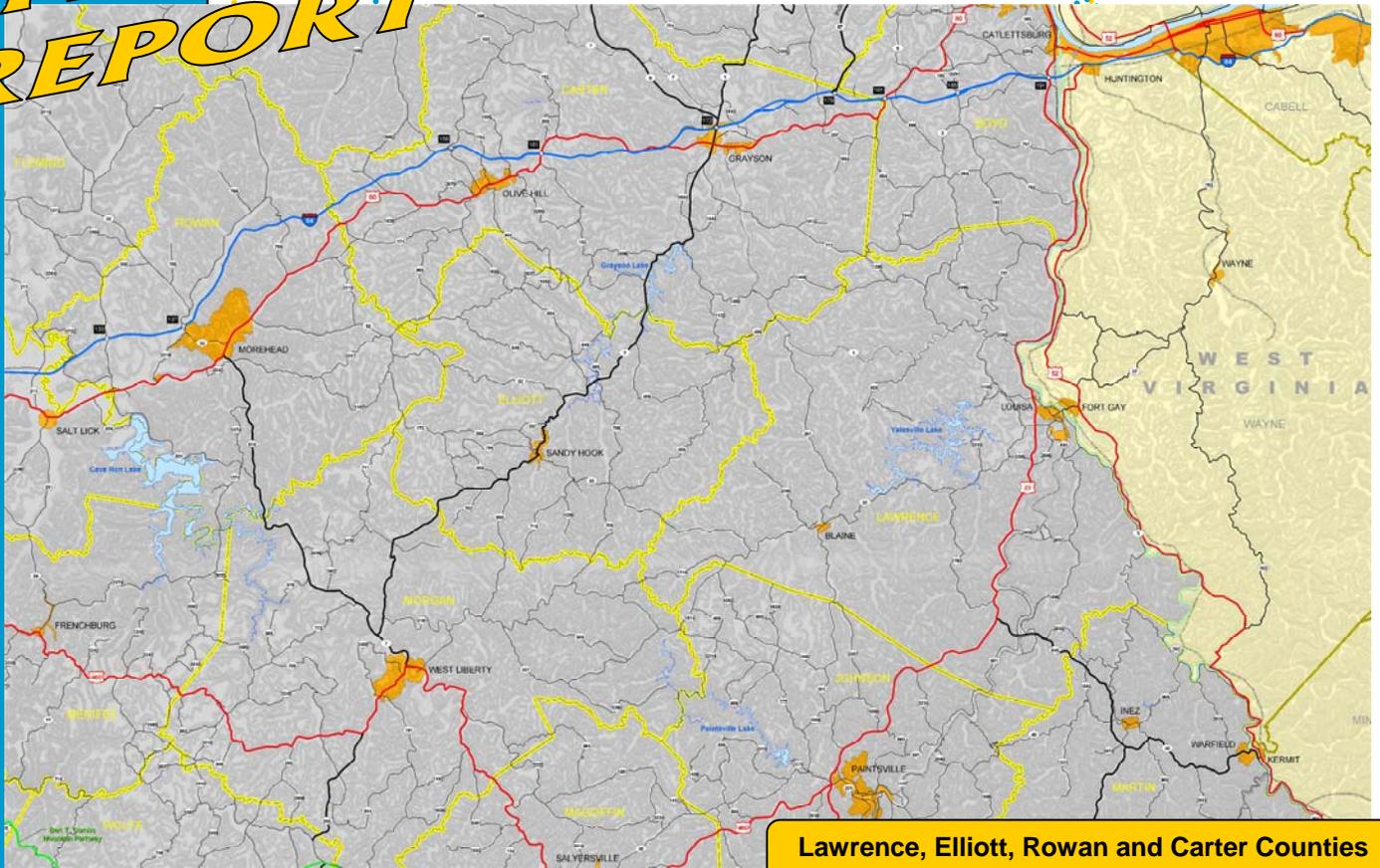


# Regional Corridor Study

## Extension of KY 645 From US 23 to Interstate 64

645

# FINAL REPORT



Lawrence, Elliott, Rowan and Carter Counties  
Six-Year Highway Plan, Item No. 12-115.00



March  
2006





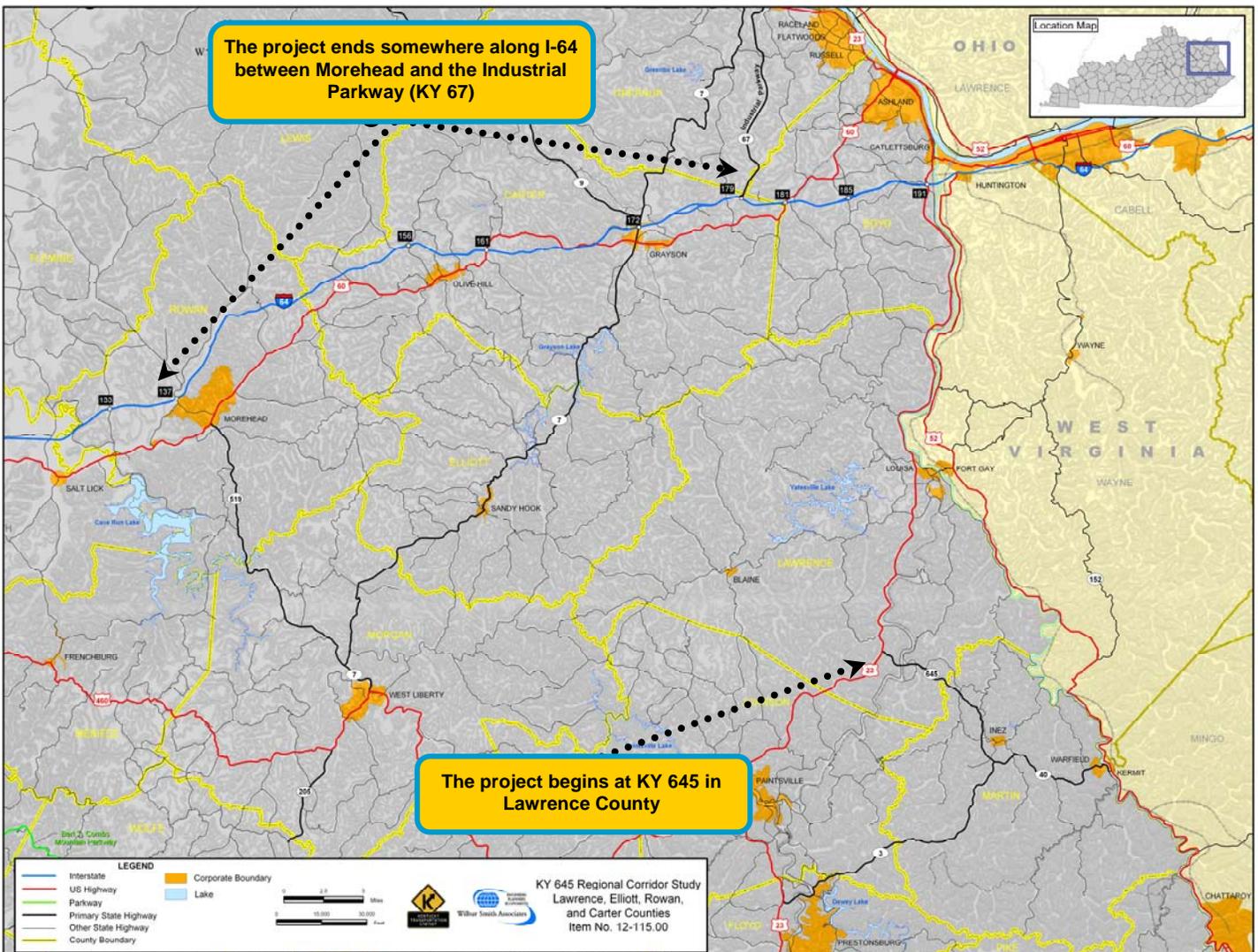
## Executive Summary

The Kentucky Transportation Cabinet (KYTC) has undertaken this regional corridor study to consider the extension of KY 645 from US 23 in Ulysses to some location along Interstate 64 between Morehead and the Industrial Parkway (Exit 179) in Carter County. Portions of this new highway could pass through parts of Lawrence, Elliott, Rowan and Carter Counties, providing improved access to employment centers, isolated communities, tourism sites, and other regional corridors. Though a new route would not physically impact Martin County, it could also improve the mobility of Martin County residents to points west.

The purpose of this study was to listen to and share information with local officials, government agencies,

other interested parties, and the public; identify known issues, concerns, and constraints, including social, traffic, environmental, and geotechnical considerations; define project goals; establish the beginning and ending points of the project; develop and evaluate project alternatives based on project goals; and make recommendations.

This project was identified in the KYTC's FY 2000-2006 Six Year Highway Plan as Item No. 12-115.00. Subsequent phases of project development, including Design, Right-of-Way Acquisition, Utility Relocation, and Construction, are not scheduled in the most recent legislatively approved *Kentucky Six-Year Highway Plan FY 2005-2010*.



## EXISTING CONDITIONS

Characteristics of KY 645 and other major highways in the study area were analyzed as part of this study, including data and/or information on transportation systems, geometric characteristics, bridges, traffic conditions, crash history, adequacy ratings, environmental features, geotechnical characteristics and planned highway improvements. Consideration of these factors for existing roadways helps to evaluate the need for improved highways in the area.

The existing KY 645 corridor is a four-lane roadway through mountainous terrain with 12-foot lanes and 10-foot shoulders. The speed limit is 55 miles per hour (mph) along the entire length of the route.



This roadway is traveled by coal trucks and other heavy vehicles, as well as the general public. The existing traffic volume along KY 645 in the study area is about 5,860 vehicles per day (vpd), with about 37.1% trucks.

