 would have the same impact as Alternative 3 on northeast end of the corridor, involving the relocation of two businesses at the proposed interchange with US 60 East.

Alternative 4 would negatively impact Landsdowne and Hillcrest Oaks subdivisions. This alternative would also impact the expansion of Brookhill subdivision. Thirty-nine homes, 14 businesses and one church would be relocated with this alternative.

Alternative 4 lies within the urban growth area from Green River Parkway to Reid Road. The northeast segment of the corridor is outside the urban growth area.

Environmental Analysis

There are two locations where Alternative 4 would cross the floodplain. The two areas would be 0.5 miles, or 9.3 percent, of the length of Alternative 4. The first area is at the intersection of US 60 East, involving 0.3 mile of floodplain. The second crossing would be the tributary of Horse Fork along the abandoned railroad right-of-way south of KY 54, involving 0.2 mile of floodplain.

Alternative 4 has four stream crossings: two cross Yellow Creek,

east of Daniels Lane; one crosses Horse Fork at KY 54; and the fourth crosses the Horse Fork tributary along the abandoned railroad right-of-way south of KY 54.

There is one archaeological site near the proposed alignment of Alternative 4. This site was surveyed in 1987. It is located between the proposed alignment of Alternative 4 and Highland Elementary School.

There are four historical sites near Alternative 4. The first site is the J.W. Edmonds Field Farm, # 129. It is located approximately 800 ft. west of the proposed Alternative 4 alignment. The second historical site is the Helen Purdy Home, # 107. This house is located off KY 54 on Ralph Avenue, approximately 250 ft. east of the proposed alignment. The third site is the John McFarland House. The house was built on what is now Fairview Drive, approximately 1,600 ft. south of where Alternative 4 would cross Fairview Drive. The fourth site is the Jeremiah Yewell House. It is located north of Fairview Drive and approximately 900 ft. south of the proposed alignment of Alternative 4.

Alternative 4 is underlain primarily by alluvium formed by glacial out-wash material. Exposed coal seams and bedrock dot the area. There are no faults within the area.

Design and Cost Estimate

Alternative 4 would be designed as a limited access expressway facility with four 12 ft. lanes and a depressed median. Interchanges would be constructed at the intersection of the Green River Parkway and the US 60 Bypass, at KY 54 and at US 60 East. Right-of-way width would be 350 ft. The estimated cost for the 5.4 mile route is \$43,679,258.

ALTERNATIVE 5: CONSTRUCTION OF EXPRESSWAY FROM US 60 EAST/KY 144 TO US 60 BYPASS/GREEN RIVER PARKWAY

Description

Alternative 5 involves the construction of an expressway facility from US 60 East/KY 144 to the intersection of the US 60 Bypass and Green River Parkway.

Projected Traffic Volumes

Alternative 5, as an expressway facility, would carry 12,700 to 20,400 vpd. Alternative 5 would reduce traffic volumes on US 60 East to 21,700 to 27,800 vpd (near the US 60 Bypass).

Level-of-Service Analysis

An arterial analysis was conducted on US 60 East from KY 144 to the US 60 Bypass using traffic projections provided by the Kentucky Transportation Cabinet. The analysis on US 60 East was performed from the intersection with the US 60 Bypass to the intersection with KY 144. US 60 East was analyzed for eastbound, as well as westbound traffic.

The findings of the segment analysis are shown in Table 18, below.

TABLE 18
SEGMENT ANALYSIS - US 60 EAST
ALTERNATIVE 5

<u>Segment</u>	<u>LOS</u>	<u>Average Speed (mph)</u>
US 60 Bypass to KY 144	D	21.8 (Eastbound)
KY 144 to US 60 Bypass	B	34.5 (Westbound)

Alternative 5 would achieve acceptable levels-of-service for westbound travel, but poor level-of-service for eastbound travel.

