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Final Report

January 2004

Madison County
Transportation Study

KENTUCKY TRANSPORTATION CABINET

CHAPTER I – INTRODUCTION

The Kentucky Transportation Cabinet (KYTC), through its Division of Multimodal Programs, has the responsibility to assist urban areas within the Commonwealth with an examination of their overall transportation systems. Therefore, the KYTC, in cooperation with local governmental officials and the U.S. Department of Transportation, allocated funds in 2002 to sponsor transportation studies for some areas with populations of more than 5,000 people.

The purpose of these urban transportation studies is primarily to analyze present and future highway travel, to identify existing system-wide deficiencies and to forecast future deficiencies in the urban area's roadway systems. These studies also provide for the development of both short-range and long-range improvements to state and federal highway systems facilities to alleviate those deficiencies. In addition, these studies may address multi-modal and intermodal transportation issues at levels of detail appropriate for individual areas. These can include bicycle and pedestrian facilities, transit service, trucking operations, rail facilities, and aviation issues.

The efficient movement of people and goods is a factor that greatly affects Madison County's ability to function effectively as an urban society. Because of this, the *Madison County Areawide Transportation Study* was sponsored by the KYTC, and conducted by the firm of Jordan, Jones and Goulding with the cooperation of Madison County and the cities of Richmond and Berea.

Background

Madison County is located in the heart of Central Kentucky, just south of Fayette County. There are two mid-sized cities - Richmond, the county seat, and Berea, renowned as the 'Folk Arts & Crafts Capital of Kentucky'. Madison County is also home to Eastern Kentucky University in Richmond and Berea College. The location of Madison County relative to the surrounding counties of the state can be seen in **Figure I-1**.

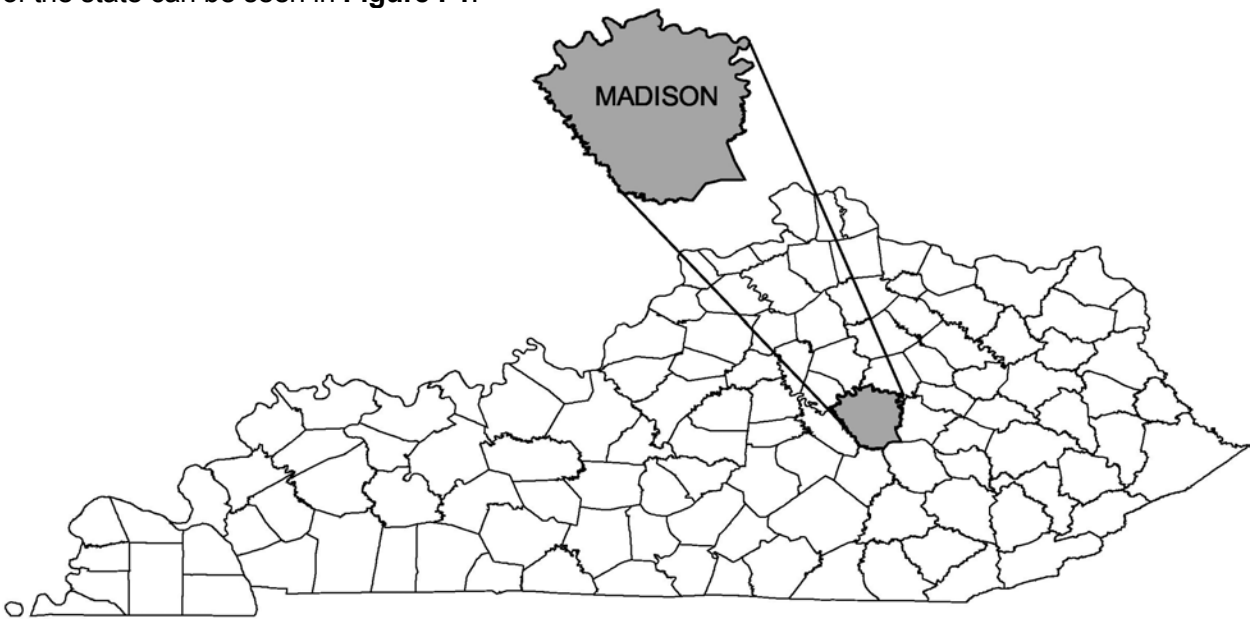


Figure I-1. Project Location

Formed in 1786, Madison County was named for Virginia statesman James Madison, who later became the fourth president of the United States. It is the largest county in the Bluegrass Region, ranking twenty-first in size and tenth in population among the 120 Kentucky counties. I-75, which runs north to south, bisects Madison County.

Madison County encompasses a land area of 446 square miles. This includes 22.8 square miles in the City of Richmond and 7.8 square miles in the City of Berea. In recent decades, the county has experienced increased growth, resulting in greater pressure on the transportation system, especially in and around Richmond and Berea. This study is intended to address those system-level congestion problems brought about by increased growth.

Purpose

The system-level transportation study for Madison County has the following basic objectives:

- Establish an integrated roadway system that efficiently accommodates existing and future travel demands;
- Develop future travel demand forecasts and resulting plans based on projected socio-economic and land use activities;
- Produce a transportation plan which recommends improvements to the system within the financial capabilities of the Commonwealth of Kentucky, the City of Richmond, the City of Berea and Madison County; and
- Develop a long-range plan that can be updated easily to reflect growing and changing demands on the roadway system.

Scope

The scope of this study is to conduct a comprehensive area wide transportation study for Madison County and develop a financially feasible transportation plan that will accommodate projected transportation demands through the Year 2025. The recommended plan has four components:

1. Public Involvement Plan. The public involvement strategy component consists of holding five (5) Transportation Study Work Group meetings and two (2) public meetings. The purpose of these meetings is to receive input from a wide cross-section of public sources such as elected officials and public works officials from the City of Berea, the City of Richmond, and Madison County, business leaders, as well as citizens at-large. This input is considered vital to understanding issues important to the community regarding transportation in general, transportation safety, and future growth within Madison County.

2. Transportation Modeling and Forecasting. A transportation model was developed for the study using data from multiple sources and the most recent travel demand modeling software available. The base year for the model network is 2000 and all long-range projections for population and employment data were made for the year 2025.

3. Operational Improvement Plan. This component consists of short-term, small scale and relatively low cost projects that can be implemented easily. Projects in the Operational

Improvement Plan can implemented by either local or state government, and may be incorporated into the State *Six Year Highway Plan*.

4. Long Range Transportation Plan. Projects in the Long Range Plan are large-scale projects that will expand or increase roadway capacity. Long Range Plan projects are prioritized and are considered as candidate projects for Kentucky's *Six Year Highway Plan* (i.e. Years 1 through 6) and the *Statewide Transportation Plan* (Years 7 through 20).

The recommended Madison County Long Range Transportation Plan is intended to function as the basis for the transportation elements for the Comprehensive Plans of the City of Richmond, the City of Berea and Madison County.

This study began in September 2002 with a projected completion date of December 2003. The study has met that target date.

CHAPTER II – PUBLIC INVOLVEMENT PLAN

The purpose of the Public Involvement Plan developed for the Madison County Areawide Transportation Study was to facilitate and coordinate the involvement of the public as the project progressed, and to describe how and when various stakeholders were involved.

The Madison County Areawide Transportation Study was a multi-faceted study to produce a master plan outlining short-term and long-term recommendations for transportation improvements in Madison County. Meaningful public input was crucial to the transportation planning process because it provided a qualitative human perspective to what would otherwise be a strictly quantitative technical exercise.

All of the recommendations addressing road improvement needs were expected to have a significant impact on Madison County, including the Cities of Richmond and Berea. A sense of public ownership of the plan through public participation in its development was necessary for plan acceptance. A Transportation Study Work Group, comprised of state and local officials and other community leaders, was established to provide input and guidance to the study process.

Transportation Study Work Group

The Transportation Study Work Group consisted of representatives of Madison County and the cities of Richmond and Berea. Representatives from the Kentucky Transportation Cabinet and the Bluegrass Area Development District were also included. Individual Work Group members were:

• Kent Clark	County Judge Executive	Madison County
• David Evans	City Manager	City of Richmond
• Randy Stone	City Administrator	City of Berea
• Robert Farmer	Chair	Madison County Planning Commission
• David Rush	Chair	Richmond City Planning Commission
• Ira Newman	Chair	Berea City Planning Commission
• James H. Howard	Executive Director	Richmond Industrial Development Corp.
• Rob Rumpke	President	Richmond Chamber of Commerce
• Will Stambaugh	Past-President	Richmond Chamber of Commerce
• Bruce Duncan	Transportation Planner	Bluegrass Area Development District
• John Allread	Transportation Planner	Bluegrass Area Development District
• Aaron Cox	Transportation Director	Kentucky River Foothills
• Willie Whittamore	Planning Branch Manager	Kentucky Transportation Cabinet – District 7
• Barry House	Project Manager	Kentucky Transportation Cabinet
• Amy Thomas	Engineer	Kentucky Transportation Cabinet

Five workgroup meetings were held. The meeting dates, and a brief list of the items discussed are listed below.

Meeting 1 – October 7, 2002

1. Study Purpose
2. Study Elements
3. Scope of Work and Schedule
4. Preliminary Existing Conditions Analysis

Meeting 2 – December 16, 2002

1. Review of Study Objectives and Scope of Work
2. Final Existing Conditions Analysis
3. Preliminary Operational Improvement Plan

Meeting 3 – April 30, 2003

1. Public Involvement Plan
2. Final Operational Improvement Plan
3. Traffic Model Development and 2025 Traffic Conditions

Meeting 4 – July 10, 2003

1. Preliminary Discussion of Recommended Plan Projects

Meeting 5 – September 23, 2003

1. Final Discussion of Recommended Plan Projects

Public Meetings

JJG staff conducted two public meetings to present information about the study and to receive input and comments. At the first meeting, on May 29, 2003, basic study facts and existing system deficiencies were presented. At the second public meeting, on September 25, 2003, future system demands and deficiencies were presented, along with the analyses of alternatives and the recommended transportation plan. A number of different methods were used to publicize the two public meetings, including:

- Distribution of approximately 150 8.5x11 flyers at various high traffic areas throughout Madison County, Richmond and Berea.

- For the first meeting, a televised interview was conducted between Tom Creasey and David Evans, Richmond City Manager. The meeting ran on Richmond's Government Channel.

- An article in the Richmond Register newspaper.

- Distribution of a Public Service Announcement to various media contacts.

Media Contacts

- Richmond Register (Newspaper)
- Adelphia Cable Bulletin Board – Richmond & Berea
- WEKU 88.9 FM
- WEKY 1340 AM
- WCYO 100.7 FM
- WLFX 106.7 FM
- WKXO 1500 AM
- WCBR 1110 AM

Public Service Announcement

The following Public Service Announcements were prepared and distributed to the media contacts:

Public Meeting 1:

The Kentucky Transportation Cabinet, in cooperation with Madison County and the Cities of Richmond and Berea, is currently conducting a study to develop a long-range transportation plan for Madison County. The study will address the need for short-term transportation improvements, as well as long-range needs through the year 2025.

A public meeting will be held in the Commission Chambers of the Richmond City Hall at 239 West Main Street in downtown Richmond on Thursday May 29, 2003 from 5:30 to 7:30 pm.

The purpose of this meeting is to gather important public input on transportation issues, and to present information on existing and projected future transportation conditions.

For additional information, please contact Stuart Kearns, Senior Planner with Jordan, Jones & Goulding at (859) 224-7776 or skearns@jjg.com.

Public Meeting 2:

The Kentucky Transportation Cabinet, in cooperation with Madison County and the Cities of Richmond and Berea, is currently conducting a study to develop a long-range transportation plan for Madison County. The study will address the need for short-term transportation improvements, as well as long-range needs through the year 2025.

A public meeting will be held in the Commission Chambers of the Richmond City Hall at 239 West Main Street in downtown Richmond on Thursday September, 25 2003 from 5:30 to 7:30 pm.

The purpose of this meeting is to gather important public input on transportation issues, and to present the final recommended transportation plan for Madison County.

For additional information, please contact Stuart Kearns, Senior Planner with Jordan, Jones & Goulding at (859) 224-7776 or skearns@jjg.com.

Significant Issues

As the study progressed, the Work Group identified several key transportation issues. Some of the major issues considered in the development of the Long Range Transportation Plan included:

- The need for Madison County, and the Cities of Richmond and Berea to cooperate when planning for the future.
- The proposed Northern Berea Bypass.
- The proposed Southern Berea Bypass.
- The Artisan Center in Berea.
- The disposal and/or destruction of chemical weapons at the Blue Grass Army Depot.
- Future development along the new Richmond Bypass.
- Duncannon Road improvements.
- Peak traffic congestion on US 25 between Richmond and Berea.

Goals and Objectives

Goals are the basis for all human decisions. In order to make sound decisions, goals must be clearly identified and logically organized. Goals should also be quantifiable, as progress toward those goals cannot be measured otherwise.

While goals are broad and generalized statements that reflect overall public interest and give general direction, objectives are more specific statements, which grow out of the goals. The objectives represent the goals in specific elements, which can be accomplished and directly measured.

Using input from the Work Group, the JJG staff developed a set of Goals and Objectives for the Madison County Areawide Transportation Study. These were used as a guide in developing the Recommended Long Range Transportation Plan. The Goals and Objectives were:

Goal 1: Provide for a Safe, Efficient, and Balanced Transportation System

Objective 1.1. Identify high accident locations.

Objective 1.2. Increase transportation system efficiency by making the most effective use of existing facilities and by using advanced technologies and management methods, as appropriate.

Objective 1.3. Identify existing and projected future congestion locations and develop strategies to reduce congestion and improve travel times.

Objective 1.4. Improve intermodal connectivity of the transportation system.

Goal 2: Enhance Economic Development Opportunities

Objective 2.1 Improve/enhance highway and/or public transportation access to industrial sites, terminals, rail and intermodal facilities, freight distribution points, and military installations.

Objective 2.2. Improve access to undeveloped areas.

Objective 2.3. Enhance access to recreational areas and tourist sites.

Goal 3: Provide for an Environmentally Sensitive Transportation System

Objective 3.1. Protect and preserve existing scenic views and viewsheds.

Objective 3.2. Preserve/enhance special historic districts, historic sites, prehistoric sites, and natural environments.

Objective 3.3. Develop a transportation system that minimizes adverse impacts on noise, air quality and water.

Goal 4: Proactively Plan for Future Transportation System Needs

Objective 4.1. Identify and prioritize future transportation system needs.

Objective 4.2. Develop a prioritized list of projects for inclusion in the State's Long Range Plan.

Objective 4.3. Encourage inclusion of projects in the State's Six Year Plan and promote funding for those projects.

Objective 4.4. Develop (promote) alternative funding mechanisms for State and local projects.

CHAPTER III - EXISTING TRANSPORTATION SYSTEM

The original primary transportation routes in Madison County were the Kentucky River and other navigable streams. It was the Kentucky River that served as the major transportation route for agricultural produce to arrive at markets in New Orleans as early as the 1780s. Over the following years the highway and road system began to form with the first state-owned turnpike, the Lexington-Richmond Pike, operating in 1852.

Rail lines such as the Louisville and Nashville Railroad began to appear in Madison County in the early 1900s. This particular line served as a major North-South line between Cincinnati and Atlanta. Both Richmond and Berea experienced tremendous growth during this period because of their accessibility by rail. The only remaining railroad today is the old Louisville and Nashville line, now owned and operated by CSX Railroad.

The major highway routes of US 25, US 421, KY 876, KY 21, and KY 52 provided the basic arterial highway system for Richmond and Berea. I-75 was built during the early 1960s to provide an alternative north-south route to US 25. I-75 crosses the Kentucky River via the Clay's Ferry Bridge, which consists of three separate structures. The first structure was completed as part of US 25 before the construction of the interstate. During the I-75 construction in the 1960s a parallel structure was built to accommodate interstate traffic. In the 1990s, a third structure was completed between the two existing bridges to provide room for six lanes on I-75.

Study Area

The study area includes all of Madison County. It is bordered by Fayette and Clark Counties and the Kentucky River to the north, Estill County to the east, Rockcastle and Jackson Counties to the south, and Garrard and Jessamine Counties to the west. The study area is shown in **Figure III-1**.

Transportation Network

The basic transportation network considered in the Madison County Transportation Study includes I-75 and all US designated highways and state routes along with some local roads. Some local roads contained in the transportation model include Duncannon Road, Barnes Mill Road, Ellipse Street, Glades Road, University Drive, Boggs Lane, Kit Carson Drive, and Old Boonesboro Road. Other local city streets and county roads serve primarily as feeder roads and were therefore excluded from detailed consideration. The traffic model network is shown in **Figure III-2**.

I-75 is the dominant north-south route through Madison County, passing to the west of both Richmond and Berea. Presently there are six interchanges with I-75 in Madison County – KY 21 (Exit 76) and KY 595 (Exit 77) on the west side of Berea, KY 876 (Exit 87) and US 25 (Exit 90) to the west of Richmond, KY 627 (Exit 95) northwest of Richmond, and US 25 (Exit 97) near the Fayette County line. An additional interchange just south of Richmond will soon be under construction. This interchange will allow motorists to use a new and larger Rest Area and will provide direct access to Duncannon Lane, which provides access to the South Richmond Industrial Park.

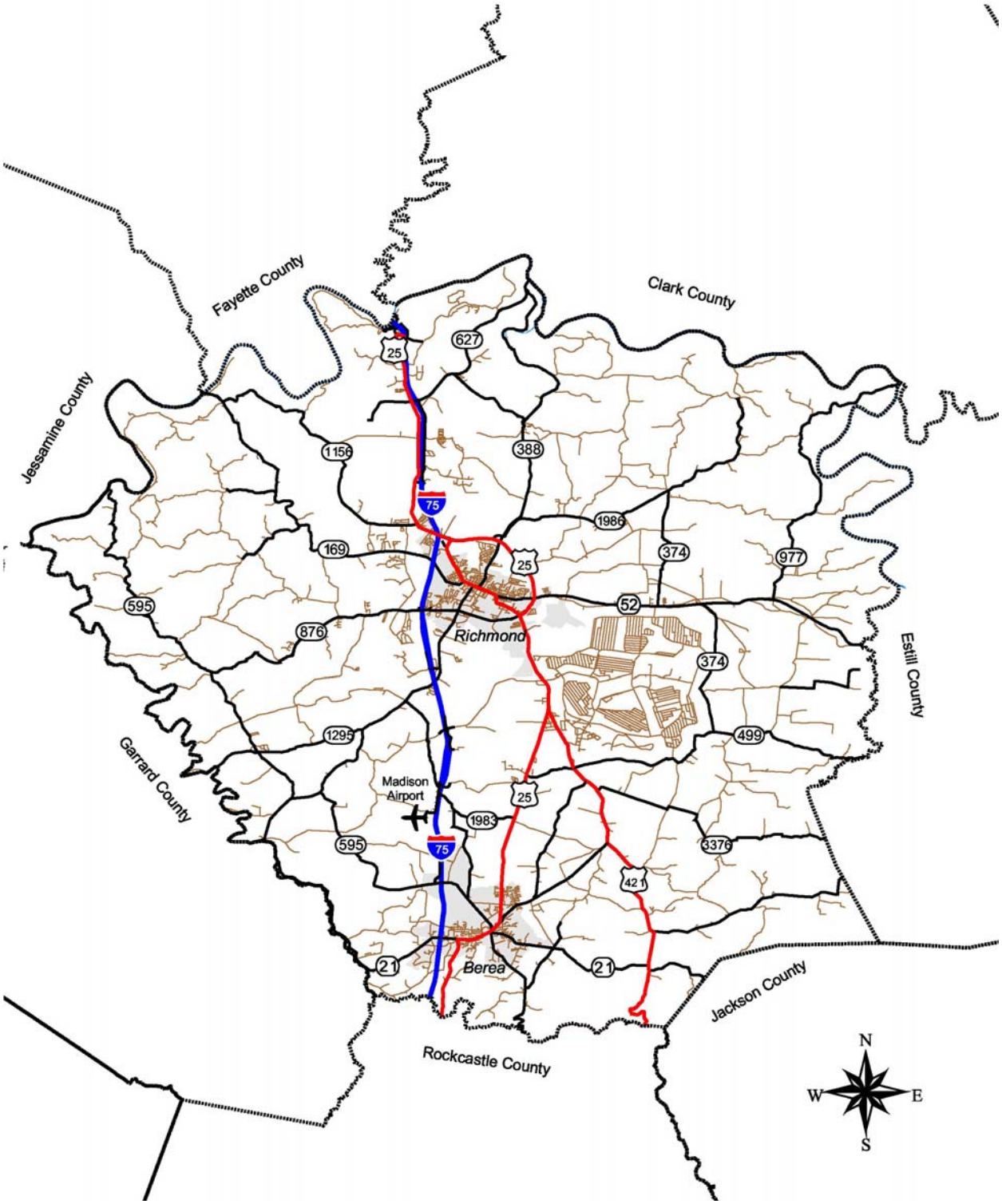


Figure III-1. Study Area

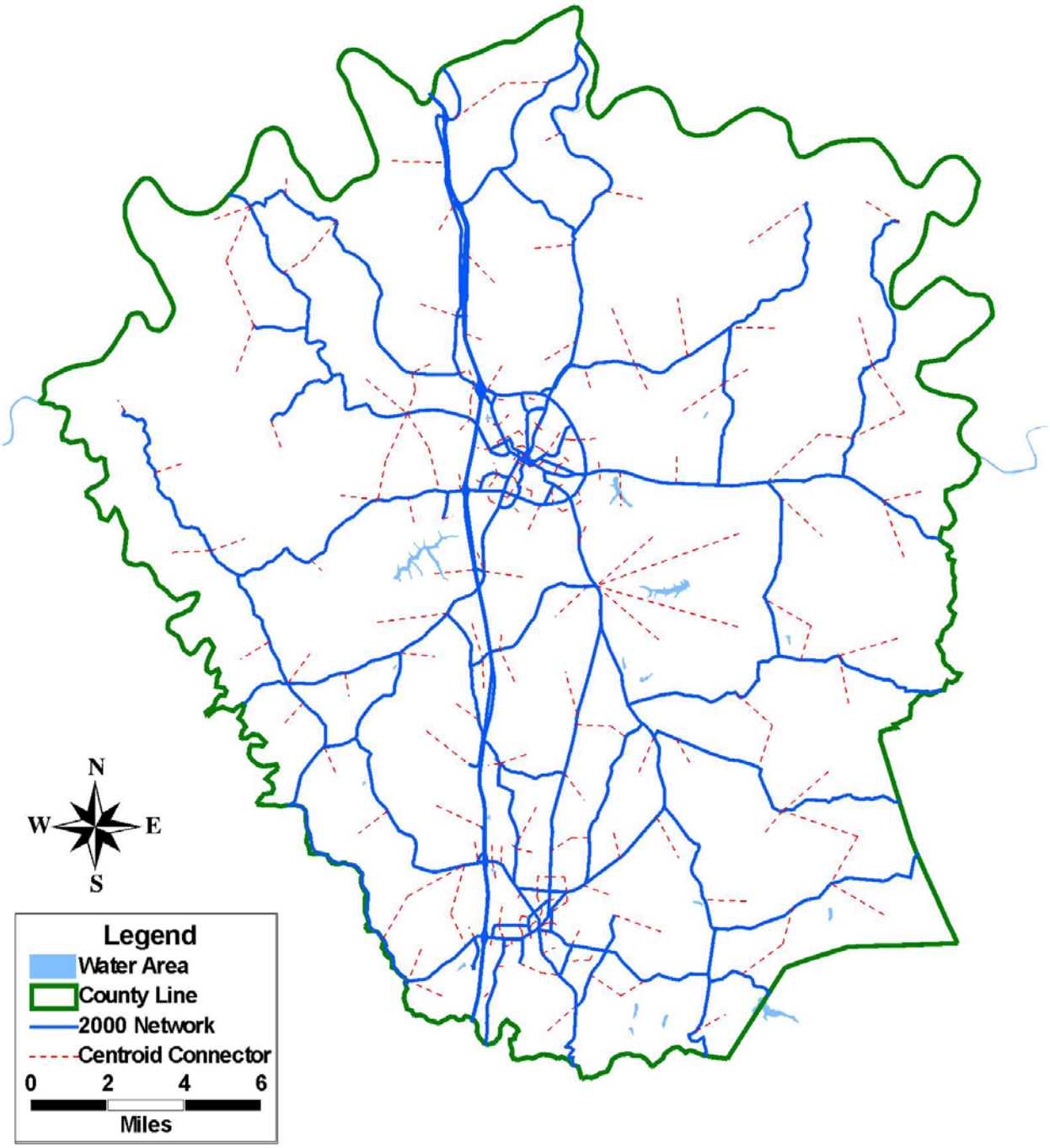


Figure III-2. Traffic Model Network

Two other major regional highways pass through the study area. They are US 25 and US 421. US 25 enters Madison County from the south at the Rockcastle County line and proceeds northward. Along the way, US 25 passes through downtown Berea and then heads northeast passing the Bluegrass Army Depot. When US 25 reaches KY 876 in Richmond, the route splits into the business route US 25X and US 25. US 25X passes through downtown Richmond becoming Big Hill Avenue and then Main Street. US 25 follows the Martin Bypass around the north of the city until it meets with US 25X around the I-75 interchange. US 25 is then located just west of the interstate and parallels I-75 to the Fayette County line.

