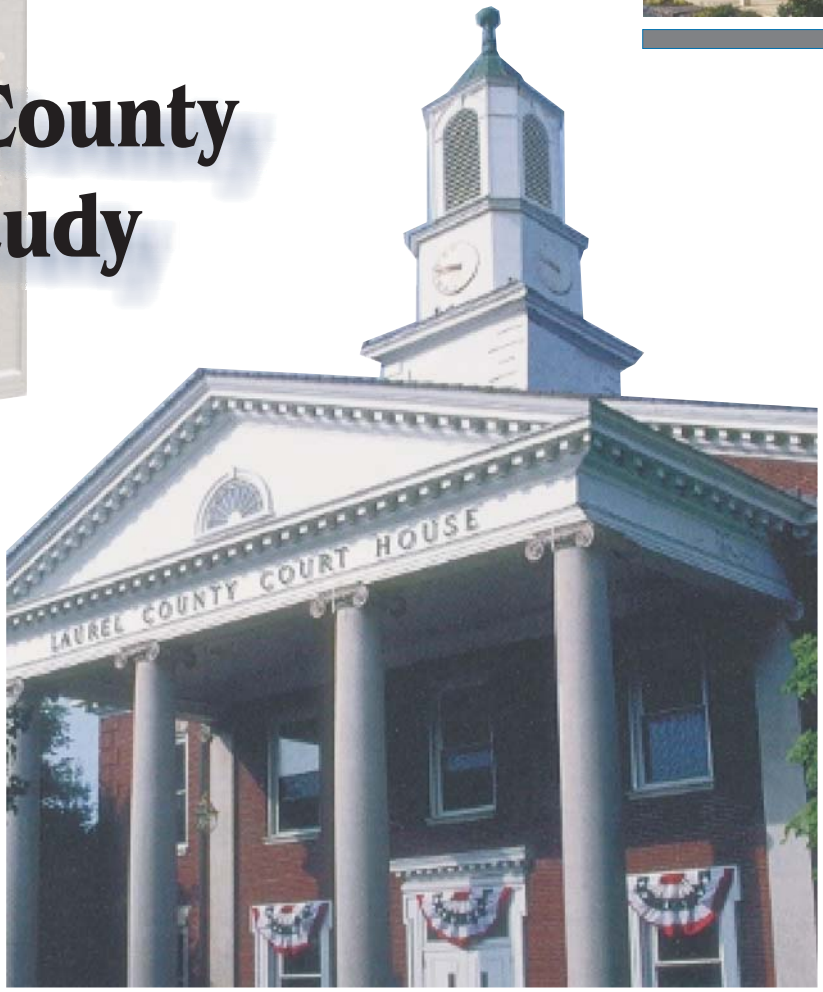
London - Laurel County Transportation Study



Prepared for
Kentucky Transportation Cabinet

Prepared by
Presnell Associates Inc

June 2001

London - Laurel County Transportation Study

Prepared for
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June 2001

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1.0 INTRODUCTION

1.1 STUDY BACKGROUND AND PURPOSE

The Division of Multimodal Programs of the Kentucky Transportation Cabinet (KYTC), through its long-range planning efforts, provides transportation planning studies for urban areas of greater than 5,000 population. The purpose of these studies is to work cooperatively with local officials to develop a program of transportation improvements that 1) are eligible for state and federal funding, 2) alleviate deficiencies in the transportation system, and 3) satisfy the urban area's transportation needs in the near term and for 20 years into the future. The plans are developed in concert with local land use planning efforts to provide a transportation system that will be adequate to accommodate anticipated growth in the area.

While the primary focus of the study is on the state and federal highway system, the study also addresses issues involving local roads. This report presents the results of the transportation planning study for the city of London and Laurel County, Kentucky. The horizon year for this study is 2020.

1.2 STUDY AREA

The study area (see Figure 1, page 4) includes the city of London and the surrounding portions of Laurel County that are currently or expected to be urban in character in the next 20 years. London is in southeastern Kentucky, approximately 75 miles south of Lexington and 98 miles north of Knoxville, Tennessee. London, the county seat of Laurel County, has a population of 5,692, according to the 2000 Census. Laurel County's population is 52,715—an increase of 21.3 percent over the 1990 census count. [1]

London is located along Interstate 75 (I-75) a major north-south interstate highway. Major east-west highways include KY 80, an AAA-rated truck route with a 80,000 pound gross load limit; and the Daniel Boone Parkway (KY 9006), a multi-lane toll road that originates in London and extends eastward to Hazard. US 25 is a AAA-rated north–south truck route that runs through the city. CSX Transportation provides main line rail service to London, and Magee Field, three miles south of London, has a 6,000-foot paved runway. An aviation company offers flight instruction, full-service fueling and

[1] Source: U.S. Census Bureau, Census 2000.

maintenance facilities, and a charter department. The nearest regularly scheduled commercial airline flights are at Bluegrass Field in Lexington, 75 miles to the north. The nearest intermodal facilities are available in Knoxville, Tennessee, 98 miles to the south.

Situated partly within the Daniel Boone National Forest, at the intersection of major north-south (I-75) and east-west (KY 80 and the Daniel Boone Parkway) routes, London/Laurel County are known as the "Vacation Crossroads." The county contains recreational attractions that include Levi Jackson State Park, where the Boone Trace and Wilderness Road pioneer trails converge, and Laurel and Wood Creek lakes. Some of the region's most popular tourist/recreational attractions are within 60 miles of London, including Cumberland Falls, Cumberland Lake, and Pine Mountain state resort parks; General Burnside State Park; Cumberland Gap National Historical Park; the Dr. Thomas Walker and the Isaac Shelby state historic sites; Big South Fork National River and Recreation Area; and Renfro Valley Entertainment Center.

1.3 STUDY SCOPE

London and Laurel County face unique challenges and opportunities resulting from their location at the crossroads of major tourist/recreational areas in the region. Plans for future economic development in the city and county will generate additional traffic causing an impact on the area's road system. This study identifies a plan for providing transportation facilities that will enable city and county leaders to take advantage of desirable opportunities, protect resources, and enhance the quality of life in the area. Specifically, the study objectives are:

- To analyze existing traffic and the capacity of the existing roadway system
- To project future socioeconomic conditions
- To project future traffic generated by the projected future socioeconomic conditions
- To analyze the existing plus committed roadway system to determine its capacity to handle future traffic volumes
- To analyze alternative roadway system improvements to determine their impact on future traffic conditions
- To prepare a list of recommended transportation system improvements

The study also includes an analysis of existing roadway deficiencies and accident data and presents a list of recommended short-term system improvements.

1.4 RELEVANT PLANNING DOCUMENTS

Sources of information used in the preparation of this study include the following:

- *Recommended 2000 Six-Year Highway Plan*, KYTC, March 2000
- *Statewide Transportation Plan* (FY 1999–2018), KYTC, December 1999
- *London-Laurel County Wish List for Future County Transportation Projects*, London–Laurel County Chamber of Commerce Transportation Committee, May 1997
- *Development Ordinance, London and Laurel County, Kentucky*, London and Laurel County Joint Planning Commission, December 1996
- *London Study Area Business Listing,* Cumberland Area Development District, 1995
- *Laurel County Economic Profile*, Kentucky Cabinet for Economic Development, May 2000
- *London and Laurel County, Kentucky, Comprehensive Plan, 1994*. R.M. Associates, Planning Consultants
- U.S. Census Bureau, 1990 Census and 2000 Census

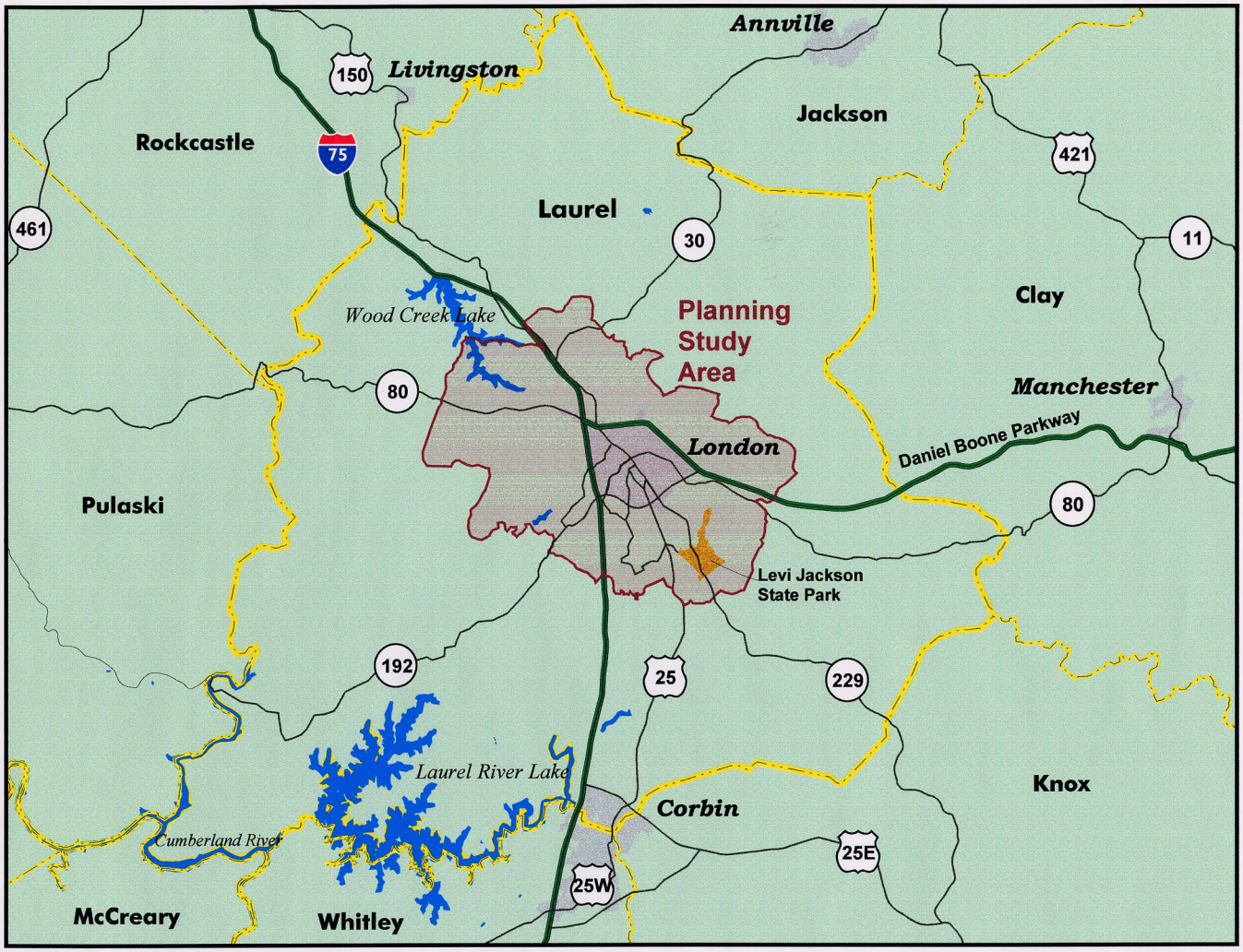

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Figure 1

Location Map

Laurel County, Kentucky

PRESNELL ASSOCIATES INC

2.0 PUBLIC INVOLVEMENT PROGRAM

The involvement of local officials and community leaders is a critical element in the successful implementation of any long-range planning effort. The public involvement program for the London/Laurel County study consisted of a series of meetings with local officials and the Transportation Committee of the London-Laurel County Chamber of Commerce (referred to hereafter as the Transportation Committee). The Transportation Committee was comprised of Chamber of Commerce members who hold an interest in transportation in the London area. The individuals represented government agencies and area businesses. The purpose of the program was to get local input in the identification of circulation problems, congestion and high accident locations, and other transportation system needs in the study area. Also, since the community's comprehensive plan was last updated in 1994, the local officials provided valuable input on the potential location of future development in the study area.

Four meetings were held in the study area. The first meeting, June 30, 1999, was an introductory meeting with the County Judge Executive, the Laurel County Tourism Director, and the Chairman of the Transportation Committee. The purpose of the meeting was to brief local officials on the scope of the project, discuss local transportation planning issues, and solicit their input on the development of a citizens advisory committee. It was decided at the meeting that the Transportation Committee would serve as the advisory committee since its members had previously studied the transportation needs in the area and had prepared a wish list of projects.

The second meeting was held August 11, 1999, with the Transportation Committee. The meeting had the following purposes: Explain the transportation planning process to the committee; receive local input on known traffic circulation problems, points of congestion or other transportation needs; and receive local input on the direction of residential, commercial, and industrial development in the study area

The committee members provided a list of projects and discussed the need for each. They also discussed the community's future growth and economic development, and provided insight as to the areas within the county that are most likely to be developed.

The third meeting was held November 17, 1999, also with the Transportation Committee. That meeting focused on the assumptions made for the distribution of future land use and the results of efforts to model future traffic conditions. A presentation was made on the changes in population and employment anticipated in the various traffic analysis zones in the study area by the horizon year 2020. The resulting traffic assigned to the transportation system and portions of the system with inadequate capacity to handle future projected traffic were also discussed.

The fourth meeting was held February 13, 2001, with Transportation Committee members, to review the draft of the study report. The primary focus of the meeting was the presentation of the recommended transportation improvement projects. The importance of prioritizing the projects as the first step in the process of having them added to the state's six-year or long-range plans was explained. It was decided that the committee would be responsible for obtaining the input of local officials and preparing a prioritized list of projects for publication in the final report.

3.0 EXISTING CONDITIONS

3.1 DEMOGRAPHIC CHARACTERISTICS

The following section summarizes the trends and status of the socioeconomic characteristics for the Commonwealth of Kentucky, Laurel County, and the city of London. The primary sources of the data include the U.S. Census Bureau and the Kentucky State Data Center at the University of Louisville's Urban Studies Institute (referred to hereafter as State Data Center).

3.1.1 Population[2]

Census 2000 data shows that Laurel County's population increased from 43,438 in 1990 to 52,715 in 2000 (a 21.3 percent gain), while London's population decreased from 5,757 to 5,692 (a 1.1 percent loss)[3]. The state's population experienced a 9.6 percent gain during the same time period. The county's average annual growth rate between 1980 and 2000 was approximately 1.5 percent, and the projected annual growth rate from 2000 to 2020 is approximately 1.1 percent. Census 2000 records a total of 20,353 households in the county and 2,400 in the city. The average number of persons per household in the county and city are 2.56 and 2.78, respectively. Table 1, below, presents 1980, 1990 and 2000 population data and 2010 and 2020 forecasts for Kentucky, Laurel County, and London.

TABLE 1

POPULATION PROJECTIONS*

	YEAR				
	1980	**1990**	**2000**	**2010**	**2020**
Kentucky	3,660,777	3,686,891	4,041,769	4,177,471	4,367,967
Number Change	--	26,114	354,878	135,702	190,496
Percent Change	--	.7%	9.6%	3.4%	4.6%
Laurel County	38,982	43,438	52,715	58,778	65,645
Number Change		4,456	9,277	6,063	6,867
Percent Change	--	11.4%	21.3%	11.5%	11.7%
London	4,009	5,757	5,692	6,836	7,677
Number Change	--	1,748	-65	1,144	841
Percent Change	--	43.6%	-1.1%	20.1%	12.3%

Source: Years 1980, 1990, and 2000 data obtained from the U.S. Bureau of the Census and the University of Louisville Urban Studies Institute, Kentucky State Data Center. Presnell Associates, Inc., calculated years 2010 and 2020 projections.

[2] Only comparative population characteristics are currently available from Census 2000. Other sources of demographic data presented in this section are cited as the data is referenced.

[3] In December 2000 London annexed land to the north and south of the city. The population changes occasioned by the annexation are not reflected in the tables, herein, because the State Data Center and Census Bureau data were compiled prior to the annexation. However, the London city limits depicted on Exhibits sheets in this report include the annexed areas.

3.1.2 Labor Force and Employment Characteristics

Labor force characteristics as reported in the 1990 Census for the residents of Kentucky, Laurel County and London are presented in Table 2, page 8. Employment-by-industry characteristics in the same areas are presented in Table 3, page 8.

The percentage of unemployed males in both the county and city in 1990 (both 4.6 percent) was lower than that for the state (5.6 percent). The percentage of unemployed females in the city and county (both 2.2 percent) was also lower than that for the state (3.8 percent). More recent unemployment rate information (November 2000) shows that the unemployment rate in Laurel County was the same as that of the state (3.6 percent).

In comparing the 1990 percentage of employment by industry among jurisdictions, the following are notable similarities and differences. In all jurisdictions, the "Services" recorded the highest percentage of employees, though both the city (29.6) and the state (28.9) had a higher percentage than the county (27.6). The categories with the second and third highest percentages were "Manufacturing" and "Retail," with manufacturing second and retail third in both the state and the county, and retail edging out manufacturing in London. Both the county and the city had a higher percentage of retail employees than the state (19.2 and 19.8 percent versus 17.5 percent, respectively), and both the state and county had a higher percentage in manufacturing (19.7 and 19.5 percent, respectively) than did the city (16.3 percent).