Land Use Impacts

This alignment would impact existing prime agricultural land uses in the Horse Fork Basin, between Green River Parkway and KY 54. There

would be a significant impact on existing commercial land uses at KY 54 and Pleasant Valley Road, where interchanges are proposed. Alternative 5 would also involve relocation of several businesses on Fairview Drive. Alternative 5 would negatively impact Landsdowne and Hillcrest Oaks subdivisions. This alternative would also impact the expansion of Brookhill subdivision. Alternative 5 is located entirely within the urban service area. Forty seven homes, 11 businesses and one church would be relocated with this alternative.

Environmental Analysis

There is one location where Alternative 5 would cross the floodplain, at a tributary of Horse Fork, south of KY 54. This would involve 0.2 mile or 4.7 percent of the total length of Alternative 5. Alternative 5 has five stream crossings, two cross Yellow Creek, east of Daniels Lane; two cross Horse Fork near KY 54; and the fifth crosses Yellow Creek south of US 60 East at KY 144. There are three archaeological sites near the proposed alignment of Alternative 5. The first site was surveyed in 1987. It is located between the proposed alignment of Alternative 5 and Highland Elementary School. The second site is approximately 500 feet northwest of where Alternative 5 would cross Daniels Lane. The third site is located just north of Hayden Road and approximately 2,700 feet east of Alternative 5.

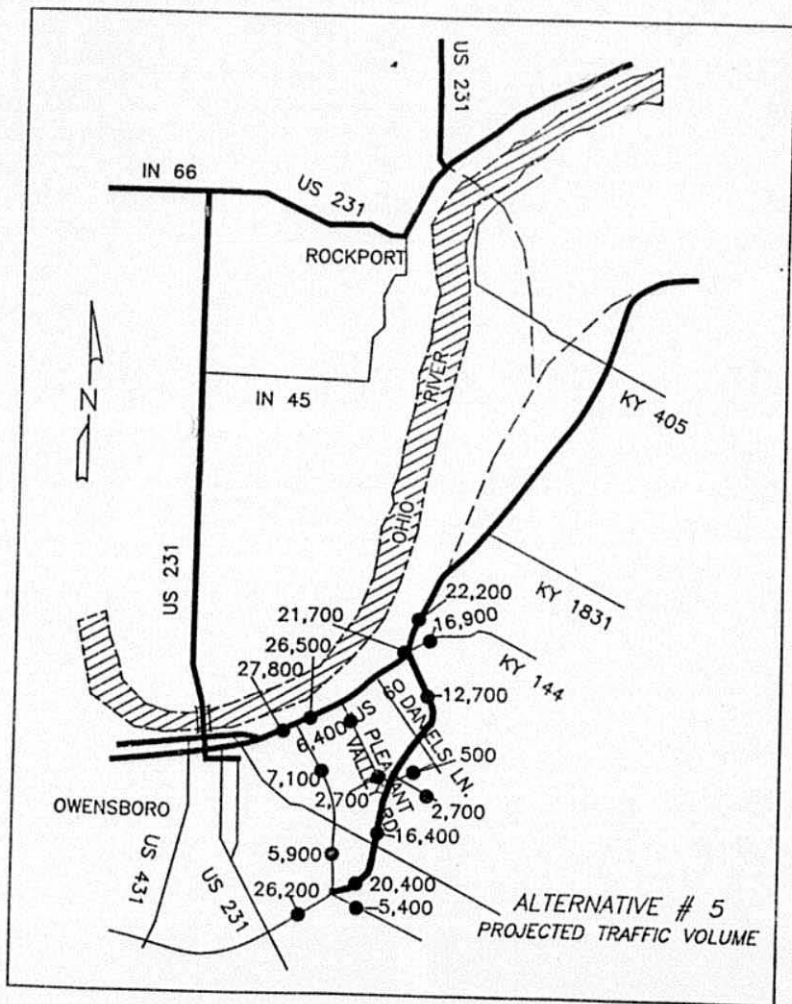
There are five historical sites near Alternative 5. The first site is J.W. Edmonds Field Farm, #129. It is located approximately 800 ft. west of the proposed Alternative 5 alignment. The second historical site is the Helen Purdy Home, #107. This house is located off KY 54 on Ralph Avenue, approximately 250 ft. east of the proposed alignment. The third site is the John McFarland House. The house was built on what is

now Fairview Drive. The fourth site is the Jeremiah Yewell House. It is located north of Fairview Drive and approximately 1,500 ft. south of the proposed alignment of Alternative 5. The fifth site is the Fuqua house, located east of Daniels Lane.