Entering the County from the south at the Rockcastle County line, US 421 proceeds northward through rural Madison County until it joins US 25 near the Bluegrass Army Depot. Other significant state routes in the study area include:

- KY 21
- KY 52 (Irvine Road and Lancaster Road)
- KY 595
- KY 876 (Barnes Mill Road and Eastern Bypass)

Federal-Aid Routes and Functional Classification

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 restructured the Federal-aid system into two systems: the National Highway System (NHS) and the Interstate system, which is a component of the NHS.

Although there are only two Federal-aid systems, all public roads functionally classified above that of rural minor collector are eligible for Federal assistance under new and/or continued programs provided by legislation approved by Congress in 1991 and the subsequent Transportation Equity Act for the 21st Century (TEA-21) in 1998. These are primarily funded under the Surface Transportation Program, the Congestion Mitigation and Air Quality Program (for which Madison County is not currently eligible), and the Highway Bridge Replacement and Rehabilitation Program.

National Highway System

The National Highway System focuses Federal resources on routes that are especially important to interstate travel and the national defense, and on roads that connect to other modes of transportation or are essential for interstate or international commerce. The NHS is designed to maintain system connectivity within the State and with adjacent states.

Section 103 (b) (1) of 23 U.S.C. defines the purpose of the NHS as:

> *"… to provide an interconnected system of principal arterial routes which will serve major population centers, international border crossings, ports, airports, public transportation facilities, and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel."*

The Federally mandated components of the NHS are: 1) the Interstate System, 2) other urban and rural principal arterials 3) intermodal connectors, which provide motor vehicle access to a major riverport, airport, public transportation facility, or other intermodal transportation facility, 4) the Strategic Highway Network (STRAHNET) which is a network of highways important to the United States strategic defense policy, and 5) major Strategic Highway Network connectors.

The Madison County routes on the NHS are: I-75 in its entirety, US 25 from US 421 to KY 876, US 421 from Rice Lane to US 25, and KY 876 from I-75 to US 25.

Functional Classifications

Streets and highways are grouped into classes or systems according to the character of service they are intended to provide. This process is called functional classification. An integral part of this process is the recognition that individual roads and streets do not serve travel independent from the rest of the highway system. Rather, most travel involves movement through a network of roads.

Functional classification can be applied in planning highway system development, determining the jurisdictional responsibility for particular systems, and in fiscal planning. Functional classification is also important in determining eligibility for Federal-aid funding.

Urban and rural functional systems are classified as such:

Principal Arterials

Principal arterials are designed to provide for major travel desires between, across, and within urban areas. Expressways within this system do not provide access to adjacent land. Principal arterials are intended to carry high traffic volumes and serve the longest trip lengths.

Minor Arterials

Minor arterials are moderate volume streets and roads that interconnect with and augment the principal arterial system. More emphasis is placed on land access than for principal arterials, but the primary emphasis is on the movement of traffic. Also, travel desires typically are shorter for minor arterials than for principal arterials.

Collectors

Collector streets penetrate neighborhoods and the urban core, collecting and distributing trips from arterials to the local street system. Collectors provide both access to adjoining land and through movement of traffic.

In rural areas, collectors are further divided into two categories: **rural major collectors** and **rural minor collectors.**

Local Streets and Roads

The sole function of local streets is to provide access to abutting land. Local streets often comprise the largest portion of total street mileage in an urban area but carry only a small portion of the total vehicle-miles traveled. Local streets were not evaluated in this study.

A breakdown of the network by functional classification mileage for Madison County is shown in **Table III-1**. The functional classification system for Madison County is shown in **Figure III-3**. This includes National Highway System routes.

Table III-1. Total Road Miles by Classification

Road Classification	Miles	Percent of Total
Rural Interstate	13.183	2.91%
Rural Principal Arterial	10.540	2.33%
Rural Minor Arterial	25.042	5.53%
Rural Major Collector	50.199	11.08%
Rural Minor Collector	104.871	23.15%
Rural Local Road	145.420	32.10%
Urban Interstate	10.952	2.42%
Urban Principal Arterial	13.794	3.05%
Urban Minor Arterial	23.466	5.18%
Urban Collector Street	15.782	3.48%
Urban Local Road	39.750	8.77%
Totals	452.999	100.00%

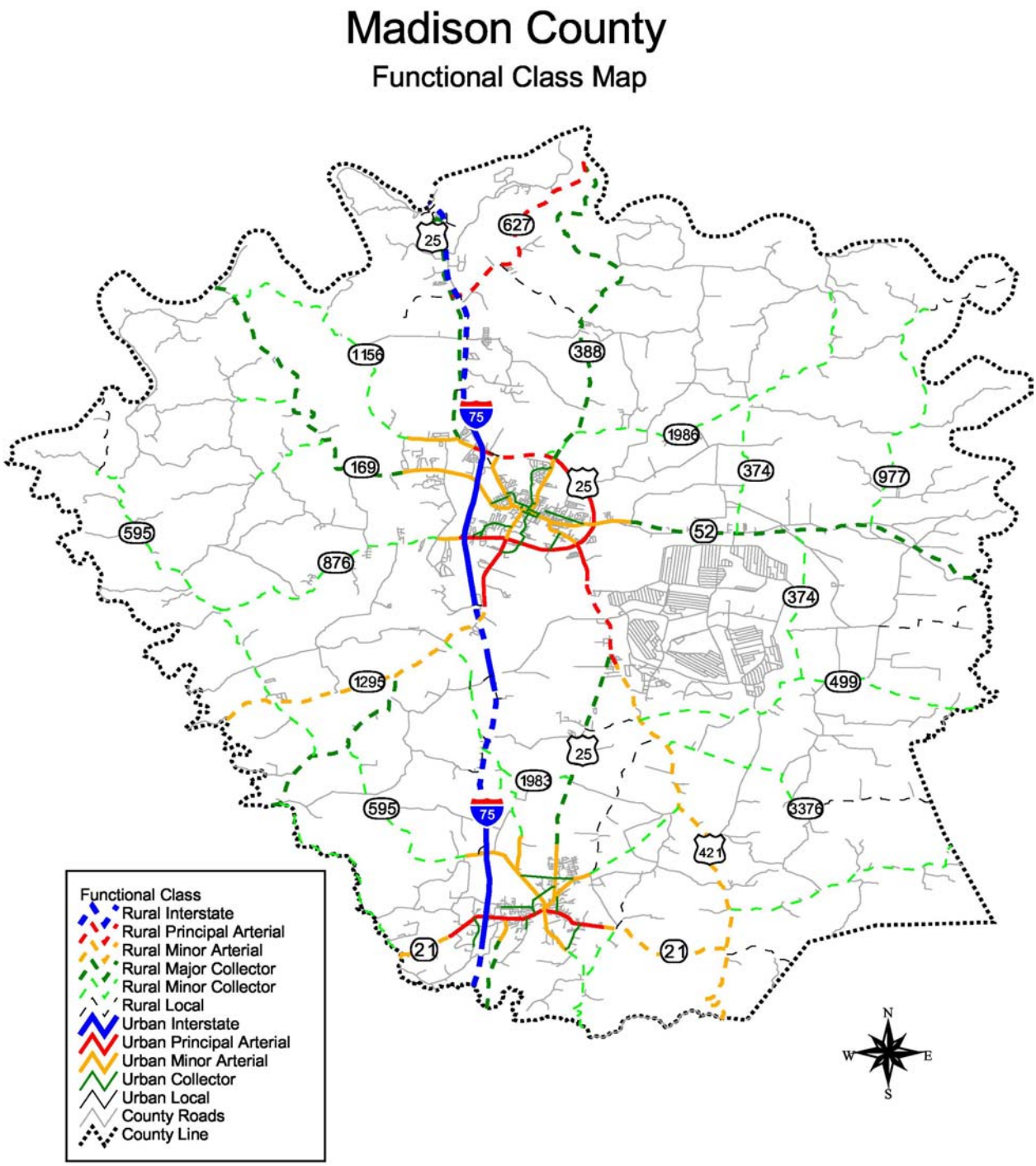


Figure III-3. Functional Classification of Madison County Highways

Daily Traffic Volumes and Level of Service

Daily traffic volumes were obtained from the Kentucky Transportation Cabinet for the Year 2000. The Transportation Cabinet maintains several permanent count stations in the area, plus numerous temporary locations at which counts are taken and updated on a regular basis.

In addition to I-75, there are two routes that presently carry more than 25,000 vehicles per day – US 25 and KY 876. A number of facilities within the Madison County study area carry significant traffic volumes of more than 20,000 vehicles per day. A list of those roads and Year 2000 average daily traffic (ADT) volumes is presented in **Table III-2**. Other major traffic-carrying facilities are US 421, KY 21, KY 52, KY 595, and KY 627.

Table III-2. Routes With 2000 ADT Greater Than 20,000 Vehicles Per Day

Route	ADT	Location
I-75	41,000 – 53,000	From Fayette Co. to Rockcastle Co.
KY 876	30,100 – 30,400	From I-75 to US 25
US 25	28,000	From KY 876 to KY 52
US 25	22,200	KY 1016 to Glade Road
US 25	21,600	From US 421 to KY 876
US 25	20,500	From KY 388 to US 25X
US 25X	20,100	From KY 52 to KY 169
US 25	20,000	From KY 21 to KY 595

Levels of Service

Level of service is a qualitative measure of traffic conditions. There are six levels of service, expressed in letter grades "A" through "F". Level of service (LOS) "A" represents the best traffic conditions – free flowing, with high travel speeds and no delays. At the other end of the spectrum, LOS "F" represents the worst traffic conditions – heavy congestion, with long delays and low travel speeds resulting from stop-and-go flow. A facility is considered to have reached its physical capacity at LOS "E." For planning, it is typically desirable to minimally maintain a LOS "D" in urban areas and a LOS "C" in rural areas.

Level of Service Analysis

Level of service can be computed for specific facility types (e.g. freeways, arterial streets, signalized intersections, etc.) based on methodologies prescribed in the Highway Capacity Manual[1] (HCM). Depending on the facility type, there are a number of methods varying in complexity and accuracy that are described in the HCM and can be used to compute level of service. These methods range from generalized tables of daily traffic volumes to very detailed, data intensive operational analyses.

[1] *Highway Capacity Manual*, Special Report 209, Transportation Research Board, National Academy of Sciences, Washington, D.C., 1997.

For the Madison County study, a planning LOS analysis was used to identify current and projected future capacity deficiencies. The method estimates level of service for roadway sections based on observed or forecasted daily traffic volumes and the physical characteristics of the roadway section. For individual streets and roads, specific parameters related to geometry, traffic control, and traffic characteristics serve as input variables. This planning LOS analysis method is a widely accepted practice in urban area planning and corridor studies.

In the study base year (2000) there were several roadway segments that had, and still have, a LOS of "D" or worse. They are:

- US 25 from KY 1156 to I-75(LOS = D)
- KY 627 from US 25 to Clark County (LOS = D)
- US 25X from KY 169 to KY 876 (LOS = D)
- KY 52 from Shale Drive to US 25X (LOS = D)
- KY 876 from KY 52 to US 25 (LOS = D)
- US 25X from KY 169 to Pin Oak Drive (LOS = E)
- US 25 from US 421 to Glades Road (LOS = E)
- KY 52 from US 25 to Estill County (LOS = E)
- KY 876 from I-75 interchange to KY 52 (LOS = F)
- US 25 from KY 876 through commercial area (LOS = F)
- US 25 from Mt. Vernon Road to Glades Road (LOS = F)

Base year (2000) levels of service for roadways and average daily traffic volumes in the Madison County study area are shown in **Figures III-4, III-5, and III-6**. Outside the peak periods, traffic on these facilities is noticeably less, thus the impact of peak hour demands on daily traffic volumes and overall LOS is slightly underestimated using this method.

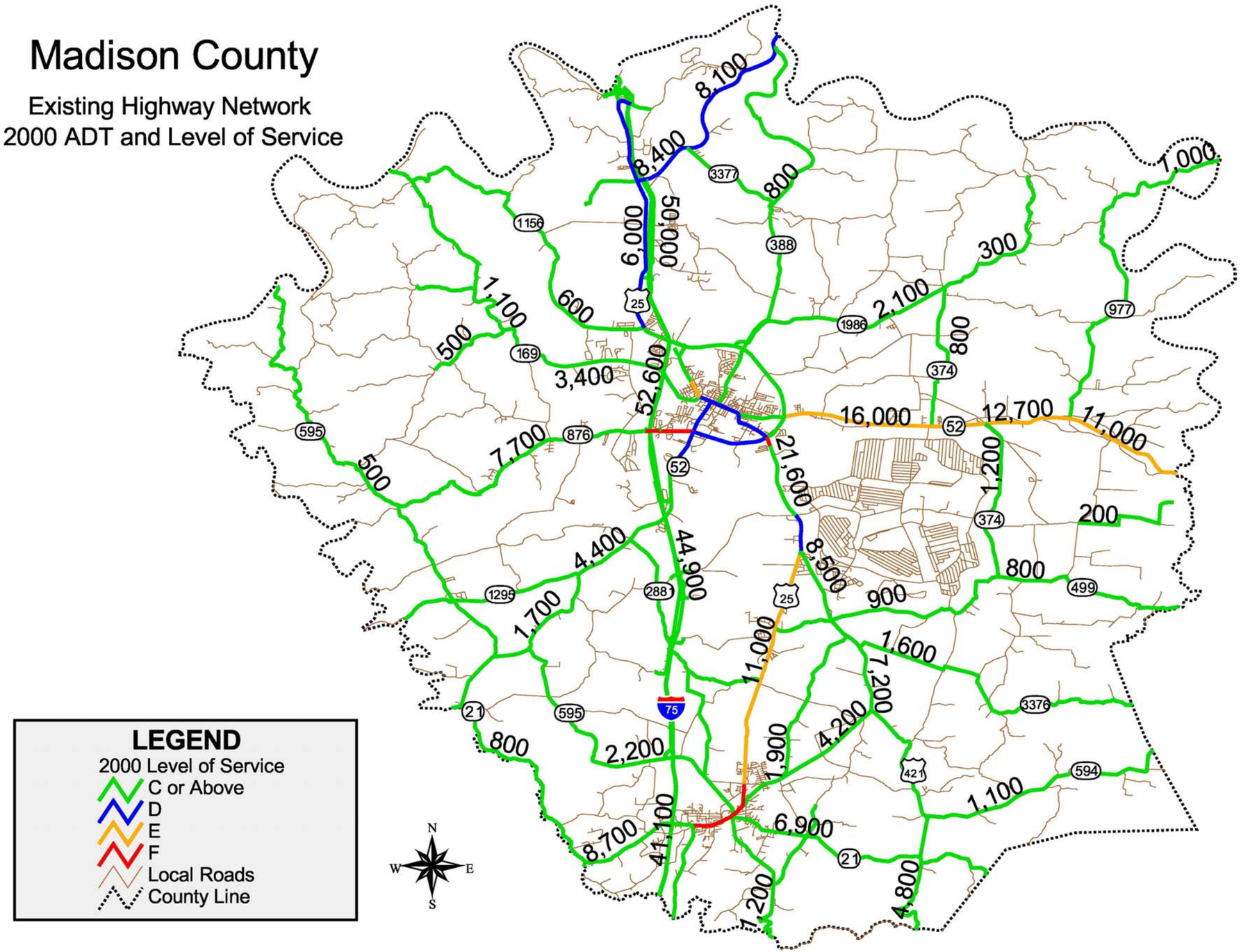


Figure III-4. Madison County 2000 ADT and Level of Service

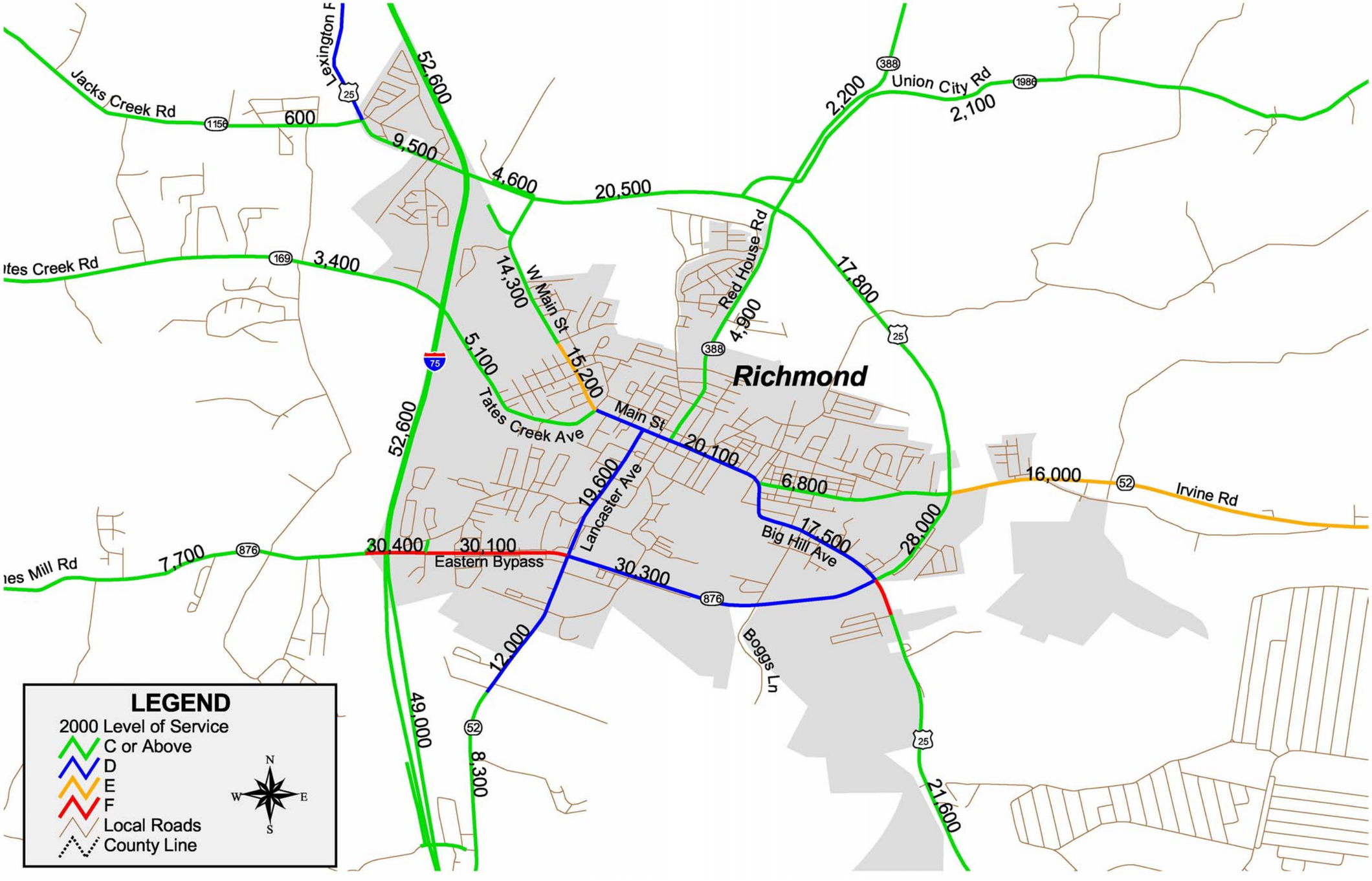


Figure III-5. Richmond 2000 ADT and Level of Service

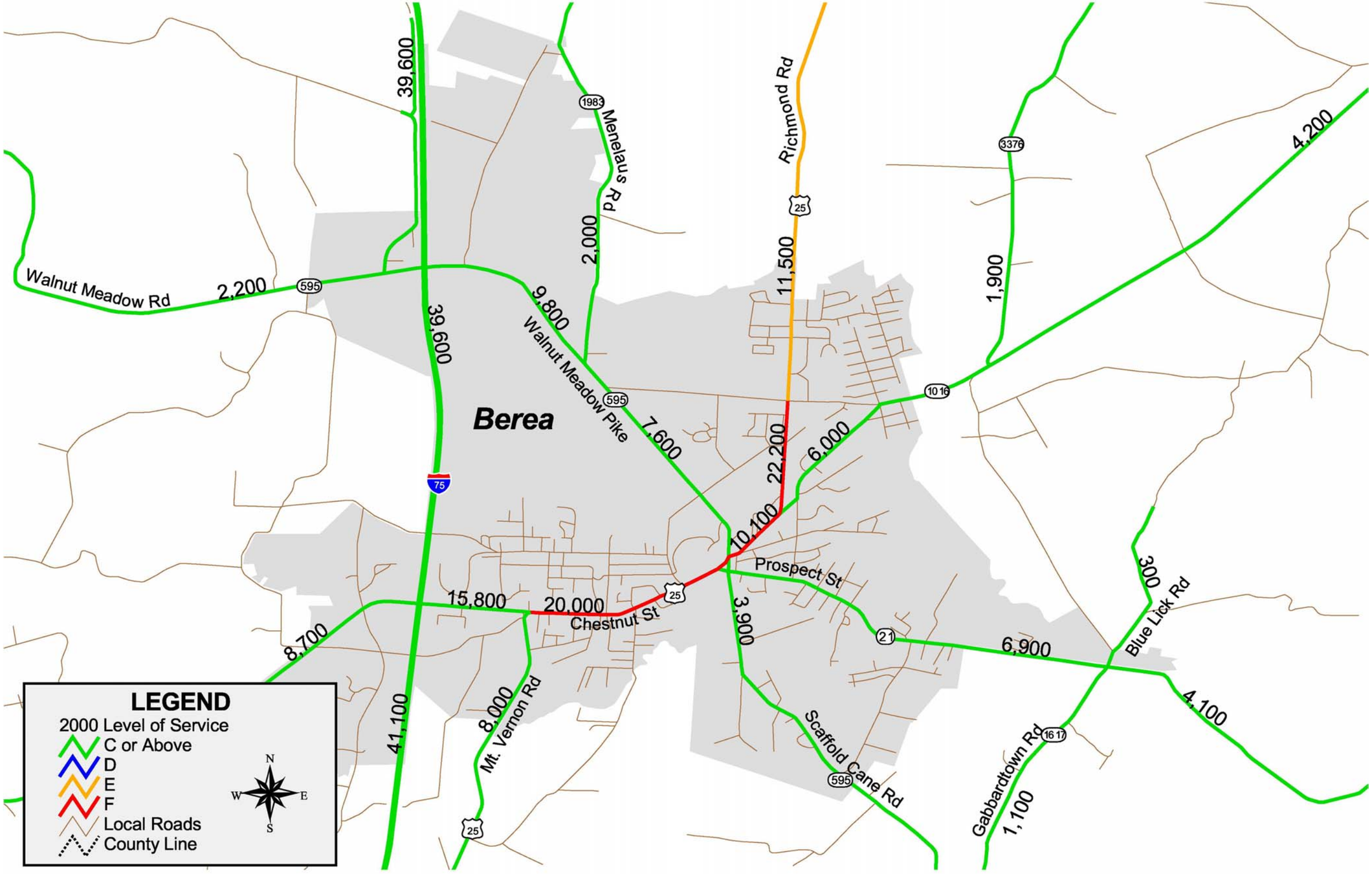


Figure III-6. Berea 2000 ADT and Level of Service

Crash Analysis

Crash data were collected from the Kentucky Transportation Cabinet for the five-year period from January 1, 1997, through December 31, 2001. Of the roads comprising the study area network, there were 8,197 reported crashes during this time frame.

Crash rates were computed for roadway sections of the network. Crash rates, expressed in terms of *crashes per 100 million vehicle-miles*, normalize the comparison by taking into account the amount of traffic on a section. The Critical Crash Rate [2] is a statistically derived value that the Kentucky Transportation Cabinet uses as a threshold to identify high crash locations.

Figure III-7 illustrates high crash roadway sections based on the five years of data. For each section, a Critical Crash Rate Factor (CCRF) was computed as the observed crash rate divided by the critical crash rate. Where this ratio is greater than 1.0, the roadway section can be considered to be a high crash location when compared to like facilities throughout Kentucky. The crash analysis results are summarized in **Table III-3**.

High Crash Locations

Madison County has a strong diversity of residential, commercial, industrial, and higher education areas, and its traffic is heavily influenced by peak travel patterns of commuting workers. It is therefore not surprising that several roads were computed to have a CCRF greater than 1.0. There are twenty-two roadway sections that have a CCRF of 0.95 or greater. They are:

- I-75 from SB Rest Area to KY 876
- I-75 from KY 627 to Fayette County line
- US 25 from Rockcastle County line to Liberty Avenue
- US 25 from US 421 to Marsha Kay Drive
- US 25 from Marsha Kay Drive to KY 52
- US 25 from KY 52 to KY 1986
- US 25 from KY 1986 to US 25X
- US 25 from US 25X to KY 1156
- KY 21 from KY 52 to KY 954
- KY 21 from KY 954 to Old KY 21 West
- KY 21 from Old KY 21 West to US 25
- KY 52 from KY 876 to Reba Road
- KY 169 from I-75 underpass to KY 1985
- KY 169 from KY 1985 to Tates Creek Ferry
- KY 374 from KY 52 to KY 1986
- KY 388 from US 25X to Miller Drive
- KY 499 from US 25 to KY 374
- KY 595 from KY 1617 to Bratcher Road
- KY 595 from Newby-Long Branch to Curtis Road
- KY 627 from US 25 to Clark County line
- KY 876 from I-75 to US 25
- KY 1156 from Boone Way to Clay Lane

[2] *Analysis of Traffic Crash Data in Kentucky (1993 – 1997)*, Research Report KTC-98-16, Kentucky Transportation Center, College of Engineering, University of Kentucky, Lexington, Kentucky, September 1998.