All of KY 645 in Lawrence County operates at acceptable levels; however, several other roadways within the study area operate at unacceptable levels, including portions of US 60, KY 1, KY 7 and KY 32. By the year 2025, additional segments of area roadways are expected to decrease in service to unacceptable levels, including most (95-100%) of KY 7 in Elliott and Carter Counties, 73% of US 60 in Rowan County, and 43% of US 60 in Carter County.

While no “high crash segments” or “high crash spots” were identified along KY 645 in Lawrence County, a number of these locations were identified along portions of I-64, US 60, KY 1, KY 7, KY 32 and other routes.

A preliminary environmental footprint was also developed for the KY 645 project area. This analysis identified potential issues and concerns within and surrounding the defined project area. The following special features are important to this project and were highlighted on the environmental footprint: Daniel Boone National Forest; Sheltowee Trace Trail; Grayson Lake State Park; Grayson Lake Wildlife Management Area; Yatesville Lake State Park; Yatesville Lake Wildlife Management Area; Laurel Creek; Caney Creek; Abandoned Mines; Dry and Abandoned Wells; and Numerous oil wells, gas wells, injection wells, water wells, and quarries.

## PROJECT PURPOSE AND NEED

Through the collection of study area data and the public involvement process, the need for an improved highway network has been identified in each of the four study area counties. The goals listed below are based on a compilation of input from highway officials, local government agencies, interest groups, members of the general public, the Citizens’ Advisory Team (CAT) and the project team. These goals address accessibility, economic benefit, connectivity, and operational conditions:

Develop a new or improved highway that provides an improved connection to I-64, while also addressing the following transportation service objectives:

- Enhances regional accessibility and mobility
- Improves access to isolated communities and populations
- Serves as an interstate connector from the I-73/74 corridor near Kermit, West Virginia to I-64

Develop a highway corridor that will serve the most traffic, while also meeting the following traffic-related objectives:

- Diverts traffic from US 23 to reduce congestion on that route
- Optimizes and/or addresses future traffic flow on regional highways
- Provides travel time savings in the region, including the improvement of emergency response times

Develop a corridor that considers all study area interests, including socioeconomic, education, tourism, and the environment, while giving consideration to the following objectives:

- Assists in promoting economic growth and development in areas that have low-income populations
- Increases employment opportunities and gives special consideration to areas with high unemployment
- Provides access to existing employment centers, including area industrial parks
- Expands access to social services such as education and health care
- Provides improved access to key tourist destinations (examples include Grayson Lake, Yatesville Lake and the new golf course in Carter County)
- Avoids or minimizes impacts to environmentally sensitive areas (i.e., the Daniel Boone National Forest, Laurel Creek, and Caney Creek)
- Fits the natural surroundings and considers context-sensitive design

## ALTERNATIVES DEVELOPMENT

Throughout the course of this study, the local stakeholders and agency representatives were given opportunities to provide input for the study and to help develop the recommendations. There were two major rounds of coordination activities, including Project Team Meetings, Local Elected Officials Meetings, Local Agencies Meetings, Citizens Advisory Team (CAT) Meetings, Public Involvement Meetings, Public Comment Surveys, and Resource Agency Coordination.

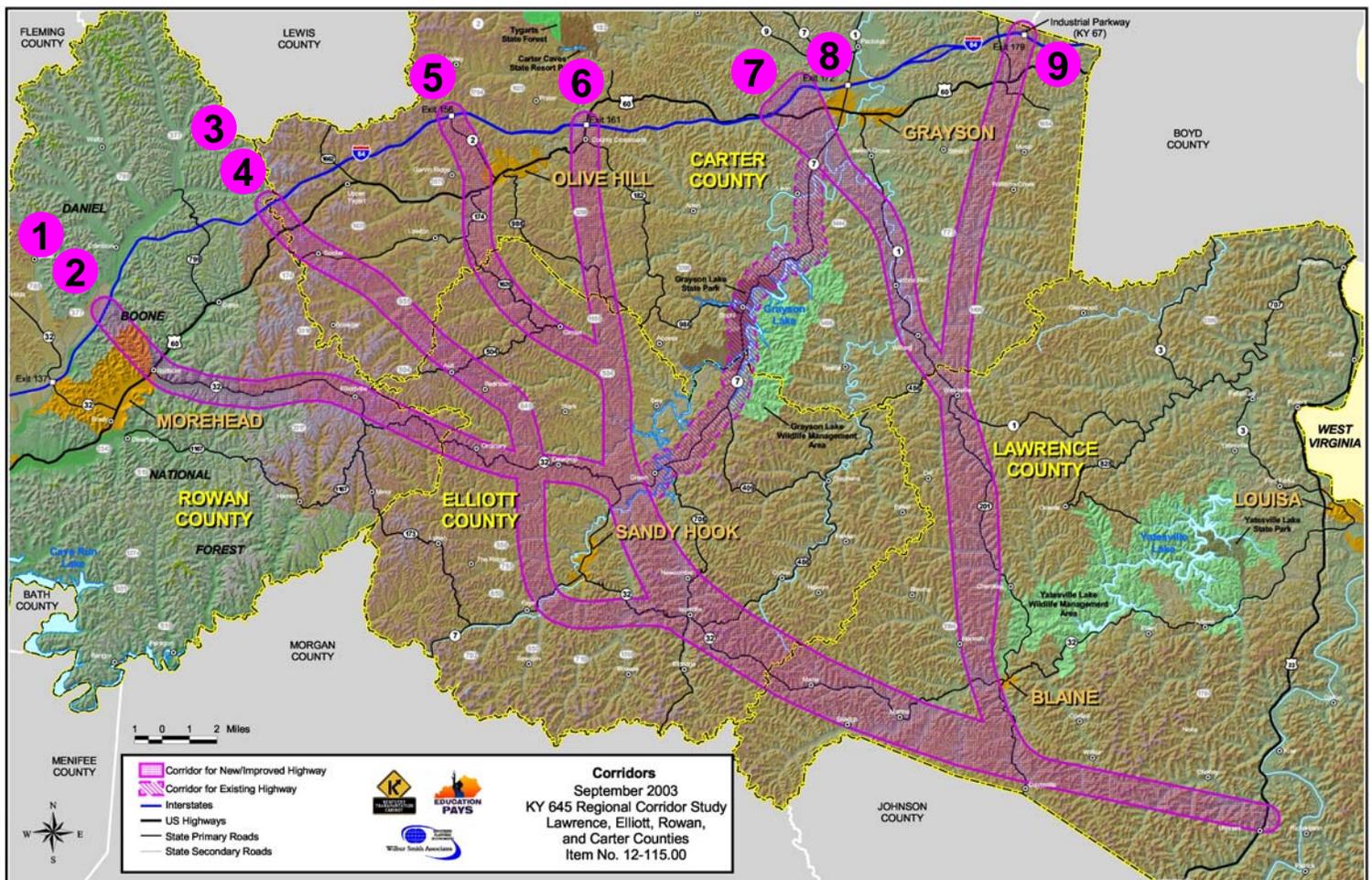
The first round of coordination sought to identify local needs, concerns and ideas for the project. Map drawing exercises allowed the public to identify locations to avoid and/or access with a new route through the region. With input from the public, the CAT and the project team, a total of nine (9) preliminary corridors and the no-build option were developed for consideration, as shown in the map below.

A Level 1 Screening of these corridors included consideration of the preliminary project goals and objectives, potential environmental and community impacts, planning level cost estimates, public input, and transportation and traffic issues. Based on the Level 1 Screening of the corridors, the Project Team

recommended that Corridors 1, 3, 6, 7, and 8 would not move forward and that Corridors 2, 4, 5, and 9, as shown below, and the no-build option, would be advanced for further consideration in the study process.

As part of the further evaluation process, environmental and geotechnical overviews were conducted on the four corridors. The overviews provided additional detail within a more defined area. A Level 2 Screening was also conducted, including: consideration of more detailed cost estimates; estimates of travel savings; cultural and historic occurrences near the corridors; environmental resources within the corridor boundaries, such as water resources, natural or forested areas, wetlands, floodplains, sensitive habitats, monitored sites, soil types, mines, cemeteries, and others; and geotechnical issues.

A second round of coordination gave local citizens, public officials and representatives of government resource agencies the opportunity to review the four corridors, the no-build option, and Level 2 Screening. Of the 664 survey responses, 369 ranked Corridor 5 as the most preferred, followed by Corridor 2 with 244 votes. The no-build option was ranked as the least preferred.



## RECOMMENDATIONS

After carefully reviewing all the findings of the study, the Project Team recommended that Corridors 4 and 9 should not move forward for further consideration. The Project Team also recognized the potential benefits of Corridors 2 and 5 as two real needs in the project area, and had a difficult time selecting one corridor over the other.

Corridor 2 has a slight advantage in regional accessibility and mobility; will likely serve more traffic in the future and provides an improved route for existing KY 32; offers better travel time savings; provides access to existing employment centers, including area industrial parks; and expands access to social services such as education and health care.