Alternative 5 is underlain primarily with alluvium formed by glacial out-wash material. Exposed coal seams and bedrock dot the area. There are no faults within the area.

Design and Cost Estimate

Alternative 5 would be designed as a limited access expressway facility with four 12 ft. lanes and a depressed median. Interchanges would be constructed at the intersection of the Green River Parkway and the US 60 Bypass; at KY 54 to Pleasant Valley Road; and at US 60 East. Right-of-way width would be 350 ft. The estimated cost for the 4.3 mile route is \$44,400,940.



RECOMMENDED ALTERNATIVE

An evaluation matrix, summarizing and comparing the six (6) alternatives presented, is shown on the last two pages of the narrative. A thorough evaluation of the alternatives presented indicates that Alternative 2(A) is the most desirable alternative, considering all of the transportation planning criteria analyzed.

Alternative 2(A) would carry more traffic than any of the other expressway alternatives considered (16,800 to 22,300 vpd). Alternative 2(A) would also reduce traffic volumes on US 60 East from 17,800 to 27,000 vpd, lower than any other alternative considered. Acceptable levels-of-service for both eastbound and westbound service on US 60 East would be achieved with Alternative 2(A).

While Alternative 2(A) involves approximately 46 relocations, this is less of a negative impact on existing residential and commercial land uses, than Alternatives 1, 3, 4 and 5. Additionally, Alternative 2(A) is located totally within a planned growth area, which is primarily agricultural. The major impacts from Alternative 2(A) would be concentrated at the proposed interchange areas. Also, Alternative 2(A) does not impact any known wetland areas, nor would this alternative directly impact any known historical or archaeological sites.

The major advantage of Alternative 2(A) over Alternative 2 is the construction of a continuous urban interchange between KY 54 and Pleasant Valley Road, which would provide access to an area anticipated to experience substantial growth during the next 20 years. Alternative 2(A) has a competitive cost estimate of \$28,680,888, as compared to the other alternatives considered which range in estimated costs from \$23.4 million to \$44.4 million.

In summary, Alternative 2(A) would provide an alternative route for through traffic from the Ohio River Bridge to southern and western destinations. This alternative would also operate at a higher level-of-service because Alternative 2(A) would be constructed as a limited access expressway. As is evidenced from the segment capacity analysis, Alternative 2(A), would improve east-west traffic service in the urban area. Finally Alternative 2(A) would coordinate well with other highway projects planned in the east urban area of Daviess County, Kentucky.

Alternatives 1, 2, 2(A), 3, 4 and 5 are summarized in the Evaluation Matrix Summary tables presented on the following pages.

EVALUATION MATRIX SUMMARY

EVALUATION CRITERIA	ALTERNATIVES					
	Do-Nothing	Alternative 1 Reconstruction of US 60 East to seven lanes with interchange at US 60 Bypass	Alternative 2 & 2A Construction of expressway from US 60 East/KY 144 to US 60 Bypass/KY 54 Alt 2A would involve construction of continuous urban interchange from Bypass/KY 54-Pleasant Valley Road	Alternative 3 Construction of expressway from US 60 East, 1 mile east of KY 144 - KY 54/US 60 Bypass	Alternative 4 Construction of expressway from US 60 East, 1 mile east of KY 144 to Green River Parkway/US 60 Bypass	Alternative 5 Construction of expressway from US 60 East/KY 144 to US 60 Bypass/Green River Parkway
Traffic Projections Alternative US 60 East	30,000-39,000 vpd	34,400-40,800 vpd 34,400-40,800 vpd	Alt 2 = 17,200 vpd 2A = 16,800-22,300 vpd Alt 2 = 18,300-28,000 vpd 2A = 17,800-27,000 vpd	7,900 vpd 14,500-33,000 vpd	8,000-15,300 vpd 14,500-33,000 vpd	12,700-20,400 vpd 21,700-27,800 vpd
Level-of-Service/ Capacity Analysis	All but one intersection on US 60 East would operate at a poor level-of-service. Eastbound travel would operate at poor level-of-service (LOS D)	Acceptable level-of-service for westbound travel (LOS A) but poor level-of-service for eastbound travel (LOS D)	Both Alternatives 2 & 2A would achieve acceptable levels-of-service on US 60 East Eastbound (LOS B-C) Westbound (LOS A)	Acceptable level-of-service on US 60 East. Eastbound (LOS C) Westbound (LOS A)	Acceptable levels-of-service for westbound travel on US 60 East (B) but poor level for eastbound travel (D)	Acceptable level-of service for westbound travel on US 60 East (B) but poor level-of-service for eastbound travel (D).