For these sections, crash records obtained from the KYTC were examined in more detail in an attempt to identify causative factors. The computer records are less detailed than the actual police reports, however, which make it difficult to evaluate some of the records. Many of the accidents are the result of congestion and heavy traffic demand. Also, the majority of crashes were at intersections where rear-end and right-angle crashes are the dominant types.

The following intersections had the highest crash frequencies for the **five-year** period between 1997 and 2001 (see **Figure III-8 for locations**):

- US 25 at KY 876/US 25X – 163 crashes
- KY 876 at KY 52 – 124 crashes
- US 25 at KY 52 – 107 crashes
- US 25 at KY 21 – 49 crashes
- US 25 at US 421 – 27 crashes
- US 25 at KY 595 – 25 crashes
- US 25 at US 25X/KY 2875 – 21 crashes
- KY 627 at I-75 ramps – 21 crashes
- KY 876 at I-75 ramps – 14 crashes
- US 25 at I-75 ramps (Exit 90) – 14 crashes

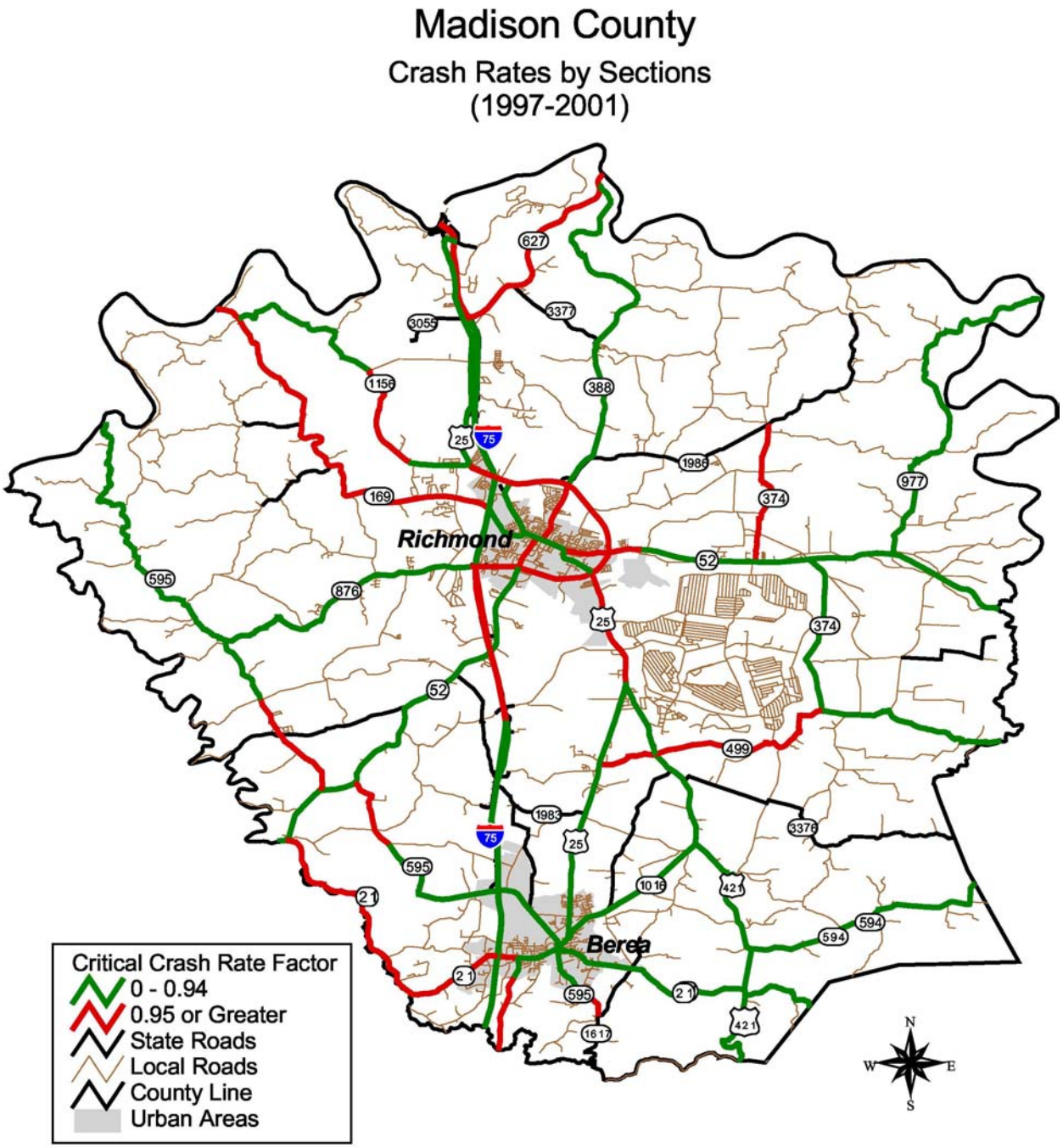


Figure III-7. High Crash Roadway Sections

Table III-3. Roadway Segment Accident Analysis

Facility	AADT	Begin MP	End MP	Length (miles)	Number of Crashes ('97 - '01)	Crash Rate (Crashes per MVM)	Funct. Class Code	Location	Functional Class	Statewide Average Crash Rate (per 100 MVM)	Critical Crash Rate (per 100 MVM)	Critical Crash Rate Factor*
I-75	39,700	73.408	75.516	2.108	74	48	1	Rural	Interstate	53	69	0.70
I-75	37,800	75.517	77.226	1.709	104	88	11	Urban	Interstate	99	123	0.72
I-75	37,800	77.227	82.715	5.488	209	55	1	Rural	Interstate	53	65	0.86
I-75	45,700	82.716	87.185	4.469	285	76	1	Rural	Interstate	53	65	1.18
I-75	50,500	87.186	90.000	2.814	246	95	11	Urban	Interstate	99	116	0.82
I-75	50,200	90.010	94.730	4.72	189	44	1	Rural	Interstate	53	64	0.68
I-75	49,500	94.740	97.543	2.803	333	132	1	Rural	Interstate	53	66	1.99
US 25	7,200	0.000	2.258	2.258	203	684	7	Rural	Major Collector	267	344	1.99
US 25	7,900	2.259	2.863	0.604	47	540	16	Urban	Minor Arterial	420	599	0.90
US 25	18,800	2.864	3.810	0.946	164	505	14	Urban	Principal Arterial	454	551	0.92
US 25	10,200	3.820	4.637	0.817	69	454	16	Urban	Minor Arterial	420	555	0.82
US 25	15,200	4.638	6.310	1.672	164	354	16	Urban	Minor Arterial	420	498	0.71
US 25	9,500	6.320	11.960	5.640	208	213	7	Rural	Major Collector	267	310	0.69
US 25	18,800	11.970	15.199	3.229	195	176	2	Rural	Principal Arterial	131	160	1.10
US 25	27,100	15.200	16.257	1.057	303	580	14	Urban	Principal Arterial	454	530	1.09
US 25	18,200	16.258	18.756	2.498	557	671	14	Urban	Principal Arterial	454	515	1.30
US 25	15,700	18.757	19.932	1.175	130	386	7	Rural	Major Collector	267	340	1.14
US 25	10,200	19.933	21.022	1.089	108	533	16	Urban	Minor Arterial	420	537	0.99
US 25	4,400	21.023	28.219	7.196	100	173	7	Rural	Major Collector	267	323	0.54
US 25X	19,400	0	2.081	2.081	169	229	16	Urban	Minor Arterial	420	482	0.48
US 25X	17,600	2.082	3.654	1.572	15	30	16	Urban	Minor Arterial	420	495	0.06
US 421	4,400	0	5	5	110	274	6	Rural	Minor Arterial	234	296	0.92
US 421	5,200	5.01	10.02	5.01	123	259	6	Rural	Minor Arterial	234	291	0.89
US 421	7,800	10.03	13.031	3.001	76	178	6	Rural	Minor Arterial	234	295	0.60
KY 21	900	0	6.176	6.176	75	739	8	Rural	Minor Collector	267	399	1.85
KY 21	5,600	6.177	8.059	1.882	68	354	6	Rural	Minor Arterial	234	324	1.09
KY 21	11,700	8.06	9.115	1.055	160	710	14	Urban	Principal Arterial	454	570	1.25
KY 21	9,000	9.116	11.066	1.95	105	328	14	Urban	Principal Arterial	454	566	0.58
KY 21	4,200	11.067	14.196	3.129	54	225	6	Rural	Minor Arterial	234	315	0.72
KY 21	600	14.197	16.172	1.975	2	92	9	Rural	Local	203	453	0.20
KY 52	1,500	0	5.444	5.444	49	329	7	Rural	Major Collector	267	376	0.87
KY 52	5,400	5.445	8.25	2.805	50	181	6	Rural	Minor Arterial	234	309	0.59
KY 52	12,800	8.26	10.91	2.65	150	242	14	Urban	Principal Arterial	454	524	0.46
KY 52	15,900	10.92	13.891	2.971	570	661	16	Urban	Minor Arterial	420	514	1.29
KY 52	13,000	13.892	22.869	8.977	286	134	7	Rural	Major Collector	267	297	0.45
KY 169	5,100	0	1.349	1.349	52	414	16	Urban	Minor Arterial	420	569	0.73
KY 169	1,900	1.35	8.051	6.701	87	374	7	Rural	Major Collector	267	354	1.06
KY 169	600	8.052	12.511	4.459	34	696	7	Rural	Major Collector	267	458	1.52
KY 374	1,500	0	4.806	4.806	34	258	8	Rural	Minor Collector	267	389	0.66
KY 374	700	4.807	9.14	4.333	28	506	8	Rural	Minor Collector	267	453	1.12
KY 388	7,000	0	1.46	1.46	197	1056	16	Urban	Minor Arterial	420	542	1.95
KY 388	2,900	1.47	5.987	4.517	52	218	7	Rural	Major Collector	267	353	0.62
KY 388	1,200	5.988	12.937	6.949	40	263	7	Rural	Major Collector	267	375	0.70
KY 499	800	0	6.379	6.379	50	537	9	Rural	Local	203	323	1.66
KY 499	800	6.38	10.992	4.612	12	178	8	Rural	Minor Collector	267	429	0.42
KY 594	1,100	0	6.668	6.668	27	202	8	Rural	Minor Collector	267	382	0.53
KY 595	1,900	0	0.96	0.96	29	871	8	Rural	Minor Collector	267	498	1.75
KY 595	6,300	0.97	4.768	3.798	145	332	16	Urban	Minor Arterial	420	500	0.66
KY 595	2,300	4.769	8.589	3.82	27	168	8	Rural	Minor Collector	267	378	0.45
KY 595	600	8.59	13.972	5.382	38	645	8	Rural	Minor Collector	267	447	1.44
KY 595	600	13.973	19.837	5.864	13	202	8	Rural	Minor Collector	267	440	0.46
KY 595	200	19.838	24.604	4.766	7	402	8	Rural	Minor Collector	267	594	0.68
KY 627	7,700	0	6.074	6.074	169	198	2	Rural	Principal Arterial	131	163	1.21
KY 876	2,400	0	6.528	6.528	92	322	8	Rural	Minor Collector	267	352	0.92
KY 876	11,400	6.529	7.097	0.568	34	288	16	Urban	Minor Arterial	420	574	0.50
KY 876	30,800	7.098	9.998	2.9	1097	673	14	Urban	Principal Arterial	454	498	1.35
KY 977	1,300	0	6.77	6.77	38	237	8	Rural	Minor Collector	267	378	0.63
KY 977	300	6.78	10.294	3.514	3	156	9	Rural	Local	203	468	0.33
KY 1016	6,000	0	1.285	1.285	54	384	16	Urban	Minor Arterial	420	561	0.68
KY 1016	5,400	1.286	4.246	2.96	49	168	6	Rural	Minor Arterial	234	307	0.55
KY 1156	1,400	0	1.352	1.352	5	145	16	Urban	Minor Arterial	420	704	0.21
KY 1156	600	1.352	4.651	3.299	19	526	8	Rural	Minor Collector	267	496	1.06
KY 1156	400	4.652	9.296	4.644	15	442	8	Rural	Minor Collector	267	503	0.88

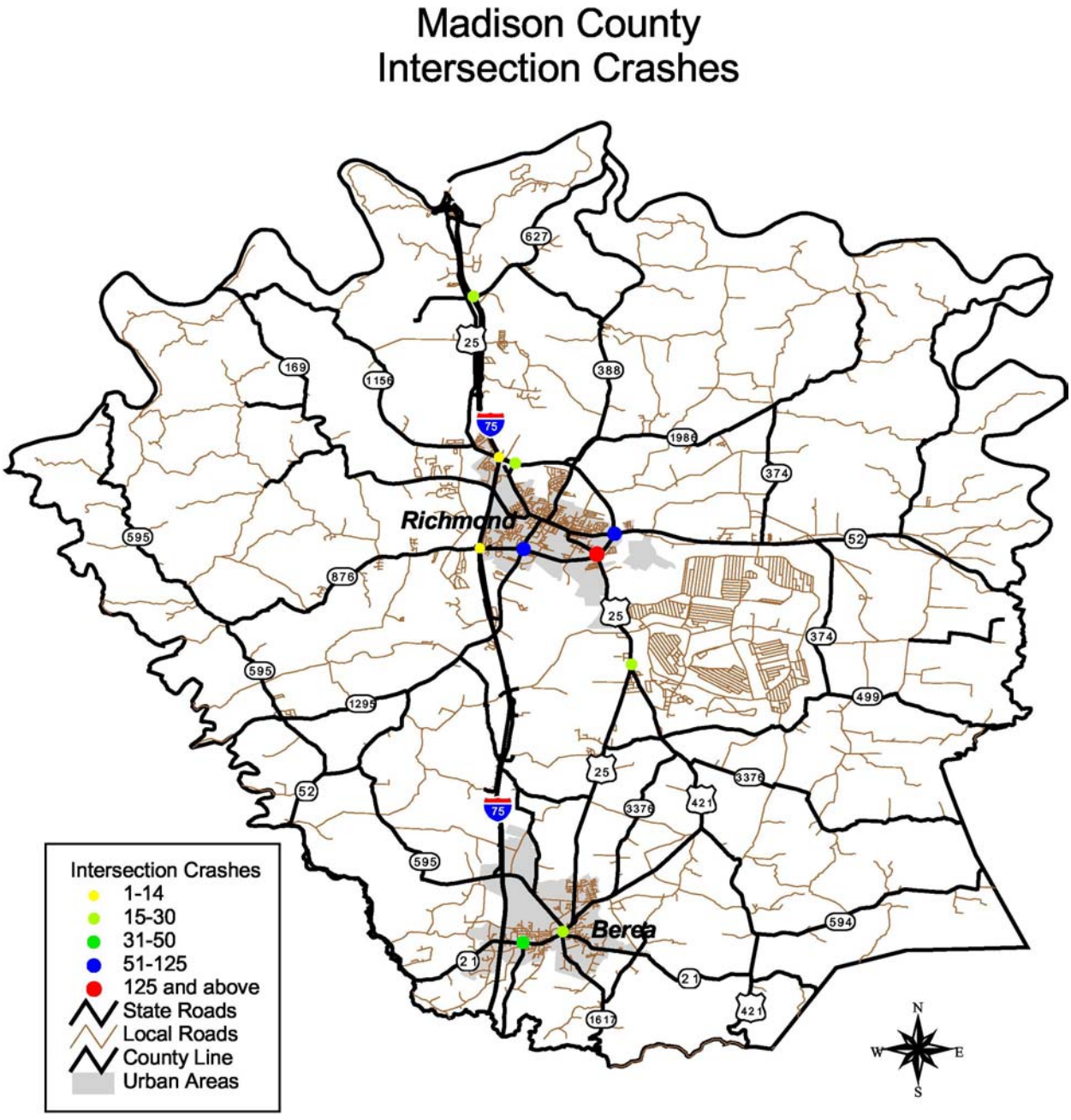


Figure III-8. High Crash Intersections

System Deficiencies

Congested Areas

Regularly occurring traffic congestion in Madison County is confined mostly to the traditional A.M. and P.M. peak commute periods. A system-wide level of service analysis is beneficial in identifying the majority of the congested facilities or areas in Madison County. This analysis is based on traffic counts and other roadway characteristics. The JJG team relied on its extensive knowledge of the area in addition to the input from the Transportation Study Work Group to identify all areas with regularly occurring congestion.

Those areas where congestion is most significant include many of the arterials. In the county, Irvine Road (KY 52) experiences peak hour congestion from the Richmond Bypass to the Estill County line. This is also true of the US 25 corridor between Richmond and Berea. In Richmond, the heaviest congestion can be found along the old EKU Bypass between I-75 and Lancaster Road. Other congested areas include: KY 52 (Lancaster Road) and US 25 (West Main Street) in Richmond. In Berea, congestion is heaviest along Chestnut Street and Main Street (US 25).

Safety Deficiencies

The analysis of crashes showed that safety deficiencies were mostly related to a combination of speed, winding roads and congestion. That is, high crash locations were concentrated in areas where traffic volumes were highest combined with a lot of turning activity – at intersections and along sections with numerous driveways. This was confirmed through examination of actual crash records at high crash locations. The high crash rate on I-75 was most likely related to the construction on the interstate to widen sections to six lanes.

Land Use-Transportation Relationship

Peak hour congestion is compounded by the relationship between land use and transportation, especially along some principal arterials. Along the EKU Bypass/KY 876 corridor, land use is heavily oriented toward commercial retail. Not only does this area “capture” a lot of weekday commuter pass-by traffic, the area also attracts primary trip destinations from throughout the region, particularly on evenings, weekends, and major shopping holidays.

Other Transportation Modes

Private passenger automobiles and trucks dominate transportation in Madison County. However, some alternative modes exist, as discussed below:

Transit

There are no fixed-route transit systems operating in Madison County at this time. Kentucky River Foothills operates Foothills Express, a demand-response transit agency servicing approximately 450 trips per day within Madison County. The Foothills Express is used by a variety of passengers with different demographics.

Aviation

The Madison Airport is a general aviation airport located off Ballard Road, 2.5 miles northwest of Exit 77 to Berea. The airport has one runway 4,500 feet long by 150 feet wide. The airport offers the following aviation services:

- Charter Service
- Visual Approach Slope Indicator (VASI)
- Runway End Identifier Lighting (REIL)
- Medium Intensity Runway Lights (MIRL)
- VHF Omnidirectional Range/Distance Measuring Equipment (VOR/DME)
- Instrument Approach
- Jet A & 100 LL fuel

Taxi

Four taxi services serve the Madison County study area. *Foothills Express* operates over 20 vans and small buses on an around the clock basis, seven days a week. In addition, three different cab services also provide transportation throughout Madison County. *Colonel's Cab Company* and *OK Cab Company* of Richmond operate five and seven taxis, respectively, with around the clock service seven days a week. *P Cab Company* in Berea provides four handicap accessible vans and eight taxis for service throughout the county from 6 A.M. to 1 A.M. for most of the week.

Waterways

The Kentucky River is located on the northern border of Madison County. This key location has played a role in the county's development and commercial operations since its establishment in 1785. The Valley View Ferry is one of a small number of ferries still in operation in the state. Valley View Ferry is by far the oldest and has been in continuous operation since 1785. Its operation today consists of shuttling vehicles and passengers across the Kentucky River and it is jointly operated by the governments of Lexington-Fayette, Jessamine, and Madison Counties. The chief advantage of using the ferry is to reduce commuting time between northwestern Madison County and Lexington.

CHAPTER IV – FORECASTS

Development of a long-range transportation plan depends on defining a set of parameters at some point in the future that will establish the framework for the plan. For the Madison County Transportation Study, the Year 2025 was established as the horizon year for which the transportation plan was to be developed. Year 2025 socioeconomic conditions then could be predicted from which future transportation needs could be identified. Some of those needs exist already and simply will increase in magnitude over time. Other needs do not exist today, but will surface at some point between now and 2025. The Madison County Long Range Transportation Plan is the result of a systematic process to identify those needs and develop strategies to sufficiently meet them.

Population and employment are two variables commonly used in urban transportation studies to forecast traffic. A computer travel demand model is a tool that uses these and other variables to forecast traffic volumes on the roadway system. The Madison County Travel Demand Model was developed for this study. Using this model, Year 2025 traffic forecasts were developed, from which future needs of the transportation system were identified. The model also was used to compare the effectiveness of alternative transportation improvements so that the best and most cost effective projects would be incorporated into the Long Range Transportation Plan.

Socioeconomic Data Forecasts

The accuracy of the traffic forecasts is highly dependent on the accuracy of the data that go into the model. These data include population and employment, two socioeconomic variables that are integral to the trip generation model. As shown previously (Chapter III, Figure III-1), the transportation study area includes all of Madison County.

2000 Base Year Estimates

The first step in developing population and employment forecasts was to estimate these numbers for the Base Year, 2000. The area was divided into traffic analysis zones, or TAZs. This scheme is presented in **Figure IV-1**.

The population and number of dwelling units in each TAZ were taken directly from the 2000 Census data at the block level. Student population was assumed to be the total population in group quarters, non-institutionalized.

The 2000 Base Year study area population and employment are presented in **Table IV-1**. The 2000 study area population was estimated to be 70,240.

To estimate employment, the Madison County employment database was obtained via the KYTC from the Kentucky Department for Employment Services. The database included most employers within the county, their number of employees, their address, and their SIC codes. The total employment reported by this database was compared to countywide control totals as determined by the Federal Bureau of Economic Analysis. It was noted for this database that the total government employment was lower than expected. For this reason, the government employment data in Madison County was supplemented by additional employment data obtained from the Polk countywide directories[1]. The total employment in Madison County used in the base year model was 27,948.

[1] http://www.citydirectory.com/polk/index.htm

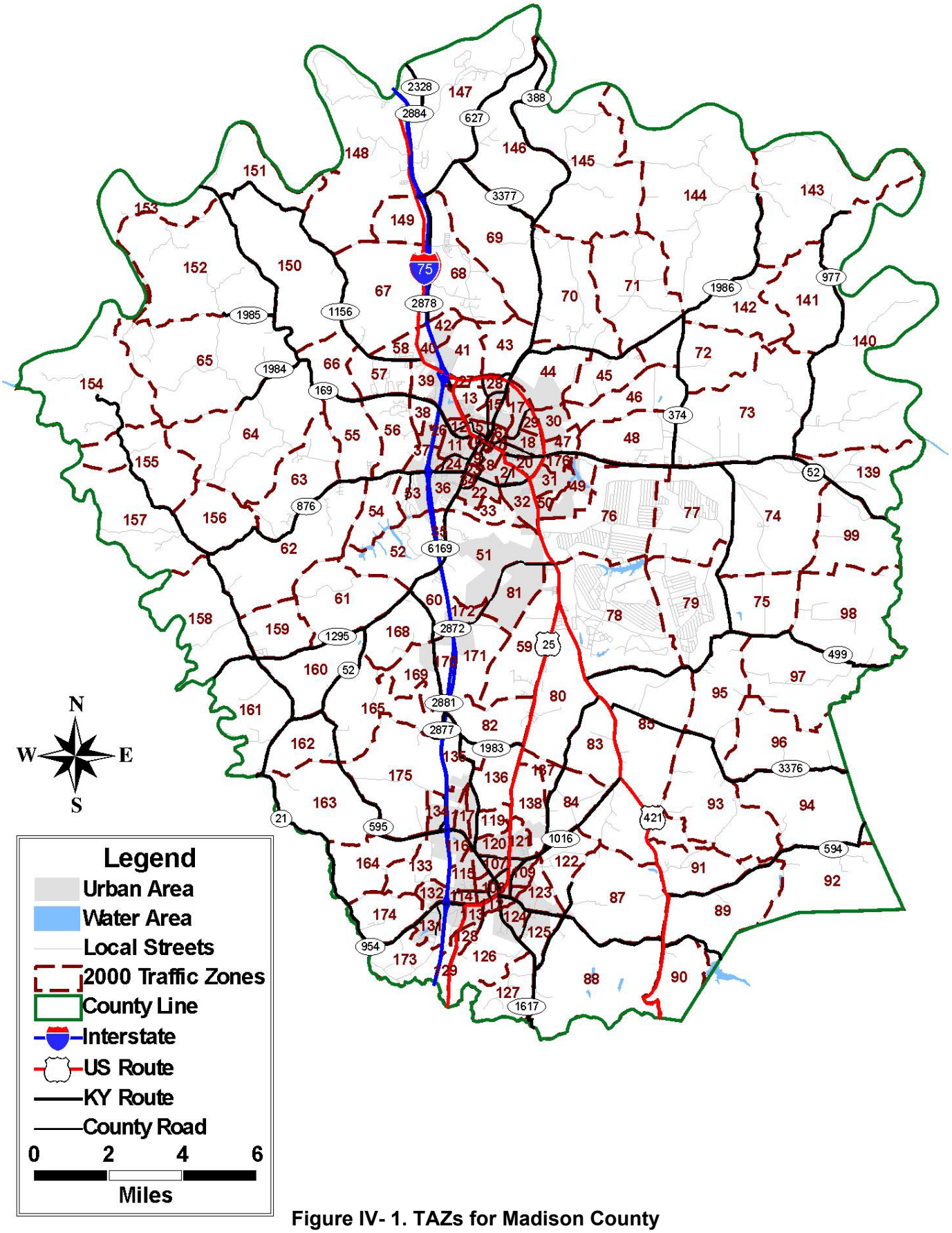


Figure IV- 1. TAZs for Madison County

Table IV- 1. 2000 Study Area Population and Employment Data

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
1	1	1	194	0	194	20	23	14	10	8	75	89	47	382	518
2	1	1	86	0	86	25	12	2	3	1	43	72	120	141	333
3	1	1	250	0	250	71	60	9	5	0	145	97	224	17	338
4	1	1	187	0	187	45	39	11	5	0	100	17	102	162	281
5	1	0	971	0	971	189	172	74	29	16	480	15	260	20	295
6	1	0	592	0	592	200	71	35	25	8	339	10	56	62	128
7	1	1	277	0	277	33	26	24	14	10	107	19	8	218	245
8	1	0	591	502	1093	125	88	50	24	8	295	244	56	605	905
9	1	0	151	1869	2020	56	21	8	6	0	91	109	2966	123	3198
10	1	1	482	0	482	169	63	22	21	4	279	4	34	1	39
11	1	0	901	4	905	193	173	55	29	13	463	0	60	9	69
12	1	0	889	0	889	139	179	62	27	16	423	2	46	1	49
13	1	0	533	0	533	91	111	27	21	9	259	172	65	2	239
14	1	0	773	0	773	86	92	58	36	31	303	0	3	0	3
15	1	0	1511	0	1511	255	231	114	79	23	702	31	11	0	42
16	1	0	198	0	198	16	29	18	11	5	79	2	0	2	4
17	1	0	14	0	14	0	0	3	0	0	3	0	0	61	61
18	1	0	1784	0	1784	179	231	146	95	55	706	6	38	301	345
19	1	0	537	22	559	80	73	33	21	20	227	1	8	29	38
20	1	0	1188	0	1188	209	200	89	44	23	565	440	104	98	642
21	1	0	748	0	748	212	157	38	19	6	432	253	1095	1002	2350
22	1	0	0	0	0	0	0	0	0	0	0	187	34	23	244
23	1	0	4	978	982	0	2	0	0	0	2	43	0	0	43
24	1	0	904	0	904	233	179	48	32	8	500	172	530	63	765
25	1	0	543	0	543	44	77	35	30	19	205	4	339	5	348
26	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	1	0	2	0	2	0	1	0	0	0	1	0	18	0	18
28	1	0	493	0	493	38	96	38	23	11	206	0	1	1	2
29	1	0	457	0	457	81	113	34	10	1	239	179	2	0	181
30	0	0	35	0	35	2	5	2	1	2	12	14	6	16	36
31	1	0	721	0	721	63	111	68	47	6	295	631	216	193	1040
32	1	0	617	0	617	69	68	53	37	20	247	802	40	81	923
33	1	0	10	0	10	0	3	0	0	0	3	45	29	332	406
34	1	0	80	324	404	19	11	6	4	1	41	99	1	0	100
35	1	0	386	0	386	9	46	28	38	6	127	0	10	1	11