Also notable is the "Wholesale Trade" base of the area, especially in London (6.9 percent versus 3.9 percent in the state). The city recorded a higher percentage of "Finance, Insurance, and Real Estate" employees (6.8 percent) than either the state (5.2 percent) or the county (4.0 percent). Finally, both the county and the city had a higher percentage of "Transportation" employees (5.7 percent) than the state (4.6 percent)

According to the London-Laurel County Chamber of Commerce publication, *Profiles* (1999), major employers in the county in 1999 included the following, along with their number of employees:

American Greetings Corp	869	Institutional Distributors	359
Affiliated Computer Services	800	Therm-O-Disc, Inc.	330
Wal-Mart Distribution	600	Laurel Cookie Factory	300
CTA Acoustics, Inc.	531	Laurel Grocery	250
Mrs. Smith's Bakery	530	Flav-O-Rich	238
Renaissance Bankcard Services	500	Aisin Automotive Casting	218
Image Entry	450	Begley Lumber Co., Inc.	150
Earthgrains	450		

TABLE 2

1990: LABOR FORCE STATUS (PERSONS, BY SEX, 16 YEARS AND OLDER)

	Kentucky		Laurel County		London	
	Male	Female	Male	Female	Male	Female
Armed Forces	28,040	1,791	1	0	0	0
Civilian Labor Force						
Employed	858,188	705,772	9,233	7,205	1,175	1,028
Unemployed	69,668	54,686	1,103	636	92	54
Not in Labor Force	394,506	726,058	5,508	9,113	823	1,422
Percent Unemployed	5.6%	3.8%	4.6%	2.2%	4.6%	2.2%
February 1999 Unemployment Rates	4.8%		4.6%		4.6%	

Sources: U.S. Bureau of the Census, 1990; and the Kentucky Department for Employment Services.

TABLE 3

1990: EMPLOYMENT BY INDUSTRY

Industry	Kentucky		Laurel County		London	
	#	%	#	%	#	%
Agriculture, Forestry, and Fisheries	59,346	3.8%	333	2.0%	11	.5%
Mining	37,595	2.4%	501	3.0%	31	1.4%
Construction	98,785	6.3%	1,024	6.2%	110	5.0%
Manufacturing	304,451	19.5%	3,232	19.7%	359	16.3%
Transportation	72,434	4.6%	937	5.7%	125	5.7%
Utilities	41,434	2.6%	321	2.0%	51	2.3%
Wholesale Trade	60,299	3.9%	1,025	6.2%	153	6.9%
Retail Trade	273,506	17.5%	3,154	19.2%	436	19.8%
Services	451,395	28.9%	4,535	27.6%	651	29.6%
Entertainment and Recreation	16,339	1.0%	164	1.0%	25	1.1%
Finance, Insurance, and Real Estate	80,556	5.2%	658	4.0%	150	6.8%
Public Administration	67,820	4.3%	554	3.4%	101	4.6%
Total	1,563,960	100%	16,438	100%	2,203	100%

Source: U.S. Bureau of the Census, 1990.

3.1.3 Workforce Commuting Patterns and Characteristics

According to 1990 Census data, 11,434 persons who worked in Laurel County also resided in the county, 4,694 county residents commuted to work outside of Laurel County (including 254 who commuted out of the state), and 2,678 non-county residents commuted into Laurel County to work. Some 1,834 London residents worked in Laurel County and 304 commuted outside the county (including 7 outside the state) to work.

Slightly over 80 percent of city and county residents in the workforce drove alone to work, while approximately 13 percent and 11 percent, respectively, carpooled to work. The remainder used other modes of transportation including walking, motorcycle, bus, or they worked at home (2.8 percent in the county and 3.5 percent in the city).

The percentage of time spent in travel to work varied between the residents of London and those of the county as a whole (see Table 4, below), with the county's resident workforce spending more time traveling to work than did the city's. Almost 61 percent of city residents but fewer than 37 percent of county residents in the workforce were within a 15-minute commute to work. Conversely, only about 12 percent of the city's workforce spent 30 or more minutes commuting, while just over 20 percent of the county's workforce commuted for 30 minutes or longer (of these, 3.7 percent had a 90-minute or more commute). The travel time to work of approximately 39 percent of the county's resident workforce and 24 percent of the city's was from 15 to 29 minutes. As noted above, approximately 3.5 percent of the city's resident workforce and 2.8 percent of the county's worked at home.

TABLE 4

1990: TRAVEL TIME TO WORK
RESIDENTS IN WORKFORCE (Workers 16 Years and Over)

Travel Time	London			Laurel County		
	Persons	% of total	Grouped % of total	Persons	% of total	Grouped % of total
Less than 5 minutes	237	11.1%	60.9%	694	4.3%	36.9%
5 to 9 minutes	648	30.3%		2,383	14.8%	
10 to 14 minutes	418	19.6%		2,878	17.8%	
15 to 19 minutes	385	18.0%	24.3%	3,540	21.9%	39.3%
20 to 24 minutes	109	5.1%		2,161	13.4%	
25 to 29 minutes	26	1.2%		648	4.0%	
30 to 34 minutes	127	5.9%	11.9%	1,543	9.7%	20.6%
35 to 39 minutes	17	0.8%		150	0.9%	
40 to 44 minutes	0	0%		144	0.9%	
45 to 59 minutes	33	1.5%		398	2.5%	
60 to 89 minutes	38	1.8%		426	2.9%	
90 or more minutes	40	1.9%		603	3.7%	
Worked at home	60	2.8%	--	560	3.5%	--
TOTAL	**2,138**			**16,128**		

Source: U.S. Census Bureau, 1990 U.S. Census Data (Database: C90STF3A).

3.1.4 Income and Percent Living below Poverty Level

A summary of the 1989 per capita and household income data published by the U.S. Census Bureau is presented in Table 5, below, for Kentucky, Laurel County and London. According to this data, Laurel County and London households are less wealthy than those of the state as a whole. The median household incomes of Laurel County and London were $18,584 and $18,955 versus $22,534 for the state. However, the per capita income of London was $11,463, which was higher than either that of the county ($8,879) or the state ($11,153).

TABLE 5

1989: COMPARATIVE PER CAPITA INCOME, MEDIAN HOUSEHOLD INCOME AND PERCENT LIVING BELOW POVERTY LEVEL

	Kentucky	Laurel County	London
Median Household Income	$22,534	$18,584	$18,955
Per Capita Income	$11,153	$8,879	$11,463
% Living Below Poverty Level	18.5%	24.8%	20.3%
% Of All Youths (Ages 0-17) Below Poverty	24.5%	29.6%	19.7%
% Of All Elderly (Ages 65+) Below Poverty	20.6%	29.2%	17.5%

Source: U.S. Bureau of the Census, 1989.

Regarding the population percentages living below the poverty level, Laurel County and London had higher percentages of their population living below the poverty level than the state. The percentage of elderly people and youths living below the poverty level was higher for the county than for both the state and the city.

In addition to the data published by the U.S. Census Bureau, descriptions of county economics can be obtained from the U.S. Bureau of Economic Analysis' (BEA) Regional Economic Information System. Below are selected statements about Laurel County:

> *In 1997, Laurel had a per capita personal income (PCPI) of $16,478. This PCPI ranked 59th in the State [out of 120], and was 80 percent of the State average, $20,570, and 65 percent of the national average, $25,288. The average annual growth rate of PCPI from 1987 to 1997 was 4.6 percent. The average annual growth rate for the State was 5.2 percent and for the nation was 4.7 percent…. The largest industries in 1997 were services, 20.1 percent of earnings; retail trade, 18.0 percent; and nondurable goods manufacturing, 11.4 percent. …. The fastest [growing industry] was retail trade, which increased at an average annual rate of 11.4 percent. The slowest growing was non-durable goods manufacturing, which increased at an average annual rate of 1.1 percent.*

3.2 GENERAL LAND USE

A windshield survey of existing land uses in the study area was conducted. The general results of that survey are described in the following paragraphs.

The general land use pattern of the study area is typical of many American cities of similar size. The downtown central business district (CBD) contains the highest concentration of mixed developments, including numerous governmental, commercial and residential land uses. From the CBD the land use density decreases in a radial pattern, except along major thoroughfares, which are characterized by more dense, mixed land use with some spots of highly concentrated commercial or industrial developments, especially in the vicinity of the two interchanges with I-75. Following is a brief analysis of the different types of land use in the study area.

Residential uses occupy the majority of developed land within the study area. There are both single-family and multi-family uses, with single-family uses predominant. The residential uses are generally located behind commercial areas, infilling land between major roadways in both named developments and along local streets. Residential uses along major road corridors include isolated residences.

Commercial uses occupy a large portion of the developed land within the study area. The CBD, which is more or less centrally situated in study area, contains many of these commercial uses. The CBD is located on the west and east side of US 25, extending between West 11th Street to the north and County Extension Road to the south. There is also a small section of the CBD that extends eastward along KY 80, to the railroad tracks. In addition to the CBD, there are other general business districts and neighborhood commercial districts throughout the study area. Each of these other commercial land uses borders a major arterial road. The largest of these areas are around the two interchanges along I-75 and along KY 192.

Public and Semi-Public uses include schools, parks, governmental buildings, cemeteries and churches distributed throughout the study area. Many of these uses are located in the CBD. City Hall, the U.S. Court House, Dyche Memorial Park (cemetery), and St. Williams School are all located within the city limits, as are a group of state office buildings and State Police Post No. 11. Greer Park is located along KY 1769, to the east, in the north central portion of the city.

Other public and semi-pubic uses located within the study area include: the London Post Office, Laurel County Junior High School, Laurel County Middle and High Schools, Laurel County Community College, Laurel County Technical School, Sublimity and Bush Elementary Schools, the London/Corbin Airport, and various cemeteries. The 800-acre Levi Jackson State Park, one of the largest single land uses within the entire study area, is located south of London and is accessible via US 25 and KY 229. The Laurel County Park, Fairgrounds and 4-H Camp are also along KY 229.

Industrial uses are generally concentrated in six districts within the study area. Each of these is located on a major thoroughfare with easy access to one of the two interchanges with I-75. Three of the industrial land uses are within the city limits, two of which are located on the northern limits of the city, along Daniel Boone Parkway. The other industrial use within the southern portion of the city is immediately north of KY 192

just west of the railroad tracks. Of the other three industrial areas, one is located just north of the city, bordering I-75 to the east; one is to the south of the city, along the west side of KY 229; and the third is a 300-acre industrial park three miles west of I-75, northwest of the city, along KY 80.

Open/Agricultural uses occupy the remainder of the land in the study area. Such land is located near the outside borders of the study area and occupies the majority of the land use in the unincorporated portions of Laurel County.

The London-Laurel County Joint Planning Commission maintains certain land use controls within the study area. Zoning regulations and building and housing codes are enforced within the city limits of London. Subdivision regulations are enforced throughout all areas of the county. Exhibit 1 shows the city's zoning districts.

3.3 TRANSPORTATION SYSTEM

This section describes the transportation system, as it presently exists.

3.3.1 Existing Roadway System

The main roadways into and out of London are Interstate 75 (I-75), the Daniel Boone Parkway, KY 80, KY 229, and US 25. I-75 provides London with an access between Lexington to the north and Knoxville to the south. The Daniel Boone Parkway begins in London and connects the city with Hazard to the east. KY 80 connects London with Somerset and the Cumberland Parkway to the west. KY 229 joins London with Barbourville to the southeast. London is connected to Corbin via US 25. Several of the routes previously listed have been designated as federal truck routes. The routes are I-75, the Daniel Boone Parkway, KY 80, and the section of KY 192 from I-75 to the Daniel Boone Parkway. These routes basically serve as an outer loop around downtown London, which helps keep large truck traffic off of the congested city streets. Table 6, page 13, summarizes selected characteristics of the roadway characteristics of the major roadways that were used in developing the traffic model to project future traffic volumes in the study area. Exhibit 2 shows the major roads used in the traffic model.

3.3.2 Functional Classification of Roadways

Roads are classified as to the functions they perform with regard to the movement of traffic and access to property. Functional classification is the grouping of roads, streets, and highways into integrated systems, each ranked by its relative importance and the function it is intended to serve relative to mobility and land access. Functional classification also identifies the role each street or highway should play in channeling the flow of traffic through a rural and/or urban environment in a logical and efficient manner. The three general functional classification categories are *Arterials*, *Collectors*, and *Local Roads*. At one extreme, the function of an arterial is to move through-traffic at high speeds over long distances with limited land access. Local roads or streets, by contrast, move traffic at relatively low speeds and provide access to adjacent property; through-traffic is discouraged. The functional classification of roads has been used by state highway departments for many years for a variety of important highway functions such as assigning jurisdictional responsibility and establishing appropriate design standards.

Definitions of these general functional classifications, along with desirable characteristics, are given below. Exhibit 3 shows the functional classifications of roadways that comprise the traffic model network.

TABLE 6

SELECTED CHARACTERISTICS OF MAJOR ROADS IN THE TRAFFIC MODEL

Route	No. of Lanes	Milepost Range	Functional Classification	Truck Route
I- 75	4	28.85 - 38.19	Rural interstate	Federal truck route
		38.19 - 40.84	Urban interstate	Federal truck route
		40.84 - 50.77	Rural interstate	Federal truck route
Daniel Boone Pkwy	4	0.00 - 3. 68	Principal Arterial	Federal truck route
	2	3.86 - 10.59	Principal Arterial	Federal truck route
US 25	2 / 3	0.00 – 10.50	Major Collector	---
	3 / 4	10.5 - 13.85	Minor Arterial	---
	2	13.85 - 16.26	Minor Arterial	---
KY 80	2 / 4	0.00 – 9.76	Principal Arterial	Federal truck route
	4	9.77 – 11.08	Principal Arterial	Federal truck route
	4 / 2	11.08 - 13.19	Minor Arterial	---
	2	13.19 - 24.70	Major Collector	---
KY 192	2	0.00 - 18.19	Major Collector	---
	4	18.19 - 22.04	Principal Arterial	Federal truck route
KY 229	2	0.00 - 11.21	Major Collector	---
	2	11.21 - 12.25	Minor Arterial	---
KY 363	2	0.00 - 9.63	Major Collector	---
	2	9.63 - 11.10	Minor Arterial	---
KY 490	2	0.00 - 1.02	Minor Arterial	---
	2	1.02 - 11.33	Major Collector	---
KY 1006	2	0.00 - 5.34	Local Road	---
	2	5.34 - 6.88	Minor Arterial	---
KY 2069	2	0.00 – 1.12	Local Road	---
KY 3432	2	0.0 2.36	Local Road	---
	2	2.36 – 3.45	Collector	---

Principal Arterials

The principal arterial system of roadways serves the major activity centers of the urban area and consists mainly of the highest traffic volume corridors. For rural scenarios, the system handles corridor movement with trip length and density suitable for substantial statewide or interstate travel. The system serves as a through system for trips that bypass the central business district of urbanized areas. Almost all controlled-access facilities are within this system, meaning no access is provided to adjoining land. Principal arterials are intended to carry high traffic volumes and serve the longest trip lengths. Principal arterials usually have four traffic lanes (two lanes in each direction), provide storage for left turns at most intersections, and are separated by a median or continuous left-turn lane.

Minor Arterials

Minor arterials are moderate volume roadways that interconnect with and augment the principal arterial system. While the primary use for the system is the movement of traffic, more emphasis is placed on access to adjoining property than with the principal arterial system. Minor arterials may only have two traffic lanes and should include a storage lane for left turns at major intersections. A minimum right-of-way width of 100 to 150 feet is desirable for an arterial, with wider rights-of-way being needed for roads with more than four lanes.

Collectors

Collectors generally serve travel of primarily intra-county and regional importance, rather than statewide importance, and have shorter travel distances than arterials. They provide a balance between mobility and land access by typically permitting access to all abutting properties. There are two categories of collectors: major and minor. Major collectors provide service to any county seat or community not served by an arterial road, and serve other traffic generators of intra-county importance such as regional parks, consolidated schools, agricultural areas, shipping points, etc. Minor collectors are spaced at intervals consistent with population density, collect traffic from local roads, and provide access to all developed areas within a reasonable distance of a major collector or higher classified road. A minimum right-of-way width of 80 to 100 feet is desirable for a collector road.

Local Roads

Local roads comprise the balance of the road network and carry low-volume, low-speed traffic. The primary function of a local road is to provide access to individual parcels of property. Local roads usually serve residential areas and may also serve scattered business and industry sites that generate modest traffic. A minimum right-of-way of 60 to 80 feet is desirable for a local road.

3.3.3 Daily Traffic Volumes

The Kentucky Transportation Cabinet provided the Base Year (1995) average daily traffic (ADT) volumes for the transportation study road network (see Exhibit 4 and Table 7, page 15). These volumes were used in the analysis of existing levels of service (described in the next section) and in the development of the traffic analysis model (described in Section 4.0), to project future (2020) traffic volumes on roads in the study area.