EVALUATION CRITERIA	DO-NOTHING	ALTERNATIVE 1	ALTERNATIVE 2 & 2A	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Land Use Impact	N/A	Negative impact on existing residential and commercial development along US 60 East. Corridor is fully in urban service area.	Land use is primarily agricultural; alternative is fully located in urban service area. Interchange reconstruction at KY 54 will negatively impact residential development.	Land use is primarily agricultural; alternative 3 is northeast segment lies outside urban service area; impact on existing industrial development on US 60 East; negative impact on residential development at KY 54 and US 60 Bypass	Land use is mixture of residential, commercial and agricultural; negative impact on residential development near Green River Parkway and commercial development at KY 54 and US 60 East	Located in urban service area. Negative impact on existing residential and commercial uses near Green River Parkway and also at KY 54
Estimated Relocations	N/A	Homes 40 Businesses 14 Schools 0 Churches 0 Total 54	Homes 43 Businesses 2 Schools 0 Churches 0 Total 45 Alt 2A Homes 44 Businesses 2 Schools 0 Churches 0 Total 46	Homes 46 Businesses 3 Schools 0 Churches 0 Total 49	Homes 39 Businesses 14 Schools 0 Churches 1 Total 54	Homes 47 Businesses 11 Schools 0 Churches 1 Total 59

EVALUATION CRITERIA	DO-NOTHING	ALTERNATIVE 1	ALTERNATIVE 2 & 2A	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Floodplain/Wetlands	N/A	Does not impact floodplain/wetlands	Does not impact floodplain/wetlands	Contains 0.3 miles of floodplain; or 8.3% of total rt.	Crosses floodplain at two locations; 0.5 miles or 9.3% of total rt.	Crosses floodplain at one location on Horse Fork; 0.2 miles or 4.7% of total rt.
Stream Crossings	N/A	None	Three stream crossings of Yellow Creek	Crosses Yellow Creek twice, east of Daniels Lane	Four stream crossings; two of Yellow Creek and two of Horse Fork	Five stream crossings; three Yellow Creek and two of Horse Fork
Archaeological/ Historical Sites	N/A	No known in area	Three archaeological and one historic site near rt; although none estimated to be directly impacted.	Five archaeological sites near rt; although none estimated to be directly impacted. One historical site near route	One archaeological and 4 historical sites near rt; although none estimated to be directly impacted.	Three archaeological sites and five historical sites near rt; although none estimated to be directly impacted
Soils	N/A	Alluvium underlay	Alluvium underlay with coal seams and bedrock in area.	Alluvium underlay with coal seams and bedrock in area.	Alluvium underlay with coal seams and bedrock in area.	Alluvium underlay with coal seams and bedrock in area.
Faults	N/A	No Faults	No Faults	No Faults	No Faults	No Faults