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
36	1	0	3083	0	3083	343	551	313	116	45	1368	70	229	99	398
37	0	0	162	0	162	2	22	15	8	5	52	47	1	2	50
38	0	0	0	0	0	0	0	0	0	0	0	0	50	0	50
39	1	0	1558	0	1558	163	278	126	69	36	672	100	260	628	988
40	1	0	1261	0	1261	193	229	108	36	24	590	312	170	46	528
41	0	0	17	0	17	0	0	3	0	0	3	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	1	0	62	0	62	2	12	5	4	1	24	0	0	184	184
44	0	0	133	0	133	5	11	9	10	5	40	0	0	0	0
45	0	0	289	0	289	10	32	26	17	11	96	0	0	0	0
46	0	0	229	0	229	22	26	19	9	12	88	0	0	1	1
47	1	0	431	0	431	50	68	35	26	6	185	6	0	4	10
48	0	0	863	0	863	63	108	66	57	27	321	7	14	22	43
49	1	0	35	0	35	3	6	2	0	0	11	23	24	30	77
50	0	0	8	0	8	0	1	0	0	0	1	0	0	0	0
51	0	0	263	0	263	4	35	21	21	5	86	0	37	400	437
52	0	0	194	0	194	6	36	18	8	6	74	0	1	9	10
53	1	0	734	0	734	37	148	45	29	25	284	116	65	22	203
54	0	0	649	0	649	54	76	57	34	25	246	0	31	17	48
55	0	0	309	0	309	10	41	27	29	4	111	16	12	2	30
56	0	0	423	0	423	12	73	30	23	15	153	0	12	3	15
57	1	0	843	0	843	19	99	77	64	24	283	0	2	7	9
58	1	0	343	0	343	10	51	24	19	13	117	0	16	0	16
59	0	0	686	0	686	42	92	55	42	21	252	2	5	278	285
60	1	0	142	0	142	10	23	8	12	0	53	0	0	127	127
61	0	0	123	0	123	11	17	7	6	4	45	0	0	1	1
62	0	0	556	0	556	22	98	38	31	19	208	0	8	13	21
63	0	0	455	0	455	16	64	37	30	15	162	0	4	22	26
64	0	0	324	0	324	21	52	29	15	9	126	2	13	6	21
65	0	0	266	0	266	23	30	24	20	6	103	0	0	4	4
66	0	0	72	1	73	5	11	5	4	0	25	0	0	2	2
67	0	0	348	0	348	18	60	30	13	9	130	0	1	5	6
68	0	0	1644	0	1644	69	212	143	107	53	584	9	7	38	54
69	0	0	213	0	213	12	33	11	13	7	76	0	0	1	1
70	0	0	512	0	512	24	72	40	32	16	184	0	36	6	42
71	0	0	206	0	206	18	38	20	12	0	88	0	0	0	0
72	0	0	396	0	396	21	39	30	31	12	133	5	3	2	10

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
73	0	0	885	0	885	56	122	77	49	28	332	0	2	26	28
74	0	0	683	0	683	34	113	49	48	12	256	33	9	20	62
75	0	0	226	0	226	12	38	20	10	5	85	0	4	7	11
76	0	0	10	0	10	3	2	0	0	0	5	25	0	526	551
77	0	0	30	0	30	4	6	2	2	0	14	0	1	12	13
78	0	0	229	0	229	16	32	14	17	6	85	0	3	0	3
79	0	0	18	0	18	3	0	2	0	1	6	0	0	0	0
80	0	0	1064	0	1064	66	152	75	70	35	398	7	0	27	34
81	1	0	19	0	19	1	6	0	0	1	8	0	0	270	270
82	0	0	467	0	467	22	65	38	33	10	168	0	6	0	6
83	0	0	147	0	147	14	19	13	7	3	56	0	2	0	2
84	0	0	871	0	871	38	104	79	69	20	310	0	7	18	25
85	0	0	730	0	730	34	80	59	55	23	251	12	0	6	18
86	0	0	511	0	511	44	65	42	29	15	195	0	1	1	2
87	0	0	303	0	303	23	48	29	19	4	123	0	53	3	56
88	0	0	374	0	374	22	55	32	29	6	144	2	0	9	11
89	0	0	363	0	363	22	45	29	34	4	134	0	0	19	19
90	0	0	172	0	172	7	27	8	14	3	59	1	3	0	4
91	0	0	327	0	327	32	47	18	20	13	130	0	0	22	22
92	0	0	130	0	130	11	21	13	4	4	53	0	0	0	0
93	0	0	320	0	320	35	28	33	16	10	122	0	0	7	7
94	0	0	270	0	270	29	28	21	17	9	104	3	1	0	4
95	0	0	208	0	208	13	31	20	10	6	80	0	0	0	0
96	0	0	308	0	308	29	48	21	21	7	126	0	0	1	1
97	0	0	329	0	329	13	35	32	21	10	111	0	1	0	1
98	0	0	168	0	168	11	17	16	11	3	58	0	0	9	9
99	0	0	244	0	244	16	51	14	14	5	100	8	0	14	22
100	1	0	71	0	71	4	4	5	6	4	23	0	0	112	112
101	1	1	20	205	225	3	3	0	0	0	6	48	698	29	775
102	1	1	186	74	260	38	29	8	11	4	90	32	63	0	95
103	1	1	5	421	426	1	0	0	1	0	2	0	586	0	586
104	1	1	262	0	262	39	37	21	12	4	113	17	184	20	221
105	1	0	101	0	101	16	22	5	3	0	46	0	181	240	421
106	1	0	13	0	13	0	1	1	2	0	4	17	0	0	17
107	1	0	324	0	324	75	46	24	20	1	166	99	28	193	320
108	1	0	133	0	133	15	21	9	5	3	53	86	68	78	232
109	1	0	424	0	424	69	75	30	21	6	201	7	12	84	103

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
110	1	0	261	0	261	41	37	19	16	4	117	0	3	270	273
111	1	1	179	195	374	27	22	11	10	4	74	79	39	0	118
112	1	1	253	160	413	30	30	18	10	9	97	12	53	56	121
113	1	1	592	0	592	72	85	39	32	19	247	36	16	5	57
114	1	1	680	0	680	113	97	61	28	15	314	272	46	95	413
115	1	0	818	0	818	89	122	75	38	19	343	2	33	2	37
116	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
117	1	0	0	0	0	0	0	0	0	0	0	0	0	994	994
118	1	0	75	0	75	8	5	5	4	2	24	0	0	714	714
119	0	0	56	0	56	3	7	6	3	0	19	0	0	3	3
120	1	0	403	0	403	47	57	35	23	8	170	59	213	35	307
121	1	0	1245	0	1245	140	185	109	71	21	526	13	14	10	37
122	0	0	473	0	473	28	58	32	42	12	172	0	0	1	1
123	1	0	850	0	850	118	128	68	43	16	373	0	62	3	65
124	1	0	545	0	545	42	91	38	27	16	214	2	1	12	15
125	1	0	399	0	399	34	59	33	23	11	160	0	7	7	14
126	1	0	668	1	669	49	81	45	46	23	244	0	0	0	0
127	0	0	402	0	402	31	49	29	26	13	148	0	0	23	23
128	1	0	119	0	119	6	16	16	4	1	43	0	8	16	24
129	0	0	106	0	106	11	9	12	4	4	40	0	0	0	0
130	1	0	314	0	314	37	44	31	9	9	130	463	8	20	491
131	1	0	382	0	382	20	50	30	23	13	136	22	19	13	54
132	1	0	194	0	194	15	29	15	11	2	72	20	85	32	137
133	1	0	489	0	489	15	57	48	36	11	167	0	3	3	6
134	1	0	23	0	23	0	2	0	1	1	4	81	26	0	107
135	1	0	31	0	31	4	2	1	1	0	8	0	0	135	135
136	0	0	91	0	91	5	9	9	8	0	31	0	6	5	11
137	0	0	105	0	105	5	12	5	8	2	32	0	0	0	0
138	1	0	585	0	585	37	85	50	42	10	224	10	162	13	185
139	0	0	433	0	433	31	62	33	25	12	163	1	45	40	86
140	0	0	942	0	942	79	100	87	54	34	354	0	7	7	14
141	0	0	110	0	110	13	14	6	7	4	44	0	0	0	0
142	0	0	160	0	160	7	21	15	9	6	58	0	0	0	0
143	0	0	96	0	96	2	16	5	5	2	30	0	0	0	0
144	0	0	383	0	383	18	50	35	19	13	135	0	3	0	3
145	0	0	195	0	195	13	37	15	6	6	77	0	63	12	75
146	0	0	371	0	371	16	47	36	26	6	131	0	11	68	79

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
147	0	0	1439	0	1439	72	177	112	85	60	506	106	51	56	213
148	0	0	740	0	740	37	105	60	52	17	271	0	52	124	176
149	0	0	130	0	130	6	17	7	13	3	46	30	2	38	70
150	0	0	244	0	244	17	25	18	20	5	85	0	1	2	3
151	0	0	102	0	102	5	11	5	9	4	34	0	0	0	0
152	0	0	216	0	216	16	35	23	10	4	88	0	0	1	1
153	0	0	138	0	138	11	16	12	7	4	50	0	0	0	0
154	0	0	102	0	102	6	6	11	8	1	32	0	0	0	0
155	0	0	92	0	92	5	17	8	3	3	36	0	9	0	9
156	0	0	45	0	45	4	2	2	0	4	12	0	0	0	0
157	0	0	90	0	90	11	12	6	6	2	37	0	0	1	1
158	0	0	147	0	147	6	22	15	10	1	54	0	0	0	0
159	0	0	292	0	292	18	40	27	17	9	111	1	1	2	4
160	0	0	141	0	141	6	15	11	11	4	47	0	0	0	0
161	0	0	130	0	130	9	23	9	6	2	49	0	0	0	0
162	0	0	69	0	69	5	10	5	6	1	27	0	0	0	0
163	0	0	122	0	122	11	17	8	4	6	46	0	0	0	0
164	0	0	138	0	138	8	18	16	8	0	50	0	9	73	82
165	0	0	316	0	316	10	32	23	23	15	103	0	12	0	12
166	1	0	3	0	3	1	1	0	0	0	2	4	17	0	21
167	1	0	432	0	432	70	95	26	15	4	210	38	67	226	331
168	0	0	140	0	140	7	23	10	9	4	53	0	61	4	65
169	0	0	25	0	25	1	3	2	2	0	8	0	0	0	0
170	0	0	6	0	6	0	0	2	0	0	2	0	0	0	0
171	0	0	33	0	33	0	3	3	1	0	7	0	0	4	4
172	0	0	10	0	10	0	1	1	1	0	3	0	0	9	9
173	0	0	288	0	288	15	51	25	16	6	113	0	0	1	1
174	0	0	406	0	406	14	56	37	25	13	145	13	7	10	30
175	0	0	236	0	236	6	28	21	15	9	79	0	4	2	6
176	1	0	297	0	297	25	55	14	21	6	121	86	123	103	312
Totals			65,484	4,756	70,240	6,749	9,721	5,157	3,536	1,570	26,733	6,221	10,792	10,935	27,948

Footnotes:

TAZ – Traffic Analysis Zone
Urban – Is the zone urban (1) or rural (0)?
CBD – In the Central Business District (1)?
Pop HH – Population in Households
Pop S – Student Population
Pop Tot – Total Population
DU 1 –Dwelling Units with 1 person
DU 2 – Dwelling Units with 2 persons
DU 3 – Dwelling Units with 3 persons
DU 4 – Dwelling Units with 4 persons
DU 5 – Dwelling Units with 5 or more persons
DU Tot – Total number of Dwelling Units
Emp R – Number of Retail Employees
Emp S – Number of Service Employees
Emp 0 – Number of Other Employees
Emp Tot – Total Number of Employees

2025 Socioeconomic Forecasts

The basis for building the future year trip generation model is the future population of the study area. The transportation study workgroup established a subcommittee of planning officials from Madison County, Richmond and Berea that also included representatives from the KYTC and the consultant. The socioeconomic data subcommittee determined a target year population (Year 2025) of 107,000 for Madison County. The subcommittee considered the Kentucky State Data Center (KSDC) projection for the Year 2025, but it was decided that the growth rate used to generate the KSDC projection of 1.5 percent per year did not adequately reflect the recent growth trends in Madison County. The subcommittee instead used a growth rate of 1.8 percent per year to arrive at the total population of 107,000.

It should be understood that 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. Madison County may grow more quickly or more slowly than the population recommended by the subcommittee. Therefore, it may be desirable to think of this model as a "population 107,000" model instead of a "Year 2025" model. This approach provides for more flexibility in the use of the future year model.

The same subcommittee was commissioned to determine an appropriate 2025 employment forecast. The continuing efforts to attract industry to Madison County combined with the pending activity at the Bluegrass Army Depot were important factors in the employment discussions. After much discussion the subcommittee recommended a total employment of 57,000 for the Year 2025. The consultant performed the distribution of the projected housing and employment using the input of the subcommittee.

Three trends worth noting in the data were the decline in population living in student housing, the decline in household size in Madison County observed over the last three census periods, and the overall increase in retail employment with respect to the other two categories. Eastern Kentucky University reported their desire to continue to reduce the amount of student housing they will provide in the future. Therefore, these trends were projected to the Year 2025 and are reflected in the socioeconomic data projections

The final distributions of Year 2025 population and employment were submitted to the socioeconomic data subcommittee and the KYTC project manager for approval before being used in the year

Year 2025 population and employment projections by Traffic Analysis Zone for the Madison County Study Area are presented in **Table IV-2**

Table IV- 2. 2025 Study Area Population and Employment Summary Data

	2000	2025
Total Population	**70,240**	**107,000**
Population in DU's	65,484	104,500
Student Population	4,756	2,500
Total Dwelling Units	**26,733**	**46,500**
1-person DU's	6,749	14,436
2-person DU's	9,721	18,583
3-person DU's	5,157	7,436
4-person DU's	3,536	3,733
5+-person DU's	1,570	2,312
Total Employment	**27,948**	**57,000**
Retail Employment	6,221	14,250
Service Employment	10,792	24,510
Other Employment	10,935	18,240

Population and Employment Changes

The projected changes in population and employment from 2000 to 2025 are summarized in **Table IV-2**. Dwelling units and population are expected to increase by almost 52 percent. Employment is projected to increase by nearly 104 percent during this same time frame. The primary sources of increase are expected to be in industrial, commercial, and medical services employment.

The most noticeable change in population is expected to occur in the following areas: north of Richmond, and between Richmond and Berea. Residential growth is expected to be concentrated in these areas due to a combination of limited areas available for growth, access to transportation facilities, and utility services over the next 25 years.

The largest changes in employment are expected to occur in many of the same areas which have been experiencing employment growth. Industrial growth is forecasted to occur in the area along Duncannon Lane, and the area along the Berea Bypass. Employment growth is also expected at the Bluegrass Army Depot, due to the planned destruction of weapons that will be done at the depot. This activity is scheduled to begin in 2005 and continue until 2014.

Table IV- 3. 2025 Study Area Population and Employment Data

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
1	1	1	194	0	194	20	23	14	10	8	75	139	97	437	673
2	1	1	86	0	86	25	12	2	3	1	43	122	170	191	483
3	1	1	250	0	250	71	60	9	5	0	145	147	324	67	538
4	1	1	187	0	187	45	39	11	5	0	100	67	202	212	481
5	1	0	971	0	971	189	172	74	29	16	480	65	360	70	495
6	1	0	592	0	592	200	71	35	25	8	339	60	156	112	328
7	1	1	277	0	277	33	26	24	14	10	107	69	108	268	445
8	1	0	1183	202	1385	241	222	84	26	19	595	244	56	805	1105
9	1	0	151	719	870	56	21	8	6	0	91	109	3166	123	3398
10	1	1	482	0	482	169	63	22	21	4	279	83	134	51	268
11	1	0	1296	2	1298	270	262	78	30	20	663	0	60	9	69
12	1	0	889	0	889	139	179	62	27	16	423	2	46	1	49
13	1	0	1520	0	1520	285	335	84	25	27	759	272	65	2	339
14	1	0	1168	0	1168	163	181	81	37	38	503	0	3	0	3
15	1	0	1511	0	1511	255	231	114	79	23	702	31	211	300	542
16	1	0	395	0	395	54	73	29	11	8	179	2	300	202	504
17	1	0	1001	0	1001	194	224	60	4	18	503	200	0	461	661
18	1	0	1784	0	1784	179	231	146	95	55	706	106	138	301	545
19	1	0	537	22	559	80	73	33	21	20	227	101	208	29	338
20	1	0	1188	0	1188	209	200	89	44	23	565	440	104	398	942
21	1	0	1143	0	1143	289	246	61	20	13	632	453	1295	1102	2850
22	1	0	987	0	987	194	224	57	4	18	500	387	534	23	944
23	1	0	4	378	382	0	2	0	0	0	2	43	800	0	843
24	1	0	904	0	904	233	179	48	32	8	500	272	630	63	965
25	1	0	543	0	543	44	77	35	30	19	205	4	339	5	348
26	1	0	197	0	197	38	44	11	0	3	100	0	0	0	0
27	1	0	2	0	2	0	1	0	0	0	1	100	218	0	318
28	1	0	690	0	690	76	140	49	23	14	306	200	1	1	202
29	1	0	457	0	457	81	113	34	10	1	239	379	302	0	681
30	1	0	430	0	430	79	94	25	2	9	212	214	306	16	536
31	1	0	1905	0	1905	296	379	137	52	28	895	831	516	293	1640
32	1	0	617	0	617	69	68	53	37	20	247	1002	340	581	1923
33	1	0	10	0	10	0	3	0	0	0	3	45	29	332	406
34	1	0	80	124	204	19	11	6	4	1	41	99	1701	0	1800
35	1	0	583	0	583	47	90	39	38	9	227	0	10	1	11

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
36	1	0	3478	0	3478	420	640	336	117	52	1568	270	429	99	798
37	1	0	754	0	754	118	156	49	10	16	352	247	1	2	250
38	1	0	395	0	395	77	89	23	1	7	200	0	50	0	50
39	1	0	1953	0	1953	240	367	149	70	43	872	300	360	928	1588
40	1	0	1656	0	1656	270	318	131	37	31	790	412	170	46	628
41	1	0	1793	0	1793	349	403	106	8	33	903	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	1	0	1838	0	1838	351	415	108	12	34	924	0	300	184	484
44	1	0	1515	0	1515	277	324	89	16	31	740	300	18	0	318
45	0	0	289	0	289	10	32	26	17	11	96	0	0	0	0
46	0	0	229	0	229	22	26	19	9	12	88	0	0	1	1
47	1	0	628	0	628	88	112	46	26	9	285	206	300	204	710
48	0	0	1060	0	1060	101	152	77	57	30	421	207	14	22	243
49	1	0	430	0	430	80	95	25	1	7	211	123	224	30	377
50	1	0	403	0	403	77	90	23	1	7	201	0	0	0	0
51	1	0	855	0	855	120	169	55	23	16	386	0	37	700	737
52	0	0	589	0	589	83	125	41	9	13	274	0	1	9	10
53	1	0	1129	0	1129	114	237	68	30	32	484	316	265	22	603
54	1	0	1241	0	1241	170	210	91	36	36	546	0	31	17	48
55	0	0	309	0	309	10	41	27	29	4	111	16	12	2	30
56	0	0	423	0	423	12	73	30	23	15	153	0	12	3	15
57	1	0	843	0	843	19	99	77	64	24	283	0	2	7	9
58	1	0	343	0	343	10	51	24	19	13	117	0	16	0	16
59	0	0	1673	0	1673	236	316	112	46	39	752	2	5	278	285
60	1	0	142	0	142	10	23	8	12	0	53	100	300	127	527
61	0	0	123	0	123	11	17	7	6	4	45	0	0	1	1
62	0	0	753	0	753	60	142	49	31	22	308	0	8	13	21
63	0	0	455	0	455	16	64	37	30	15	162	0	4	22	26
64	0	0	324	0	324	21	52	29	15	9	126	2	13	6	21
65	0	0	266	0	266	23	30	24	20	6	103	0	0	4	4
66	0	0	72	1	73	5	11	5	4	0	25	0	0	2	2
67	0	0	1927	0	1927	329	418	122	20	39	930	0	1	5	6
68	0	0	2039	0	2039	146	301	166	108	60	784	109	7	38	154
69	0	0	1397	0	1397	245	301	80	18	29	676	0	0	1	1
70	0	0	743	0	743	69	124	53	33	20	301	0	36	6	42
71	0	0	601	0	601	95	127	43	13	7	288	0	0	0	0
72	0	0	396	0	396	21	39	30	31	12	133	5	3	2	10

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
73	0	0	1280	0	1280	133	211	100	50	35	532	0	2	26	28
74	0	0	683	0	683	34	113	49	48	12	256	33	9	20	62
75	0	0	226	0	226	12	38	20	10	5	85	0	4	7	11
76	1	0	10	0	10	3	2	0	0	0	5	25	0	826	851
77	0	0	30	0	30	4	6	2	2	0	14	0	1	312	313
78	0	0	229	0	229	16	32	14	17	6	85	0	3	300	303
79	0	0	18	0	18	3	0	2	0	1	6	0	0	300	300
80	0	0	2051	0	2051	260	376	132	74	53	898	7	0	27	34
81	1	0	19	0	19	1	6	0	0	1	8	0	0	1270	1270
82	1	0	763	0	763	80	132	55	34	15	318	0	506	200	706
83	0	0	542	0	542	91	108	36	8	10	256	0	2	0	2
84	1	0	1266	0	1266	115	193	102	70	27	510	0	7	18	25
85	0	0	1125	0	1125	111	169	82	56	30	451	12	0	6	18
86	0	0	906	0	906	121	154	65	30	22	395	0	1	1	2
87	0	0	698	0	698	100	137	52	20	11	323	0	53	3	56
88	0	0	374	0	374	22	55	32	29	6	144	2	0	9	11
89	0	0	363	0	363	22	45	29	34	4	134	0	0	19	19
90	0	0	172	0	172	7	27	8	14	3	59	1	3	0	4
91	0	0	327	0	327	32	47	18	20	13	130	0	0	22	22
92	0	0	130	0	130	11	21	13	4	4	53	0	0	0	0
93	0	0	320	0	320	35	28	33	16	10	122	0	0	7	7
94	0	0	270	0	270	29	28	21	17	9	104	3	1	0	4
95	0	0	208	0	208	13	31	20	10	6	80	0	0	0	0
96	0	0	308	0	308	29	48	21	21	7	126	0	0	1	1
97	0	0	329	0	329	13	35	32	21	10	111	0	1	0	1
98	0	0	168	0	168	11	17	16	11	3	58	0	0	9	9
99	0	0	244	0	244	16	51	14	14	5	100	8	0	14	22
100	1	0	663	0	663	120	138	39	8	15	323	200	300	112	612
101	1	1	20	200	220	3	3	0	0	0	6	48	698	29	775
102	1	1	186	100	286	38	29	8	11	4	90	32	63	0	95
103	1	1	5	400	405	1	0	0	1	0	2	0	586	0	586
104	1	1	262	0	262	39	37	21	12	4	113	17	184	20	221
105	1	0	101	0	101	16	22	5	3	0	46	0	181	240	421
106	1	0	13	0	13	0	1	1	2	0	4	17	0	0	17
107	1	0	324	0	324	75	46	24	20	1	166	99	28	193	320
108	1	0	133	0	133	15	21	9	5	3	53	86	68	78	232
109	1	0	424	0	424	69	75	30	21	6	201	7	12	84	103