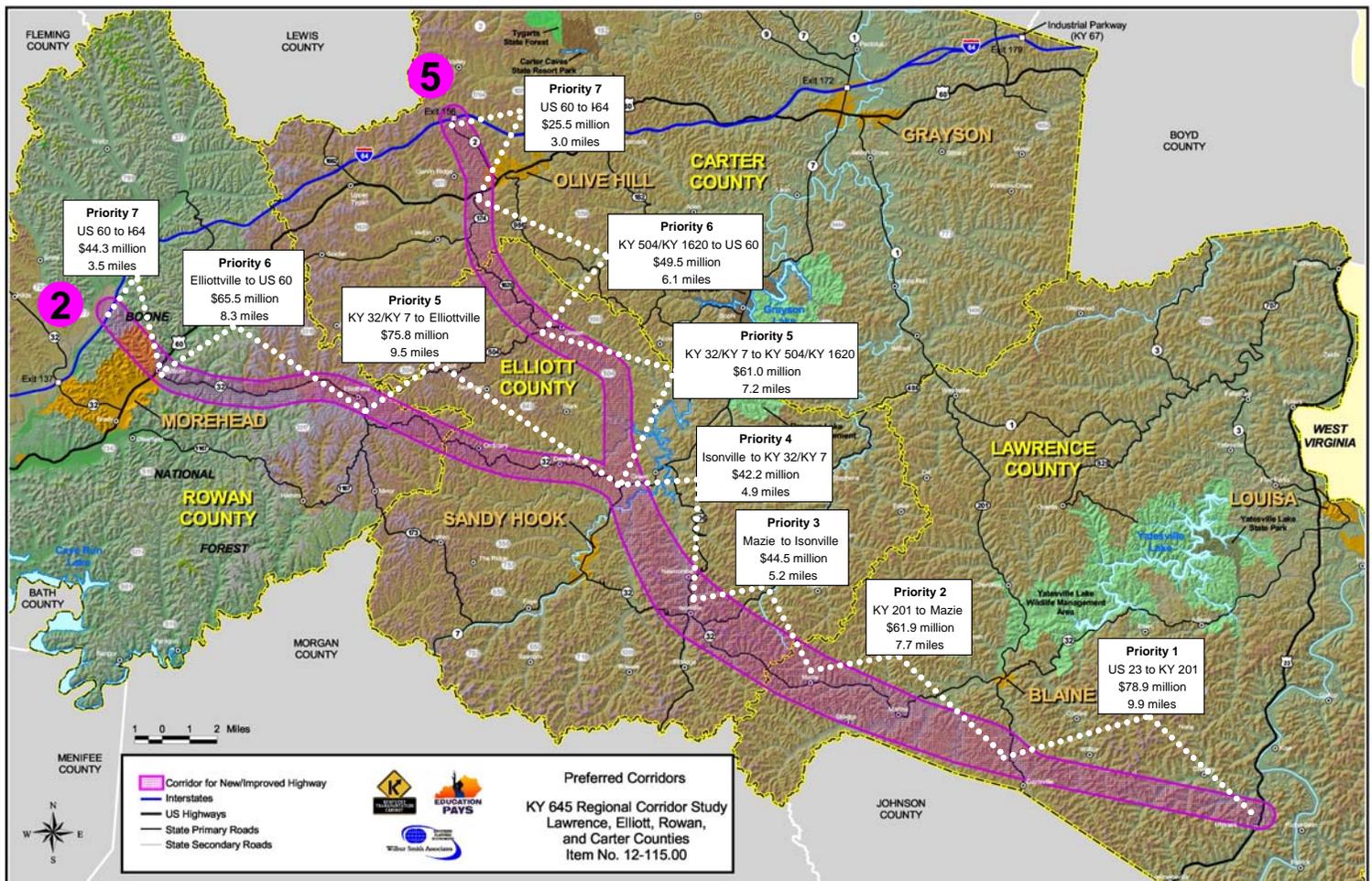
Corridor 5 has a slight advantage in improving access to isolated communities and populations; promoting economic growth, development, and employment opportunities in areas that have low-income populations and high unemployment; avoids or minimizes impacts to environmentally sensitive areas, such as the Daniel Boone National Forest; and it received the most overall public votes throughout the public involvement process.

Ultimately, the Project Team recommended that two (2) alternatives be advanced for further consideration in the next phase of project development: Corridors 2 and 5. The Project Team also identified priority sections for Corridors 2 and 5, beginning at the existing terminus of KY 645 at US 23 and moving northwest, as shown in the map below. Estimated costs for completion of the recommended corridors is shown by section below, with a total of \$413.1 million for Corridor 2 and about \$363.5 million for Corridor 5.

## CONTACT INFORMATION

Additional information regarding the KY 645 Regional Corridor Study can be obtained from the following KYTC Division of Planning staff members: Daryl J. Greer, P.E., Director; Jimmy C. Wilson, P.E., Team Manager; and Ted Noe, P.E., Project Manager.

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## TABLE OF CONTENTS

|   |            |
|---|------------|
| <b>I. INTRODUCTION.....</b>   | <b>1-1</b> |
| A. Background.....  | 1-1        |
| B. Project Location .....   | 1-2        |
| C. Programming and Schedule.....  | 1-2        |
| <b>II. EXISTING CONDITIONS.....</b>   | <b>2-1</b> |
| A. Highway Systems.....   | 2-1        |
| B. Geometric Characteristics.....   | 2-3        |
| C. Bridges.....   | 2-3        |
| D. Traffic and Level of Service.....  | 2-4        |
| 1. Existing Traffic Volumes (Year 2002).....  | 2-4        |
| 2. Level of Service (Year 2002).....  | 2-5        |
| 3. Estimated No-Build Future Traffic (Year 2025) Based on Historic Growth .....         | 2-7        |
| 4. Estimated No-Build Future Level of Service (Year 2025) Based on Historic Growth..... | 2-7        |
| E. Crash Analysis .....   | 2-9        |
| F. Adequacy Ratings.....  | 2-11       |
| G. Environmental Footprint.....   | 2-12       |
| H. Programmed Highway Improvements.....   | 2-12       |
| 1. Lawrence County .....  | 2-12       |
| 2. Elliott County.....  | 2-13       |
| 3. Rowan County.....  | 2-13       |
| 4. Carter County.....   | 2-14       |
| <b>III. INITIAL CABINET, PUBLIC AND AGENCY INPUT .....</b>                              | <b>3-1</b> |
| A. Project Team Meeting (September 6, 2002).....  | 3-1        |
| B. Local Officials and Agencies Meetings .....  | 3-1        |
| 1. Local Officials Meeting – FIVCO (October 15, 2002).....                              | 3-2        |
| 2. Local Agencies Meeting – Lawrence County (November 20, 2002) .....                   | 3-2        |
| 3. Local Agencies Meeting – Elliott County (November 20, 2002).....                     | 3-2        |
| 4. Local Agencies Meeting – Carter County (November 22, 2002).....                      | 3-2        |
| 5. Local Agencies Meeting – Rowan County (November 22, 2002).....                       | 3-3        |
| 6. Local Agencies Meeting – Martin County (June 25, 2003) .....                         | 3-3        |
| C. Citizens Advisory Team Meetings.....   | 3-3        |
| 1. CAT Meeting #1 – Carter County (April 15, 2003) .....                                | 3-3        |
| 2. CAT Meeting #2 – Elliott County (May 15, 2003).....                                  | 3-4        |
| D. Public Information Meetings – Round 1 .....  | 3-4        |
| 1. General Comments .....   | 3-5        |
| 2. Map Exercise .....   | 3-5        |
| 3. Public Comment Survey Responses.....   | 3-7        |
| E. Resource Agency Coordination – Round I (July 8, 2003).....                           | 3-9        |
| <b>IV. PROJECT PURPOSE AND NEED.....</b>  | <b>4-1</b> |
| <b>V. ALTERNATIVES DEVELOPMENT PROCESS.....</b>   | <b>5-1</b> |
| A. Third Citizens’ Advisory Team Meeting (August 28, 2003) .....                        | 5-1        |
| B. Level 1 Screening .....  | 5-1        |
| C. Second Project Team Meeting (March 10, 2004) .....                                   | 5-3        |
| <b>VI. ALTERNATIVES EVALUATION .....</b>  | <b>6-1</b> |
| A. Environmental Overview .....   | 6-1        |
| 1. Potential Issues.....  | 6-1        |

|  |            |
|--|------------|
| 2. <i>Conclusions</i> .....  | 6-5        |
| B. Geotechnical Overview .....   | 6-5        |
| 1. <i>Potential Issues</i> .....   | 6-5        |
| 2. <i>Conclusions</i> .....  | 6-6        |
| C. Level 2 Screening .....   | 6-6        |
| D. Second Round of Local Officials Meetings (October 2004) .....   | 6-8        |
| 1. <i>Local Officials Meeting – Lawrence County (October 12, 2004)</i> .....   | 6-8        |
| 2. <i>Local Officials Meeting – Martin County (October 12, 2004)</i> .....   | 6-9        |
| 3. <i>Local Officials Meeting – Carter County (October 13, 2004)</i> .....   | 6-9        |
| 4. <i>Local Officials Meeting – Rowan County (October 21, 2004)</i> .....  | 6-10       |
| 5. <i>Local Officials Meeting – Elliott County (October 21, 2004)</i> .....  | 6-10       |
| E. Public Information Meetings – Round 2 .....   | 6-11       |
| 1. <i>General Comments</i> .....   | 6-12       |
| 2. <i>Public Comment Survey Responses</i> .....  | 6-13       |
| F. Second Round of Resource Agency Coordination (December 2004).....   | 6-13       |
| G. Final Citizens’ Advisory Team Meeting (March 28, 2005).....   | 6-18       |
| H. Project Team Meeting (May 3, 2005).....   | 6-18       |
| <b>VII. RECOMMENDATIONS .....</b>  | <b>7-1</b> |
| A. Corridors Not Moved Forward for Further Consideration.....  | 7-1        |
| B. Corridors Moved Forward for Further Consideration .....   | 7-1        |
| 1. <i>Develop a new or improved highway that provides an improved connection to I-64</i> .....   | 7-2        |
| 2. <i>Develop a highway corridor that will serve the most traffic</i> .....  | 7-2        |
| 3. <i>Develop a corridor that considers all study area interests, including<br/>        socioeconomic, education, tourism, and the environment</i> ..... | 7-3        |
| 4. <i>Other Issues</i> .....   | 7-5        |
| C. Recommendations .....   | 7-6        |
| D. Potential Design Criteria and Considerations .....  | 7-7        |
| 1. Construction Sections .....   | 7-7        |
| 2. Typical Section.....  | 7-8        |
| 3. Traffic Forecast .....  | 7-9        |
| E. Phase Costs.....  | 7-10       |
| F. Summary of Environmental Issues for Future Phases.....  | 7-11       |
| G. Construction Considerations .....   | 7-13       |
| <b>VIII. ACKNOWLEDGEMENTS AND CONTACTS .....</b>   | <b>8-1</b> |