EVALUATION CRITERIA	DO-NOTHING	ALTERNATIVE 1	ALTERNATIVE 2 & 2A		ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Design	N/A	-Seven, 12 ft lanes -Partial interchange with US 60 Bypass -Reconstruction of intersection with KY 144 -Right-of-Way Width=120 ft -Length of rt= 2 miles	-Limited access expressway -Four 12 ft lanes with median -Interchange construction at KY 144/US 60 East; reconstruction of KY 54/US 60 Bypass Alt2A involves construction of urban interchange between KY 54-Pleasant Valley Road -Length of rt= 2.7 miles		-Limited access expressway -Four 12 ft lanes with median -Interchange construction at US 60 East; interchange reconstruction at KY 54/US 60 Bypass -Right-of-way width=350 ft -Length of route= 3.6 miles	-Limited access expressway -Four 12 ft lanes with median -Interchange construction at US 60 East; KY 54 reconstruction at Green River Parkway/US 60 Bypass -Right-of-way width=350 ft -Length of route= 5.4 miles	-Limited access expressway -Four 12 ft lanes with median -Interchange construction at US 60 East/KY 144; KY 54 and Pleasant Valley Road; reconstruction at Green River Parkway/US 60 Bypass -Right-of-way= 350 ft -Length of route= 4.3 miles
Design	N/A	\$ 657,500	Alt 2 \$ 846,250	Alt 2A \$ 1,081,250	\$ 955,000	\$ 1,380,000	\$ 1,481,250
Right-of-way	N/A	7,194,075	5,544,638	7,259,638	7,891,018	12,709,258	12,631,690
Utilities	N/A	2,440,000	315,000	315,000	726,000	640,000	663,000
Construction	N/A	13,150,000	16,925,000	20,025,000	19,100,000	28,950,000	29,625,000
Total	N/A	\$23,441,575	\$23,630,888	\$28,680,888	\$28,672,018	\$ 43,679,258	\$ 44,400,940

WORKS CITED

- Aerial Photographs of Daviess County, Kentucky. Map. Owensboro:
Daviess County Property Valuation Administration, 1984.
- American Association of State Highway and Transportation Officials. A
Policy on Geometric Design of Highways and Streets. Washington:
1984.
- Archaeological Sites for East Daviess County, Kentucky. Map. Lexington:
University of Kentucky, Department of Anthropology, 1970.
- Davenport, William, Chief District Engineer, Kentucky Department of
Highways. Personal Interview. September 7, 1990.
- Flood Insurance Rate Map of Daviess County, Kentucky. Map. Washington:
United States Department of Housing and Urban Development, 1980.
- Geological Survey Map, Owensboro East Quadrangle. Map. Washington:
United States Department of Interior, 1982.
- Green River Area Development District. A New Bridge for Regional
Access: Ohio River Bridge/Connector Route Feasibility Study.
Owensboro: 1987.
- . Owensboro-Daviess County Urban Area Transportation Improvement
Program. Owensboro: 1990.
- . Population and Employment Base Data and Projections for Use in
Traffic Model. Owensboro: 1984.
- Homburger, Wolfgang, Louis Keefer, and William McGrath, ed.
Transportation and Traffic Engineering Handbook. 2nd Ed.
Englewood Cliffs: Institute of Transportation Engineers, 1982.
- Institute of Traffic Engineers. Planning Urban Arterial and Freeway
Systems. Washington: 1988.

- Kentucky Heritage Council. Historic Resources Data File: Daviess County Sites Surveyed. Frankfort: 1990.
- Kentucky Transportation Cabinet. I-24/US 60 Subarea Study. Frankfort: 1987.
- . Strategic Six-Year Highway Plan. Frankfort: 1980.
- . Traffic Accident Reporting System. Frankfort: 1990.
- . Traffic Projections for East County Corridor. Frankfort: 1990.
- Louisville-Jefferson County Planning Commission. Snyder Freeway Corridor Study. Louisville: 1989.
- Owensboro-Daviess County Planning Commission. Comprehensive Plan for Owensboro-Daviess County. Owensboro: 1980.
- Presnell and Associates. South Central Louisville Transportation Study. Louisville: 1985.
- RBA Group. Cross-County Connector: Land Use and Environmental Impact Analysis. Atlanta: 1986.
- Transportation Research Board. Highway Capacity Manual. Washington: Federal Highway Administration, 1985.
- Transportation Research Board. Highway Capacity Analysis Computer Software. 1985. PC-DOS 2.11, 256KB, disk.
- United States Bureau of Census. Local Area Program: 1990 Preliminary Population Estimates, Daviess County, Kentucky. Washington: 1990.
- University of Kentucky, Department of Anthropology. Archaeological Sites for East Daviess County. Lexington: 1990.