TABLE 7

1995 AVERAGE DAILY TRAFFIC

Route	Average Daily Traffic
I-75 North of KY 80	28,500
I- 75 South of KY 80	28,700
I-75 South of KY 192	35,100
KY 490	8,100
KY 80 West of I-75	14,100
KY 80 West of CSX Railroad	6,100
Daniel Boone Pkwy East of US 25	10,400
Daniel Boone Pkwy East of KY 472	6,800
US 25 North of KY 80/ Daniel Boone Pkwy	15,900
US 25 South of KY 80/ Daniel Boone Pkwy	21,700
US 25 (Main Street) North of KY 1006 (5th Street)	16,700
US 25 (Main Street) North of Carnaby Square	16,700
US 25 North of KY 192	14,300
US 25 South of KY 192	20,900
US 25 South of KY 1006	9,500
KY 3432 (West 16th Street)	3,600
KY 1006 near Falls Street	7,800
KY 1006 North of KY 192	6,900
KY 1006 South of KY 192	5,100
KY 192 West of KY 80	14,000
KY 192 West of US 25	22,100
KY 192 East of US 25	14,400
KY 192 West of KY 363	22,700
KY 192 West of I-75	6,000
KY 363 North of KY 192	4,100
KY 363 South of KY 192	7,500
KY 2069 East of KY 1006	2,000

3.3.4 Levels of Service

Level of service (LOS) is a qualitative measure used to describe traffic conditions. LOS is based on motorists' and passengers' perceptions of several factors, including speed and travel time, freedom to maneuver, traffic interruptions or gaps, comfort, and convenience. There are six levels of service used in the description of traffic. These range from LOS A (the best traffic condition) through LOS F (the worst traffic condition). For planning purposes, LOS D or better typically is designed for and desired for urban areas, and LOS C or better is sought for rural areas. Each LOS represents a range of operating conditions, as described in general terms in Table 8, below. Exhibit 4 shows the Base Year (1995) ADT volumes for study area roadways, along with the level of service.

TABLE 8

LEVEL OF SERVICE DESCRIPTIONS

LOS	Description
A	Represents the best operating conditions. Traffic is free flowing and drivers are able to proceed at their desired speed. Delays are minimal.
B	Traffic flow is stable, but the presence of other vehicles in the traffic stream becomes noticeable. Freedom to select a desired speed is not affected, but freedom to maneuver slightly declines. Delays remain minimal.
C	Traffic flow is stable, but interactions with other vehicles in the traffic stream begin to affect operations. Speed selection and maneuvering are affected by the presence of other vehicles. Delays become noticeable and general levels of comfort and convenience decline noticeably, as well.
D	This represents high density, but stable, flow. Speed and freedom to maneuver are severely restricted, but traffic flow remains high. Delays are more substantial and intersection queues form frequently. Though driver comfort and convenience generally are poor, the utility or productivity of the facility is high. This is often considered to be the limit of acceptability for planning purposes in urban areas.
E	Operating conditions are at or near capacity. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver is extremely difficult and driver comfort and convenience levels are extremely poor. Delays approach the unacceptable level and operations are usually unstable.
F	Oversaturated conditions exist when demand exceeds capacity, resulting in forced or breakdown flow. Operations are characterized by stop-and-go conditions and are extremely unstable. Delays generally exceed limits of driver acceptability. Though undesirable, LOS F conditions are commonplace during peak traffic periods in major urban areas.

Source: *Highway Capacity Manual*, Special Report 209, Transportation Research Board, National Academy of Sciences, Washington D.C., 1994.

3.3.5 Traffic Accident Summary

Traffic accident information for the London and Laurel County study area was obtained from the Kentucky State Police. Data was available for the full three-year period of 1996 through 1998. At the time of the accident records request, this was the most recent data that was available. Traffic accident data were summarized to determine locations with high accident rates. The high accident "spots" (roadway segments up to 0.3 mile long) had three-year accident totals converted to accident rates.

These accident rates were expressed in terms of annual accidents per 100 million vehicles. This allows for a comparison of accident rates on facilities of different functional class and traffic volumes. Next a critical accident rate was selected for the roadway based upon the number of lanes, traffic on the roadway, the class of roadway, and whether the road is considered rural or urban. These critical rates were found in the *1999 Analysis of Traffic Accident Data* from the Kentucky Transportation Center.

The accident rate and the critical accident rate for each roadway spot with a high accident total were compared to determine the Critical Rate Factor (CRF). The equation used for this comparison is as follows: Critical Rate Factor = Accident Rate / Critical Accident Rate. A high-accident location will have a CRF greater than 1.0. A higher CRF indicates that the location has a notably higher accident rate than similar roadways in other parts of the state. Table 9, below, provides a summary of the high-accident locations for the study area based on the available records. These locations are shown on Exhibit 5, identified by the Site Identification (ID) number provided in Table 9.

All of the high-accident locations were analyzed to determine if there are any contributing factors that might be corrected with an engineering or construction solution. This analysis and recommendations regarding shot- and long-term improvements are presented in Sections 5.1 and 5.2, pages 29 through 37.

TABLE 9

SUMMARY OF HIGH-ACCIDENT LOCATIONS

Route	Site ID	Milepost	Length In Miles (rounded)	Nearest Intersection(s)	Number of Accidents	ADT	CRF
US 25	1	6.953 – 7.0	0.05	N of KY 1189	11	9,100	1.65
US 25	2	7.5 – 7.511	0.01	Fariston N and S Rds.	6	9,100	1.89
US 25	3	8.928 – 9.028	0.1	S of KY 1006	15	9,500	1.42
US 25	4	10.062 – 10.162	0.1	South Laurel H.S. (S entr.)	16	11,900	1.32
US 25	5	10.405 – 10.505	0.1	S of KY 192	26	21,000	1.49
US 25	6	10.7 – 10.9	0.2	Carter Rd.	31	14,300	1.09
US 25	7	11.0 – 11.3	0.3	Reams St.	39	7,200	1.67
US 25	8	11.8 – 11.9	0.1	East Dixie St.	24	9,400	1.77
US 25	9	11.932– 12.119	0.2	KY 363 to KY 80	50	12,000	2.06
US 25	10	12.8 – 12.9	0.1	South Reuben St. - KY 3432	37	11,500	2.41
US 25	11	12.916 – 13.038	0.1	KY 3432 - North Reuben St.	30	18,300	1.25
US 25	12	13.1 – 13.3	0.2	Chinook Dr.	53	18,300	1.56
US 25	13	15.8 – 15.821	0.02	KY 2041	11	13,600	2.29
US 25	14	16.3 – 16.4	0.1	N of KY 490	12	5,600	1.56
KY 192	15	17.9 – 18.1	0.2	Chestnut St.	18	6,000	1.48
KY 192	16	18.7 – 19.0	0.3	Shopping Centers	95	22,700	1.76
KY 192	17	19.1 – 19.3	0.2	Shopping Centers	49	22,700	1.23
KY 192	18	19.981 – 20.07	0.1	W of US 25	27	22,100	1.23
KY 192	19	20.1 – 20.2	0.1	E of US 25	24	14,400	1.35
KY 229	20	11.1 – 11.2	0.1	Ray Overby Rd.	16	6,300	1.93
KY 363	21	9.187 – 9.421	0.2	N of KY 1006	18	7,500	1.16
KY 363	22	9.554 – 9.654	0.1	S of KY 192	10	7,500	1.09
KY 1006	23	3.8 – 3.886	0.1	KY 2069	8	5,100	1.36
KY 1006	24	6.495 – 6.5	0.01	Falls St.	11	7,800	4.40
KY 1006	25	6.6 – 6.7	0.1	Laurel to Hill Sts.	15	5,900	1.48
KY 2069	26	0.321 - 0.446	0.1	Sublimity Loop Rd.	10	2,000	2.28

4.0 TRANSPORTATION PLAN DEVELOPMENT

A key objective of this transportation plan is to determine future highway capacity deficiencies and identify improvements to the roadway network that would correct/prevent the deficiencies. A traffic demand model was the tool used to forecast the future volumes. The traffic demand model was developed to reflect the known travel patterns in 1995 and then forecast to the year 2020. This section documents the development of and results obtained from that model. The modeled study area includes approximately 15 percent of Laurel County, geographically, and approximately 42 percent of the county's population. The Technical Memorandum detailing the model methodology and results is presented as a separate document, as part of this study.

4.1 TRAFFIC MODEL DEVELOPMENT

An initial step in creating a transportation model covering a large area is the division of the study area into numerous, small geographical areas—called traffic analysis zones (TAZs)—for which socioeconomic and traffic information can be obtained and studied in a manageable fashion. Following the identification of the TAZs, travel demand is assessed based on the data obtained for each of the zones. Basically, travel demand is a measure of the volume of traffic traveling to and from all of the various possible locations within and outside of a given area. That travel must take place on a transportation system or network, in this case, a road network.

Traffic Analysis Zones

The London/Laurel County study area was divided into 77 traffic analysis zones, as shown in Exhibit 6. These zones were used for data collection, analysis, and traffic modeling. Selection of zone boundaries and size were based on considerations such as land use, natural features or barriers, existing roadways, census-tract boundaries, and socioeconomic characteristics.

The Cumberland Valley Area Development District (CVADD) collected Base Year (1995) socioeconomic data by traffic analysis zones. The socioeconomic data included population, employment, and dwelling units. The population was calculated by applying the 1990 census tract persons-per-dwelling-unit rate to the number of dwelling units. To estimate employment, a listing of employers was created using a combination of Workforce Development Cabinet data, phone book listings, and field surveys. Each business within the study area was contacted to determine the number of employees. Employment was classified in two ways: 1) as either retail or non-retail, and 2) as commercial, industrial, or public. Table 10, pages 19-20, provides a summary of the Base Year (1995) socioeconomic characteristics for the TAZs. Also, traffic data was collected for 20 external stations (i.e., sites outside the study area) for modeling the volumes of traffic heading into, passing through, and going out of the study area.

Travel Demand

The projection of travel demand has three phases: trip generation, trip distribution and trip assignment. Trip generation determines the number of trips produced by and attracted to each traffic analysis zone within the study area. It is a function of the socioeconomic characteristics of the zone. Trip distribution is the determination of the

TABLE 10

TRAFFIC ANALYSIS ZONES
SOCIOECONOMIC CHARACTERISTICS—BASE YEAR (1995) AND YEAR 2020:

Zone	1995									2020 Projection			
	# of Dwelling Units	Population by Zone	# of Businesses	Number of Employees						Population	Number of Employees		
				Total Employees	Retail	Non - Retail	Public	Industrial	Commercial		Total Employees	Retail	Non-Retail
1	17	47	30	368	8	360	218	6	144	16	203	4	199
2	38	105	12	52	3	49	22	0	30	48	50	3	47
3	25	69	6	48	4	44	42	0	6	35	51	4	46
4	39	107	2	47	0	47	24	0	23	87	51	0	51
5	84	231	5	225	24	201	194	0	31	361	244	26	218
6	52	143	2	3	3	0	0	0	3	178	74	74	0
7	10	28	25	217	62	155	37	25	155	29	221	63	158
8	7	19	9	443	43	400	0	113	330	0	443	43	400
9	10	28	6	12	1	11	0	0	12	36	35	3	32
10	78	215	38	453	281	172	0	69	384	428	637	395	242
11	107	294	14	135	21	114	80	0	55	377	184	29	155
12	24	66	1	481	0	481	0	481	0	75	620	0	620
13	128	352	28	486	41	445	11	350	125	451	504	42	461
14	34	94	14	152	20	132	9	12	131	120	212	28	184
15	480	1320	38	400	166	234	77	106	217	1,643	556	231	325
16	55	151	62	748	246	502	7	22	719	194	876	288	588
17	32	88	24	210	102	108	0	11	199	113	273	132	140
18	69	190	18	138	60	78	4	0	134	333	249	108	141
19	90	248	40	798	581	217	16	0	782	318	1032	751	281
20	117	322	14	125	9	116	91	0	34	412	250	18	232
21	151	415	19	207	130	77	9	0	198	531	236	148	88
22	159	437	5	25	0	25	0	0	25	560	25	0	25
23	149	410	5	12	10	2	0	0	12	496	28	24	5
24	51	140	35	759	260	499	7	435	317	179	810	278	533
25	43	118	42	506	36	470	322	16	168	151	649	46	602
26	76	209	13	136	43	93	83	0	53	268	154	49	105
27	99	272	4	163	28	135	120	0	43	358	218	37	181
28	15	41	9	112	0	112	0	50	62	5	175	0	175
29	17	47	4	56	0	56	35	0	21	61	24	0	24
30	90	248	12	89	12	77	24	6	59	318	165	22	143
31	49	135	8	20	8	12	0	0	20	173	45	18	27
32	41	113	7	64	59	5	0	0	64	144	85	79	7
33	48	132	6	35	17	18	0	0	35	170	49	24	25
34	219	602	17	335	39	296	0	231	104	761	451	53	399
35	47	129	7	120	7	113	43	37	40	165	158	9	148
36	40	110	42	1345	174	1171	45	1049	251	151	1476	191	1285
37	98	270	18	524	82	442	75	357	92	345	588	92	496
38	154	424	17	414	117	297	274	0	140	543	545	154	391
39	88	242	5	31	0	31	0	0	31	310	49	0	49

TABLE 10 (Continued)

Zone	1995									2020 Projection			
	# of DwellingUnits	Populationby Zone	# of Businesses	Number of Employees						Population	Number of Employees		
				Total Employees	Retail	Non -Retail	Public	Industrial	Commercial		Total Employees	Retail	Non-Retail
40	139	382	28	783	504	279	195	0	588	505	929	598	331
41	151	415	3	36	35	1	0	0	36	556	85	82	2
42	233	641	9	35	13	22	0	5	30	1,051	85	32	53
43	126	347	2	3	1	2	0	0	3	445	31	10	20
44	185	509	2	9	8	1	0	0	9	670	29	26	3
45	112	308	3	8	5	3	0	0	8	389	29	18	11
46	313	861	10	141	5	136	0	0	141	1,107	215	8	207
47	119	327	3	6	4	2	0	0	6	418	11	7	4
48	74	204	2	65	0	65	0	0	65	262	171	0	171
49	114	314	4	4	4	0	0	0	4	402	12	12	0
50	102	281	11	52	29	23	0	18	34	360	76	42	34
51	70	193	6	34	14	20	0	20	14	247	67	27	39
52	95	261	0	0	0	0	0	0	0	334	0	0	0
53	90	248	2	5	4	1	0	0	5	384	11	9	2
54	15	41	2	3	2	1	0	0	3	52	9	6	3
55	98	270	3	6	4	2	0	0	6	345	14	9	5
56	49	135	0	0	0	0	0	0	0	173	0	0	0
57	60	165	0	0	0	0	0	0	0	211	0	0	0
58	78	215	5	113	5	108	100	0	13	275	159	7	152
59	73	201	0	0	0	0	0	0	0	257	0	0	0
60	46	127	2	13	0	13	0	0	13	162	22	0	22
61	139	382	2	4	0	4	0	0	4	490	10	0	10
62	104	286	0	0	0	0	0	0	0	316	0	0	0
63	123	338	3	89	3	86	35	54	0	433	165	6	160
64	176	484	18	78	52	26	11	2	65	557	106	70	35
65	101	278	10	91	30	61	61	10	20	306	109	36	73
66	210	578	6	312	0	312	0	260	52	677	385	0	385
67	50	138	1	1	0	1	0	0	1	177	5	0	5
68	108	297	3	4	0	4	0	0	4	371	9	0	9
69	234	644	3	6	0	6	0	0	6	787	11	0	11
70	84	231	24	415	109	306	44	217	154	296	521	137	384
71	106	292	24	190	165	25	7	0	183	373	328	284	43
72	99	272	2	6	5	1	0	0	6	348	124	103	21
73	41	113	4	39	3	36	32	2	5	144	178	14	164
74	39	107	2	5	0	5	4	0	1	147	9	0	9
75	86	237	2	7	0	7	0	0	7	303	11	0	11
76	49	135	2	106	6	100	0	100	6	173	192	11	181
77	70	193	1	305	0	305	0	300	5	247	4,736	0	4,736
Totals	7,291	20,061	867	13,468	3,707	9,761	2,358	4,364	6,746	25,684	22,069	5,120	16,949
					13,468		13,468					22,069	

number of trips between each combination of traffic zones within the study area. It is a function of the productions and attractions of a particular pair of zones and the distance between them. Trip assignment is the routing of trips between each zonal pair over the highway network. Typically the model assigns trips based on the shortest travel time path between the zones. The end result of these three phases is the number of automobile trips traveling each link of the highway network during a typical weekday. Travel modes other than roadway vehicles were not included in this traffic model.

Travel within the study area was divided into three categories:

1. Internal-Internal (I-I) trips—trips having both the origin and the destination within the study area

2. External-Internal (E-I) trips—trips having only the origin or the destination within the study area

3. External-External (E-E) trips-—trips that pass through the study area, having both the origin and the destination outside the study area

For the London model development, all of these trips were synthesized mathematically through the use of the MINUTP travel demand software, which is used as the statewide traffic model. Printed MINUTP files for the London model are included in the Technical Memorandum document.