## APPENDICES

|   |
|---|
| Appendix A. Figures   |
| Appendix B. Tables (on attached CD)                           |
| Appendix C. Project Area Photographs (on attached CD)         |
| Appendix D. Meeting Minutes (on attached CD)                  |
| Appendix E. Round I Resource Agency Letters (on attached CD)  |
| Appendix F. Alternatives Development                          |
| Appendix G. Environmental Overview (on attached CD)           |
| Appendix H. Geotechnical Overview (on attached CD)            |
| Appendix I. Round II Resource Agency Letters (on attached CD) |

## LIST OF FIGURES

|             |   |            |
|-------------|---|------------|
| Figure 1-A. | Study Area .....                          | Appendix A |
| Figure 2-A. | Existing Traffic Characteristics .....    | Appendix A |
| Figure 3-A. | Future Traffic Characteristics.....       | Appendix A |
| Figure 4-A. | Crash Data by Severity & Location.....    | Appendix A |
| Figure 5-A. | Adequacy Ratings on Selected Routes ..... | Appendix A |
| Figure 6-A. | Environmental Footprint.....              | Appendix A |

## LIST OF TABLES

|             |   |            |
|-------------|---|------------|
| Table 1.    | Study Area Routes.....                                | 2-1        |
| Table 2-B.  | Highway Systems .....                                 | Appendix B |
| Table 3-B.  | Geometric Characteristics .....                       | Appendix B |
| Table 4-B.  | Bridge Data.....                                      | Appendix B |
| Table 5.    | Bridges Eligible for Federal Funding.....             | 2-4        |
| Table 6-B.  | Traffic Characteristics (Existing & Future) .....     | Appendix B |
| Table 7.    | Study Area Routes with Unacceptable LOS in 2002 ..... | 2-6        |
| Table 8.    | Study Area Routes with Unacceptable LOS in 2025 ..... | 2-8        |
| Table 9-B.  | Vehicle Crash Analysis – Segment.....                 | Appendix B |
| Table 10.   | KY 645 Vehicle Crash Segment Analysis.....            | 2-10       |
| Table 11-B. | Vehicle Crash Analysis – Spot.....                    | Appendix B |
| Table 12.   | KY 645 Vehicle Crash Spot Analysis.....               | 2-11       |
| Table 13.   | Public Survey Response Summary – Round I.....         | 3-8        |
| Table 14.   | Phase Costs .....                                     | 7-10       |

## I. INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) has undertaken this regional corridor study to consider the extension of KY 645 from US 23 in Ulysses to some location along Interstate 64 between Morehead and the Industrial Parkway (Exit 179).

The purpose of this study was to:

- Listen to and share information with local officials, government agencies, other interested parties, and the public;
- Identify known issues, concerns, and constraints, including social, traffic, environmental, and geotechnical considerations;
- Define project goals;
- Establish the beginning and ending points of the project;
- Develop and evaluate project alternatives based on project goals; and
- Make recommendations.

Through this Regional Corridor Study, the KYTC ensures that future project improvements to KY 645 effectively address identified transportation needs, and that project development efforts meet the federal requirements as defined in the National Environmental Policy Act (NEPA).

### A. Background

The Kentucky 645 Regional Corridor Study was identified in the KYTC's Approved 2000-2002 Biennial Highway Construction Program and Identified Preconstruction Program Plan for FY 2003 Through FY 2006 (generally referred to as the Six Year Highway Plan) as Item No. 12-115.00. This project was initially described as the evaluation of possibilities for extending KY 645 from US 23 at Ulysses to I-64 at the Industrial Parkway (Exit 179).

During the first project team meeting, held on September 6, 2002, it was decided that this corridor study should be expanded to consider regional needs, as explained in **Chapter III** of this report. As a result, Rowan and Elliott Counties were added to the study area and the project description evolved into the extension of KY 645 from US 23 in



*KY 645/US 23 (Lawrence County)*



*Exit 179 along I-64 (Carter County)*

Ulysses to some location along Interstate 64 between Morehead and the Industrial Parkway (Exit 179) in Carter County.

## **B. Project Location**

As previously mentioned and illustrated in **Figure 1-A, Appendix A**, portions of this new highway could pass through parts of Lawrence, Elliott, Rowan and Carter Counties in northeastern Kentucky. Though a new route would not physically impact Martin County, it could improve the mobility of Martin County residents to points west. For that reason, during the summer of 2003, Martin County residents requested the opportunity to be involved with this planning study process. The project team decided that Martin County would be included in all public involvement efforts to the same degree as Lawrence, Elliott, Rowan, and Carter counties.

## **C. Programming and Schedule**

This study was funded in the FY 2002 (2000-06) Six Year Highway Plan, with committed funds of \$500,000.

Subsequent phases of project development, including Design, Right-of-Way Acquisition, Utility Relocation, and Construction, are not scheduled in the most recent legislatively approved *Kentucky Six-Year Highway Plan FY 2005-2010*.

## II. EXISTING CONDITIONS

Characteristics of KY 645 and other major highways in the study area are identified in the following sections. Included are data and/or information on transportation systems, geometric characteristics, bridges, traffic conditions, crash history, adequacy ratings, environmental features, and planned highway improvements. Features of the highways in the study area are summarized from the KYTC Highway Information System (HIS) database.

Project area roadways considered as part of this analysis are presented in **Table 1**. These roadways were selected because they were deemed important to the overall transportation system in the study area. Specifically, they are major traffic carriers within the project area and serve the inflow and outflow of goods for the area. In addition, portions of these roadways could potentially become part of any future KY 645 corridor. Detailed maps and tables of characteristics along these study area routes are presented in **Appendix A** and **Appendix B**, respectively, as referenced throughout this report. Summary tables are also included throughout this document. In select cases, maps and table summaries may include roadway segments that fall outside of the segments defined in **Table 1**.

Photographs taken throughout the study area can be found in **Appendix C**.

**Table 1. Study Area Routes**

| Route                 | Begin Milepoint | End Milepoint | Route                         | Begin Milepoint | End Milepoint |
|-----------------------|-----------------|---------------|-------------------------------|-----------------|---------------|
| <b>Carter County</b>  |                 |               | <b>Elliott County (cont.)</b> |                 |               |
| I-64                  | 148.665         | 180.812       | KY 504                        | 0.000           | 13.916        |
| US 60                 | 0.000           | 35.036        | KY 1620                       | 0.000           | 3.788         |
| KY 1                  | 0.000           | 12.009        | <b>Lawrence County</b>        |                 |               |
| KY 2                  | 0.000           | 3.093         | US 23                         | 0.000           | 28.947        |
| KY 7                  | 0.000           | 10.865        | KY 1                          | 0.000           | 14.140        |
| KY 174                | 0.000           | 9.254         | KY 3                          | 17.054          | 34.479        |
| KY 182                | 0.000           | 8.535         | KY 32                         | 0.000           | 29.162        |
| KY 207                | 0.000           | 4.865         | KY 201                        | 0.000           | 18.160        |
| KY 486                | 0.000           | 2.802         | KY 645                        | 0.000           | 5.205         |
| KY 986                | 0.000           | 13.912        | <b>Rowan County</b>           |                 |               |
| KY 1620               | 0.000           | 1.330         | I-64                          | 132.918         | 148.665       |
| KY 1662               | 0.000           | 1.724         | US 60                         | 7.099           | 17.112        |
| <b>Elliott County</b> |                 |               | KY 32                         | 4.593           | 21.761        |
| KY 7                  | 0.000           | 18.874        | KY 173                        | 0.000           | 3.883         |
| KY 32                 | 0.000           | 18.058        | KY 799                        | 0.000           | 5.735         |
| KY 173                | 0.000           | 6.765         | KY 1167                       | 0.000           | 12.542        |
| KY 486                | 0.000           | 14.226        |                               |                 |               |

### A. Highway Systems

Major highway systems information is shown in **Table 2-B**, **Appendix B**, including the State Primary Road System, Functional Classification System, National Highway System (NHS), National Truck Network (NN), and Designated Truck Weight Class. Major highway systems summarized for the study area are as follows:

- State-maintained roads in Kentucky are classified into one (1) of six (6) categories under the State System, ranging from the highest order classification to the lowest as follows: State Primary roads, State Secondary roads, Rural Secondary roads, and Supplemental roads. State Primary routes are those routes which are considered to be long-distance, high-volume intrastate routes that are of statewide significance. Mobility is the prime function of the routes which can be distinguished by high traffic-carrying capacity. These routes link major urban centers within the state and/or serve as major regional corridors.



*Truck Traffic along US 23*

KY 645 is classified as a State Primary Route on the State System. Other State Primary routes within the project area include I-64 and segments of US 23, US 60, KY 1, KY 7, and KY 32.

- One of 13 functional classification categories is assigned to each state-maintained road in Kentucky, based on the function the road provides and whether the road is an urban or rural road. These are classified from highest to lowest and by geographic designation as: Rural Interstate, Urban Interstate, Other Rural Freeways and Expressways (Principal Arterial), Other Urban Freeways and Expressways (Principal Arterial), Other Rural Principal Arterial, Other Urban Principal Arterial, Rural Minor Arterial, Urban Minor Arterial, Rural Major Collector, Urban Collector, Rural Minor Collector, Rural Local, and Urban Local.

In the study area, KY 645 is classified as a Rural Principal Arterial. According to Federal criteria, Rural Principal Arterials provide statewide or interstate travel and represent between two (2) and four (4) percent of total roadway mileage. They are characterized by high traffic densities and longer trip lengths. They provide an integrated network and exclude stubs except for special geographic or traffic conditions.