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
110	1	0	261	0	261	41	37	19	16	4	117	0	3	270	273
111	1	1	179	200	379	27	22	11	10	4	74	79	39	0	118
112	1	1	253	150	403	30	30	18	10	9	97	12	53	56	121
113	1	1	592	0	592	72	85	39	32	19	247	36	16	5	57
114	1	1	680	0	680	113	97	61	28	15	314	272	46	95	413
115	1	0	818	0	818	89	122	75	38	19	343	2	33	2	37
116	1	0	1	0	1	0	0	0	0	0	0	600	800	0	1400
117	1	0	0	0	0	0	0	0	0	0	0	100	200	1194	1494
118	1	0	75	0	75	8	5	5	4	2	24	100	200	914	1214
119	1	0	352	0	352	61	74	23	4	5	169	500	700	503	1703
120	1	0	995	0	995	163	191	69	25	19	470	59	213	35	307
121	1	0	1245	0	1245	140	185	109	71	21	526	213	314	10	537
122	1	0	1065	0	1065	144	192	66	44	23	472	100	200	401	701
123	1	0	1245	0	1245	195	217	91	44	23	573	0	62	3	65
124	1	0	940	0	940	119	180	61	28	23	414	2	1	12	15
125	1	0	794	0	794	111	148	56	24	18	360	100	207	7	314
126	1	0	668	1	669	49	81	45	46	23	244	0	0	0	0
127	0	0	402	0	402	31	49	29	26	13	148	0	0	23	23
128	1	0	119	0	119	6	16	16	4	1	43	0	8	16	24
129	0	0	106	0	106	11	9	12	4	4	40	0	0	0	0
130	1	0	314	0	314	37	44	31	9	9	130	463	8	20	491
131	1	0	382	0	382	20	50	30	23	13	136	22	19	13	54
132	1	0	194	0	194	15	29	15	11	2	72	20	85	32	137
133	1	0	1081	0	1081	131	191	82	38	22	467	200	203	3	406
134	1	0	319	0	319	58	69	17	2	6	154	181	26	0	207
135	1	0	31	0	31	4	2	1	1	0	8	0	0	135	135
136	1	0	1473	0	1473	277	322	89	14	26	731	0	6	5	11
137	1	0	500	0	500	82	101	28	9	9	232	0	0	0	0
138	1	0	980	0	980	114	174	73	43	17	424	10	162	313	485
139	0	0	433	0	433	31	62	33	25	12	163	1	45	40	86
140	0	0	942	0	942	79	100	87	54	34	354	0	7	7	14
141	0	0	110	0	110	13	14	6	7	4	44	0	0	0	0
142	0	0	456	0	456	65	88	32	10	11	208	0	0	0	0
143	0	0	96	0	96	2	16	5	5	2	30	0	0	0	0
144	0	0	778	0	778	95	139	58	20	20	335	0	3	0	3
145	0	0	195	0	195	13	37	15	6	6	77	0	63	12	75
146	0	0	371	0	371	16	47	36	26	6	131	0	11	68	79

TAZ	URBAN	CBD	POP_HH	POP_S	POP_TOT	DU_1	DU_2	DU_3	DU_4	DU_5	DU_TOT	EMP_R	EMP_S	EMP_O	EMP_TOT
147	1	0	1735	0	1735	130	244	129	86	65	656	606	551	56	1213
148	0	0	4688	0	4688	814	1001	290	71	92	2271	100	252	124	476
149	1	0	130	0	130	6	17	7	13	3	46	130	202	38	370
150	0	0	244	0	244	17	25	18	20	5	85	0	1	2	3
151	0	0	398	0	398	63	78	22	10	9	184	0	0	0	0
152	0	0	216	0	216	16	35	23	10	4	88	0	0	1	1
153	0	0	138	0	138	11	16	12	7	4	50	0	0	0	0
154	0	0	102	0	102	6	6	11	8	1	32	0	0	0	0
155	0	0	92	0	92	5	17	8	3	3	36	0	9	0	9
156	0	0	45	0	45	4	2	2	0	4	12	0	0	0	0
157	0	0	90	0	90	11	12	6	6	2	37	0	0	1	1
158	0	0	147	0	147	6	22	15	10	1	54	0	0	0	0
159	0	0	292	0	292	18	40	27	17	9	111	1	1	2	4
160	0	0	141	0	141	6	15	11	11	4	47	0	0	0	0
161	0	0	130	0	130	9	23	9	6	2	49	0	0	0	0
162	0	0	69	0	69	5	10	5	6	1	27	0	0	0	0
163	0	0	122	0	122	11	17	8	4	6	46	0	0	0	0
164	0	0	138	0	138	8	18	16	8	0	50	0	9	73	82
165	0	0	316	0	316	10	32	23	23	15	103	0	12	0	12
166	1	0	3	0	3	1	1	0	0	0	2	204	17	0	221
167	1	0	432	0	432	70	95	26	15	4	210	38	67	226	331
168	0	0	436	0	436	65	90	27	10	9	203	0	61	4	65
169	0	0	25	0	25	1	3	2	2	0	8	0	0	0	0
170	1	0	6	0	6	0	0	2	0	0	2	100	300	0	400
171	1	0	33	0	33	0	3	3	1	0	7	100	300	4	404
172	1	0	10	0	10	0	1	1	1	0	3	100	300	9	409
173	0	0	288	0	288	15	51	25	16	6	113	0	0	1	1
174	0	0	406	0	406	14	56	37	25	13	145	13	7	10	30
175	0	0	236	0	236	6	28	21	15	9	79	0	4	2	6
176	1	0	1481	0	1481	258	323	83	26	28	721	286	423	103	812
Totals			104,502	2,499	107,001	14,395	18,546	7,416	3,675	2,279	46,500	14,250	24,510	18,240	57,000

Footnotes:

TAZ – Traffic Analysis Zone
Urban – Is the zone urban (1) or rural (0)?
CBD – In the Central Business District (1)?
Pop HH – Population in Households
Pop S – Student Population
Pop Tot – Total Population
DU 1 –Dwelling Units with 1 person
DU 2 – Dwelling Units with 2 persons
DU 3 – Dwelling Units with 3 persons
DU 4 – Dwelling Units with 4 persons
DU 5 – Dwelling Units with 5 or more persons
DU Tot – Total number of Dwelling Units
Emp R – Number of Retail Employees
Emp S – Number of Service Employees
Emp 0 – Number of Other Employees
Emp Tot – Total Number of Employees

Transportation Model Development

The Madison County Traffic Model was used in this study to predict future travel demand and to evaluate the impact of alternative transportation improvement projects. The traditional modeling approach was followed: trip generation, trip distribution and trip assignment. Due to the size of the Richmond and Berea urban areas and the relatively minor role that other transportation modes play in the overall transportation system, this was an automobile (including trucks) model only. Thus, there was no mode choice component of the model. The TransCAD modeling package was used to run the model.

Travel within the study area was divided into three trip categories:

1. Internal-Internal (I-I) Trips – trips with both the origin and destination within the study area;

2. External-Internal (E-I) Trips – trips with either origin or destination inside the study area and the other terminus outside the study area; and

3. External-External (E-E) Trips – trips that pass through the study area and have both the origin and destination outside the study area.

There were no current travel data that were applicable to the Madison County model. All trips, therefore, were synthesized mathematically using relationships derived from past studies in similar small urban areas. Using these relationships, production and attraction equations were derived for three internal trip purposes:

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

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

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

The gravity model was used to distribute internal trips (both I-I trips and E-I trips). The gravity model basically assumes that the number of trips between any two traffic zones is directly proportional to the amount of activity or "gravity" (productions and attractions) within the two zones and inversely proportional to the distance (and therefore travel time) separating the zones.

Initially the same internal trip equation was used for all zones. However, during the calibration process, the zones were categorized as either urban or rural. The trip rate was increased for trips in the urban zones and decreased in the rural zones to account for differing trip generation characteristics. Ultimately an internal trip rate of 3.7 daily trips per person in the urban areas and 2.6 daily trips per person in the rural areas produced the best results.

The 2000 base year model was calibrated to existing traffic counts. That is, for the base year, the model was used to "predict" traffic on specific network links and model results were compared to actual counts on those same links. A model is considered to be calibrated when the differences between predicted volumes and actual counts fall within acceptable limits. The root mean square error (RMSE) was used as a calibration measure. Generally, a RMSE of 30 percent or less is considered to be acceptable. After adjustments to the individual model components were made, a final RMSE of 26.0 percent was obtained for the Madison County model.

Planned and Programmed Transportation Improvements

Beginning with the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, states were required to take an approach to transportation planning that included an emphasis on enhancing transportation system efficiency, monitoring and improving performance, and ensuring that future transportation investments reflect the impacts on the economy, the environment, and quality-of-life. With the passage of the Transportation Equity Act for the 21st Century (TEA-21) in 1998, the statewide transportation planning process established in ISTEA was continued and confirmed as the primary mechanism for cooperative transportation decision-making in Kentucky.

Kentucky's statewide planning process has both a short-range component and a long-range component. The *Statewide Transportation Plan* presents a long-range, 20-year vision of statewide needs and transportation improvements. The Plan only includes projects for which some type of funding is anticipated; however, TEA-21 allows states to include in the financial plan, for illustrative purposes, additional potential projects that would be included in the Long-Range Plan if reasonable additional resources beyond those identified in the financial plan become available. The current *Statewide Transportation Plan (FY 1999 – 2018)* was finalized in January 2000.

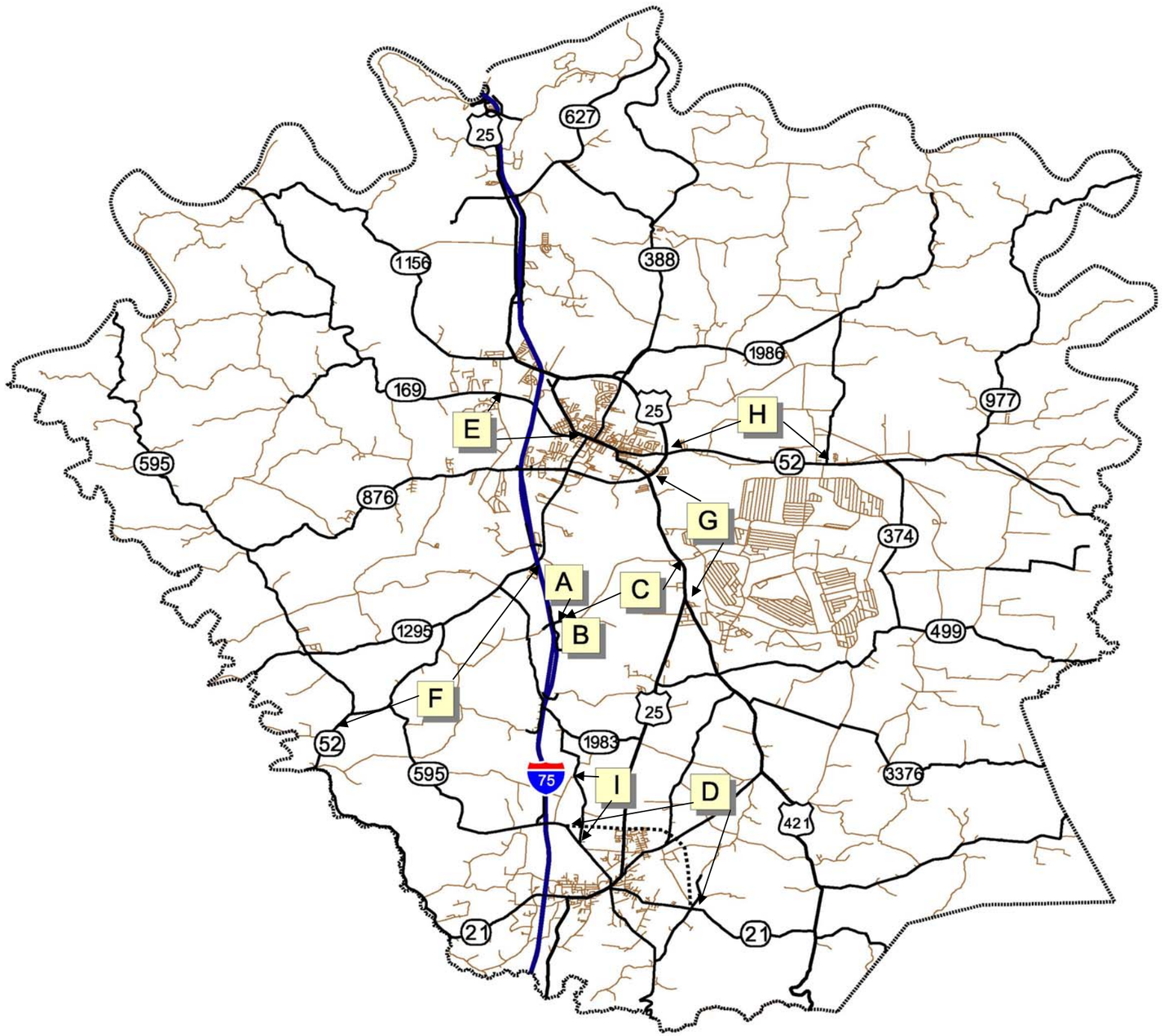
The short-range component of Kentucky's statewide planning process actually has two parts. The *Six Year Highway Plan* details the spending of state and federal monies for construction, maintenance and planning activities over the next six years. The Plan matches anticipated annual funding against estimated project costs. The current version of the Plan is for Fiscal Years 2003 – 2008.

The other short-range component is the *Statewide Transportation Improvement Program* (STIP). It lists projects to be advanced in the next three years with the appropriate federal agencies. The STIP is a subset of the *Six Year Highway Plan* and, like the *Six Year Plan*, is fiscally constrained. Kentucky's current STIP was completed in August 2002.

For Madison County, there are several major construction projects contained in the current *Six Year Highway Plan FY 2003 – 2008*. Those are:

- I-75 – Widen to 6 lanes from KY 21 at Berea to Rockcastle County line
- New I-75 Interchange at Duncannon Road
- I-75 Rest Area Rehabilitation (Near Duncannon Road)
- Duncannon Road – widen from 2 to 5 lanes from the planned I-75 interchange to US 25
- Berea Northern Bypass - construction of a new 4-lane bypass KY 21 to KY 595
- KY 169 (Tates Creek Pike) – widen from 2 to 3 lanes from Goggins Lane to US 25X (Main Street)
- KY 52 (Lancaster Road) – reconstruction from Wallace Mill Road to I-75
- US 25 (Berea Road) – widen from 2 to 4 lanes from US 421 to KY 876 (Richmond Bypass)
- KY 52 (Irvine Road) – widen from 2 to 4 lanes from KY 876 (Richmond Bypass) to KY 374N
- KY 1983 (Menelaus Road) – widen from 2 to 5 lanes from KY 595 to Mayde Road

A map containing short-term *Six Year Highway Plan* projects is presented in **Figure IV-2**.



Madison County

Six Year Plan Projects

A Duncannon Road Interchange with I-75
- Construct new interchange along I-75 at Duncannon Road
Estimated Cost: $13.4 million

B I-75 Rest Area Rehabilitation
- Reconstruct the northbound and southbound rest areas on I-75
Estimated Cost: $13.7 million

C Duncannon Road Reconstruction
- Widen and improve to 5 lanes from new interchange with I-75 to US 25
Estimated Cost: $14.4 million

D Berea Northern Bypass
- Construct new 4-lane bypass north of Berea from KY 21 to KY 595 near I-75 Exit 77
Estimated Cost: $34.5 million

E KY 169 (Tates Creek Pike) Reconstruction
- Reconstruct to 3 lanes from Goggins Lane to US 25X
Estimated Cost: $13.2 million

F KY 52 (Lancaster Road) Reconstruction
- Reconstruct KY 52 from Wallace Mill Road to I-75
Estimated Cost: $22 million

G US 25 (Berea Road) Widening
- Widen to 4 lanes from US 421 to KY 876
Estimated Cost: $28.5 million

H KY 52 (Irvine Road) Reconstruction
- Widen to 4 lanes from KY 876 to KY 374 North
Estimated Cost: $15.7 million

I KY 1983 (Menelaus Road) Widening
- Widen to 5 lanes from KY 595 to Mayde Road
Estimated Cost: $3.7 million

Figure IV- 2. Planned and Programmed Improvements

Future Traffic Forecasts

Year 2025 traffic forecasts for the Madison County area are presented in **Figure IV-3**. Traffic volumes from the 2000 model are included in this figure as a baseline for comparison. The forecasts were developed using the Madison County Traffic Model. The transportation network was assumed to be that which exists today plus those Madison County projects contained in the *Six Year Highway Plan FY 2003 – 2008*. The table below lists those roads anticipated to experience the heaviest traffic volumes in the future.

Facility	2025 Volume Range	Annual Growth Rate (2000 to 2025)
Interstate 75	83,000 - 105,600 vpd	2.4 – 3.4 %
US 25 (Berea Road)	20,100 - 42,500 vpd	2.5 – 3.5 %
KY 876 (Richmond Bypass)	34,600 - 39,300 vpd	2.6%
KY 52 (Irvine Road)	21,600 - 25,700 vpd	2.4%

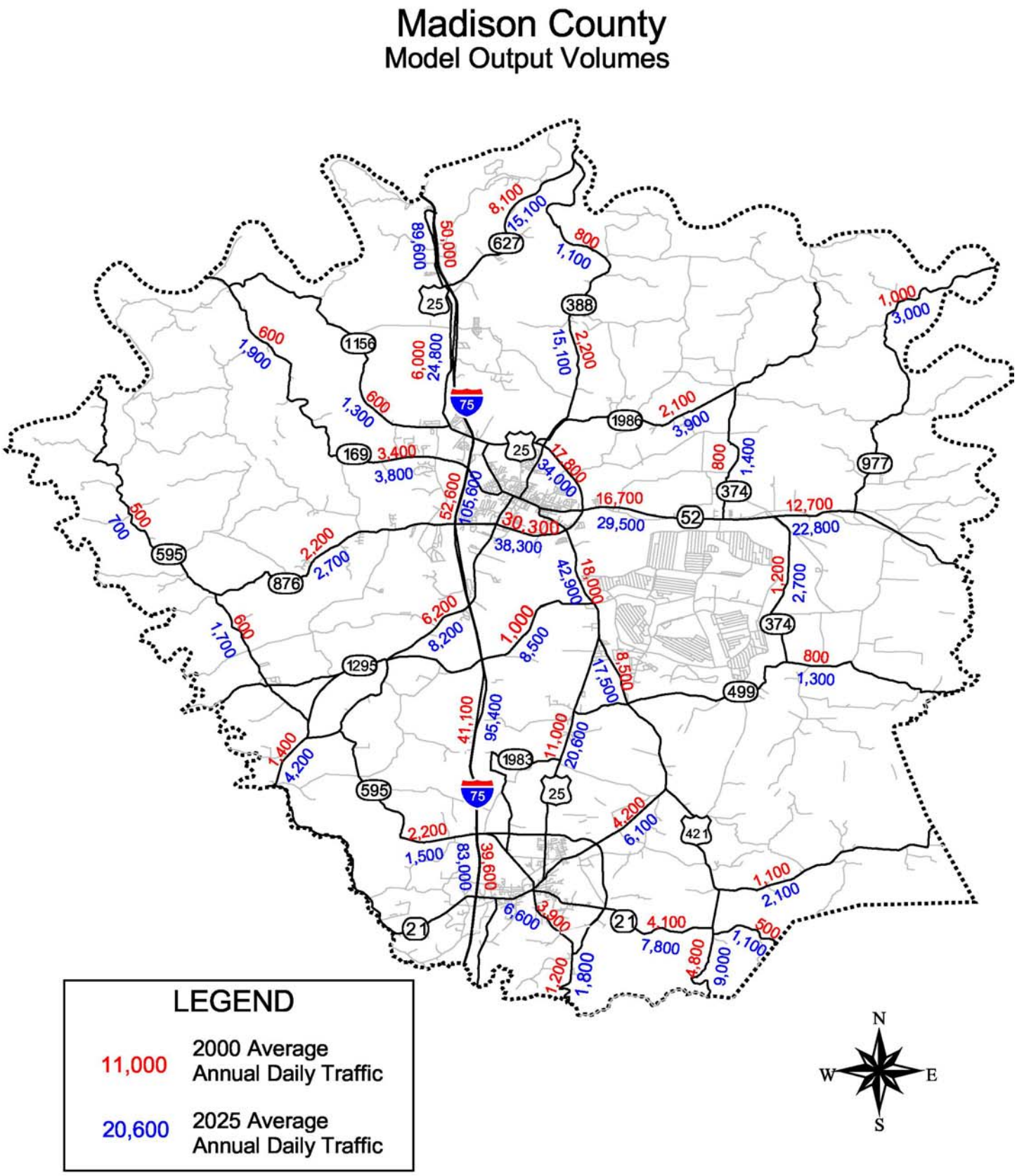


Figure IV- 3. 2000 Existing and 2025 E+C Traffic Volumes

CHAPTER V – OPERATIONAL IMPROVEMENT PLAN

Purpose

The Operational Improvement Plan is a list of short-term improvement projects that will provide incremental capacity and safety benefits in a cost effective manner. The focus of these projects is to provide safer and more efficient utilization of the existing transportation system quickly and at a relatively low cost.

Unfortunately, these benefits are reduced over time as traffic grows. At some point, major improvements are usually required to provide a safe and desirable overall level of service. Many of the projects in this plan were developed in response to interviews with members of the project work group, local law enforcement, public works officials, and the Kentucky Transportation Cabinet (KYTC).

An initial list of candidate projects was compiled from a survey sent to the work group members prior to the first work group meeting. The returned surveys revealed several commonly perceived problem spots. Some of these spots will likely be improved by projects already committed in the current KYTC Six-Year Plan. As none of the potential operational improvement projects also listed in the Six-Year Plan were determined to have critical safety hazards requiring immediate attention, those projects were not considered for operational improvements in this plan. The focus was placed on finding additional projects through a countywide safety analysis and field visits.

A countywide crash analysis was performed on all major state maintained roadways. This analysis revealed many roadway sections where high numbers of crashes were occurring. The high crash road sections, survey responses, and the study team's knowledge of the area were all used in forming a preliminary list of operational improvement projects. Each potential project was reviewed in the field to determine feasibility and benefits. During the field visits, other possible projects were also identified and evaluated.

Operational Improvement Projects

A list of operational improvement projects is listed in **Table V-1** and the locations of these projects are displayed on maps in **Figures V-1, V-2, and V-3**.They have been grouped into three priority categories that, on a scale of one to three, indicate which projects would yield the greatest benefits. Group 1 projects provide the greatest benefit at the least cost. At the other end, Group 3 projects, while still beneficial, have a higher relative cost and/or require more resources to implement. Many of these projects involve intersections on congested roadway sections, some are high crash locations, and some have poor geometric alignment.

Table V-1. Operational Improvement Projects

	PROJECT LOCATION	PROJECT DESCRIPTION	PRIORITY GROUP*	COST ESTIMATE
1.	Various Traffic Signal Upgrades	Replace Protected Only Left Turn Phases with Protected/Permitted Left Turn Treatments on the Richmond By-pass	1	$3,000 per Intersection Approach
2.	US 25 (Main Street in Berea) At KY 595	Place Durable Striping Through This Intersection To Better Define Lanes And Vehicle Paths.	1	$7,500
3.	US 25X (Main Street in Richmond) At Estill Drive	Place Durable Striping Through This Intersection To Better Define Lanes And Vehicle Paths.	1	$7,500
4.	KY 21 Coordinated Traffic Signal System	Install Communications For Signals From I-75 to US 25 On KY 21 In Berea	1	$30,000**
5.	US 25 At KY 52	Lengthen Southbound Left Turn Lane From US 25 Onto Eastbound KY 52 By 250 Feet.	1	$40,000
6.	KY 876 At KY 52	Install Right Turn Lane From Eastbound KY 876 To Southbound Lancaster Road	1	$75,000***
7.	US 25 At KY 499	Improve KY 499 Approach	2	$150,000***
8.	KY 1016 At Shortline Pike	Realign Intersection	3	$225,000***
9.	US 421 At KY 499	Realign Intersection	3	$320,000***
10.	US 25 At Boone Street (Berea)	Realign Intersection	3	$625,000***

*Relative comparison of benefits, cost, and ease of implementation. Group 1 projects have the greatest benefits, least cost, and/or easily implemented.

** Estimate for radio communications to interconnect additional traffic signals. Does not include the cost of other major equipment upgrades (equipment cabinets, poles, signal heads, wiring, etc.) or creating coordinated timing plans.