The gravity model was used to distribute both I-I trips and E-I trips. The gravity model is an iterative mathematical procedure that determines the number of trips between any two traffic zones. Basically the gravity model assumes that the number of trips between any two zones is directly proportional to the activity levels of the zones (traffic productions and attractions) and inversely proportional to the distance, in travel time, between them.

4.2 BASE YEAR (1995) TRAFFIC MODEL

Internal trips were derived from results observed in a number of studies of similar-size areas where household origin-destination studies were conducted during the 1960s and 1970s. Based on these studies, an initial trip rate of 2.57 trips per person was used. To increase the accuracy of the internal trip generation model, these trips were stratified into three trip-purpose categories:

1. Home Based Work (HBW) – trips with one end at home and one end at work

2. Home Based Other (HBO) – all other trips with one end at home

3. Non-Home Based (NHB) – trips with neither end at home

After several runs during the calibration phase, it became apparent that the model was not generating enough trips. The internal trip rate was raised incrementally until it was determined that a rate of 3.4 trips per person gave the best result. However, because the model still did not show enough trips around the retail areas along KY 192, the

National Cooperative Highway Research Program's *NCHRP Report 187*[4] equations were applied to the employment data to calculate productions and attractions. Though producing a higher trip rate than had been used previously in Kentucky's small urban areas, applying the *NCHRP Report 187* equations was justified because the modeling process develops trips at the home end and does not adequately account for internal trips made during the day by employees commuting into the study area. The higher trip rate of 3.4 attempts to account for those non-home based trips made by commuting employees.

As noted, external trips were divided into External-External (E-E) trips and External-Internal (E-I) trips. During this study, E-E trips were based on the *NCHRP Report 365*[5]. These equations were used to compute the percentage of E-E trips at each external station and the percentage of trips going from one external station to another.

Two E-I trip attraction equations were tested. The first was from the *Kentucky Transportation Center Research Report 493*. The second was from *the NCHRP Report 187*. The decision on which equation to use was made simultaneously with the decision on the internal trip equations. Therefore, the equation from the *NCHRP Report 187* was used. The equation was adjusted so that the total E-I attractions would equal the E-I productions.

The next step was to check the accuracy of the synthesized trip data. The total trip table for the Base Year (1995) was constructed by adding the trip table produced by the internal gravity model to the external trip tables. This trip matrix was then assigned to London/Laurel County study area highway network. Individual link volume checks between the model assignments and ground counts provided checks on the model's accuracy.

For a model to be calibrated, the difference between the predicted volumes and actual volumes must be within acceptable limits. The statistical method selected to test the calibration was the root mean square error (RMSE). Calibration basically consisted of various measures to lower the RMSE. Generally, a percent RMSE under 30 percent is considered acceptable.

Through an iterative method of adjusting internal trip rates, internal trip equations, and network adjustments, most links had assigned volumes that closely approximated the actual 1995 traffic counts. Turn penalties were necessary at the I-75 interchanges to discourage local traffic from the interstate. The final RMSE for the London model was 20.31 percent. The close approximation of the link assignments to the traffic counts indicates that the trip rate and the adjusted link network were adequate, and that the internal and external trip simulation models satisfactorily reproduced 1995 traffic volumes.

The Technical Memorandum explains, in detail, the methodology and results of the Base Year (1995) model calibration on a link-by-link basis.

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[4] "Quick-Response Urban Travel Estimation Techniques and Transferable Parameters, User's Guide," *NCHRP Report 187*, National Cooperative Highway Research Program, Transportation Research Board, Washington, D.C., 1978.

[5] "Travel Estimation Techniques for Urban Planning," *NCHRP Report 365*, National Cooperative Highway Research Program, Transportation Research Board, Washington, D.C., 1998.

4.3 PLANNED AND PROGRAMMED TRANSPORTATION PROJECTS

The KYTC has a variety of ongoing transportation projects, some of which have been funded (i.e. programmed) while others have been listed as future projects. The funded projects are included in the state's Six-Year Plan, and the projects that have not yet been funded are listed in the Statewide Transportation Plan.

4.3.1 Six-Year (Biennial) Plan

To obtain state road funds, the KYTC must submit a Six-Year Plan to even-year sessions of the Kentucky General Assembly. The Six-Year Plan lists the highway projects that the KYTC intends to accomplish over the following six-year period. All phases (design, right of way, utilities and construction) for each proposed project, as well as the year in which the work is planned, are shown in the Six-Year Plan. The most recent Six-Year Plan, which was approved by the Kentucky General Assembly in April 2000 and published by the KYTC in June 2000, covers the years 2001-2006. (Upon approval, the plan is referred to as the "Biennial Highway Construction Plan.") Table 11, page 24, lists the projects that are in Biennial Plan for London/Laurel County.

For the purposes of this planning study it has been assumed that by the horizon year, 2020, each of the projects in the Six-Year Plan will have been implemented. Therefore, they have been included in the traffic model. One exception is I-66, which is described in more detail in Section 4.3.3, below.

4.3.2 Statewide Transportation Plan (20-Year Period)

As a requirement for receiving federal funds, the KYTC must prepare a long-range plan—the Statewide Transportation Plan—that lists all transportation projects that the KYTC intends to pursue over a 20-year period. This long-range plan must match project costs to an estimate of the amount of funds that will be available over that same 20-year period. The plan is updated every three to five years. The current Statewide Transportation Plan covers the years 1999-2018 and was approved in December 1999. Table 12, page 24, lists the projects in the long-range plan for London/Laurel County:

Since funding has not been specifically identified for these projects, none of the projects except I-66 were included in the future year traffic model so that the need for the projects could be evaluated. The special nature of I-66 is described below.

4.3.3 I-66

Since 1992, the KYTC has been participating in and sponsoring studies to determine the need for a new east-west interstate corridor across southern Kentucky. The first study, completed in 1994, looked at the need from a national perspective and studied various corridors and modes of transportation from California to Virginia. The study indicated that a new, cross-country I-66 was probably not justified, but that some segments of I-66 may warrant further study. One such segment is in Kentucky. Based on that preliminary study's findings, the KYTC commissioned a study in 1995 that culminated in the May 1997 publication of the "Southern Kentucky Corridor I-66, An Economic Justification and Financial Feasibility" report.

TABLE 11

KENTUCKY SIX-YEAR (BIENNIAL) PLAN: LONDON/LAUREL COUNTY

Route	Description	Phase*	Year
I-66	Locate I-66 from the Cumberland Pkwy @ Somerset to I-75 at London	D	2000
I-66	Construct I-66 from the Cumberland Pkwy @ Somerset north and east to KY 80 east of Somerset	D R U	2000 2004 2004
I-75	Reconstruct KY 192/KY 1006 interchange (exit 38)	R U C	2000 2000 2001
I-75	Widen I-75 to 6 lanes from US 25E to the Little Laurel River (including SB bridge)	D	2006
I-75	Widen I-75 to 6 lanes from north of the new weigh stations to KY 192	C	2001
I-75	Widen to 6 lanes from KY 80 at London to 0.2 mile north of the north US 25 overpass	R U	2005 2005
I-75	Widen the Rockcastle River bridges to 6 lanes	D C	2001 2003
US 25E	Reconstruct US 25E / US 25W / US 25 intersection	D	2004
KY 30	Reconstruct from Daniel Boone Pkwy to East Bernstadt	C	2000
KY 30	Relocate KY 30 from Vivia extending east to 0.1 mile of the Rockcastle River	D R U C	2001 2003 2005 2006
KY 363	Add left-turn lanes on KY 363 at intersection and relocate east KY 1006 approach	R U C	2001 2001 2002
KY 229	Reduce vertical curve on KY 229; add left-turn for KY 229 and relocate KY 1189 – both approaches	R U C	2000 2000 2001
KY 1305	Lida bridge and approaches at Little Sandy Creek 0.45 mile northwest of KY 488	C	2002
KY 1305	Replace bridge and approaches at Muddy Gut Creek 0.25 miles southeast of Daniel Boone Pkwy overpass	D R U C	2001 2003 2003 2004
DB 9006	Daniel Boone Pkwy from Mile Post (MP) 0.00, US 25 to MP 3.88, KY 192	C	2002
DB 9006	Daniel Boone Pkwy from MP 3.88, KY 192 to MP 8.8, 0.4 mile west of KY 1305	C	2005
US 25E	US 25E from MP 0.344, US 25 and US 25W to MP 2.024, west ramp to I-75	D C	2003 2005
I-75	Mill open graded and replace from KY 909 (MP 49.0) to Rockcastle Co. line (MP 50.8)	C	2005

* Abbreviations Key: D = Design R = Right-of-Way U = Utilities C = Construction

TABLE 12

KENTUCKY 20-YEAR PLAN: LONDON/LAUREL COUNTY

Route	Description
KY 30	Reconstruct east of East Bernstadt to US 421 at Tyner
KY 1006	Reconstruct from KY 192 to Main Street in London
I-66	New interstate facility from I-75 near London to Daniel Boone Pkwy east of London
I-66	New interstate facility from Cumberland Pkwy at Somerset to I-75 near London

The study looked at a new interstate corridor across southern Kentucky from far western Kentucky near Wickliffe to South Williamson in far eastern Kentucky's Pike County. The study included an economic analysis that concluded that the proposed I-66 would "deliver substantial economic development and quality-of-life benefits to this economically distressed region." To study the proposed interstate in greater detail, the KYTC conducted two scoping studies—one for a section of interstate from Hazard to the West Virginia state line, and the other for a section from west of Somerset to east of London. The first study was completed in 1999 and the second in June 2000. The section considered in the second study would tie together the Cumberland Parkway, which now terminates in Somerset, to the Daniel Boone Parkway, which starts in London. The study recommended that the proposed I-66 pass to the north of Somerset and parallel KY 80, crossing the Rockcastle River near KY 80's existing crossing. After crossing the river, I-66 would swing south and cross I-75 south of London, then tie into the Daniel Boone Parkway near KY 488, about 1.5 miles east of the London Toll Plaza.

Because of the KYTC's strong commitment to I-66, this study has included I-66 in the road network. Therefore, the effect of a new interstate corridor south of London was analyzed and its impact on other roads in the London area was studied.

4.4 FUTURE YEAR (2020) TRAFFIC MODEL DEVELOPMENT

Future travel demands are directly related to land use, population, and employment, the same factors that influence existing travel demands. Accurate estimation of future traffic is dependent upon realistic projections of these variables. Year 2020 traffic volume projections for the study area were created using the traffic model developed for existing (1995) traffic, programmed and planned road improvements, and year 2020 projections of the socioeconomic variables involved. The underlying assumption of this procedure is that the derived relationships between the socioeconomic variables and trip generation remain constant over time. Therefore, traffic analyses based on this model cannot reflect gross changes in travel characteristics that could be caused, for example, by extreme increases in gasoline prices or other factors that might artificially restrict travel.

The primary basis for building the future-year trip generation model is the future population of the study area. The population of the study area was determined by using the Kentucky State Data Center population estimates for Laurel County to obtain a target year (2020) population of 25,684. The Cumberland Area Development District developed a target-year 2015 forecast of population and employment. This was forecast to 2020 using a straight-line method from the 2015 forecast. New population and employment were placed within the zones according to subdivision plats on file and the anticipated development of the industrial park along KY 80 west of I-75. Commercial development is expected to continue along KY 192.

The exercise of tying a specific population forecast to a specific future year was used only to arrive at a logical level of growth for planning purposes. London may grow more quickly or more slowly than the Kentucky State Data Center predicts. Therefore, it may be desirable to think of this model as a "population 25,684" model instead of a "Year 2020" model. This approach provides for more flexibility in the use of the future-year model. The socioeconomic data by traffic analysis zone for the years 1995 and 2020 are listed in Table 10, pages 19-20. Table 13, page 26, capsulizes selected employment data for those years.

TABLE 13

1995 AND 2020 EMPLOYMENT COMPARISONS

	1995	2020
Retail	3,707 (28%)	5,120 (23%)
Non-Retail	9,761 (72%)	16,949 (77%)
Total	13,468 (100%)	22,069 (100%)

Internal Trips

The same approach used in developing internal trips for the Base Year (1995) model was used for the year 2020 model, applying the year 2020 socioeconomic data. The resulting productions and attractions, by traffic analysis zones, are presented in the Technical Memorandum.

External-Internal Trips

The calibrated equation used in determining the base year External-Internal (E-I) attractions was also used for determining the future year E-I attractions, with the incorporation of year 2020 socioeconomic data. The total number of future year E-I productions was set equal to the total number of future year E-I attractions. This total was divided among the external stations according to the Base Year percentage of the total E-I trips. The resulting set of E-I productions and attractions is shown in the Technical Memorandum.

External-External Trips

The future year External-External (E-E) trips were obtained by applying growth factors to the Base Year E-E trips, using the MINUTP program FRATAR. The growth factors were based on annual growth rates of three percent over 25 years. These factors were determined by analyzing ADT volume trends at the external stations and the projected population growth of the surrounding counties.

VMT Growth

After examining projected future year vehicle-miles of travel (VMT) produced by the model and future year assignments on major routes within the network, it was believed that the future year trip generation methodology did not produce adequate growth on the highway links. It has been noted that growth in vehicle-miles traveled in Kentucky has increased at a much higher rate than population growth. This reflects a societal trend of increased trip-making. Therefore, as a reflection of this trend and projecting that trend into the future, the Internal-Internal and External-Internal trips were increased by a factor of 1.5. This factor, which represents an increase in VMT per person of 1.65 percent per year over 25 years, was based on ongoing research being conducted by the KYTC and the University of Kentucky.

Trip Assignment

Future year assignments were made to the E+C network—a traffic model network containing the existing (E) system plus those projects committed (C) to construction in the Six-Year Plan, listed in Section 4.3, above. I-66 was also included as a committed

project. In addition, the KYTC has design underway, through a pavement rehabilitation project, to widen the Daniel Boone Parkway to four lanes from just east of US 25 to the planned intersection with the proposed relocated KY 30. Therefore, the Daniel Boone Parkway was modeled as a four-lane highway from US 25 to the proposed KY 30 intersection. Exhibit 7 depicts the 2020 ADT volume forecasts and levels of service with the existing roadway network, and Exhibit 8 depicts this data with the E + C + I-66 network.

4.5 IDENTIFICATION OF FUTURE DEFICIENCIES

Both operational and capacity deficiencies—existing and future—on the road network in the study area were identified and analyzed as major tasks of this transportation study. Recommendations regarding transportation improvements that would help correct existing and/or prevent future deficiencies were also identified (see Section 5.0). Operational deficiencies were determined via discussions with local officials and members of the Transportation Committee, including a review of the committee's list of recommended road improvements; direct observation of existing conditions on field visits; and the examination of accident records to pinpoint high-accident locations and identify potential engineering solutions.

Capacity deficiencies were determined through the use of the traffic analysis model described above. As noted, the traffic analysis assumed that the projects in the current edition of the Six-Year Plan and the I-66 project would have been completed. With these projects included, the year 2020 traffic model was run to identify the sections of the London/Laurel County road network that would have capacity deficiencies. The major roadways that may experience capacity problems in the year 2020 are shown in Exhibit 8. Roadways with an LOS of D, E, or F were considered candidates for further study.

The deficiencies projected for the London/Laurel County road network are not surprising. The corridors that carry the higher volumes of traffic today will continue to serve as the major thoroughfares in the year 2020. Therefore, based on the 2020 E+C+I-66 network model (see Exhibit 8), the following locations are projected to experience capacity problems. Recommendations for roadway improvements identified in Section 5.2 of this study address these and other problems along these roadways.

- The Daniel Boone Parkway, KY 192, and KY 80 will handle the majority of the east-west travel movements. The following conditions are expected:

  Daniel Boone Parkway: In the London area, traffic volumes are projected to increase from the 1995 range of 6,800–10,400 vpd to 16,100–24,300 vpd in 2020, and the level of service is expected to deteriorate to LOS E between relocated KY 30 and KY 638, and LOS D between KY 638 and KY 1305.

  KY 192: Traffic volumes are projected to increase from the 1995 range of 14,000–22,700 vpd to 25,700–33,900 vpd in 2020, and the level of service is projected to deteriorate to LOS E between KY 1006 and US 25, and LOS D between US 25 and KY229.

KY 80: The level of service is projected to deteriorate to LOS F between KY 192 and KY 1561, to LOS E between KY 1561 and KY 521, and to LOS D south of KY 521.

- The majority of the north-south traffic will use I-75 and US 25, and high volumes of traffic are projected along these routes.

I-75: The recent widening of I-75 to six/eight lanes will significantly improve the level of service on I-75, but the interstate will continue to carry a high volume of local traffic unless an alternative is provided. Traffic volumes are projected to increase from the 1995 ADT of 28,700 vpd to 62,900 vpd in 2020. The level of service is projected to be C or better along the length of I-75 through the project area.

US 25: This road will continue to serve as a major corridor for retail and commercial services, and as the main thoroughfare for downtown London. Traffic volumes are projected to increase from the 1995 range of 9,500–21,700 vpd to 13,800–33,400 vpd in 2020, by which time all but the following two sections are projected to experience LOS D or worse: Daniel Boone Parkway to KY 1769, and KY 229 to KY 192, both of which are projected to experience LOS C.