- The NHS, first established in 1991 by the Intermodal Surface Transportation Efficiency Act (ISTEA), includes Interstate Highways and other significant Principal Arterials important to the nation's economy, defense, and mobility. KY 645 is not on the NHS. However, I-64 in Rowan and Carter counties, US 23 from MP 0.000 to MP 29.069 in Lawrence County, and KY 1 from MP 11.502 to MP 12.009 in Carter County are included. Outside of the study area, but within Carter County, KY 9 is on the NHS from MP 0.0 (KY 1/KY 7) to MP 18.262 (Lewis County Line).

- The NN includes roads designated for use by commercial trucks with increased dimensions (102 inches wide; 13 feet, 6 inches high; semi-trailers up to 53 feet long; and trailers up to 28 feet long – not to exceed two (2) trailers per truck). In the study area, KY 645 is not on the NN. However, I-64 and US 23 from MP 0.000 to MP 29.069 in Lawrence County are both on the NN.
- Kentucky Revised Statutes require weight limits on the state-maintained highway system. There are three (3) weight classification limits: (1) AAA – 80,000 lbs. maximum gross vehicle weight; (2) AA – 62,000 lbs. maximum gross vehicle weight; and (3) A – 44,000 lbs. maximum gross vehicle weight. In the study area, KY 645 has a weight classification limit of AAA. For special circumstances, occasional exceptions may be granted for over-dimensional or overweight vehicles by permits issued by the KYTC, Division of Motor Carriers.

## B. Geometric Characteristics

Geometric characteristics for major routes in the study area are listed in **Table 3-B, Appendix B**, including the number of lanes, lane widths, shoulder widths, roadway type, local terrain, route speed limits, and pavement type. The percent passing sight distance information was not available in KYTC's HIS database for most of the study area routes. In the study area, KY 645 has the following characteristics:

- Both divided and undivided highway cross-sections, with the majority (84%) divided;
- Mountainous terrain;
- Four (4) 12-foot driving lanes;
- Ten (10) foot shoulders;
- High flexible pavement; and
- Posted speed limits of 55 mph.

## C. Bridges

Bridge data for the routes considered in this study are listed in **Table 4-B, Appendix B**. A bridge with a sufficiency rating less than fifty (50.0) is considered to be eligible for replacement with federal funds under the Federal-Aid Highway Bridge Replacement and Rehabilitation Program. Bridges can be rated either structurally deficient or functionally obsolete. Eleven (11) bridges within the study area have sufficiency ratings below 50.0 and are presented in **Table 5**. All structurally deficient and functionally obsolete bridges are not shown in **Table 5**, but are listed in **Table 4-B, Appendix B**.

**Table 5. Bridges Eligible for Federal Funding**

| Bridge No.                        | Bridge MP | Bridge Length (feet) | Bridge Width (feet) | Horizontal Clearance (feet) | Sufficiency Rating | Structural Function | Feature Intersected |
|-----------------------------------|-----------|----------------------|---------------------|-----------------------------|--------------------|---------------------|---------------------|
| <b>Carter County</b>              |           |                      |                     |                             |                    |                     |                     |
| <b>US 60 MP 0.000 - MP 35.036</b> |           |                      |                     |                             |                    |                     |                     |
| B00041                            | 2.400     | 33                   | 21.5                | 19.5                        | 8.0                | SD                  | Fleming Fork        |
| B00038                            | 3.700     | 27                   | 22.3                | 20.0                        | 46.2               | FO                  | Reeves Branch       |
| <b>Elliott County</b>             |           |                      |                     |                             |                    |                     |                     |
| <b>KY 7 MP 0.000 - MP 18.890</b>  |           |                      |                     |                             |                    |                     |                     |
| B00008                            | 10.324    | 210.0                | 21                  | 20.0                        | 39.1               | FO                  | Little Sandy River  |
| B00001                            | 13.626    | 378.0                | 21.2                | 20.0                        | 47.8               | FO                  | Little Sandy River  |
| <b>KY 32 MP 0.000 - MP 18.058</b> |           |                      |                     |                             |                    |                     |                     |
| B00003                            | 11.300    | 129.0                | 21.4                | 19.0                        | 44.2               | SD                  | Middle Fork         |
| <b>Lawrence County</b>            |           |                      |                     |                             |                    |                     |                     |
| <b>KY 1 MP 0.000 - MP 14.140</b>  |           |                      |                     |                             |                    |                     |                     |
| B00052                            | 0.122     | 37                   | 24.0                | 22.5                        | 17.9               | SD                  | Little Cat Creek    |
| <b>Rowan County</b>               |           |                      |                     |                             |                    |                     |                     |
| <b>US 60 MP 7.099 - MP 17.112</b> |           |                      |                     |                             |                    |                     |                     |
| B00001                            | 10.089    | 54                   | 23                  | 20.0                        | 11.0               | SD                  | Martin Branch       |
| B00006                            | 14.923    | 37                   | 23                  | 20.0                        | 23.4               | SD                  | Hayes Branch        |
| B00007                            | 15.221    | 33                   | 23.2                | 20.5                        | 12.0               | SD                  | Hayes Branch        |
| <b>KY 32 MP 4.593 - MP 21.761</b> |           |                      |                     |                             |                    |                     |                     |
| B00012                            | 11.88     | 28                   | 26                  | 19.0                        | 45.6               | SD                  | Patty's Lick Creek  |
| <b>KY 799 MP 0.000 - MP 5.735</b> |           |                      |                     |                             |                    |                     |                     |
| B00033                            | 5.3       | 61                   | 20.4                | 19.0                        | 29.8               | SD                  | Holly Fork          |

## D. Traffic and Level of Service

Existing (Year 2002) and estimated future (Year 2025) traffic and operational conditions for each major route in the study area are discussed in the following subsections.

### 1. Existing Traffic Volumes (Year 2002)

Existing traffic volumes (Year 2002) for segments of the study area routes were summarized based primarily on information provided in the HIS database. If unavailable, truck percentages were derived for the study area routes using default values from the Division of Multimodal Programs' 2002 *Traffic Forecasting Report* or classification data collected for KY 645. Traffic characteristics for all routes in the study area are shown in **Figure 2-A, Appendix A** and in **Table 6-B, Appendix B**.

The existing traffic volume along KY 645 in the study area is 5,860 vehicles per day (vpd). Existing truck percentages are approximately 37.1% of the total traffic along the study route. In comparison, existing traffic volumes along I-64 range between 12,400 and 20,800 vpd. Traffic volumes along US 23 range between 6,500 and 11,300 vpd.

## 2. Level of Service (Year 2002)

Level of Service (LOS) is a qualitative measure of highway traffic conditions, as defined in the *2000 Highway Capacity Manual*, published by the Transportation Research Board (TRB). Individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six (6) levels of service are defined and given letter designations from A to F, with LOS A as the best condition, representing free flow conditions, and ranging to LOS F, the worst condition, representing severe congestion and/or time delays. Typically, a minimum of LOS D is considered acceptable in urban areas and LOS C is considered acceptable in rural areas. Existing LOS for each route in the study area is shown in **Figure 2-A**, **Appendix A**, and in **Table 6-B**, **Appendix B**. **Table 7** summarizes the roadways within the study area with unacceptable LOS in 2002.

**Level of Service (LOS)**

- LOS is used to describe traffic conditions, where LOS A is the best and LOS F is the worst.
- KY 645 currently operates at LOS A in the study area.

All of KY 645 in Lawrence County operates at acceptable levels; however, several other roadways within the study area experience unacceptable levels:

- Fifteen percent (15%) of US 60 in Carter County operates at LOS D.
- In Rowan County, 34% of the segments evaluated are LOS D and LOS E.
- A significant portion of KY 7 in Carter County (60%) and Elliott County (100%) operates at LOS D and LOS E.
- In addition, short segments of KY 3 and KY 32 in Lawrence County and KY 1 in Carter County operate at LOS D and LOS E.

Table 7. Study Area Routes with Unacceptable<sup>1</sup> LOS in 2002

| Begin MP   | End MP | Segment Length | % Trucks   | 2002 ADT        | LOS |
|--|--------|----------------|------------|-----------------|-----|
| <b>Carter County</b>                               |        |                |            |                 |     |
| <b>US 60 (5.150 miles of 35.036 miles or 15%)</b>  |        |                |            |                 |     |
| 8.873  | 10.42  | 1.547          | 2.3 - 3.5  | 10,600 - 13,200 | D   |
| 10.816   | 13.488 | 2.672          | 3.5        | 7,500 - 7,820   | D   |
| 23.830   | 23.870 | 0.040          | 4.0        | 8,700           | D   |
| 23.930   | 24.821 | 0.891          | 2.0        | 7,460 - 12,900  | D   |
| <b>KY 1 (0.284 mile of 12.009 miles or 2%)</b>     |        |                |            |                 |     |
| 11.725   | 12.009 | 0.284          | 8.3        | 11,400          | E   |
| <b>KY 7 (6.482 miles of 10.865 miles or 60%)</b>   |        |                |            |                 |     |
| 0.000  | 5.343  | 5.343          | 5.1 - 5.3  | 2,380 - 4,200   | D   |
| 9.157  | 10.290 | 1.133          | 5.1 - 33.4 | 6,170 - 6,800   | D   |
| 10.290   | 10.296 | 0.006          | 33.4       | 6,300           | E   |
| <b>Elliott County</b>                              |        |                |            |                 |     |
| <b>KY 7 (18.874 miles of 18.874 miles or 100%)</b> |        |                |            |                 |     |
| 0.000  | 6.428  | 6.428          | 6.7 - 15.8 | 942 - 2,600     | D   |
| 6.428  | 10.400 | 3.972          | 5.3 - 8.3  | 2,600 - 6,260   | E   |
| 10.400   | 18.874 | 8.474          | 5.3        | 2,190 - 2,960   | D   |
| <b>Lawrence County</b>                             |        |                |            |                 |     |
| <b>KY 32 (0.696 mile of 29.162 miles or 2%)</b>    |        |                |            |                 |     |
| 28.466   | 29.162 | 0.696          | 9.0        | 13,800          | D   |
| <b>Rowan County</b>                                |        |                |            |                 |     |
| <b>US 60 (3.384 miles of 10.013 miles or 34%)</b>  |        |                |            |                 |     |
| 7.099  | 9.645  | 2.546          | 2.4 - 3.6  | 10,600 - 18,400 | E   |
| 9.645  | 10.483 | 0.838          | 4.2        | 9,250           | D   |

1) Unacceptable LOS means LOS E or below in urban areas, or LOS D or below in rural areas.