*** Includes Right-of-Way acquisition (where necessary), relocation of utilities, and construction costs.

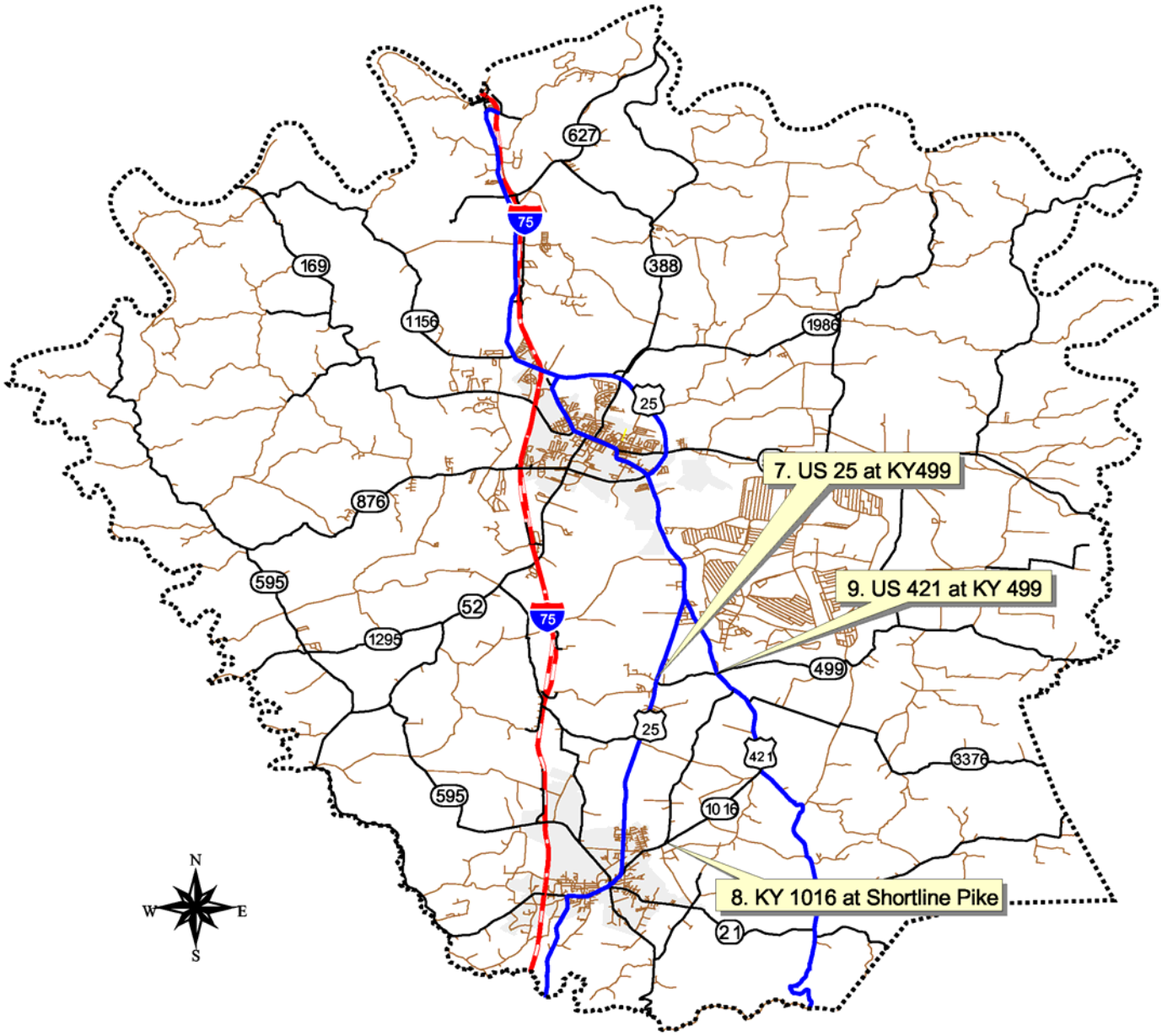


Figure V-1. Madison County Operational Improvement Projects

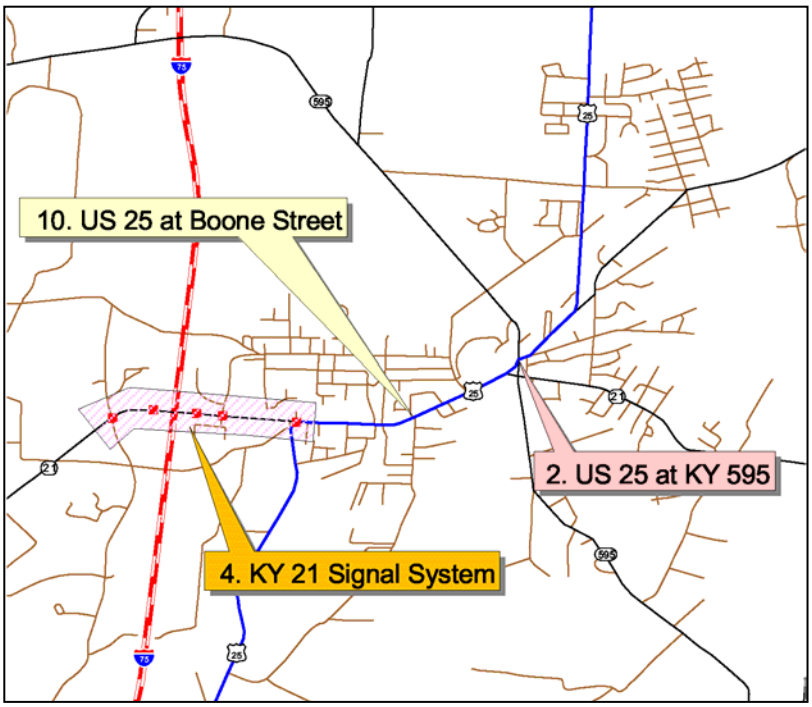


Figure V-2. Berea Area Operational Improvement Projects

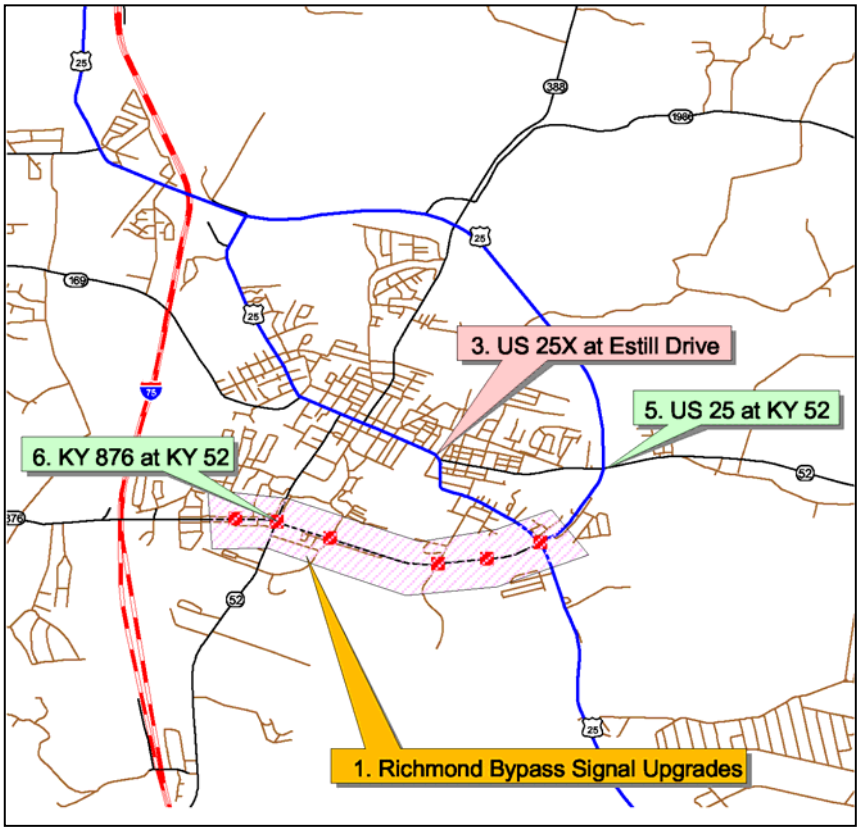


Figure V-3. Richmond Area Operational Improvement Projects

1. Protected/Permitted Left Turn Signal Replacement Program

It is recommended that a program be established to replace traffic signals along the Richmond Bypass that have "Protected Only" left turn phases. Currently, about half the intersections along the by-pass have this type of left turn treatment. Traffic signals with "Protected Only" left turn treatments should be reevaluated to determine whether this alternative left turn treatment would benefit traffic operations. The use of protected/permitted left turn treatments can significantly reduce the delay experienced by left turning vehicles, increase capacity, and improve the overall flow of traffic through the intersection. A list of candidate locations is presented in **Table V-2**.

This conversion process can be performed quickly with low construction cost. The cost per intersection approach is approximately $3,000 for materials and labor. The implementation of any protected/permitted left turn treatments should be in accordance with the current KYTC policies regarding such signal indications.

Table V-2. Candidates for Protected/Permitted Left Turn Treatments

Intersection			Direction of Approach			
Major Street		Minor Street	Northbound	Southbound	Eastbound	Westbound
KY 876	at	Brown Drive			X	X
KY 876	at	KY 52 (Lancaster Road)	X	X	X	X
KY 876	at	Kit Carson Drive			X	X
KY 876	at	Boggs Lane			X	X
KY 876	at	Richmond Mall			X	X
KY 876	at	US 25 (Berea Road)	X	X		
KY 876	at	KY 52 (Irvine Road)	X	X	X	X
A total of 18 intersection approaches are listed.						

2. US 25 (Main Street) at KY 595 in Berea – Place Durable Striping Through Intersection to Better Define Lanes and Vehicle Paths

This intersection in downtown Berea is not a typical intersection. These routes cross to form an "X" on a map of Berea. The angle at which these roads intersect complicates traffic flow. Currently, the intersection is open and unmarked, which can lead to confusion for motorists unfamiliar with this high tourism area. In addition, the stop lines are marked very far back, creating a sea of asphalt in the middle of the intersection.

It is recommended that durable striping be placed around the intersection to clearly define the vehicle paths through the intersection, and to mark out areas of pavement that are not utilized. The addition of centerline tracks through the intersection and covering large areas of unused pavement as traffic islands should accomplish this task. Another benefit will be to delineate the areas in advance of on-street parking that should reduce the potential of a rear-end collisions with parked cars. Some "before and after" images of the intersection can be seen in **Figures V-4 and V-5**.

Figure V-4. "Before" View of US 25 and KY 595 in Berea

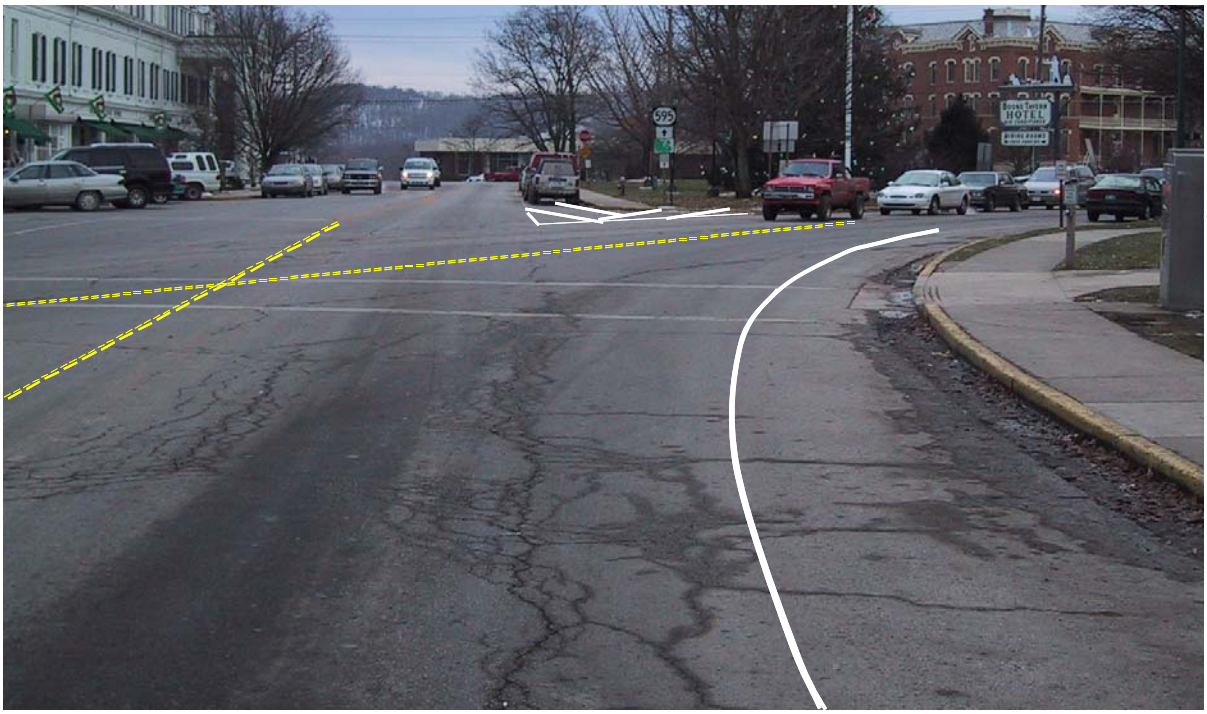


Figure V-5. "After" View of US 25 and KY 595 in Berea

3. US 25X (Main Street) at Estill Drive in Richmond – Place Durable Striping Through Intersection to Better Define Lanes and Vehicle Paths

Similar to the previous project, it is recommended that durable striping be placed through the intersection of US 25X and Estill Drive in Richmond. Currently, the intersection is without lane designations in the eastbound direction. This intersection is visually "busy" with railroad tracks, a gas station, liquor store, and the traffic signal surrounding it. There is also a utility pole and a traffic signal pole exposed to traffic in the gas station parking lot. The addition of lane markings throughout the intersection will better define vehicle paths and lane assignments. Also, the driveways to the gas station should be better defined with striping. "Before" and "After" images of the intersection can be seen in **Figures V-6 and V-7**.

Figure V-6. "Before" View of Main Street and Estill Drive in Richmond

Figure V-7. "After" View of Main Street and Estill Drive in Richmond

4. KY 21 Coordinated Traffic Signal System

It is recommended that a coordinated traffic signal system be created along KY 21 in Berea from Dogwood Drive to Mt. Vernon Road (US 25). The addition of communication between intersections and coordinated timing plans should improve traffic flow by having the signals work together. Traffic signal systems have been proven to reduce delays and travel times on arterial streets by an average of 15 percent and reduce crashes by 10 to 12 percent. **Figure V-8** shows the intersections included in the KY 21 coordinated signal system.

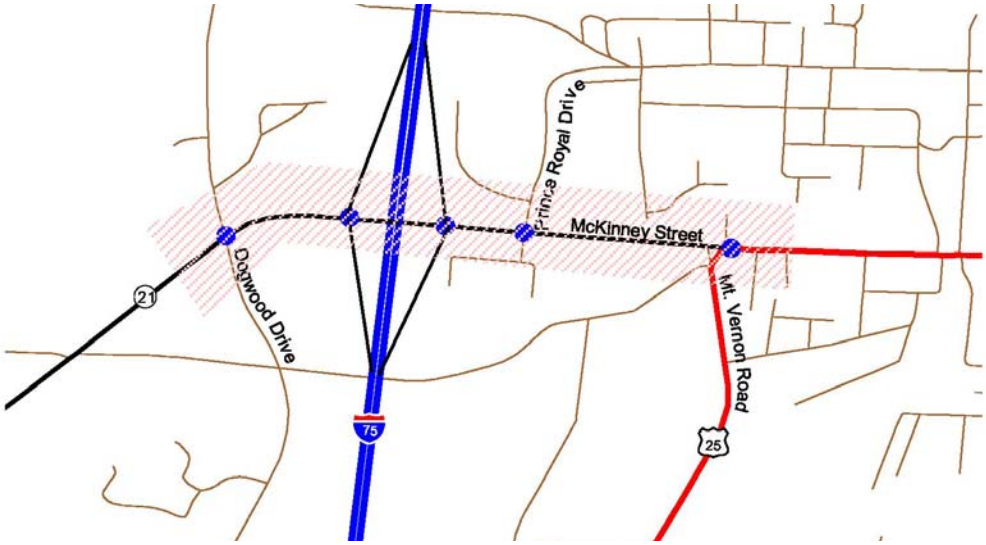


Figure V-8. KY 21 Signal System in Berea

5. Richmond Bypass (US 25) at Irvine Road (KY 52) – Lengthen Southbound Left Turn Lane

KY 52 and US 25 are major routes around the city of Richmond. KY 52, at this location carries traffic to and from the east of Richmond and Madison County. The Bypass serves as a connection to I-75. The US 25 southbound left turn lane onto eastbound KY 52 is currently too short to accommodate afternoon rush hour traffic demands. It is recommended that the left turn lane be lengthened by 250 feet. This should provide the extra storage necessary to accommodate left turning traffic during peak periods.

6. KY 876 at KY 52 – Add right turn lane from eastbound KY 876 to southbound Lancaster Road (KY 52)

The addition of an eastbound right turn lane at the Richmond Bypass and Lancaster Road intersection would help to alleviate some of the queuing during peak hours. Often there will be a long queue on the eastbound approach and those needing to make a right turn must wait in the queue until reaching the intersection. Some motorists use the shoulder as a right turn lane. This driver behavior is potentially unsafe and illegal (passing on the shoulder). **Figure V-9** demonstrates a motorist making a right turn using the shoulder.

Figure V-9. Vehicle Using Shoulder As Right Turn Lane

7. US 25 at KY 499 – Improve KY 499 Approach

The intersection of US 25 and KY 499 has three approaches. A culvert carries a stream under US 25 south of the KY 499 westbound approach. The KY 499 approach is on an incline with trees and a guardrail blocking the motorist's view of oncoming traffic. It is recommended that the existing culvert be extended and the guardrail along US 25 be relocated further from US 25. Once the culvert is extended, the area can be filled in and some vegetation removed. This will eliminate the sight distance problem and increase safety. **Figure V-10** shows the existing intersection and **Figure V-11** illustrates the improvement concepts.

Figure V-10. KY 499 Approach at US 25 Looking South

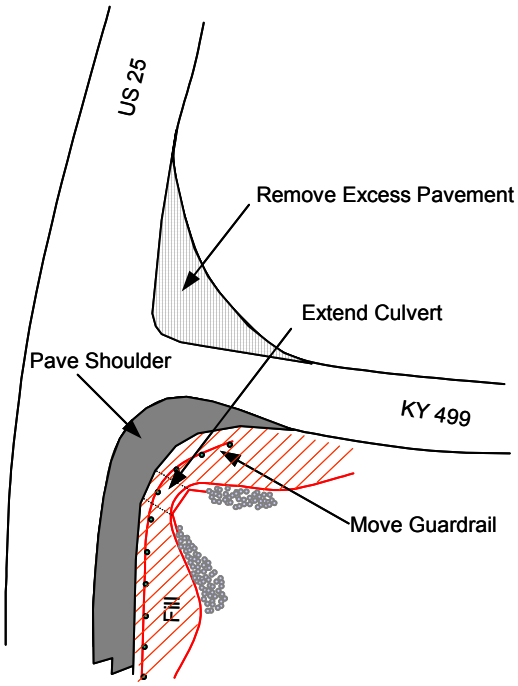


Figure V-11. US 25 and KY 499 Improvements

8. KY 1016 at Shortline Pike – Realign Intersection

Shortline Pike intersects KY 1016 at a skewed angle. It is recommended that this intersection be considered for realignment to create a 90-degree intersection. The realignment should provide a safer intersection. **Figure V-12** illustrates the improvement concepts.

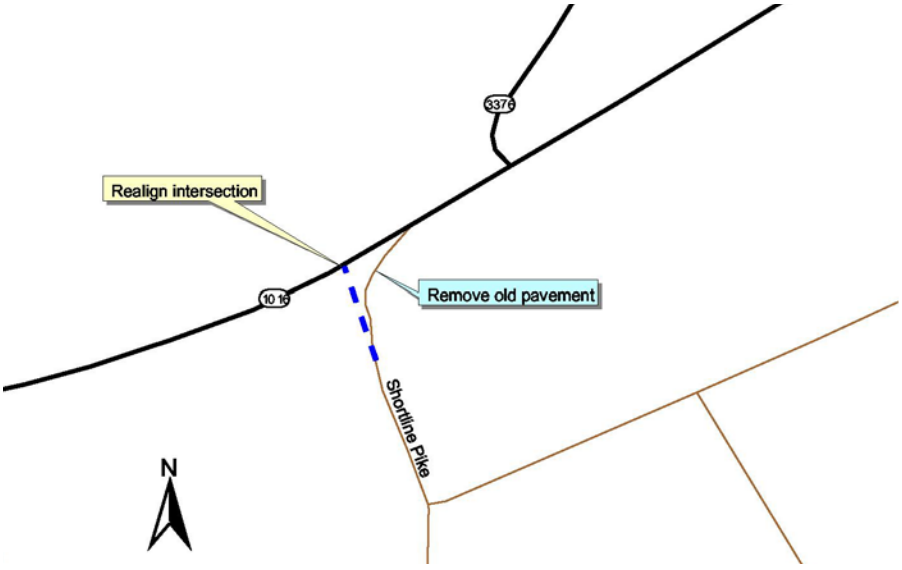


Figure V-12. KY 1016 and Shortline Pike Realignment

9. US 421 at KY 499 – Realign Intersection

The KY 499 approaches of the intersection with US 421 are currently offset from one another. An automotive dealership occupies the northwest corner of the intersection. It is recommended that the KY 499 approaches should be realigned so that they are directly across from one another. Also, access management principles should be applied on US 421, especially in the vicinity of the automotive lot. The auto dealership, like many others in Madison County, has no defined access points. The realignment should provide a safer intersection and straighten KY 499. **Figure V-13** illustrates the improvement concepts and **Figure V-14** displays a picture of the dealership.

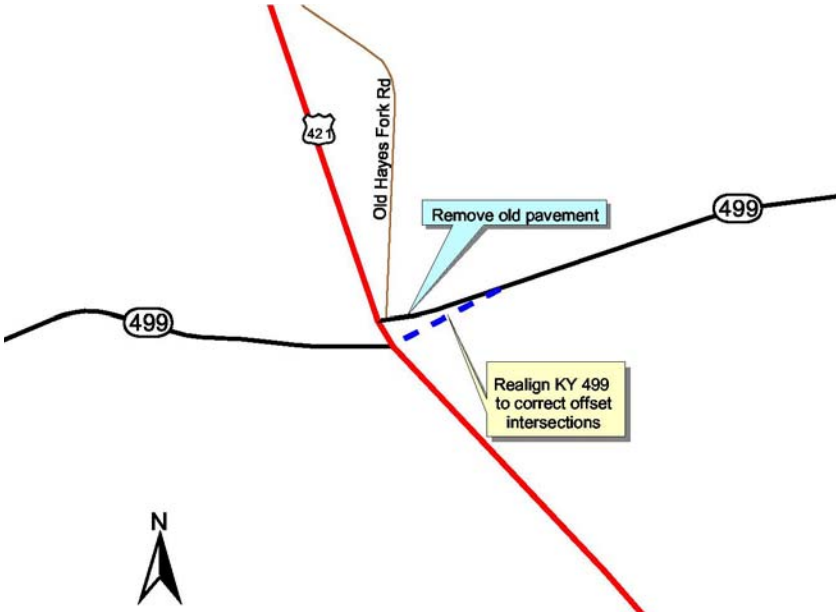


Figure V-13. US 421 and KY 499 Realignment

Figure V-14. Used Car Dealership On Northwest Corner of US 421 At KY 499

10. Chestnut Street (US 25) at Boone Street in Berea – Realign Intersection

The Boone Street and Fee Street approaches to US 25 are currently offset from one another. This intersection should be considered for realignment. It will be necessary to move the Boone Street approach to the west in order to accomplish this. This project will require moving utility lines and right-of-way acquisition. For this reason, the Boone Street/Chestnut Street realignment is the lowest priority in the operational improvement plan for Madison County. **Figure V-15** illustrates the improvement concepts.

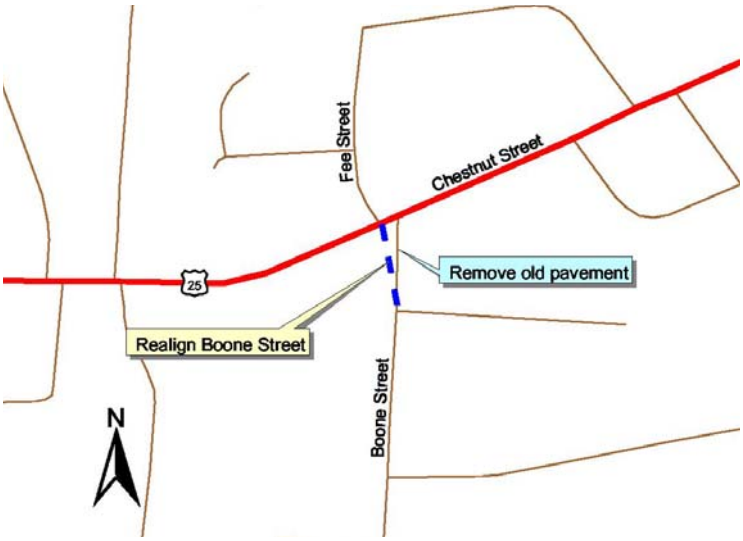


Figure V-15. US 25 and Boone Street Realignment

General Recommendations

It is a general recommendation that access management principles be applied wherever practical and feasible. Access management is defined as:

A process that provides or manages access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed.

Safety and operational benefits from access management have been documented in numerous studies conducted by public agencies and universities. The density of access points, both signalized and unsignalized, can greatly affect the average travel speed and number of crashes on a given roadway.

All municipalities within Madison County currently require managed access for new development. There are many examples of older establishments that have open access across wide portions of road frontage. **Figure V-16** shows multiple examples of this type in Madison County.

Figure V-16. Examples of Open, Unrestricted Access

Past experience has demonstrated that crash frequency increases with the number of access points. The use of shared driveways and interconnection of adjacent parcels are examples of low-cost access management measures that would reduce conflict between vehicles. It is recommended that situations, such as those illustrated above, be corrected by imposing access management with future roadway improvement projects or when land use changes provide opportunities for access modifications.