- Other major arterials projected to have capacity problems in 2020 include:

KY 229: The level of service is projected to deteriorate to LOS F between KY 192 and the CSX railroad tracks, and LOS E from the railroad tracks to Levi Jackson State Park.

KY 363: From KY 192 south to KY 1006 the level of service is projected to be F, while LOS E is projected between KY 1006 and I-75.

5.0 RECOMMENDED TRANSPORTATION PLAN

As noted in Section 4.5, above, an operational analysis of major roads in the study area revealed the existence of capacity and operational deficiencies at several locations. The operational analysis looked at ways to improve the efficiency of the existing system and identified small-scale, low-cost improvements that could be accomplished in the short-term. In addition, major long-term improvements to the study area's overall transportation network were identified as part of this study. Exhibit 9 depicts the locations of the improvements, using the identification code preceding each description, below. Exhibit 10 presents the projected (2020) traffic volumes and levels of service of network roads with committed projects, I-66, and the Transportation Plan in place. The following sections describe both the potential short-term and long-term improvements. (Note: **S** denotes **S**hort-term and **L** denotes **L**ong-term improvements.)

5.1 OPERATIONAL IMPROVEMENTS – SHORT-TERM

Several short-term operational improvements were suggested by the London Chamber of Commerce Transportation Committee or, in the case of high-accident locations, were identified via a review of accident data and during field investigations of the sites. The deficiencies and potential short-term operational improvements are described below. Project cost estimates are provided on Table 14, page 34.

S-1. **KY 1006/Falls Street Intersection:** Falls Street, a narrow roadway on a relatively steep grade, intersects KY 1006 (West 5th Street) from the northwest at an angle. KY 1006 is also very narrow through this area, and steep hillsides with a retaining wall and buildings formerly part of a college campus abut both roadways. Sight distance is poor owing to the terrain and skewed angle of the intersection, and there has been a high rate of accidents in this area. Long-term improvements proposed for KY 1006 (see project L-6, page 36), would substantially resolve problems along this roadway. For the short term, it is recommended that the turning radius be improved to facilitate right turns from Falls Street onto KY 1006 by filling a deeply eroded "dip" in the pavement of the right lane at the intersection. It is also recommended that a blind-intersection-ahead sign and a flashing yellow warning light be installed on southbound US 25 a sufficient distance from the intersection to alert motorists to the presence of the intersection, which is obscured by hilly terrain.

S-2. **US 25/KY 1189 Intersection**: The skewed angle of KY 1189's intersection with US 25 and hilly terrain along US 25 north and south of the intersection cause sight distance problems and contribute to the high accident rate at this location. While the long-term improvements proposed for US 25 (see project L-1, page 35) could help alleviate the safety problem, the following short-term measures are recommended: On US 25 north and south of the intersection, erect intersection-approach signs and install flashing yellow warning lights. On KY 1189 east of the intersection, erect an intersection-approach sign and at the intersection install a flashing red light.

S-3. **US 25/Fariston South Road/Fariston North Road Intersection:** Hilly terrain along southbound US 25 blocks a motorist's view of the upcoming intersection, and obstacles on both sides of Fariston North Road at the intersection obstruct a motorist's view of traffic on US 25. While the long-term improvements proposed for US 25 (see project L-1, page 35) could help alleviate the safety problems at this high-accident location, the following short-term measures are recommended: On US 25 north and south of the intersection, erect intersection-approach signs and install flashing yellow warning lights. On Fariston North Road at the intersection, cut back the hillside along the south side of the road to improve a motorist's view of northbound US 25 traffic, and require the removal of advertising signs on the north side of the road to improve a motorist's view of southbound US 25 traffic.

Fariston South Road, looking east across US 25 toward Fariston North Road.

S-4. **US 25/South Laurel County Middle/High Schools Access Drives:** A loop road that provides vehicular access to the schools intersects US 25 at two locations approximately 0.1-mile apart. The northernmost drive is about 0.2 mile south of the KY 192 intersection, where some of the heaviest traffic volumes along the entire US 25 corridor occur. The northern driveway provides one-way access only: an entrance for school buses and cars in the morning, and an exit for those vehicles in the afternoon. A guard directs traffic at this location. The southern driveway provides two-way access and there is no traffic guard at this location. The presence of the traffic guard at the northern drive may have alleviated some of the safety problems recorded in this area; however, it is probable that incidences of rear-ending and other problems still occur, particularly in the vicinity of the southern drive. While improvements proposed for US 25 (see project L-1, page 35) could further reduce the potential for accidents, the following short-term measure is recommended: The flashing yellow warning lights and school zone signs northbound and southbound on US 25 should be relocated to a position over the roadway for greater visibility.

S-5. **US 25 –** From KY 192 north to KY 229 (1.7 miles): The many business access drives and several residential streets along the roadway, together with the high accident rate along this stretch, suggest that the posted 45 mph speed limit may be too high for current conditions. A speed study is recommended to determine whether the speed limit should be reduced through this area.

S-6. **US 25/KY 3432 Intersection:** The approaches to this intersection (from just north of the southern Reuben Street/US 25 intersection to just south of Reuben Street's northern intersection with US 25) have been identified as a high-accident locations, and several factors appear to contribute to the safety problems in the area: US 25 narrows from five lanes to three lanes just north of this intersection, forcing southbound drivers to quickly maneuver into the lanes provided for either continuing south or making a turn. The high volume of traffic and the congestion caused by the many business accesses along this route aggravate the problem,

impairing some drivers' abilities to make quick lane-change decisions. A safety study is recommended to consider improvements such as more access control of business entrances. For the short-term, it is recommended that better signage be provided well in advance of the lane transition area to warn drivers of the approaching transition, and that pavement striping be improved to more clearly demarcate lane options.

S-7. **US 25/Chinook Drive Intersection:** Chinook Drive is directly across from a major shopping center anchored by a Kroger supermarket. The section of US 25 from just south to just north of the intersection has a three-year recorded total of 53 accidents, the majority of which were rear-endings or turning-movement related. Driver inattention was the most frequently cited contributing factor to the accidents. The intersection is signalized and US 25 is a five-lane roadway with turn lanes. A safety study is recommended to identify potential safety improvements, such as limiting the number of business access points and/or improving directional signage at the intersection approaches.

Chinook Drive approaching US 25 intersection.

S-8. **US 25/KY 2041 Intersection:** This intersection has been identified as a high-accident location, with driver inattention, improper turning or passing, and failure to yield right-of-way cited as contributing factors. While improvements proposed for US 25 (see project L-2, page 36) could reduce the potential for accidents at this location, the following short-term measure is recommended: Flashing yellow warning lights should be installed at the intersection approaches to alert drives that vehicles may be entering US 25 from KY 2041, or may be stopped on US 25 in preparation for making a left- or right-turn movement.

S-9. **US 25 –** From KY 490 to the north access drive of Institutional Distributors, Inc. (approximately 0.3 mile): This business is located immediately north of KY 490, which has a separate right-turn lane to provide access to US 25. One of the company's parking areas is directly east of the US 25 right-of-way. The parking spaces are immediately off the road right-of-way and almost perpendicular to the roadway. A vehicle exiting a space must back almost directly into traffic coming from the KY 490 turn lane onto US 25. Just north of this parking area is the first leg of a loop access drive that leads to building's main entrance and additional company parking areas. The second leg of the loop intersects US 25 about 0.2-mile farther north. The section of US 25 just north of KY 490 has a high accident rate. While the proposed widening of US 25 to four lanes through the KY 490 intersection (see project L-2, page 36) could reduce the potential for accidents at this location, a number of the accidents appear to be a result of the

ABOVE: US 25 southbound, at KY 490 northbound exit. BELOW: US 25 northbound, approaching pull-off parking for Institutional Distributors, Inc

traffic flow to and from the company parking lots. Along this stretch of US 25, left-turning movements and rear endings were the most frequently cited accident types, and failure to yield right-of-way and driver inattention were the most frequently cited contributing factors. Dialogue with the company officials is recommended to identify feasible methods of improving safety in the area, including, possibly, eliminating the pull-in parking area near the KY 490 intersection, and making the loop drive one-way, with the entrance at the south leg and the exit at the north leg.

S-10. KY 192/Chestnut Street Intersection: Chestnut Street provides access to a residential area. A gas station is located on KY 192 directly across from Chestnut Street. This intersection is at the crest of a hill and is difficult to see from KY 192, while both eastbound and westbound traffic on KY 192 is difficult to see from Chestnut Street for the same reason. The stretch of KY 192 immediately east and west of the intersection is a high-accident location. To improve safety through this area, intersection-approach signs should be erected on KY 192 in both directions, well in advance of the intersection. On Chestnut Street, along either side of the street at the intersection, the right-of-way should be kept clear of obstructions, such as trees and bushes, to improve sight distance.

S-11. KY 192/KY 363 Intersection: This intersection, noted as a high-accident site, is located along the most heavily traveled and commercialized section of KY 192. The intersection is signalized, and there are left-turn lanes on KY 192. On KY 363 there is a right-turn lane at both legs of the intersection, demarcated by a striped traffic island. While the proposed long-term improvements to KY 192 and KY 363 (see projects L-4 and L-6, page 36) could improve traffic flow and reduce the potential for accidents through this intersection, the following short-term measures are recommended: On KY 363, remove the islands and restripe the roads to add lanes for both straight-through and left-turning traffic; and on KY 192 add a right-turn lane for turns onto northbound KY 363.

S-12. S-12. KY 1006/KY 2069 Intersection: This T-intersection, a high-accident location, occurs at the crest of a hill, which obscures a northbound motorist's view of the intersection, and restricting sight distance of a motorist on KY 2069 at the intersection. It is recommended that the crest of the hill south of the intersection be lowered to improve sight distance in all directions through this area.

KY 1006 northbound, approaching KY 2069, right, at crest of hill.

S-13. KY 2069/Sublimity Loop Road Intersection: This is a four-way intersection—the eastbound leg is a private drive, the westbound leg is KY 2069, northbound leg is KY 2069/Sublimity Loop Road, and the southbound leg is Sublimity Loop Road. There is a business with a continuous pull-in parking area in the northwest quadrant of the intersection, abutting the private drive and accessible via KY 2069, only. Motorists westbound on KY 2069 are required to

KY 2069 westbound, approaching KY 2069/Sublimity Loop Road/private drive (straight ahead) intersection.

come to a stop before making a right turn onto northbound KY 2069, or a left turn onto southbound Sublimity Loop Road. The stop sign at the intersection's westbound approach is the only traffic control at this location. Both KY 2069 and Sublimity Loop Road are narrow and winding, rural roads that and traverse hilly terrain. This terrain restricts sight distance at the intersection, which has been noted to be as a high-accident location. It is recommended that stop signs be erected at the three unsigned legs of the intersection, and that "four-way-stop ahead" signs be placed along each roadway well in advance of the intersection.

S-14. KY 229/Ray Overby Road Intersection: This high-accident location is along a narrow section of KY 229 in an area where three residential streets intersect within 0.1-mile of each other (Ray Overby Road, James Lewis Road, and Roger Brown Road). In addition, there are several business access drives. In the northeast quadrant of the KY 229/Ray Overby Street intersection there is a small business that has a continuous pull-in/parking area directly abutting both roadways. Although the proposed widening of KY 229 through this area (see project L-5, page 36), could reduce the potential for accidents in this area, short-term improvements are recommended, as follows: A congested-area-ahead sign should be installed on KY 229 just north of the railroad tracks, and a speed study should be conducted to determine whether the posted speed in this area should be reduced.

From parking lot facing Ray Overby Road / KY 229 intersection, northbound.

S-15. US 25 – From KY 1006 (West 5th Street) to Daniel Boone Parkway/KY 80: Sections of this stretch of US 25 are expected to experience poor levels of service and continued high accident rates at several locations. A study is recommended to analyze existing conditions—such as signage, signalization, and access controls—and identify methods of improving safety and traffic flow.

S-16. KY 192 – From KY 363 to KY 229: Sections of this high-traffic-volume, heavily commercial stretch of KY 192 have been identified as high-accident locations. While the recommended long-term improvements (see project L-4, page 36) could be expected to reduce the potential for accidents, in the short-term it is recommended that a speed study be conducted to determine whether the currently posted 55 mph speed limit should be reduced.

TABLE 14

COST ESTIMATES: SHORT-TERM IMPROVEMENT PROJECTS

Project ID	Location	Description	Cost
S-1	KY 1006/Falls St. Intersection	Improve the turning radius on Falls St.; install flashing light and blind-intersection sign on southbound US 25	$40,000
S-2	US 25/KY 1189 Intersection	Intersection-approach signs (4), flashing lights (2 yellow, 1 red)	440,000
S-3	US 25/Fariston South Rd./ Fariston North Rd. Intersection	Intersection-approach signs (2), flashing lights (2 yellow), lower crest of hill	$40,000
S-4	US 25/South Laurel Schools Access Drives	Relocate 2 school zone signs and flashing lights	$15,000
S-5	US 25 from KY 192 to KY 229	Speed study	$1,000
S-6	US 25/KY 3432 Intersection	Improve signage, pavement striping; safety study	$2,000*
S-7	US 25/Chinook Dr. Intersection	Safety study	*
S-8	US 25/KY 2041 Intersection	Flashing yellow lights (2)	$40,000
S-9	US 25 from KY 490 to business access drive.	Access and parking study	$2,000
S-10	KY 192/ Chestnut St. Intersection	Intersection approach signs (2)	$250
S-11	KY 192/KY 363 Intersection	On KY 363 cut back islands and stripe to add lanes for -through and left-turning traffic. On KY 192, add a right-turn lane at the leg of the intersection with KY 363	$10,000
S-12	KY 1006/KY 2069 Intersection	Lower crest of hill	$125,000
S-13	KY 2069/ Sublimity Loop Rd. Intersection	Stop signs (3) and “four-way-stop ahead” signs (4)	$500
S-14	KY 229/ Ray Overby Rd. Intersection	Congested-area-ahead sign and speed study on KY 229	$500
S-15	US 25 from KY 1006 (West 5th St.) to Daniel Boone Parkway/KY 80	Safety and traffic studies	$50,000
S-16	KY 192 from KY 363 to KY 229	Speed study	$1,000

* The cost of the safety studies would be included in the cost of proposed Project S-15.

5.2 TRANSPORTATION IMPROVEMENT PROJECTS – LONG-TERM

Based on the results of the traffic analyses detailed in Section 4.0, various transportation improvements were studied in more detail using the year 2020 traffic model to test the likelihood that the projects would improve the capacity deficiencies shown on Exhibit 8. Different improvement strategies were considered, including spot improvements, reconstruction and/or widening of existing roads, and the construction of new roads. In addition, the analysis considered the reasonableness and feasibility of each improvement strategy. Some preliminary concepts presented unrealistic constraints that would prevent implementation of a strategy. On the other hand, a strategy that might be difficult to implement would offer the only solution to a problem.

As stated above, the analysis of the study area's year 2020 transportation needs assumed that the projects included in KYTC's Six-Year Plan (Table 11, page 24) will have been implemented, as planned. In addition, the analysis showed that the projects included in the Statewide Transportation Plan (Table 12, page 24) offer benefits to the transportation road network in London/Laurel County and should be considered for inclusion in future editions of KYTC's Six-Year Plan. To satisfy the future transportation needs that are not met by projects in either the Six-Year Plan or the Statewide Transportation Plan, the following nine highway projects are recommended for implementation over the next 20 years. Cost estimates, in year 2000 dollars, are shown on Table 15, page 38. The projects are described below and depicted on Exhibit 9.

L-1. **US 25 –** From KY 1189 north to KY 192 (3.6 miles): US 25 south of KY 192 is a major commercial/retail corridor for London. In addition the roadway also serves as a link to Corbin, Kentucky, 19 miles to the south. The London-Corbin Airport is 18 miles south of KY 192; an industrial park is located near Lily, approximately 6 miles south of KY 192; and the combined campuses of South Laurel County Middle and High Schools and Laurel County Technical College are located almost immediately south of KY 192. By the year 2020, traffic volumes are projected to increase from 20,900 vpd to 30,400 vpd just south of KY 192, and from 9,500 vpd to 13,800 vpd just south of KY 1006. The level of service along US 25 in this proposed project area would deteriorate to F. Several high-accident locations have been identified along this stretch of the roadway, which has two lanes from KY 1189 to KY 1006, and three lanes from KY 1006 to KY 192. In addition, it is probable that US 25, south of KY 1189, would be the location of an interchange with the proposed I-66. Improvement to US 25 will be difficult because of the development along the corridor. However, because of the expected increase in traffic volumes, the need to alleviate safety problems, and the potential interchange, the following long-term improvements are recommended, at an estimated total cost of $23.0 million:

L-1A. From KY 1189 to KY 1006 (2.1 miles), widen this two-lane section to a four-lane rural highway, and realign the KY 1189 approach to eliminate the skewed alignment at the intersection.

L-1B. From KY 1006 to KY 192 (1.5 miles), widen this three-lane section to a five-lane curb and gutter, urban roadway.