**3. Estimated No-Build Future Traffic (Year 2025) Based on Historic Growth**

No-Build future traffic was estimated using historic growth rates and assuming no future improvements along study area roadways. The growth rates were based on KYTC's historic traffic counts for each study area route. Growth rates ranged from a low of 1.0 percent in Elliott and Carter Counties to a high of 2.7 percent in Carter County. The growth rate for KY 645 traffic was 2.3 percent with a resulting traffic volume in 2025 of 9,900 vpd. Projected future year traffic volumes are shown in **Figure 3-A, Appendix A, and Table 6-B, Appendix B.**

**4. Estimated No-Build Future Level of Service (Year 2025) Based on Historic Growth**

KY 645 in Lawrence County is expected to operate at LOS A in Year 2025; however, other key roadways within the study area would show significant degradation of service:

- Ten (10) miles of US 60 in Carter County and four (4) miles in Rowan County would experience unacceptable LOS, including two (2) short sections with LOS F.
- Nearly all of KY 7 (95%) in Carter County would be operating at LOS D or LOS E.
- Sixty-five percent (65%) of KY 2 in Carter County would be operating at LOS D. LOS for KY 7 in Elliott County and small segments of KY 3 and KY 32 in Lawrence County would remain at LOS D and LOS E.
- In addition, approximately one (1) mile of KY 32 in Rowan County would operate at LOS E.

The estimated No-Build future LOS is shown for the study area in **Figure 3-A, Appendix A** and in **Table 6-B, Appendix B. Table 8** summarizes the roadways within the study area with unacceptable LOS in 2025.

**Table 8. Study Area Routes with Unacceptable<sup>1</sup> LOS in 2025**

| Begin MP   | End MP | Segment Length | Existing % Trucks | 2025 ADT        | 2025 LOS |
|--|--------|----------------|-------------------|-----------------|----------|
| <b>Carter County</b>                               |        |                |                   |                 |          |
| <b>US 60 (15.223 miles of 35.036 miles or 43%)</b> |        |                |                   |                 |          |
| 6.436  | 8.873  | 2.437          | 2.3               | 7,700 - 11,000  | D        |
| 8.873  | 9.017  | 0.144          | 2.3               | 17,500          | E        |
| 9.017  | 9.120  | 0.103          | 3.5               | 20,800          | F        |
| 9.120  | 10.420 | 1.300          | 3.5               | 16,700 - 19,400 | E        |
| 10.420   | 13.488 | 3.068          | 3.5               | 11,100 - 12,300 | D        |
| 23.610   | 24.129 | 0.519          | 2.0 - 4.0         | 7,600 - 13,700  | D        |
| 24.129   | 24.821 | 0.692          | 2.0               | 17,700 - 20,300 | E        |
| 24.821   | 30.735 | 5.914          | 2.0               | 7,200 - 9,800   | D        |
| 33.990   | 35.036 | 1.046          | 28.1              | 8,100           | D        |
| <b>KY 1 (1.718 miles of 12.009 miles or 14%)</b>   |        |                |                   |                 |          |
| 10.105   | 11.539 | 1.434          | 8.3               | 10,300 - 37,200 | D        |
| 11.725   | 12.009 | 0.284          | 8.3               | 17,700          | E        |
| <b>KY 7 (10.296 miles of 10.865 miles or 95%)</b>  |        |                |                   |                 |          |
| 0.000  | 4.789  | 4.789          | 5.1 - 5.3         | 3,800 - 5,600   | D        |
| 4.789  | 5.343  | 0.554          | 5.1               | 6,800           | E        |
| 5.343  | 9.598  | 4.255          | 5.1               | 6,800 - 10,900  | D        |
| 9.598  | 10.296 | 0.698          | 33.4              | 10,200 - 11,000 | E        |
| <b>KY 2 (2.022 miles of 3.093 miles or 65%)</b>    |        |                |                   |                 |          |
| 1.071  | 3.093  | 2.022          | 9.2               | 8,400           | D        |
| <b>Elliott County</b>                              |        |                |                   |                 |          |
| <b>KY 7 (18.874 miles of 18.874 miles or 100%)</b> |        |                |                   |                 |          |
| 0.000  | 6.428  | 6.428          | 6.7 - 15.8        | 1,300 - 3,700   | D        |
| 6.428  | 10.400 | 3.972          | 5.3 - 8.3         | 3,700 - 8,900   | E        |
| 10.400   | 18.874 | 8.474          | 5.3               | 3,100 - 4,200   | D        |
| <b>Lawrence County</b>                             |        |                |                   |                 |          |
| <b>KY 32 (0.696 miles of 29.162 miles or 2%)</b>   |        |                |                   |                 |          |
| 28.466   | 29.162 | 0.696          | 9.0               | 17,700          | E        |
| <b>Rowan County</b>                                |        |                |                   |                 |          |
| <b>US 60 (7.352 miles of 10.013 miles or 73%)</b>  |        |                |                   |                 |          |
| 7.099  | 7.495  | 0.396          | 2.4               | 26,800          | F        |
| 7.495  | 7.950  | 0.455          | 2.4               | 16,000 - 24,600 | E        |
| 7.950  | 8.100  | 0.150          | 2.4               | 27,700          | F        |
| 8.100  | 8.375  | 0.275          | 2.4               | 25,500          | E        |
| 8.375  | 8.787  | 0.412          | 2.4               | 27,700          | F        |
| 8.787  | 9.645  | 0.858          | 3.6               | 23,800          | E        |
| 9.645  | 14.451 | 4.806          | 4.2 - 7.7         | 8,800 - 13,900  | D        |
| <b>KY 32 (1.190 miles of 17.168 miles or 7%)</b>   |        |                |                   |                 |          |
| 5.890  | 7.080  | 1.190          | 2.4               | 46,200          | E        |

1) Unacceptable LOS means LOS E or below in urban areas, or LOS D or below in rural areas.

## E. Crash Analysis

Crash data from the HIS database were considered for major routes for a four-year period (January 1, 1998 to December 31, 2001). The location of crashes with valid milepoint designations are shown by corridor segment in **Table 9-B, Appendix B** and by spot locations (0.1 miles in length) in **Table 11-B, Appendix B**. **Figure 4-A, in Appendix A**, displays the crash data by severity and location. High crash segments and spots are shown on **Table 10** and **Table 12**, respectively.

When a roadway segment has a critical rate factor greater than one (1.00), this indicates that accidents at this location may not be occurring randomly. The critical rate factors are calculated using the methodology presented in the Kentucky Transportation Center's *Analysis of Traffic Accident Data in Kentucky (2000-2004)*<sup>1</sup>. A spot location or segment of roadway is considered to have a high crash rate when the total crash rate is higher than the critical crash rate for similar roadways in the state.

Each crash is classified into one (1) of three (3) categories based on the degree of severity: fatal, injury, or property-damage-only. During the period studied, there were no fatal, nine (9) injury, and four (4) property-damage-only crashes along KY 645 in Lawrence County. In contrast, during the period studied there were 33 fatal, 1,255 injury, and 2,556 property-damage-only crashes on all routes within the study area.

No high crash segments or spots occur along KY 645 in Lawrence County. However, as shown in **Tables 10** and **12** and in **Figure 4-A in Appendix A**, high crash segments and spot locations occur throughout the study area. A portion of I-64 is considered to be a potential high crash location, from Exit 137 near Morehead in Rowan County to Exit 161 near Counts Crossroads in Carter County.

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<sup>1</sup> Agent and Pigman. *Analysis of Traffic Accident Data in Kentucky (2000-2004)*. Kentucky Transportation Center.