Prioritization of Projects

In Table V-1, projects are categorized as Group 1, Group 2, or Group 3 projects. Group 1 projects are those that can provide immediate benefits. Group 2 projects and should be constructed as funding becomes available. Group 3 projects have been recommended as viable projects, but would have the least impact when project cost and/or overall priorities are considered.

Other Operational Issues

During the months of June through December 2001, a Grand Jury was convened and examined four traffic related problems that the jury members dealt with each day they performed their duties. These issues were:

- The pedestrian crossing on Lancaster Avenue for EKU students
- Double parked delivery trucks in downtown Richmond
- Three closely spaced traffic signals that constrain traffic on US 25 immediately south of the By-pass
- Traffic congestion caused by train crossings on East Main Street at Estill Avenue

Since the issue of this Grand Jury report, the Lancaster Avenue crosswalk has been removed by the KYTC.

The issue regarding double parked delivery trucks is an enforcement matter for the Richmond Police Department.

The three closely spaced signalized intersections on US 25 have been incorporated into the Richmond Bypass's coordinated traffic signal system. The spacing of these intersections is not ideal; however, carefully monitored operation of the system can help facilitate the flow of traffic through this congested area.

Trains have the right-of-way at all roadway crossings. Minor improvements to this intersection were addressed as part of this plan. The roadway geometry, limited amount of roadway right-of-way, and the cost of separating the grade of either the railroad or Main Street make any large scale improvements at this rail crossing unfeasible.

CHAPTER VI – FUTURE TRANSPORTATION NEEDS

The Year 2025 Madison County traffic model was used to develop the traffic forecasts for the Madison County area. Forecasts were made with the underlying assumption that projects in the current Six Year Highway Plan would be constructed. This is referred to as an "Existing Plus Committed" (E+C) planning model. It includes roads as they exist today, plus all improvements currently programmed in the KYTC "Six Year Highway Plan."

System Deficiencies

I-75, US 25/US 421, and KY 876 (Richmond Bypass) will continue to be the most heavily traveled arterials in Madison County. Traffic volumes are expected to increase between 40 percent and 100 percent over the next 20 years, with I-75 volumes forecast to increase by slightly more than 100 percent.

Interstate 75

The E+C traffic volumes on I-75 are projected to increase from 41,000 - 53,000 vehicles per day (vpd) today to 83,000 – 105,600 vpd in 2025. By that time the current program of widening Interstate 75 to six lanes through Madison County will be completed. The entire interstate corridor in Madison County is expected to be over capacity (LOS F) during peak periods by Year 2025, if it is not widened again by that time.

In addition to interstate commerce and recreational travel through the mid-eastern United States, it is anticipated that I-75 will be used increasingly as a connection between Richmond and Berea.

US 25

Daily traffic volumes will be around 43,000 vpd on the combined US 25/US 421 route. After the US 25/US 421 split, a future volume of approximately 20,600 vpd is forecast for the southern section of US 25 to Berea.

In the post interstate era, US 25 still serves Madison County as a vital link. There are four primary sources of trips on this roadway section:

- Residential areas between Richmond and Berea
- Industrial area at Duncannon Road
- The Bluegrass Army Depot
- Trips back and forth between Richmond and Berea

There have been times where I-75 has been temporarily closed due to a catastrophic crash. US 25 serves as the alternate north/south route during these events.

The northern section of US 25, from the I-75 interchange near Fayette County to KY 1156 (Jacks Creek Road), will also experience significant traffic growth by Year 2025. Traffic volumes are projected to increase from 6,000 vpd in 2000 to 25,000 vpd in 2025. This dramatic increase in volume can be explained by the fact that there is substantial residential growth forecasted to occur along this section of US 25.

US 25 (Chestnut Street) in the area around Berea College is projected to have a LOS F. The volumes in this section are expected to be between 18,000 and 19,000 vpd. With the arts and crafts festivals and other tourism related travel throughout the year, this section of US 25 will experience both regular recurring congestion and periodic special event congestion. However, these conditions will be similar to those that exist today (or slightly improved) due to the relief provided by the northern bypass which was included in the E+C model.

Martin Bypass

The volumes on the Martin Bypass, on the north side of Richmond, are expected to almost double by Year 2025 with volumes ranging from 34,000-36,000 vpd. This is due to the anticipated residential growth on Richmond's northern side. This residential growth will also cause large increases in traffic on some collector routes to the bypass. For example, KY 388 is projected to carry large volumes of traffic between planned neighborhoods and the Martin Bypass. The bypass will likely operate at capacity in the Year 2025 with a LOS E.

Richmond Bypass

Portions of this route are currently over capacity. It is projected in the design year that the whole southern section of the bypass will operate at LOS F if no improvements are made. Daily traffic volumes on the Richmond Bypass (KY 876) are expected to increase from the current 30,000 vpd to 38,300 vpd around the Eastern Kentucky University campus, and more than 45,000 between US 25 and Irvine Road (KY 52).

KY 52

KY 52 from KY 374 (Charlie Norris Road) to the Estill County line will require additional capacity to adequately support the anticipated future volumes. This section of KY 52 currently does not appear in the KYTC Six Year Plan. The expected future volume on this section is 22,800 vehicles per day, which would result in LOS F operations.

US 25X (Main Street in Richmond)

Traffic volumes along US 25 X (Main Street) in Richmond will grow only slightly by Year 2025. However, even this small increase in traffic puts the peak operating conditions beyond the road's capacity (LOS F). Right-of-Way for widening does not exist within the built downtown environment. Other traffic management strategies such as parking management (peak hour restrictions or construction of more off-street public parking), or construction of a one-way couplet could be considered as means to help relieve congestion on Richmond's Main Street.

Summary of Deficiencies

By 2025, the main deficiencies of the Madison County transportation network will be the inability to accommodate the traffic demand in the I-75 corridor between the Richmond interchanges and the Richmond Bypass in the area around the Eastern Kentucky University campus. These two corridors experience the heaviest travel demand today and will continue to do so in the future. Problems on the Richmond Bypass will continue to worsen if capacity and traffic handling capability in this area are not increased.

Deficiencies are also projected in the system's ability to accommodate traffic flow on US 25. This route changes in functionality and character through Madison County and will likely experience a variety of problems in several different places. The eastern section of KY 52 that carries traffic to and from Estill County will also experience rapid growth as Richmond continues to grow as a regional hub for retail sales, secondary education, and medical care.

Deficiencies in system capacity based on Year 2025 E+C traffic volumes are illustrated in **Figures VI-1 to VI-3**. The maps show Year 2025 daily traffic volumes and levels of service for principal roads in the network along with Year 2000 traffic volumes for comparison.

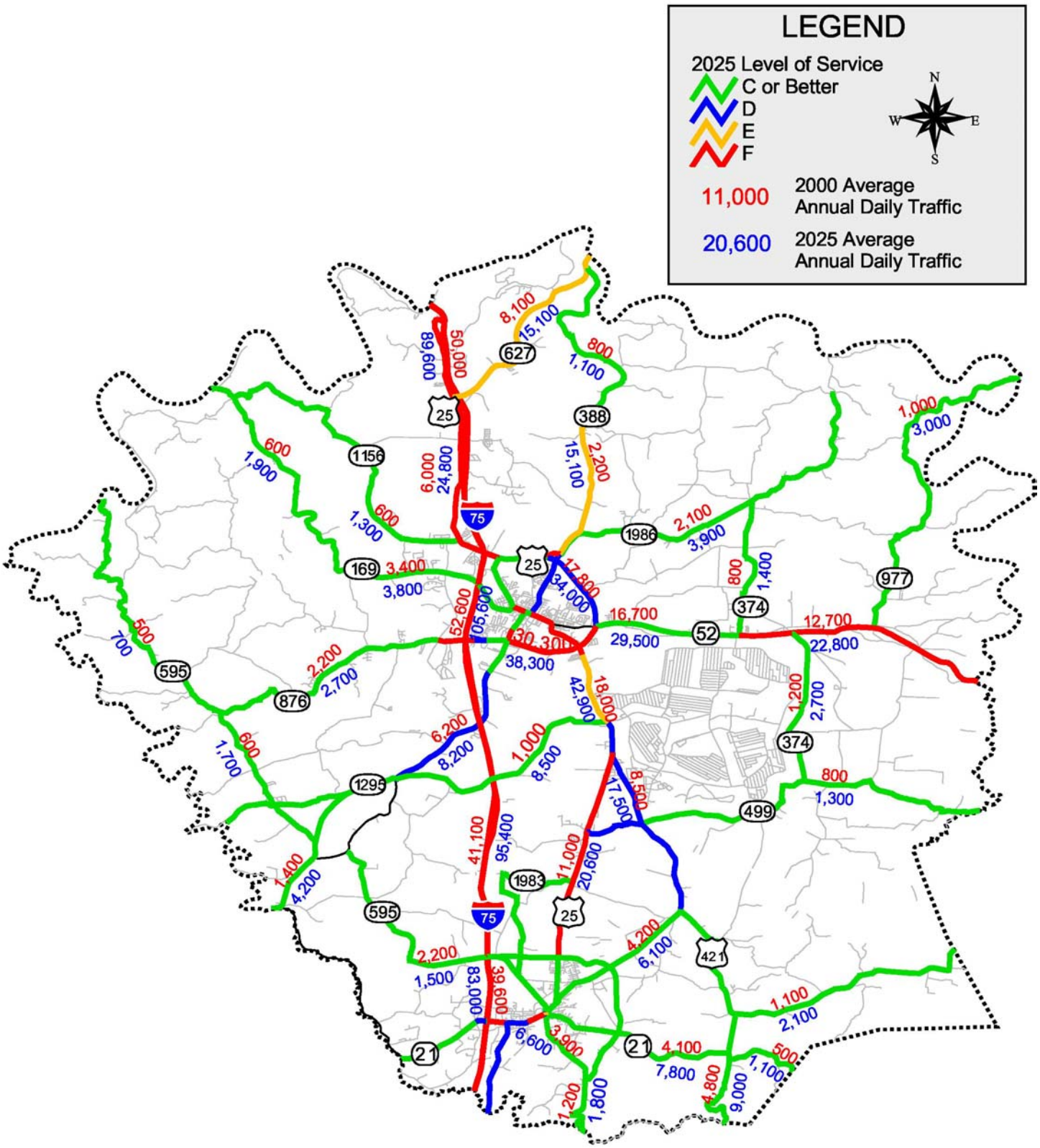


Figure VI- 1. Year 2025 E+C System Deficiencies

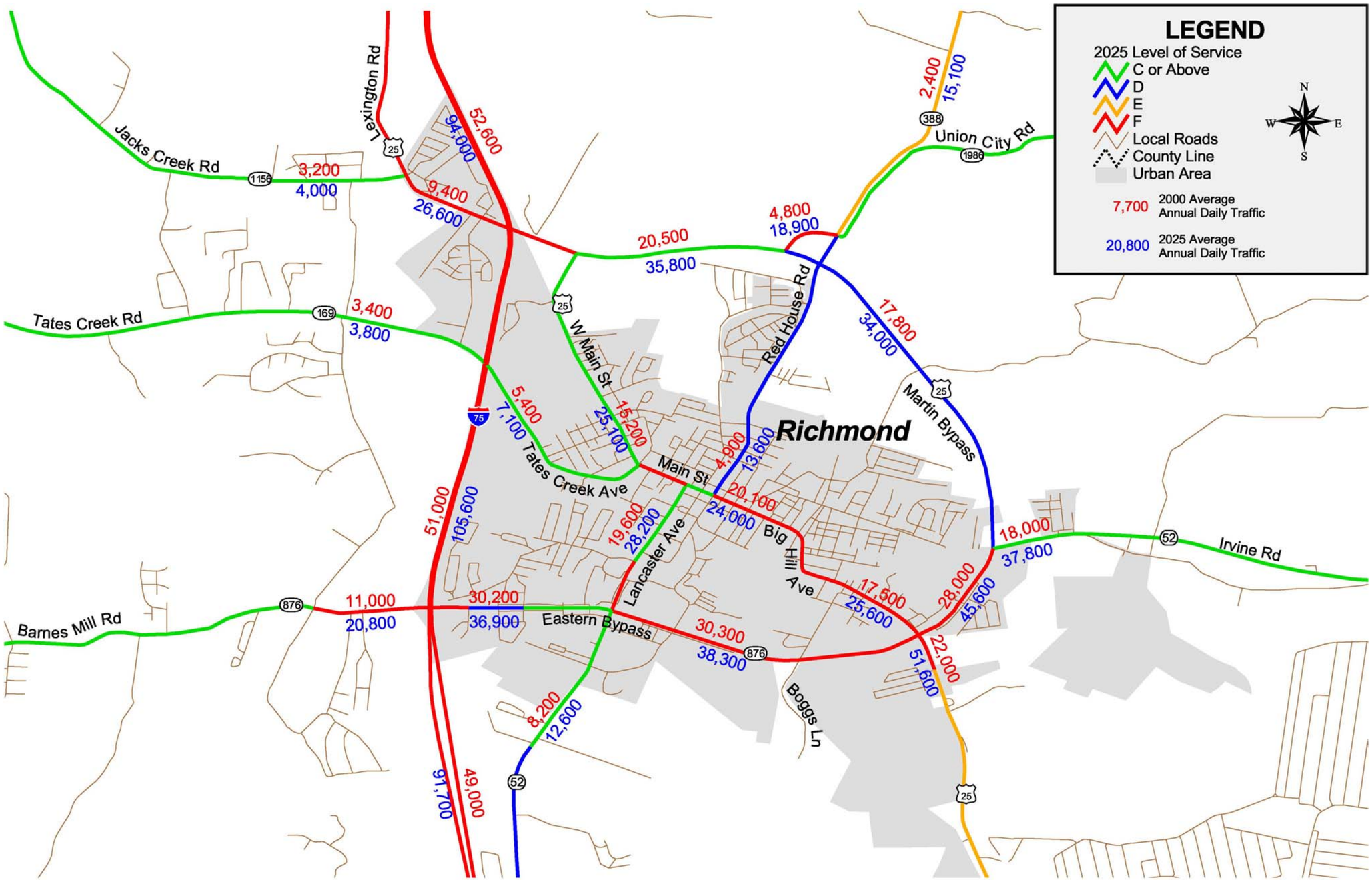


Figure VI- 2. Year 2025 E+C System Deficiencies - Richmond

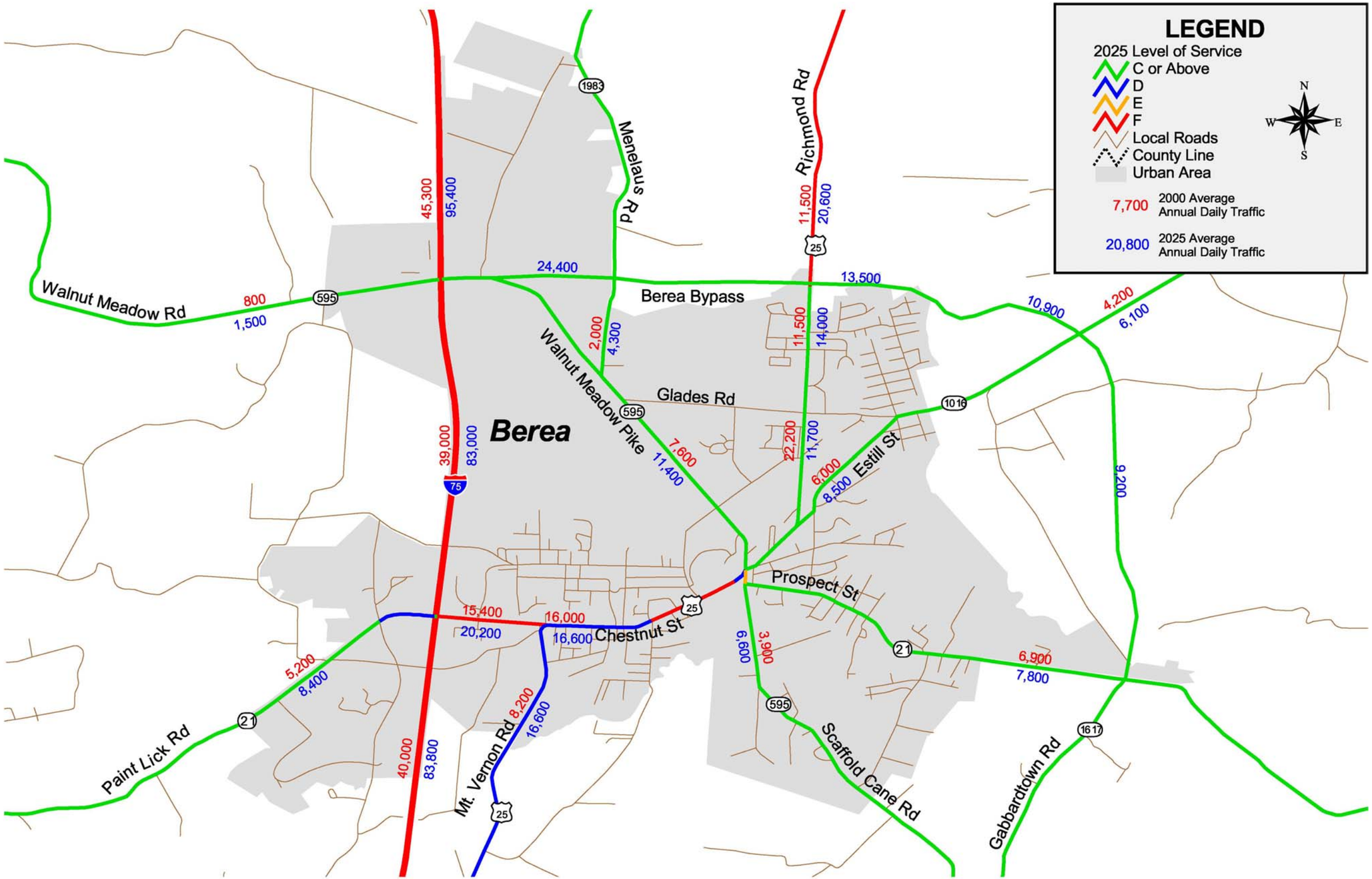


Figure VI- 3. Year 2025 E+C System Deficiencies - Berea

Development of Alternatives

Chapter V – Operational Improvement Plan discussed short term deficiencies and needs as well as solutions developed to address those needs. These operational improvements are low-cost capacity and safety enhancement projects that can be implemented over a short time frame. However, the continued growth of traffic volumes will eventually overcome the added capacity or other enhancements and the need for larger scale projects will arise.

This chapter discusses the development of long-term, major roadway improvements and evaluates alternative improvement projects in the form of major capacity expansion (lane addition) projects or construction of new roads. No other alternatives were considered feasible as major transportation improvements, because automobile travel so heavily dominates transportation in Madison County.

The process for developing the long-range plan for Madison County was the same as the Operational Improvement Plan, which consisted of constructing a tiered list of prioritized projects.

Six Year Highway Plan

The "Six Year Highway Plan" is a document that outlines KYTC near-term projects to be constructed within the next six years. Project schedules and funding for the projects are updated biennially. It is important to note that only the first two years of the plan have committed funds. The remaining projects in the outer four years are projects the KYTC is committed to perform, however, they are not yet funded.

It was recommended by the Transportation Study Work Group that the projects currently in the "Six Year Highway Plan" be continued as Priority 1 projects. These projects include the following:

Duncannon Road Interchange with I-75

This project provides for the construction of a new interchange at I-75 and Duncannon Road. This project is 0.5 miles long and is estimated to cost $13.4 million. This new interchange will provide access to an area with some industrial development and one of the primary security gates of the Bluegrass Army Depot.

Long range development plans call for increased industrial development in the area. With the new Duncannon Road interchange being the only I-75 interchange between Richmond and Berea, heavy commercial and military traffic will have more direct access to the interstate. This will remove these trips from passing through these two cities and help manage the amount of heavy truck traffic on US 25 between Richmond and Berea.

I-75 Rest Area Rehabilitation

This project, which will be constructed in conjunction with the Duncannon Road interchange, involves the reconstruction of the northbound and southbound rest areas on I-75. The project cost estimate is $13.7 million. The existing rest areas are located in close proximity to the Duncannon Road bridge. In order to construct a new interchange at Duncannon Road, the rest areas will have to be relocated. The current studies on this project conclude that the construction of a single rest area at the new Duncannon Road interchange is the best alternative. It has been determined that there is no suitable site along I-75 that can provide the facilities for conventional rest areas, with the primary reason for this being current interchange spacing requirements. The new rest area will be off the interstate and accessed via Duncannon Road.

Duncannon Road Reconstruction

This project involves widening and improving Duncannon Road from the planned I-75 interchange to US 25. Duncannon Road currently has a 2-lane cross-section and a 5-lane cross-section is planned. This project is 4.0 miles long, and is estimated to cost $14.4 million. This project is necessary to accommodate the increase in traffic volumes, particularly trucks, as the land adjacent to Duncannon Road continues to develop in the future.

By the Year 2025, the forecasted traffic volume is 8,500 vehicles per day compared to 1,000 vpd today. As the area grows, most of these trips will be new to the area. Some trips to Duncannon Road currently travel from I-75, through Richmond and Berea, and arrive at Duncannon Road via US 25. The improvements to Duncannon Road should remove these trips, especially heavy truck and military traffic from driving through those two cities, by allowing more direct access to I-75.

US 25 (Berea Road) Widening

This project would widen US 25 from US 421 to KY 876 (Richmond Bypass) in Richmond. This section of US 25 currently has a 2-lane cross section and this project would widen US 25 to a 4-lane cross section, providing more capacity to a crucial north-south route in the county. This project is 3.5 miles long, and is estimated to cost $28.5 million.

US 25 is the primary north/south route between Richmond and Berea, other than I-75. It serves a growing industrial and residential area between the two cities as well as the Bluegrass Army Depot. This project complements the Duncannon Road widening project, forming a circulating roadway system between I-75, the Richmond Bypass, US 25, and Duncannon Road. US 25 also acts as an alternate route for I-75 during interstate closures due to catastrophic crashes. Therefore, this project has incident management benefits as well.

It should be noted that the traffic forecast and level of service analyses made during this study indicate that four lanes will not be adequate to accommodate the future development and growth in traffic along this route (see Other Major Alternative Projects section for more discussion).

Berea Northern Bypass

This project makes provisions for the construction of a new 4-lane bypass on the north side of Berea from KY 21 to KY 595 near Exit 77 of Interstate 75. Traffic volumes for 2025 are forecast to be 9,200 – 24,400 for this new roadway. This is a very broad range. It is recommended that the bypass be constructed as a four-lane road from it's beginning near I-75 to US 25. From US 25 around to KY 595 in the southeast quadrant of Berea, a two-lane facility will provide ample capacity for the lower volume sections on the eastern side of town. It's recommended that sufficient right-of-way be reserved to accommodate an eventual four-lane facility for the entire route. This bypass is 5.28 miles long and is estimated to cost $26.8 million.

This project is projected to ease traffic congestion on the Chestnut Street portion of US 25 and KY 595 by removing traffic destined to US 25 out of the downtown and college areas. The new road will also open new land for development on the northern and eastern sides of Berea.

KY 169 (Tates Creek Pike) Reconstruction

This project allows for the reconstruction of KY 169 (Tates Creek Pike) from Goggins Lane to US 25X (Main Street) in Richmond. Tates Creek Pike currently has a 2-lane cross-section and this project assumes a 3-lane cross-section. This project is 2.2 miles long, and is estimated to cost $13.3 million.

The need for this project is based upon the residential character of the roadway. There are numerous driveways and residential side streets along this portion of KY 169. Traffic operations and safety would be greatly enhanced by the addition of a continuous left turn lane.

KY 52 (Lancaster Road) Reconstruction

This project involves the reconstruction of KY 52 from Wallace Mill Road near the Garrard County line to Interstate 75. KY 52 is currently being improved in Garrard County, and this project is expected to increase connectivity between Richmond and Lancaster. This project is 7.0 miles long, and is estimated to cost $22.0 million.

KY 52 is the only east/west route that travels completely through Madison County. Garrard County is also one of the fastest growing counties in Kentucky. It is likely that the number of commuters, shoppers, and students from Garrard County, as well as from continued residential development along KY 52, will increase the need for this project.

KY 52 (Irvine Road) Reconstruction

This project involves the reconstruction of KY 52 from KY 876 (Richmond Bypass) to KY 374 (Charlie Norris Road). This section of KY 52 is currently a 2-lane road and the reconstruction plans call for widening to a 4-lane road. Such a project would provide more capacity for this prominent east-west route connecting the cities of Richmond and Irvine. This project is 3.5 miles long, and is estimated to cost $15.7 million.

Again, as the only continuous east/west route that crosses Madison County, this segment of KY 52 illustrates the impacts from a growing number of commuters from a neighboring county as well as converting more farm land to residential uses.

KY 1983 (Menelaus Road) Widening

This project involves widening KY 1983 (Menelaus Road) to five lanes from KY 595 to Mayde Road north of Berea. This project is 1.8 miles long, and is estimated to cost $3.7 million. The need for this project arises from the surrounding land uses and the condition of the existing road. KY 1983 is a very narrow roadway with lanes that are approximately 10 feet wide. As the primary access to Berea's industrial area, this road is in need of improvements to enhance safety and to support additional industrial growth.

Other Major Alternative Projects

Based on the Year 2025 E+C network deficiency analysis, a number of projects were identified which would increase system capacity and provide safer operating facilities. Major alternative improvement projects that were considered and evaluated are discussed below.