L-2. **US 25 –** From KY 80/Daniel Boone Parkway to KY 490 (2.7 miles): US 25 is already operating at LOS E with a traffic volume of 15,900 vpd. It is expected that the volume will continue to increase and the level of service will be LOS F at two locations between KY 80 and KY 490 by the year 2020. Even with the relocated KY 30 in operation, traffic traveling north out of London on US 25 will grow. To handle this increase in traffic, it is recommended that this section of US 25 be widened from two lanes to four lanes. The estimated total cost for this improvement is $13.0 million.

L-3. **KY 1006 –** From KY 192 to Main Street (1.5 miles): This stretch of KY 1006 is a two-lane roadway that has a current (1995) traffic volume of 6,900 vpd and a projected (2020) volume of 1,100 vpd. From approximately Houser Road to Main Street, KY 1006 is narrow and curving; sidewalks, steep hillsides and developed properties abut the roadway; and site distance is poor at several locations due to the terrain, skewed intersections, retaining walls, and/or other obstructions. Two high-accident sites are located along this stretch of roadway (one having a Critical Factor exceeding 4.0). The Statewide Transportation Plan includes a project to reconstruct KY 1006 from KY 192 north to Main Street (i.e., US 25 in downtown London), a distance of 1.5 miles. It is recommended that this project be included in the state' Six-Year Plan.

L-4. **KY 192 –** From KY 1006 to US 25 (1.6 miles): KY 192, a four-lane roadway, has been the recent growth corridor for the London/Laurel County area. The roads radiating out of downtown London have signalized intersections with KY 192, and the city's newest retail/commercial development has occurred along KY 192. Traffic volumes have increased substantially, as have development pressures, and a number of high-accident locations exist along the roadway. Traffic volumes are expected to almost double by the year 2020 and, between KY 1006 and US 25, the increased volume would exceed the road's capacity. It is recommended that the section from KY 1006 to US 25 be widened to six lanes. The estimated total cost for this improvement is $8.0 million.

L-5. **KY 229 –** From to Levi Jackson State Park to KY 192 (2.7 miles): KY 229 connects London to sections of southeast Laurel County, and to Barbourville and US 25E in Knox County. Levi Jackson State Park, Laurel County Park and the Fairgrounds are also along KY 229, just south of London. From KY 192 south to approximately the Little Laurel River KY 229 is currently operating at LOS D. By the year 2020, the traffic volume is projected to increase and the level of service is projected to fall to LOS F just south of KY 192 and LOS E from the CSX railroad crossing south to the state park. The expected traffic volume warrants reconstruction of the road to improve access to the state park and other facilities along the route. It is recommended that this section of KY 229 be widened to four lanes. The estimated total cost of this improvement is $13.0 million.

L-6. **KY 363 –** From KY 3429 to KY 1006 (1.0 mile): By the year 2020, the level of service is projected to fall to LOS E from KY 1006 south to around KY 3429. To relieve some of the pressures and improve the quality of travel, the state plans improvements to the KY 363/KY 1006 intersection, including left-turn lanes on KY 363 (see Table 11, page 24). In addition to these improvements, minor roadway and culvert widening and shoulder improvements are recommended, at an estimated total cost of $500,000.

L-7. **KY 80 –** From KY 1561 to KY 192 (2.0 miles): While the Daniel Boone Parkway carries the bulk of the east-west traffic, local traffic relies on KY 80 to provide access to residential areas east of London. Sections of KY 80 are projected to experience a poor level of service, with LOS F south of KY 192 and LOS E north of KY 1561 expected by the year 2020. The road geometrics and resulting high cost of improvement would most likely prevent a total reconstruction of KY 80; however, spot improvements and minor widening (particularly along the stretch of road fronting Bush Elementary School) are recommended for KY 80 from KY 192 to KY 1561. The estimated total cost is $2.0 million.

L-8. **Western Connector –** From KY 80 to KY 192 (4.7 miles): Over the years, as development has occurred west of I-75, including an industrial park along KY 80 approximately 1.5 miles west of I-75, local traffic has relied upon I-75 to serve as the north-south corridor between KY 80 and KY 192. The I-75 widening project was designed to accommodate some of this local traffic even though the Interstate System was not intended to serve this type of traffic. The traffic model shows that the proposed western connector would draw traffic off I-75 and would carry close to 10,000 vpd by the year 2020. Industrial growth will continue on the west side of London and the western connector would provide a local highway corridor to offer alternative access between KY 80 and KY 192. It is recommended that the western connector be constructed as an alternative corridor to provide an option for this local traffic west of I-75. The estimated total cost is $27.0 million.

L-9. **Daniel Boone Parkway –** From KY 1305 to the terminus of KYTC widening project (5.5 miles): The parkway is the major east-west corridor connecting I-75 to eastern Kentucky. Commercial truck traffic, in particular, relies heavily on this corridor to access the mountainous eastern region of the state. The parkway is also considered to be a likely location for an interchange with proposed I-66. Projections show that the parkway will have a year 2020 traffic volume that is more than double the current volume, and that levels of service will deteriorate to LOS D and LOS E east and south of relocated KY 30. As part of a pavement rehabilitation project and the construction of KY 30 on new alignment, the Daniel Boone Parkway will be widened to four lanes. The KYTC has also begun design to widen the parkway from two lanes to four lanes from MP 37 to MP 44. It is recommended that the four-lane widening already under design as part of the pavement rehabilitation and KY 30 projects be extended approximately 5.5 more miles, to KY 1305, which is just north of the potential location of an interchange with proposed I-66. The project could be carried forward in two phases, as described below, at an estimated total cost of $32.0 million.

L-9A. From KY 1305 to KY 192 (3.0 miles), widen this two-lane section to four lanes.

L-9B. From KY 192 to Relocated KY 30 (2.5 miles), widen this two-lane section to four lanes.

5.3 FUNDING SOURCES AND PRIORITIES FOR IMPLEMENTATION

The recommended long-range improvement projects and their estimated costs (in year 2000 dollars) are summarized in Table 15, below. The projects were also studied to prioritize an implementation schedule. Since it is unlikely that all projects could be started immediately because of funding limitations (see section below), and because the scope of the projects varies significantly, a realistic schedule that prioritizes the projects was developed. The priority ranking reflects the level of a project's importance in meeting the area's transportation needs; therefore, the ranking indicates the order in which projects should be considered for inclusion in the state's Six-Year Plan. For purposes of ranking, the projects are divided into three tiers—high, medium and low—with "high" denoting the top priority for consideration.

TABLE 15

COST ESTIMATES: LONG-TERM IMPROVEMENT PROJECTS

Project Priority	Project Description/Recommendation	Length (miles)	Cost Estimate
L-1	US 25 South—		
L-1A	KY 1189 to KY 1006: Widen to 4 lanes, rural	2.1	$23,000,000
L-1B	KY 1006 to KY 192: Widen to 5 lanes, curb and gutter	1.5	
L-2	US 25 North—D.B. Pkwy to KY 490: Widen to 4 lanes, rural	2.7	$13,000,000
L-3	KY 1006—KY 192 to Main Street: Add to State Six-Year Plan	1.5	
L-4	KY 192—KY 1006 to US 25: Widen to 6 lanes	1.6	$ 8,000,000
L-5	KY 229—Levi Jackson Park Entrance to KY 192: Widen to 4 lanes, rural	2.7	$13,000,000
L-6	KY 363—KY 3429 to KY 1006: Minor Improvements	1.0	$ 500,000
L-7	KY 80—KY 1561 to KY 192: Minor widening	2.0	$ 2,000,000
L-8	Western Connector—KY 80 to KY 192: Build 4 lanes, rural	4.7	$27,000,000
L-9	Daniel Boone Pkwy—		
L-9A	KY 1305 to KY 192: Widen to 4 lanes	3.0	$32,000,000
L-9B	KY 192 to Relocated KY 30: Widen to 4 lanes	2.5	

The KYTC depends on two major sources of funds to support the Commonwealth's transportation program. Kentucky's Road Fund is supported by users' taxes, primarily on fuel, vehicle sales and heavy trucks. Kentucky also receives an annual apportionment of federal dollars from the Highway Account of the Federal Trust Fund. This is a return to Kentucky of the federal excise taxes paid by motorists traveling in Kentucky. The most recent federal-aid transportation bill, *Transportation Equity Act for the 21st Century (TEA-21),* became law in 1998. *TEA-21* provides federal funds for each state through federal Fiscal Year 2003. Some State Road Fund dollars are used to match the federal dollars sent to Kentucky.

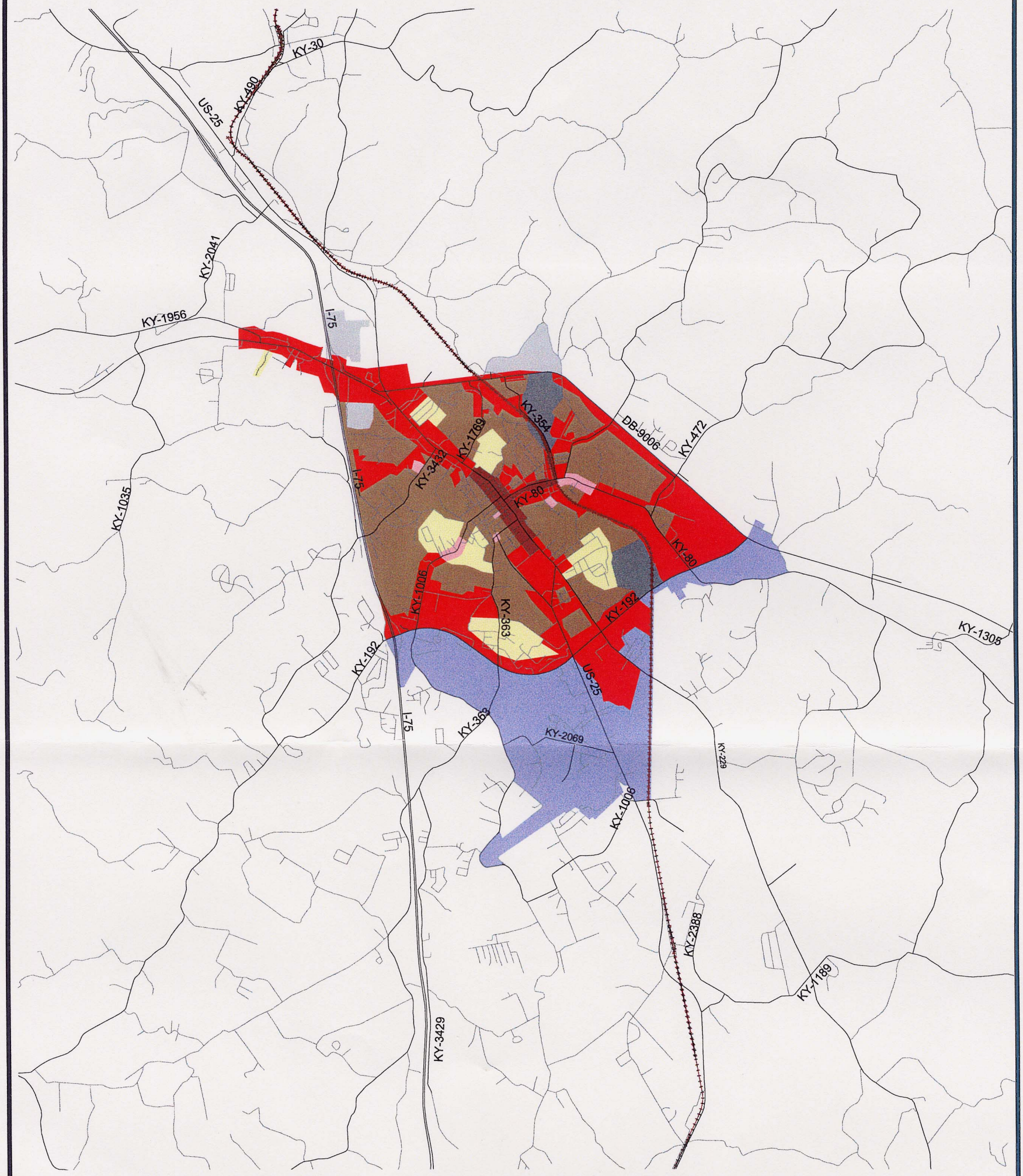
6.0 CONCLUSION

6.1 LOCAL / REGIONAL TRANSPORTATION STUDIES

The KYTC generally relies heavily upon local and regional studies, such as the London/Laurel County Transportation Study, to identify new projects to be included in both the Statewide Transportation Plan and the Six-Year Plan. Since the needs for highway improvements far exceed the amount of funds available to meet those needs, a systematic review of transportation problems, as done in this study, provides the KYTC with an objective evaluation of the current and long-range highway needs in the study area. This study will be an excellent resource for the future as new plans, at the state level, are prepared.

6.2 CONTINUITY

It is critical to the planning process that the community periodically reviews the plan to make sure that it accurately reflects the needs of Laurel County and London. The plan should be reviewed every five to ten years. As the city and county continue to grow and the population, housing, employment changes, the associated transportation needs may change, and those changes should be addressed in an updated plan.



KEY

- State Roads
- Local Roads
- Railroad
- Streams

ZONING

- Single Family Residential
- Multi-Family Residential
- Neighborhood Business
- General Business
- Central Business District
- Industrial-Light
- Industrial-Heavy
- Annexation, December 2000

EXHIBIT 1

CITY OF LONDON ZONING DISTRICTS

London/Laurel County, KY

N W E S

Not To Scale

PRESNELL ASSOCIATES, INC.
Engineering • Architecture • Planning • Landscape Architecture
707 West Main Street
Louisville, Kentucky 40202
(502) 585-2222 • (800) 928-2222
www.presnellgroup.com

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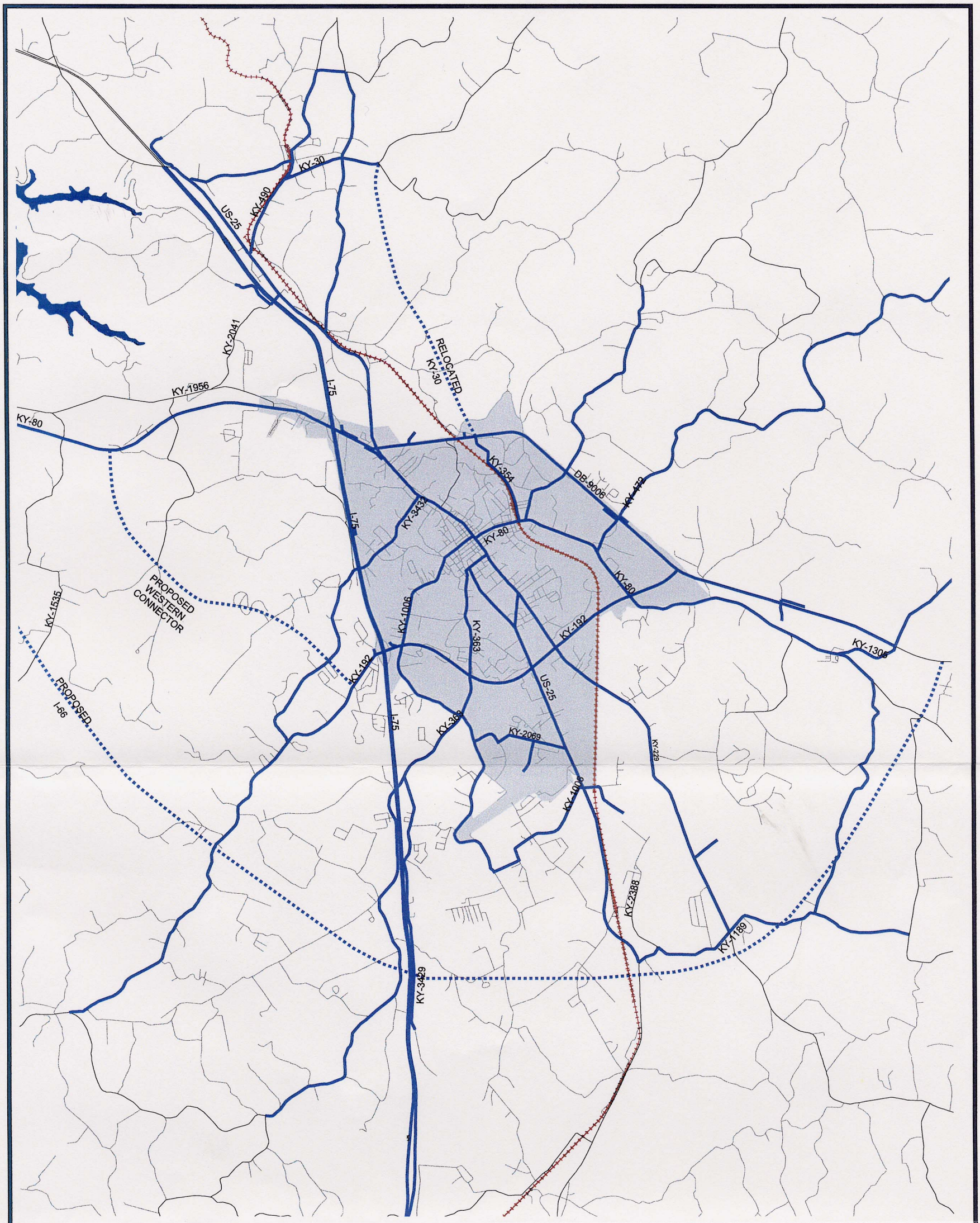