Table 10. KY 645 Vehicle Crash Segment Analysis

| Route                 | Begin MP | End MP  | Vehicle Crashes |        |     |       | Critical Rate Factor |
|-----------------------|----------|---------|-----------------|--------|-----|-------|----------------------|
|                       |          |         | Fatal           | Injury | PDO | Total |                      |
| <b>Carter County</b>  |          |         |                 |        |     |       |                      |
| I-64                  | 148.665  | 156.265 | 1               | 31     | 51  | 83    | 0.93                 |
| I-64                  | 156.265  | 161.452 | 1               | 23     | 38  | 62    | 0.95                 |
| KY 1                  | 11.385   | 11.539  | 0               | 6      | 15  | 21    | 1.52                 |
| KY 7                  | 9.526    | 9.598   | 0               | 3      | 7   | 10    | 1.74                 |
| KY 174                | 0.000    | 1.091   | 1               | 7      | 4   | 12    | 1.10                 |
| <b>Elliott County</b> |          |         |                 |        |     |       |                      |
| KY 7                  | 6.822    | 6.955   | 0               | 4      | 4   | 8     | 1.36                 |
| KY 7                  | 6.955    | 7.043   | 0               | 4      | 9   | 13    | 2.34                 |
| KY 7                  | 7.043    | 7.173   | 0               | 7      | 11  | 18    | 2.40                 |
| KY 7                  | 7.448    | 7.535   | 0               | 2      | 4   | 6     | 0.98                 |
| KY 7                  | 8.101    | 8.762   | 0               | 4      | 11  | 15    | 0.93                 |
| KY 32                 | 7.633    | 8.586   | 1               | 6      | 4   | 11    | 1.18                 |
| KY 1620               | 0.000    | 2.222   | 0               | 4      | 3   | 7     | 1.00                 |
| <b>Rowan County</b>   |          |         |                 |        |     |       |                      |
| I-64                  | 132.918  | 136.301 | 2               | 18     | 56  | 76    | 1.10                 |
| I-64                  | 136.301  | 137.285 | 2               | 12     | 54  | 68    | 1.62                 |
| I-64                  | 137.285  | 148.665 | 0               | 22     | 94  | 116   | 0.91                 |
| US 60                 | 0.240    | 0.624   | 0               | 4      | 12  | 16    | 1.16                 |
| US 60                 | 7.614    | 7.950   | 0               | 8      | 50  | 58    | 1.53                 |
| US 60                 | 7.950    | 8.100   | 0               | 7      | 17  | 24    | 1.09                 |
| US 60                 | 9.645    | 10.483  | 0               | 24     | 57  | 81    | 1.89                 |
| US 60                 | 14.451   | 17.197  | 0               | 25     | 25  | 50    | 0.96                 |
| KY 32                 | 4.750    | 5.100   | 0               | 16     | 25  | 41    | 1.37                 |
| KY 32                 | 5.201    | 5.718   | 0               | 30     | 67  | 97    | 1.68                 |
| KY 32                 | 5.718    | 5.890   | 0               | 17     | 26  | 43    | 1.38                 |
| KY 32                 | 8.190    | 8.429   | 0               | 11     | 52  | 63    | 1.53                 |
| KY 32                 | 8.429    | 8.564   | 0               | 14     | 37  | 51    | 1.77                 |
| KY 32                 | 8.564    | 8.825   | 0               | 7      | 18  | 25    | 1.65                 |
| KY 799                | 5.735    | 8.680   | 0               | 7      | 14  | 21    | 1.21                 |
| KY 1167               | 2.338    | 5.586   | 0               | 5      | 14  | 19    | 1.05                 |

Note: A Critical Rate Factor greater than 1.0 indicates a high crash location, and a Critical Rate Factor greater than 0.9 indicates a potential high crash location.

**Table 12. KY 645 Vehicle Crash Spot Analysis**

| Route                  | Begin MP | End MP  | Vehicle Crashes |        |     |       | Critical Rate Factor |
|------------------------|----------|---------|-----------------|--------|-----|-------|----------------------|
|                        |          |         | Fatal           | Injury | PDO | Total |                      |
| <b>Carter County</b>   |          |         |                 |        |     |       |                      |
| <b>KY 7</b>            | 9.500    | 9.600   | 0               | 6      | 11  | 17    | 1.13                 |
| <b>KY 174</b>          | 0.846    | 0.946   | 0               | 4      | 6   | 10    | 2.09                 |
|                        | 1.072    | 1.172   | 0               | 2      | 4   | 6     | 1.25                 |
|                        | 1.682    | 1.782   | 0               | 2      | 6   | 8     | 1.65                 |
|                        | 2.604    | 2.704   | 0               | 4      | 2   | 6     | 1.24                 |
|                        | 3.504    | 3.604   | 0               | 4      | 2   | 6     | 1.24                 |
|                        | 3.900    | 4.000   | 0               | 4      | 4   | 8     | 1.65                 |
|                        | 5.412    | 5.512   | 0               | 6      | 0   | 6     | 1.09                 |
| 6.998                  | 7.098    | 0       | 4               | 4      | 8   | 1.22  |                      |
| <b>KY 486</b>          | 1.916    | 2.016   | 0               | 6      | 0   | 6     | 1.74                 |
| <b>KY 1662</b>         | 0.600    | 0.700   | 0               | 6      | 0   | 6     | 1.93                 |
| <b>Elliott County</b>  |          |         |                 |        |     |       |                      |
| <b>KY 7</b>            | 6.951    | 7.051   | 0               | 6      | 12  | 18    | 1.48                 |
|                        | 7.073    | 7.173   | 0               | 6      | 10  | 16    | 1.20                 |
| <b>KY 173</b>          | 4.672    | 4.772   | 0               | 2      | 4   | 6     | 1.33                 |
| <b>KY 504</b>          | 4.100    | 4.200   | 0               | 2      | 6   | 8     | 3.10                 |
| <b>KY 1620</b>         | 2.184    | 2.284   | 0               | 4      | 2   | 6     | 2.33                 |
| <b>Lawrence County</b> |          |         |                 |        |     |       |                      |
| <b>US 23</b>           | 14.513   | 14.613  | 1               | 8      | 5   | 14    | 1.37                 |
| <b>KY 3</b>            | 23.908   | 24.008  | 0               | 9      | 0   | 9     | 1.56                 |
| <b>Rowan County</b>    |          |         |                 |        |     |       |                      |
| <b>I-64</b>            | 137.200  | 137.300 | 1               | 5      | 26  | 32    | 1.86                 |
| <b>US 60</b>           | 9.840    | 9.940   | 0               | 10     | 12  | 22    | 1.16                 |
| <b>KY 799</b>          | 3.500    | 3.600   | 0               | 0      | 8   | 8     | 2.26                 |
| <b>KY 1167</b>         | 0.000    | 0.100   | 0               | 2      | 10  | 12    | 1.09                 |
| <b>Ky 1167</b>         | 5.005    | 5.105   | 0               | 0      | 6   | 6     | 1.57                 |

Note: A Critical Rate Factor greater than 1.0 indicates a high crash location, and a Critical Rate Factor greater than 0.9 indicates a potential high crash location.

## F. Adequacy Ratings

The KYTC HIS database provides an adequacy rating percentile for state-maintained arterials and most major collectors. The composite rating is based on condition, safety, and service of the route. The Condition Index considers only the condition of the road's pavement. The Safety Index is evaluated based on lane width, shoulder width, median widths, alignment, and critical crash rate factors. Service considers the route's volume-to-capacity ratio and access control. **Figure 5-A, Appendix A** depicts the adequacy ratings assigned to various study area routes and the percentile group, divided into fourths, in which each route is included.

If a road or road segment falls into the lowest percentile groups, this indicates that a problem may exist that merits further investigation. As shown in **Figure 5-A**, portions of the following routes have poor adequacy ratings, or fall into the lowest percentile group: US 60, KY 377, and KY 519 in Rowan County; KY 9, and KY 486 in Carter County; KY 7, KY 201, and KY 504 in Elliott County; and KY 201 in Lawrence County.

## G. Environmental Footprint

An environmental footprint was developed for the KY 645 project area. This preliminary environmental analysis identified potential issues and concerns within and surrounding the defined project area.

A local area Geographic Information System (GIS) was assembled for this project using environmental resource information data collected from numerous sources that include: federal, state, and local databases; agency contacts; field investigations; and existing in-house data. The compiled data was geo-referenced as needed using the GIS developed for the project. Windshield surveys of the project area included consideration of known and unknown environmental issues within the project area.

The environmental footprint, shown in **Appendix A, Figure 6-A**, includes a variety of features including utilities, streams, EPA sites, cemeteries, and churches. The aerial photograph highlights structures, terrain and potential prime farmland. Special features important to this project and highlighted on the environmental footprint are the Daniel Boone National Forest, Sheltowee Trace Trail, Grayson Lake State Park, Grayson Lake Wildlife Management Area, Yatesville Lake State Park, Yatesville Lake Wildlife Management Area, Laurel Creek, Caney Creek, Big Sinking Creek, abandoned mines, dry and abandoned wells, and numerous oil wells, gas wells, injection wells, water wells, and quarries. Geotechnical data was provided by the KYTC Division of Materials and the Kentucky Geological Survey as part of the resource agency coordination. The information received from all resource agencies and other interested parties is summarized in **Chapter III**.

In addition to the environmental footprint, Environmental and Geotechnical Overviews were conducted on four (4) alternatives. The overviews provided additional detail within a more defined area. The Environmental and Geotechnical Overviews are discussed in **Chapter VI** and included in **Appendices G and H**.

## H. Programmed Highway Improvements

In addition to the KY 645 Regional Corridor Study, several other projects are planned and programmed for project area routes in the KYTC's FY 2005-FY 2010 Recommended Six Year Highway Plan. A summary of these projects is provided below by county.

### 1. Lawrence County

- Right-of-way, utility, and construction activities for a new interchange at the US 23 and KY 3 intersection in Louisa (Item No. 12-3.00);
- Right-of-way, utility, and construction activities for the reconstruction of KY 32 between the end of the Corps of Engineers' reconstruction at Yatesville Lake and US 23 (Items No. 12-284.00 and 284.01);
- Construction activities for a new bridge over Blaine Creek near Hargis Branch (Item No. 12-112.00); and

- Right-of-way, utility, and construction activities for sight distance improvements on KY 581 (Item No. 12-8117.00).

## **2. Elliott County**

- Right-of-way, utility, and construction activities for the reconstruction of KY 7 from 0.4 miles north of KY 706 to the Carter County line (Item No. 9-126.50);
- Design, right-of-way, utility, and construction activities for the replacement of the bridge and approaches on KY 32 over Middle Fork, 0.05 miles west of the junction with KY 719 (Item No. 9-1058.00); and
- Right-of-way, utility, and construction activities for the reconstruction of KY 7 from 0.4 miles north of KY 706 to the Carter County line (Item No. 9-126.50).
- Utility and construction from 0.8 miles south of KY 557 to Sandy Hook (Item No. 9-293.01).