I-75

I-75, which is part of the National Highway System, is an integral part of the nation's highway network. The study has demonstrated that additional through lanes are needed from the Fayette County line to the Rockcastle County line. Presently the majority of I-75 in Madison County is a six-lane interstate, with ongoing construction in southern Madison County. The model output and level of service analysis indicate that the interstate would require expansion to eight lanes by Year 2025. Even at eight lanes the roadway will be at or near capacity (99,000 to 109,700 vpd). The total cost of widening I-75 to eight lanes through Madison County would be approximately $219 million in current dollars.

National and state statistics on freeway travel indicate that interstate traffic volumes are growing at rates never envisioned when the interstate system was initially planned. Historical traffic volumes on the interstate system have approximately doubled every twenty years. This equates to an annual growth rate of 3.4 percent per year. For example, in 1966 (first year I-75 was counted) 14,400 vpd were recorded on the section between US 25 and KY 627; in 1983, that figure increased to 35,200; in 2003, 70,200 vpd were recorded on the same section of I-75 (KYTC count station 753 in Madison County).

As a means of comparison, typical growth rates for non-interstate roadways usually range between 2.0 and 2.5 percent per year. Over a period of twenty years, traffic increases by factors of 1.5 to 1.65 respectively.

The current six-lane sections should be able to support a daily traffic volume of 84,500 based upon the Level of Service calculations performed as part of this study. This assumes that 10.4 percent of the total daily traffic travels during the peak hour and that approximately 58 percent of that volume is traveling in the peak direction.

At the current rate of growth, the above referenced section of I-75 in northern Madison County will reach capacity around the Year 2009. Further to the south, between the Richmond interchanges (US 25 and KY 876), the current volume (2003) is 52,700; therefore using the same calculations, this segment of I-75 will reach capacity around the Year 2017.

It should be noted that the great disparity in traffic volumes between these two adjacent sections of I-75 that was counted in 2003 (70,200 vs. 52,700) has not been observed in previous counts. It is likely that most of this difference can be explained by either a construction-related reason or some other anomaly. Therefore, the timing difference noted above is likely to be exaggerated, and it would be prudent to say at this point that these two sections of I-75 will likely reach capacity sometime during the 2010 decade. In the southernmost section of the county, from KY 595 to the south, the traffic volumes are somewhat lower. These sections are expected to be at or near capacity by the Year 2025.

US 25 (Lexington Road)

On the north end of Madison County, US 25 (Lexington Road) runs parallel to the interstate. Currently, this two-lane road carries about 6,000 vpd, and Year 2025 projections are for up to 24,000 vpd due to the expected growth in residential land uses. Without improvements or some relief routes, it will be over capacity (LOS F) by 2025. Widening US 25 to four lanes from Exit 97 of I-75 (near the Fayette County line) to KY 1156 (Jacks Creek Road), a distance of 7.2 miles, would enable operation at LOS D. The estimated cost for this capacity expansion is $33.7 million in current dollars. US 25 is already widened from KY 1156 to the south. This was done in conjunction with the reconstruction of the I-75 interchange with US 25.

US 25 / US 421

This proposed project would involve widening the existing route to six lanes from KY 876 (Richmond Bypass) to the US 25 and US 421 split. There is a Six Year Plan project to widen this section of roadway to four lanes. However, according to Year 2025 projections, even a four lane road will be insufficient in the future. The need for widening to six lanes can be explained by the potential industrial development along Duncannon Road in conjunction with US 25 becoming a more attractive route between Richmond and Berea as the interstate grows more congested. The proposed widening project would cover a distance of 3.5 miles with an estimated cost of $44.7 million.

US 25 (Richmond/Berea Road)

This proposed project would widen the existing route to four lanes from Glades Road north of downtown Berea to US 421. Currently, this two-lane road carries about 11,000 vpd, and Year 2025 projections are more than 20,000

vpd. Without improvements, this section of roadway will be beyond its capacity by Year 2025. The proposed widening project would be 7.12 miles long with an estimated cost of $33.7 million.

KY 52 (Irvine Road)

This proposed project would entail widening the existing route to four lanes from KY 374N to the Estill County line. Currently, this two lane road carries about 13,000 vpd, and Year 2025 projections are for up to 22,000 vpd. With the widening of KY 52 just to the west included in the Six Year Plan, the widening of this particular section is a logical step considering the forecast volumes. This section is estimated to cost $20.9 million, and it is about 5.1 miles long.

Richmond Bypass North Widening

This section of the Richmond Bypass, referred to as the Martin Bypass, is mostly undeveloped at the current time. It is almost inevitable that the land adjacent to the Martin Bypass will become developed with either commercial or residential uses by Year 2025. Therefore, the volumes on this section of the bypass are expected to almost double by Year 2025 with volumes ranging from 34,000-36,000 vpd. This route will operate at capacity in Year 2025 with a LOS E. This project calls for the widening of the Martin Bypass to six lanes, to accommodate the increase in traffic volumes. It is important to note that strict control of access should be maintained along this section of the bypass to ensure that it does not mirror the access and congestion problems of the southern portion of the bypass. This section is about 3.4 miles long, and it is estimated cost $25.2 million to build.

Richmond Bypass South Widening

This section of the Richmond Bypass, referred to as the EKU Bypass, is heavily developed with commercial uses at the current time. Since this is a built environment, traffic on this section of the bypass does not increase dramatically in the Year 2025. The current volumes are 28,000-30,000 vpd and the projected 2025 volumes are 36,900-45,600 vpd. However, this part of the bypass will operate at LOS F if no improvements are made to relieve the congestion. This project calls for the widening of the EKU Bypass to six lanes from I-75 to KY 52 (Irvine Road). This section is approximately 2.9 miles long, and is estimated to cost $20.3 million to complete.

Other Considerations

Consideration also was given to constructing a southern section of the Berea Bypass from the terminus of the new northern/eastern bypass at KY 21 connecting to I-75 approximately one mile south of the KY 21 interchange, as has been discussed locally in relation to comprehensive planning efforts. Due to the estimated cost, levels of traffic the road would attract, and the close proximity of the Bypass and KY 21 interchanges with I-75, this project was placed as the lowest priority in the long-range Madison County plan.

FHWA interchange spacing guidelines for rural areas list the minimal spacing between interchanges at three miles. Any new interchange to the interstate system requires an Interchange Justification Study. This study requires a close examination of the following eight items:

1. The existing interchanges and transportation network cannot provide an adequate level of access nor be improved satisfactorily handle the design year traffic

2. All reasonable alternatives for transportation management system type improvements such as mass transit, ramp metering, and high occupancy vehicle lanes must be assessed

3. The proposed interchange must not adversely impact safety and operation of the interstate facility

4. The proposed interchange connects to a public road only

5. The proposal considers and is consistent with local and regional land use and transportation plans

6. In areas where the potential exists to construct multiple future interchanges, all requests must be accompanied by a comprehensive evaluation of the interstate network considering all possible access points.

7. The request for a new access generated by new or expanded development demonstrates appropriate coordination between the development and related transportation system improvements

8. The request for new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal

Given these criteria, the justification of a new interchange on I-75 is not likely in the foreseeable future.

The cost of the bypass extension to I-75 would be very high relative to any benefits to the surrounding area. Extending the roadway to meet the minimum three-mile interchange spacing requirement would greatly escalate costs (which are estimated at $20.3 million, based on connecting to I-75 one mile south of KY 21).

The topography through the potential corridor is such that developing the adjacent land would be difficult, and current land use plans do not anticipate significant land use changes in this part of Madison County. Without significant development in the area, it is expected that only about 2,000 vpd would be served by this facility. At this time it is estimated that only 1,000 trips per day would be diverted from the KY 21 interchange.

It is recommended that until this potential route can be studied in much greater detail, that this project remain as the lowest priority project for Madison County.

CHAPTER VII – RECOMMENDED IMPROVEMENTS

The value of a transportation plan lies in its ability to schedule transportation improvements serving the future movement of people and goods while striking a balance between the needs of residents, visitors, and those travelers who must pass through the region. The recommended transportation improvements are based on an analysis of projected land use, traffic demands, programmed improvements, and cost analyses. The result must be a balance of transportation projects, which accommodates future travel demands in a safe, convenient, and responsive manner, and are adaptable to different patterns of development.

The recommended transportation improvements contained in this plan are the result of a process which identified future travel demands in Madison County and subsequently analyzed the ability of the existing transportation system to meet those demands. Where the existing system was found to be deficient, improvements to the network, either as new facilities or expansion of existing facilities, were examined to determine how adequate service could be provided.

After testing various alternatives and discussing the results with the Transportation Study Work Group, it was clearly the consensus of the group that improvements to the existing system should have the highest priority, especially on those routes that would provide relief to the existing transportation system.

Year 2025 Transportation Plan

The value of any plan is a function of the ability to implement the recommendations contained in the plan. The KYTC has existing mechanisms to program projects and establish priorities; these processes have to be utilized fully in order to develop a viable plan.

The Year 2025 Madison County Transportation Plan has four elements. These are:

1. Projects in the Kentucky Six Year Highway Plan;

2. Projects in the 20-year Statewide Transportation Plan;

3. Recommended Improvements developed as a result of the Madison County Areawide Transportation Study; and

4. The Operational Improvement Plan.

Six Year Highway Plan (Committed)

Projects contained in the Transportation Cabinet's Six Year Highway Plan are treated as committed due to the fact that the Kentucky General Assembly adopts the program by legislative action. There are eleven projects in the current (FY 2002 – 2008) Six Year Plan that affect Madison County:

1. I-75 – Reconstruct Rest Areas;

2. I-75/Duncannon Road – New Interchange;

3. Duncannon Road – Widen to 5 lanes from I-75 to US 25;

4. Berea Northern Bypass – New 4 lane facility from KY 595 to KY 21;

5. KY 169 (Tates Creek Pike) – Reconstruct from Goggins Lane to US 25X (Main Street);

6. KY 52 (Lancaster Road) – Reconstruct from Wallace Mill Road to I-75;

7. US 25 - Widen to 4 lanes from US 421 to KY 876 (Richmond Bypass);

8. KY 52 (Irvine Road) – Reconstruct from US 25 (Richmond Bypass) to KY 374N (Charlie Norris Road)

9. US 421 – Replace Bridge and Approaches at Branch of Joe Lick Fork

10. KY 1983 (Menelaus Road) – Widen to 5 lanes from KY 595 to Mayde Road; and

11. US 25 at KY 1156 – Construct left turn lanes on US 25

Statewide Transportation Plan

The Kentucky Transportation Cabinet develops a twenty-year Statewide Transportation Plan, which is updated every four years. This document provides a backlog of transportation needs from which projects are drawn into the Six Year Plan. The current draft (FY 2005 – 2018) does not contain any long-range projects that are not already included in the Six Year Plan.

Recommended Long Range Transportation Improvements

A number of projects vital to accommodate the future growth of Madison County were identified as needed in addition to those projects already contained in either the Six Year Plan or the Statewide Transportation Plan.

The projects were then categorized by a three-tiered priority system. Priority I projects are those most urgently needed to sustain the functionality of the Madison County transportation system. They will provide much needed additional capacity to alleviate current traffic congestion. Priority II projects enhance the mobility of the system by providing additional capacity to existing corridors. Their urgency is less than Priority I projects, but they are important to supporting Madison County's growth and viability. Priority III projects will meet future demands for additional capacity resulting from growth in Madison County.

The Recommended Long-Range Transportation Improvements for the Madison County Area are presented in **Figure VII-1**. They are:

Priority I Projects

- I-75 – Reconstruct Rest Areas;
- I-75/Duncannon Road – New Interchange;
- Duncannon Road – Widen to 5 lanes from I-75 to US 25;
- Berea Northern Bypass – New 4 lane facility from KY 595 to KY 21;
- KY 169 (Tates Creek Pike) – Reconstruct from Goggins Lane to US 25X (Main Street);
- KY 52 (Lancaster Road) – Reconstruct from Wallace Mill Road to I-75;

- US 25 - Widen to 6 lanes from US 421 to KY 876 (Richmond Bypass) (Note: This study has identified a need for 6 lanes rather than the 4 lanes currently shown in the Six Year Plan.);
- KY 52 (Irvine Road) – Widen from US 25 (Richmond Bypass) to KY 374N (Charlie Norris Road);
- US 421 – Replace Bridge and Approaches at Branch of Joe Lick Fork;
- KY 1983 (Menelaus Road) – Widen to 5 lanes from KY 595 to Mayde Road; and
- US 25 at KY 1156 – Construct left turn lanes on US 25.

Priority II Projects

- KY 52 (Irvine Road) – Widen to 4 lanes from KY 374N (Charlie Norris Road) to Estill County line;
- US 25 (Berea Road) – Widen to 4 lanes from Glades Road to US 421;
- US 25 – Widen to 4 lanes from KY 1156 (Jacks Creek Road) to Exit 97 near Fayette County line; and
- KY 876 (Richmond Bypass) – Widen to 6 lanes from I-75 to KY 52 (Irvine Road).

Priority III Projects

- US 25 (Martin Bypass) – Widen to 6 lanes from KY 52 to I-75;
- I-75 – Widen to 8 lanes from the Rockcastle County line to the Fayette County line; and
- Berea Southern Bypass – New 2 lane bypass from KY 21 to US 25 (with consideration of a new interchange with I-75).

Summary of Recommendations

The Recommended Long-Range Transportation Improvements, including priorities and estimated cost in present dollars, are summarized in **Table VII-1.** The locations of the recommended projects throughout Madison County are shown in **Figure VII-1**.

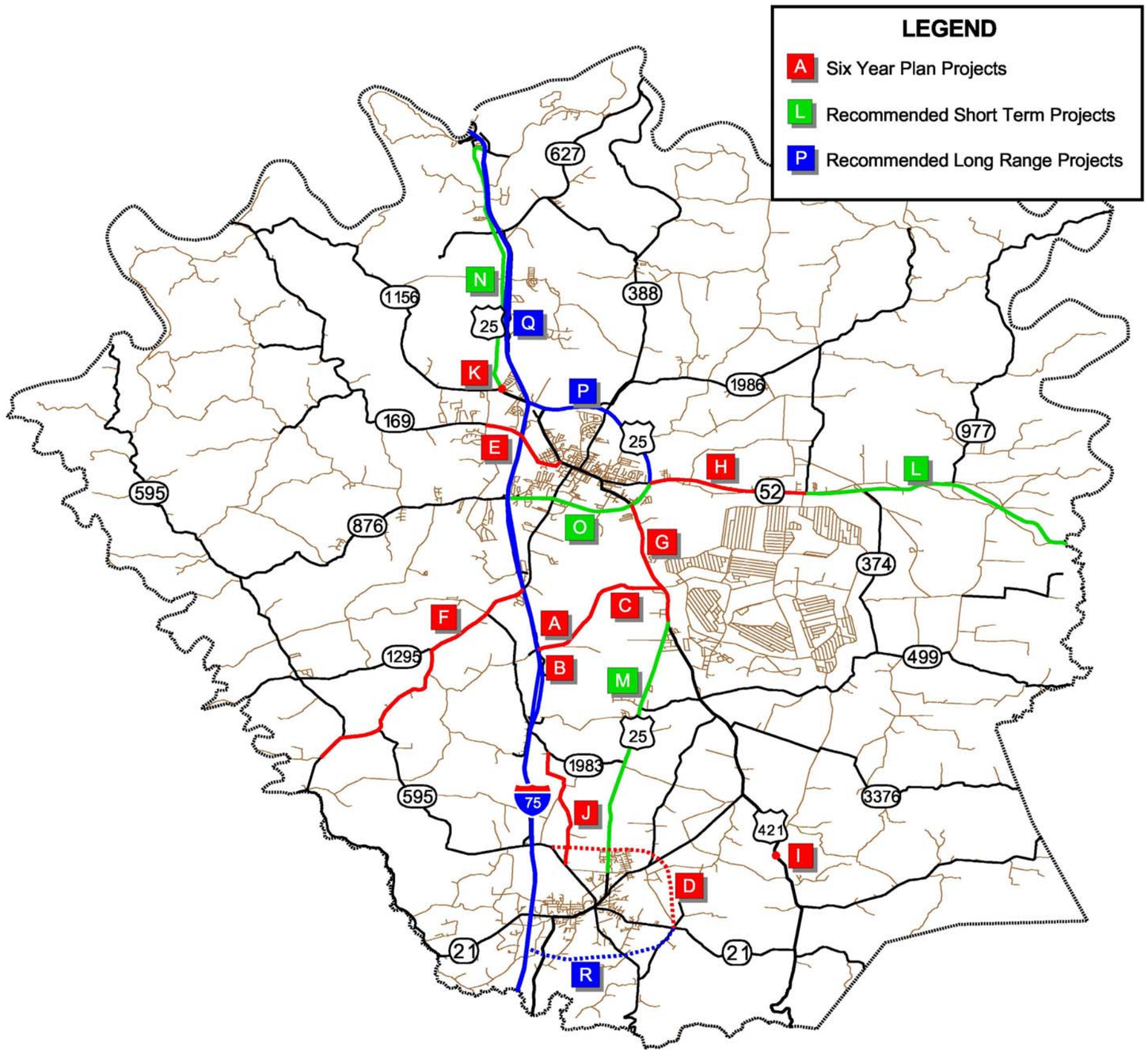
Operational Improvement Plan

Traffic operational improvements can provide immediate and relatively inexpensive benefits to traffic flow and can reduce potential conflicts, which lead to fewer accidents and reductions in accident severity. A detailed discussion of traffic operational improvements is contained in Chapter V.

Table VII-1 Recommended Long-Range Transportation Improvement Projects

LABEL	PRI.	ROUTE	LENGTH	TERMINI/MILEPOINTS		DESCRIPTION	ESTIMATED COST				
							DESIGN	RIGHT OF WAY	UTILITIES	CONSTRUCTION	TOTAL
A	I	I-75 Rest Areas	0.10		82.44	Reconstruct NB & SB Rest Areas	*$1,802,927*	$700,000	$400,000	$10,780,000	$13,682,927
					82.54	Scope: Rest Area Rehab					
B	I	I-75 and Duncannon Road Interchange	0.50		82.68		*$900,000*	$1,000,000	$500,000	$11,000,000	$13,400,000
					83.18	Scope: New Interchange					
C	I	Duncannon Road	4.00	New I-75 Interchange	N/A	Widen and Improve	*$325,000*	$3,900,000	$2,400,000	$7,800,000	$14,425,000
				US 25	N/A	Scope: Reconstruction					
D	I	Berea Northern Bypass	5.28	KY 595	N/A	New four lane facility	*$2,120,000*	*$4,316,000*	$1,000,000	$27,060,000	$34,496,000
				KY 21	N/A	Scope: New Route					
E	I	KY 169 (Tates Creek Pike)	2.24	Goggins Lane	0.00		*$450,000*	*$2,800,000*	*$3,490,000*	$6,500,000	$13,240,000
				US 25X (Main Street)	2.24	Scope: Reconstruction					
F	I	KY 52 West (Lancaster Road)	7.08	Wallace Mill Road	1.17		$2,000,000	$0	$0	$20,000,000	$22,000,000
				I-75	8.25	Scope: Reconstruction					
G	I	US 25	3.54	US 421	11.96	Widen to six lanes	$1,200,000	$7,000,000	$3,500,000	$33,000,000	$44,700,000
				KY 876 (Richmond Bypass)	15.50	Scope: Major Widening					
H	I	KY 52 East (Irvine Road)	3.53	US 25 (Richmond Bypass)	12.97	Widen to four lanes	*$1,347,725*	*$1,614,000*	*$1,356,600*	$11,400,000	$15,718,325
				KY 374N (Charlie Norris Road)	16.50	Scope: Major Widening					
I	I	US 421	0.100	Branch of Joe Lick Fork	N/A		*$50,000*	$50,000	$75,000	$300,000	$475,000
					N/A	Scope: Bridge Replacement					
J	I	KY 1983 (Menelaus Road)	1.00	KY 595	21.60	Widen to five lanes	*$1,097,575*	$150,000	$500,000	$2,000,000	$3,747,575
				Mayde Road	22.60	Scope: Major Widening					
K	I	US 25 at KY 1156		Add left turn lane to US 25		Construct Left Turn Lanes	*$75,000*	$165,000	$500,000	$750,000	$1,490,000
						Scope: Hazard Elimination					
										Priority I Sub Total	**$177,374,827**
L	II	KY 52 East (Irvine Road)	6.36	KY 374N (Charlie Norris Road)	16.51	Widen to four lanes	$2,000,000	$2,400,000	$2,000,000	$14,500,000	$20,900,000
				Estill County Line	22.87	Scope: Major Widening					
M	II	US 25	7.12	Glades Road	4.91	Widen to four lanes	$1,900,000	$5,400,000	$5,400,000	$21,000,000	$33,700,000
				US 421	12.03	Scope: Major Widening					
N	II	US 25	7.20	KY 1156 (Jacks Creek Road)	21.02	Widen to four lanes	$2,000,000	$5,400,000	$7,200,000	$22,000,000	$36,600,000
				Exit 97 (near Fayette County line)	28.22	Scope: Major Widening					
O	II	KY 876 (Richmond Bypass)	2.90	I-75 Interchange South	7.10	Widen to six lanes	$1,600,000	$800,000	$3,200,000	$14,700,000	$20,300,000
				KY 52 (Irvine Road)	10.00	Scope: Major Widening					
										Priority II Sub Total	**$111,500,000**
P	III	US 25 (Martin Bypass)	3.68	KY 52 (Irvine Road)	16.26	Widen to six lanes	$1,700,000	$1,000,000	$4,000,000	$18,500,000	$25,200,000
				I-75 Interchange North	19.93	Scope: Major Widening					
Q	III	I-75	24.14	Rockcastle County Line	73.41	Widen to eight lanes	$15,000,000	$18,000,000	$8,200,000	$163,000,000	$204,200,000
				Fayette County Line	97.54	Scope: Major Widening					
R	III	Berea Southern Bypass	3.33	KY 21	N/A	New four lane facility	$1,400,000	$1,700,000	$6,000,000	$13,400,000	$22,500,000
				US 25	N/A	Scope: New Route					
										Priority III Subtotal	**$251,900,000**
										Grand Total	**$540,774,827**

Notes:
All Priority I Projects are derived from the Kentucky Transportation Cabinet's 2002-2008 Six Year Plan.
Cost estimates shown in *italics* have already been authorized.
Projects in Priority groups II and III are listed in order of priority.



Madison County
Recommended Plan Projects

A I-75 Rest Areas

B I-75 and Duncannon Road Interchange

C Duncannon Road
- New I-75 interchange to US 25

D Berea Northern Bypass
- KY 595 to KY 21

E KY 169 (Tates Creek Pike)
- Goggins Lane to US 25X (Main Street)

F KY 52 West (Lancaster Road)
- Wallace Mill Road to I-75

G US 25 (Berea Road)
- KY 876 (EKU Bypass) to US 25 / US 421 split

H KY 52 East (Irvine Road)
- US 25 (Richmond Bypass) to KY 374 N (Charlie Norris Road)

I US 421 Bridge Replacement
- Branch of Joe Lick Fork

J KY 1983 (Menelaus Road)
- KY 595 to Mayde Road

K US 25 at KY 1156
- Add left turn lane to US 25

L KY 52 (Irvine Road)
- KY 374 N (Charlie Norris Road) to Estill County line

M US 25 (Berea/Richmond Road)
- US 421 to Glades Road

N US 25 (Lexington Road)
- Exit 97 (near Fayette County line) to KY 1156 (Jacks Creek Road)

O KY 876 (Richmond Bypass)
- KY 52 East (Irvine Road) to I-75 South

P US 25 (Martin Bypass)
- I-75 North to KY 52 East (Irvine Road)

Q Interstate 75
- Fayette County line to Rockcastle County line

R Berea Southern Bypass
- KY 21 to US 25

Figure VII-1 Recommended Long-Range Transportation Improvement Projects

Plan Implementation

The success of the *Year 2025 Madison County Transportation Plan* lies in the ability to implement its projects – short-term operational projects and major long-term improvement projects. Many of the short-term projects can be implemented quickly, depending on funding availability, and should be pursued aggressively. The long-term, major projects must go through the statewide transportation planning process.

Ideally, Priority I projects should be included in the Kentucky Six Year Highway Plan. This would demonstrate a commitment to the project with respect to timing (schedule) and funding. Priority II and possibly Priority III projects should be considered for inclusion in the next version of the Statewide Transportation Plan. While this does not guarantee funding or commit to a schedule, it does demonstrate a formal acknowledgement of the need for the project.

The challenge is to introduce projects from the list of recommended long-range improvements into the Six Year Plan and the Statewide Transportation Plan. Madison County projects must compete with other projects from all over the state. Thus, the community must be unified and proactive in the legislative process that implements Kentucky's statewide transportation planning process.

Summary

The proposed projects contained in this program provide the core highway system needed in the Madison County area to accommodate the anticipated population, employment, and traffic growth through the Year 2025. The total cost of all the committed and recommended improvements is more than $540 million. However, this total includes approximately $204 million for widening I-75. While the Interstate improvement is a much-needed project, it serves primarily traffic traveling through the area and should not be counted against Madison County's program.

Obviously, actual implementation of any part of the program depends on the availability of funds from both state and local governments as well as private developers. In addition, the timing of projects will depend on actual growth patterns and the resultant traffic demands on various segments of the system.

It will be necessary to regularly compare developing and projected traffic patterns and traffic volumes with those presented here, in order to make adjustments to project schedules and to ensure that Madison County's transportation system provides adequate levels of service. As part of this continuous process, it is recommended that this transportation plan be re-evaluated in the future on a regular basis.

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