KEY

- Network Model Roads
- Proposed Roads
- Local Roads
- Railroad
- London City Limits

EXHIBIT 2

TRAFFIC MODEL NETWORK

London/Laurel County, KY

N
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Not To Scale

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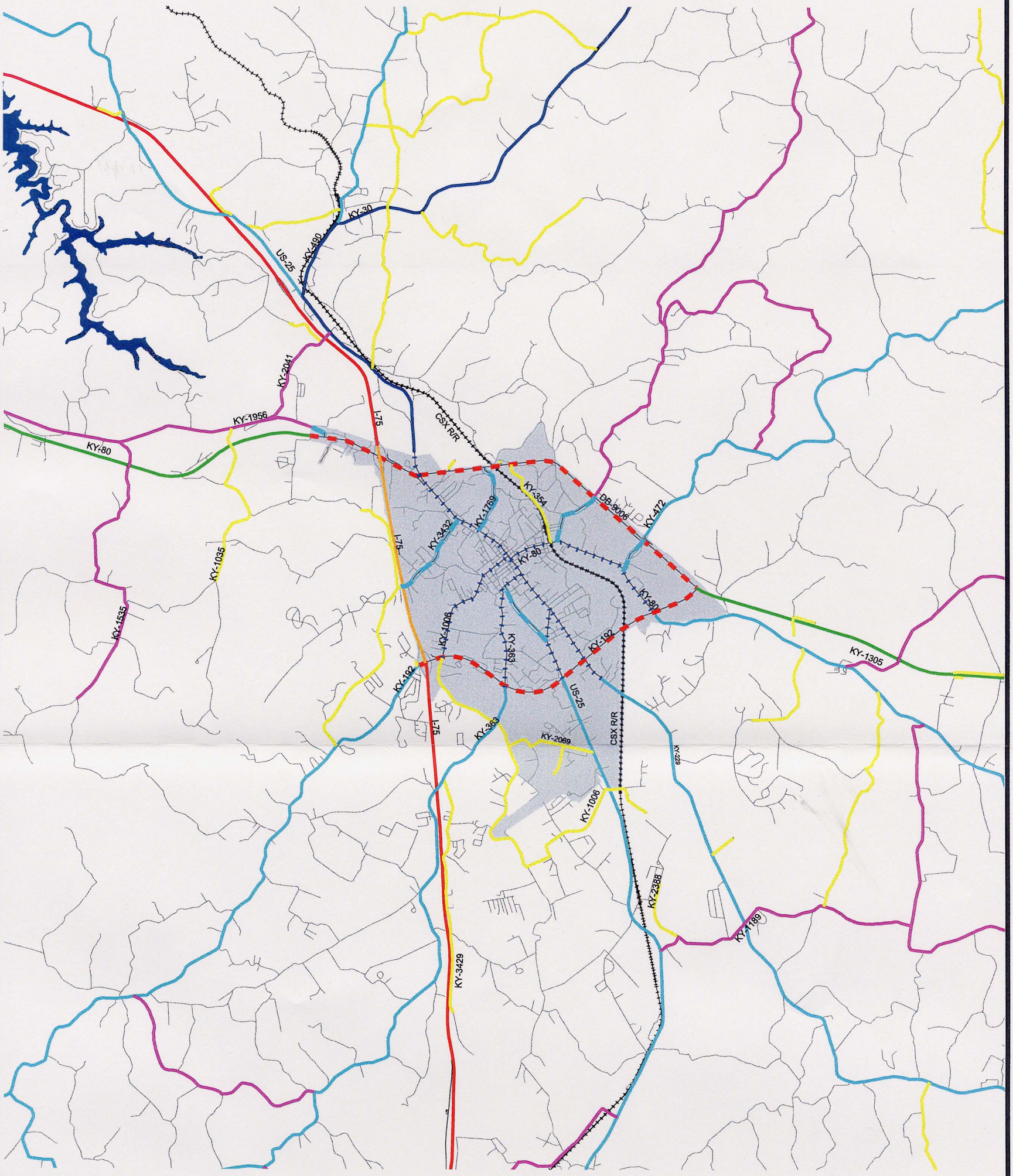

Functional Classifications

- Rural Interstate
- Rural Principal Arterial
- Rural Minor Arterial
- Rural Major Collector
- Rural Minor Collector
- Rural Local
- Urban Interstate
- Urban Principal Arterial
- Urban Minor Arterial
- Urban Collector
- Urban Local

EXHIBIT 3

FUNCTIONAL CLASSIFICATION SYSTEM

London/Laurel County, KY

N W E S

Not To Scale

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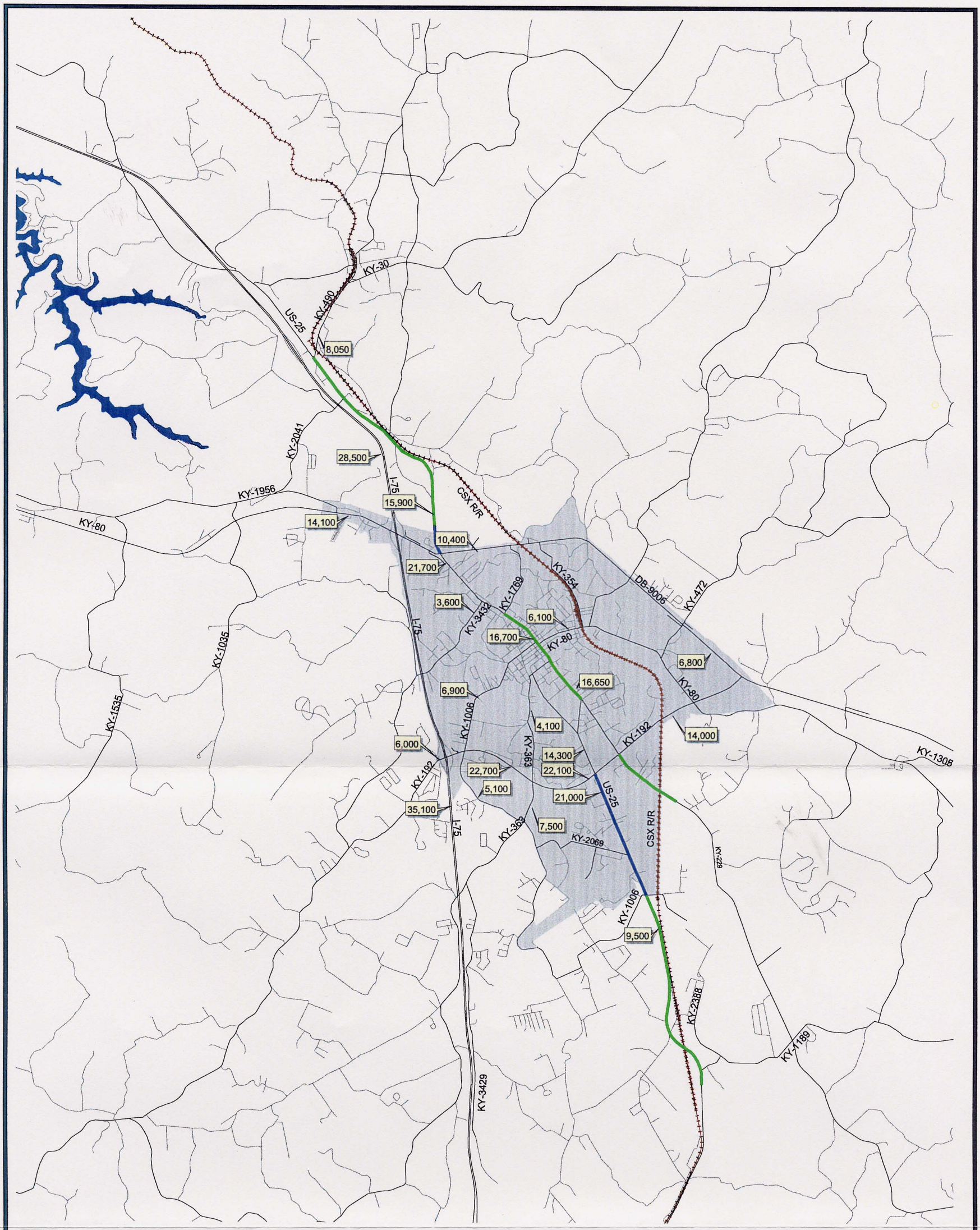

KEY

Level of Service

- C or Better
- D
- E
- F
- State Roads
- Local Roads
- London City Limits

EXHIBIT 4

1995 AVERAGE DAILY TRAFFIC AND LEVELS OF SERVICE

London/Laurel County, KY

N W E S

Not To Scale

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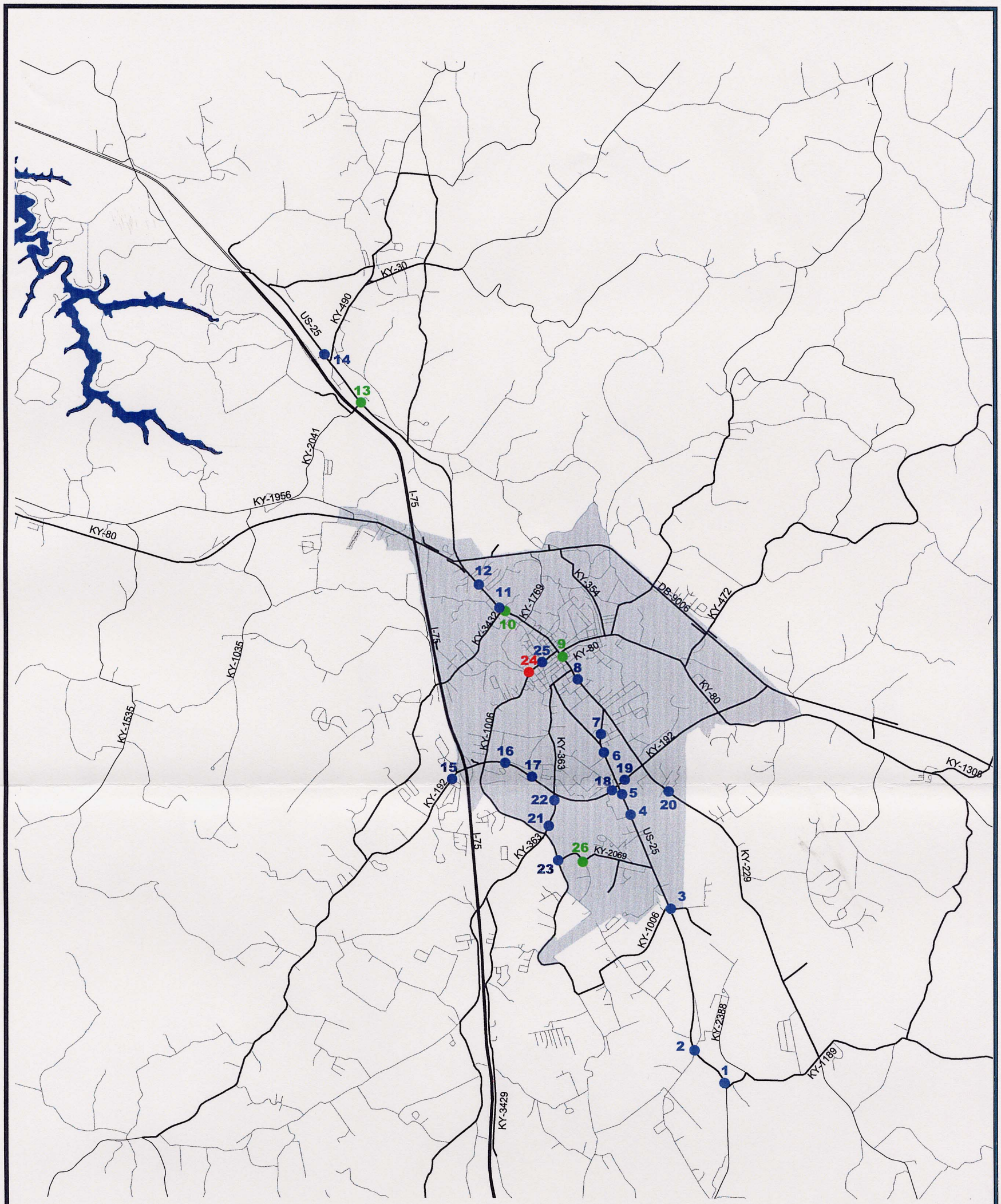

KEY

CRF - Critical Rate Factor

- 1.00 -1.99
- 2.00 - 2.99
- > 3.00

- State Roads
- Local Roads
- Wood Creek Lake
- London City Limits

NOTE: Site ID Numbers correspond to ID numbers on Table 9 in the report.

EXHIBIT 5

HIGH ACCIDENT LOCATIONS

London/Laurel County, KY

N W E S

Not To Scale

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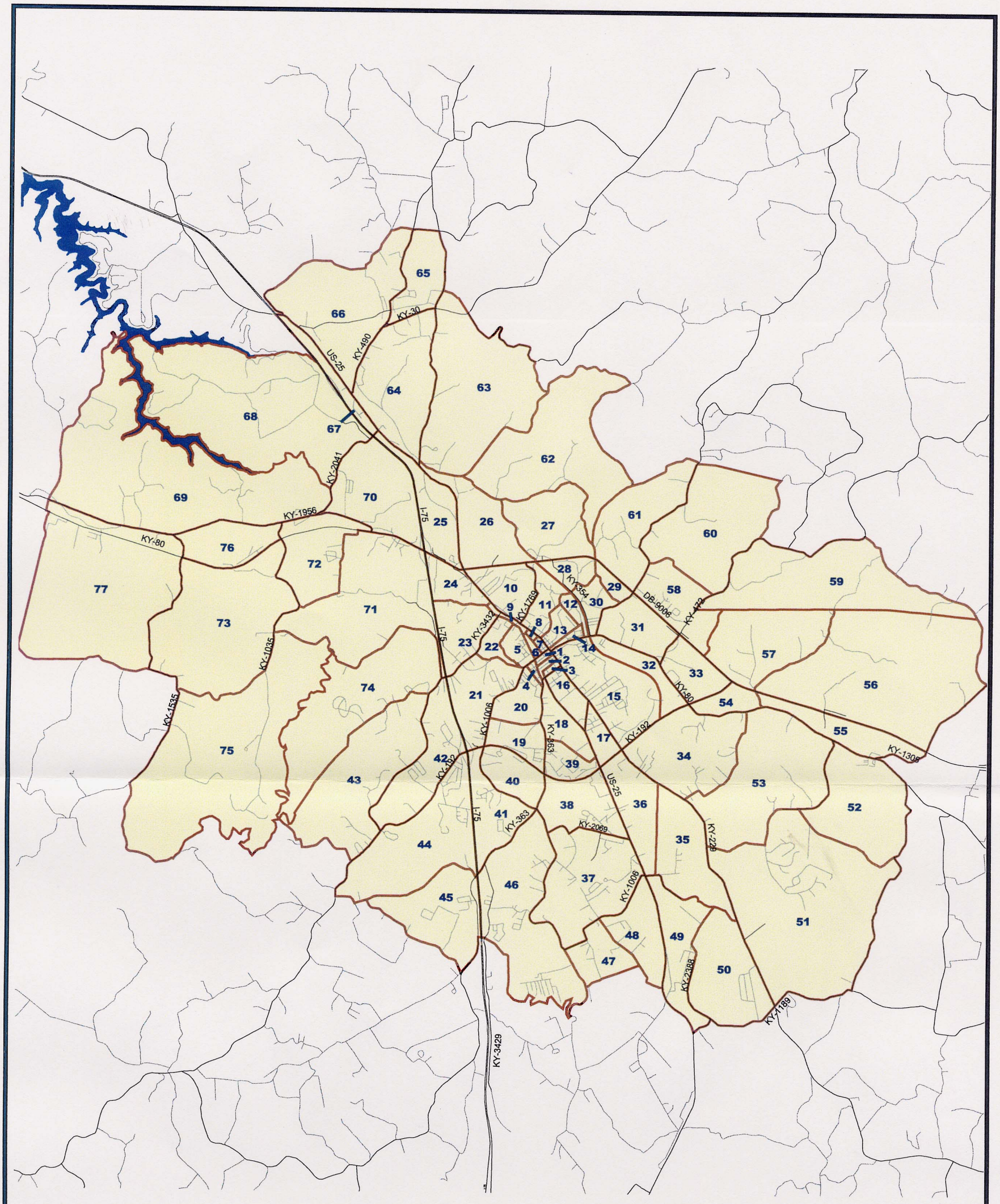

KEY

- State Roads
- Local Roads
- Traffic Zones
- Wood Creek Lake

EXHIBIT 6

TRAFFIC ANALYSIS ZONES (TAZ)

London/Laurel County, KY

N
W E
S

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Louisville, Kentucky 40202
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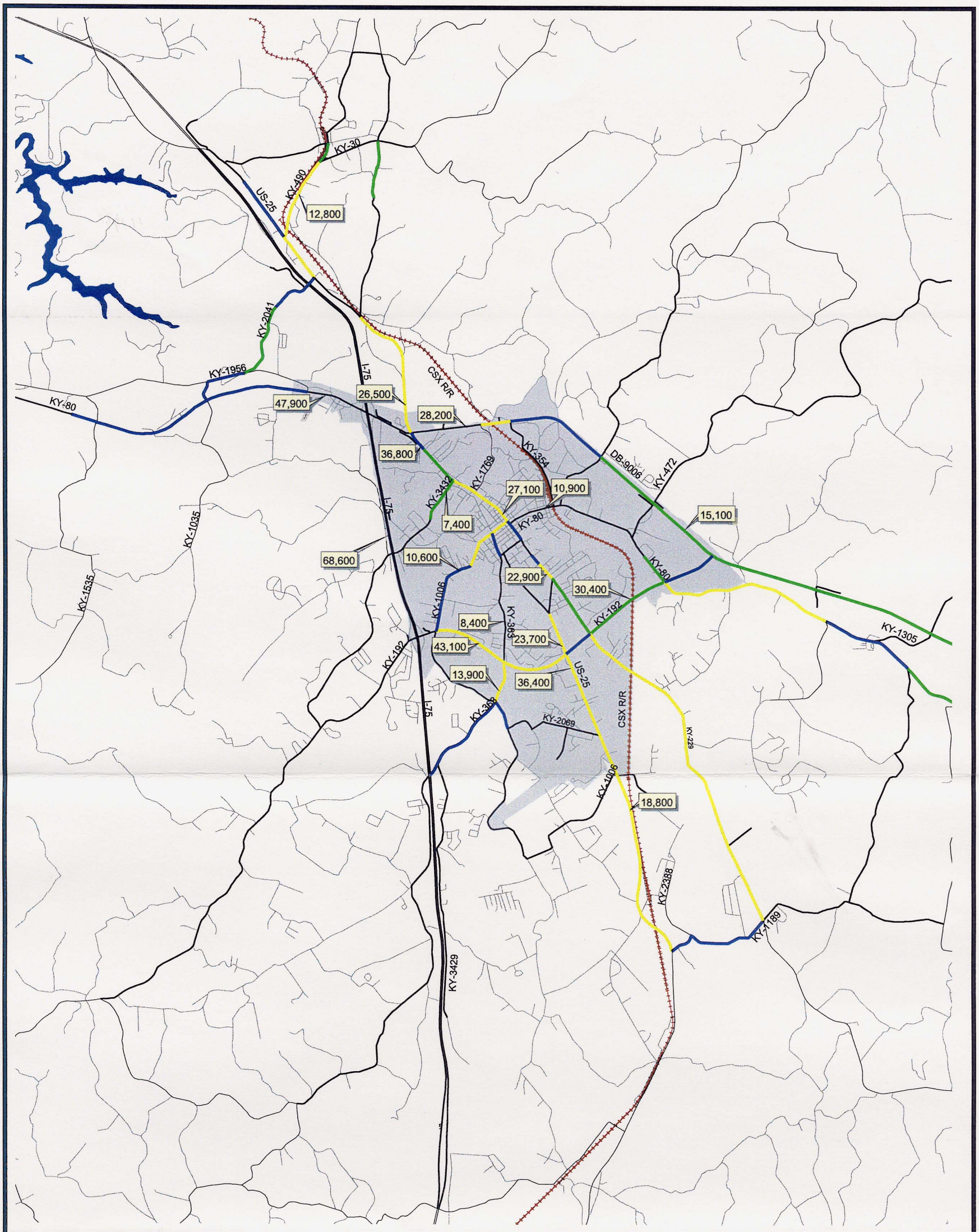

KEY

Level of Service

- C or Better
- D
- E
- F
- State Roads
- Local Roads
- London City Limits

EXHIBIT 7

2020 AVERAGE DAILY TRAFFIC & LEVELS OF SERVICE WITH EXISTING NETWORK

London/Laurel County, KY

N W E S

Not To Scale

PRESNELL ASSOCIATES, INC.
Engineering • Architecture • Planning • Landscape Architecture
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Louisville, Kentucky 40202
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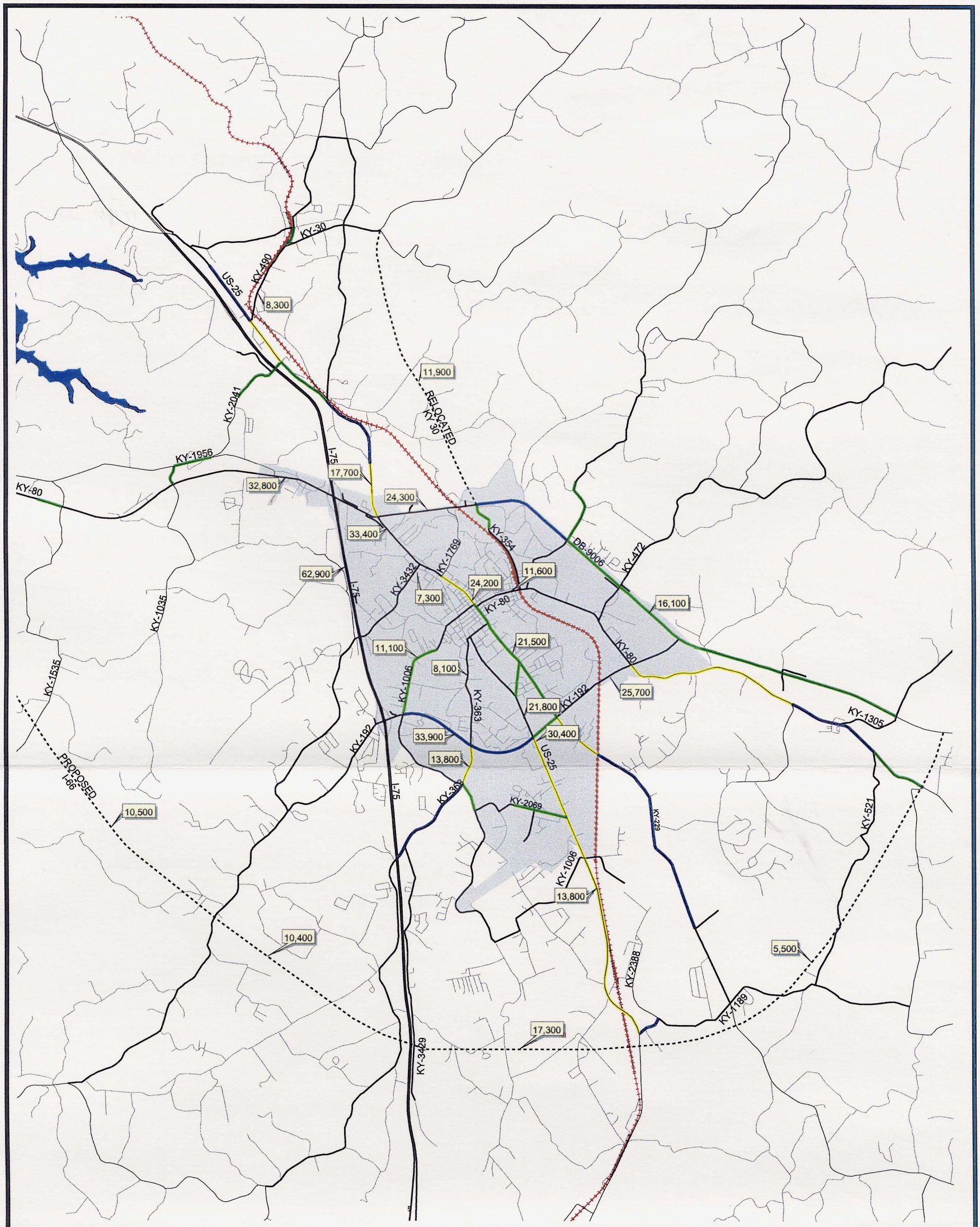
KY-80
KY-1956
KY-1035
KY-1535
KY-2041
US-25
KY-490
KY-30
8,300
I-75
17,700
32,800
24,300
33,400
62,900
KY-1769
KY-3432
7,300
KY-354
11,600
24,200
KY-80
DB-9006
KY-472
16,100
11,100
8,100
KY-1006
KY-363
21,500
KY-192
21,800
25,700
KY-1305
33,900
30,400
13,800
US-25
KY-305
KY-2069
KY-229
KY-521
KY-1006
13,800
PROPOSED I-66
10,500
10,400
KY-3429
17,300
KY-2388
5,500
KY-1189
RELOCATED KY-30
KEY
Level of Service
C or Better
D
E
F
State Roads
Local Roads
London City Limits
EXHIBIT 8
2020 AVERAGE DAILY TRAFFIC FORECASTS AND LEVELS OF SERVICE WITH E+C+I-66 NETWORK
London/Laurel County, KY
N
W
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Not To Scale
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Louisville, Kentucky 40202
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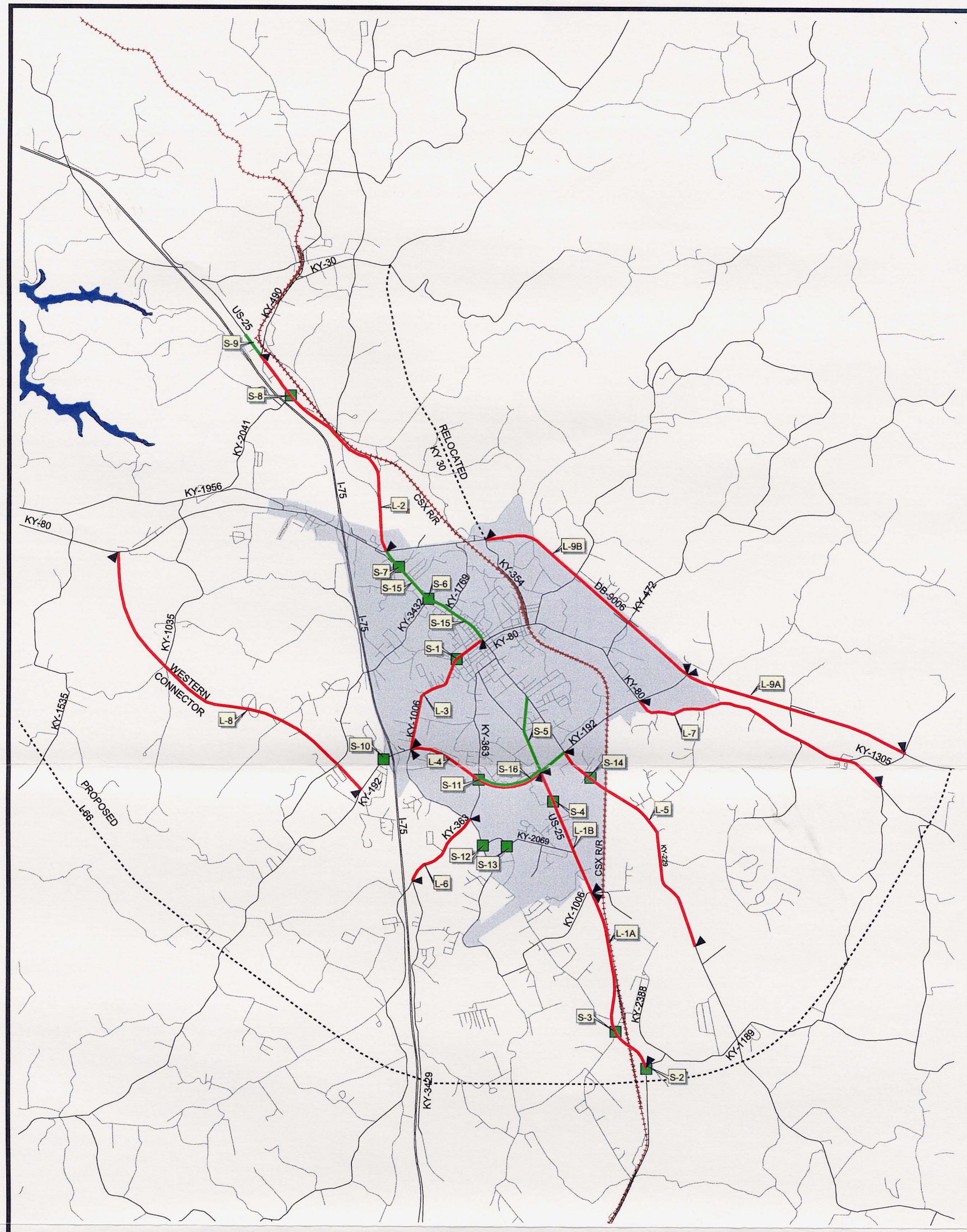

KEY

- Short -Term Improvement
- Short -Term Improvement
- Long -Term Improvement
- State Roads
- Local Roads
- Levi Jackson State Park
- London City Limits

EXHIBIT 9

RECOMMENDED TRANSPORTATION PLAN

London/Laurel County, KY

N W E S

Not To Scale

PRESNELL ASSOCIATES, INC.
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Louisville, Kentucky 40202
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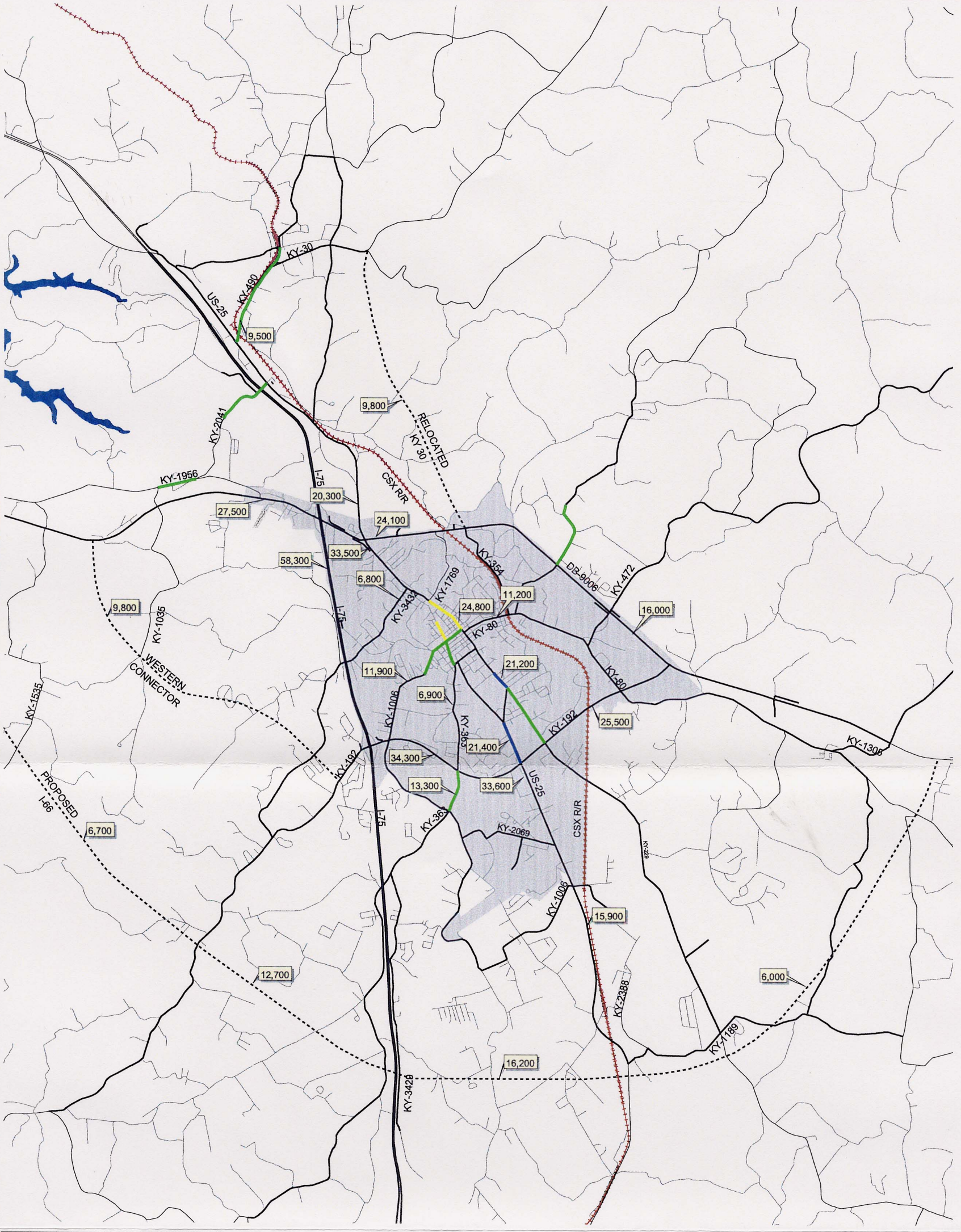

KEY

Level of Service

- C or Better
- D
- E
- F
- State Roads
- Local Roads
- London City Limits

EXHIBIT 10

2020 AVERAGE DAILY TRAFFIC & LEVELS OF SERVICE WITH TRANSPORTATION PLAN

(Including E+C+I-66 Network)

London/Laurel County, KY

N W E S

Not To Scale

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