## **3. Rowan County**

- Construction activities for the reconstruction of KY 519 from 0.5 miles south of Warren Branch to the US 60 Bypass at Morehead (Item No. 9-156.01);
- Right-of-way, utility, and construction activities for the replacement of the bridge and approaches at Open Fork Creek (Item No. 9-1048.00);
- Design, right-of-way, utility, and construction activities for the replacement of the bridge and approaches on US 60 over Hays Branch (Item No. 9-1061.00);
- Design and construction activities for the pavement rehabilitation on I-64 from the Bath County line to Bullfork Road Bridge (Item No. 9-2011.00);
- Construction activities for the pavement rehabilitation on I-64 from MP 141.5 to MP 148.7 (Item No. 9-2016.00);
- Construction activities for the widening of KY 32 from I-64 north to approximately 0.3 miles north of KY 377 (Item No. 9-142.00);
- Right-of-way, utility, and construction activities for a new route from US 60/KY 32 east of Morehead to I-64, including a new interchange (Item No. 9-301.00);
- Design, right-of-way, utility, and construction activities for the landslide repair on KY 211 from the north bank of the Licking River, northwest to the Fleming County line (Item No. 9-5012.00); and
- Right-of-way, utility, and construction activities for the widening of KY 519 from the intersection of KY 801, extending 2.0 miles north (Item No. 9-7030.00).

**4. Carter County**

- Construction activities for the reconstruction of US 60 at Rock Crusher Curve, 0.1 miles east of KY 1025 (Item No. 9-159.00);
- Right-of-way, utility, and construction activities for a commercial vehicle monitoring station rehabilitation on I-64 at the westbound port of entry (Item No. 9-300.10);
- Design, right-of-way, utility, and construction activities for the replacement of the bridge and approaches on KY 1959 over Everman Creek, 0.1 miles south of the junction with KY 7 (Item No. 9-1065.00);
- Construction activities for the pavement rehabilitation on I-64 from KY 1 MP 171.61 to MP 180.81 at the Boyd County line (Item No. 9-2010.00);
- Right-of-way and utility activities for the widening of KY 7 (Carol Malone Boulevard) from Little Sandy River Bridge to Academic Drive (Item No. 9-144.00); and
- Design, right-of-way, utility, and construction activities for the landslide repair on KY 2 from 2.0 miles northwest of US 60 in Olive Hill to KY 59 (Item No. 9-5010.00).

### III. INITIAL CABINET, PUBLIC, AND AGENCY INPUT

Through the course of this Regional Corridor Study of KY 645, the local citizens, public officials and representatives of government resource agencies were given the opportunity to provide input for the study. This chapter describes the first round of public and agency involvement that occurred through the study process and describes the comments and input received as a result of these efforts. Activities undertaken as part of the second round of cabinet, public, and agency involvement are summarized in **Chapters V** and **VI**, as they relate to the development and evaluation of the improvement alternatives. In addition to the information presented in this chapter, **Chapter V** and **Chapter VI**, material related to the public involvement process is included in the public meeting notebooks.

**Public and Agency Involvement**

- Project Team Meetings
- Local Elected Officials Meetings
- Local Agencies Meetings
- Citizens Advisory Team (CAT) Meetings
- Public Involvement Meetings
- Public Comment Surveys
- Resource Agency Coordination

#### A. Project Team Meeting (September 6, 2002)

The first Project Team Meeting was held on September 6, 2002, at the FIVCO Area Development District office building in Catlettsburg, Kentucky. The project team convened to discuss: the purpose, goals and objectives of the proposed project; review preliminary existing conditions data for the study corridor; and identify future study needs. A copy of the meeting minutes is included in **Appendix D**.

Team members noted that this project began as a legislative addition by the local State Representative and the original study concept consisted of considering a new route between the KY 645/US 23 intersection and the Industrial Parkway. Members believed such a route would primarily serve truck traffic and industrial developments in the area, as well as local traffic. While team members agreed this route would most likely benefit the region, they discussed another option to consider the project a regional corridor study from KY 645 at US 23 to some point along I-64 between Morehead and the Industrial Parkway (Exit 179) in Carter County. Three main corridors could be considered for detailed analysis, including connections between KY 645 at US 23 and I-64 near 1) the Industrial Parkway, 2) Morehead, and 3) west of Grayson. It was also noted during this meeting that consideration should be given to providing a route from KY 645 at US 23 to Blaine, then along KY 32 from Blaine to the proposed Morehead Connector project.

#### B. Local Officials and Agencies Meetings

As part of the initial public involvement, one meeting was held with local officials, four meetings were held with local agencies, and one meeting was held with combined local officials/agencies, from October, 2002, through June, 2003. The purposes of these meetings were to inform these groups about the project, discuss potential project issues and concerns, and solicit input. Copies of the meeting minutes are included in **Appendix D**.

**1. Local Officials Meeting – FIVCO (October 15, 2002)**

On October 15, 2002, in Catlettsburg, Kentucky local elected officials and project team members gathered to discuss issues and concerns relating to the KY 645 project. All attendees agreed that improvements to the transportation system within the project area were warranted. Providing improved connectivity within the region; providing access to I-64 and other key routes; maximizing traffic flow; and considering items such as industry, employment, services, education, and tourism were important to local communities and should receive careful consideration by the project team.

During this meeting, local elected officials indicated that the original scope of the project should be expanded to include Elliott and Rowan Counties so that the project could have a greater impact on the entire region. The meeting attendees agreed that eastern Rowan County should be the western limit of the study area and the Industrial Parkway in Carter County should be considered the eastern limit of the study area.

During subsequent discussions, the officials noted the benefits and disbenefits of placing a corridor in the eastern, western, and central portion of the project area and noted that those items previously deemed important to the community should be considered when evaluating where any corridor should go.

**2. Local Agencies Meeting – Lawrence County (November 20, 2002)**

The first meeting with local agencies was held in the Lawrence County Courthouse on November 20, 2002. It was noted that connectivity with the Industrial Parkway may encourage more businesses to locate facilities in the area. In addition, agency representatives indicated a route between KY 645 and the Industrial Parkway could be situated between Grayson Lake and Yatesville Lake, potentially minimizing impacts to each. It was also pointed out that there is no National Forest land in this area.

**3. Local Agencies Meeting – Elliott County (November 20, 2002)**

A second local agencies meeting was held on November 20, 2002 at the Elliott County Courthouse and agency representatives identified the primary needs for this project as serving the greatest amount of traffic, educational trips and industrial park traffic. Attendees noted that this project should be coordinated with other transportation projects in the region.

**4. Local Agencies Meeting – Carter County (November 22, 2002)**

The Carter County local agencies meeting was held in Grayson, Kentucky on November 22, 2002 at the Grayson City Hall Building. Attendees at this meeting indicated the project team should focus primarily on opening the area to more development as well as encouraging existing industry to expand. Opinions differed on whether a connection between KY 645 and the Industrial Parkway would open up the region for development.

**5. Local Agencies Meeting – Rowan County (November 22, 2002)**

A meeting with agency representatives was held at the Rowan County Public Library on November 22, 2002. During this meeting, local agency representatives indicated that connectivity with educational facilities, industrial sites and tourism sites should be considered when choosing potential corridors. While many representatives agreed improvements within the regional transportation system were needed, some argued existing routes should be upgraded as opposed to constructing new routes. The project team responded by noting that all options would be considered and while the geometry of many routes within the project area impairs improving such routes, all reasonable efforts would be afforded to exploring this option.

**6. Local Officials/Agencies Meeting – Martin County (June 25, 2003)**

As mentioned in **Chapter I**, Martin County residents requested the opportunity to be involved with this planning study process. It was decided by the project team that Martin County would be included in all public involvement efforts to the same degree as Lawrence, Elliott, Rowan, and Carter counties. As a result, the first meeting with local officials and agencies was held at the Roy F. Collier Community Center in Inez on June 25, 2003. Meeting attendees suggested that the KY 645 extension could serve as an alternative route between the I-73/74 Priority Corridor in West Virginia and I-64. They also noted the project would provide better connectivity to educational and recreational facilities and promote economic development opportunities in economically distressed areas.

**C. Citizens Advisory Team Meetings**

A Citizens’ Advisory Team (CAT) was formed for this project with the purpose of public involvement and providing community insight in the project development process. The CAT was able to take project information to the community and bring thoughts and concerns about the project back to the project team. Two CAT meetings were held during the first round of the public involvement process and a brief summary is provided below. Copies of the meeting minutes can be found in **Appendix D**.

**1. CAT Meeting #1 – Carter County (April 15, 2003)**

The first CAT meeting was held in Grayson, Kentucky on Tuesday, April 15, 2003 at The Commercial Bank of Grayson. The purpose of the meeting was to introduce the project; discuss the purpose of the project; discuss potential project issues; and solicit input from the community via the CAT. In addition, future public involvement activities including meeting locations, dates and times were discussed.



*A Citizens’ Advisory Team was formed as part of the public involvement stage for this project.*

Project team members indicated that the project began as a study for extending KY 645 through Lawrence and Carter Counties and evolved into a regional corridor study that also included Elliott and Rowan Counties. It was noted through meetings with local representatives that expanding the original scope of the project could be more advantageous for the region. Specifically, project team members indicated that the primary focus of this project is to provide better access to the region, since the majority of existing roadways are narrow, curvy, and difficult to travel. Moreover, it was noted that the regional corridor study will provide recommendations for improvements in a prioritized manner and all options were still possible for evaluation at this stage of the project; including the no-build alternative.

As part of a group exercise, CAT members were asked the question, "What issues or concerns about a new connector route need to be considered?" Comments received from this exercise can be summarized into the following categories and are further described in the meeting minutes in **Appendix D**: emergency services; long range transportation development; and economic, employment, industrial park, educational, congestion, safety, access, cost, environmental, tourism, and geotechnical issues.

## **2. CAT Meeting #2 – Elliott County (May 15, 2003)**

The second CAT Meeting was held May 15, 2003 at the Elliott County Public Library. The purpose of this meeting was to review the previous meeting; review, discuss, and summarize the questionnaires returned to the CAT members; solicit input from the members as to potential constraints and opportunities throughout the study area; and discuss and draw potential locations for corridors on project area maps. Participants drew on maps areas to avoid, destinations, and potential corridors.

## **D. Public Information Meetings - Round I**

Five (5) public meetings were held during the first round of public involvement for this project. The meetings were held in Carter, Elliott, Lawrence, Martin, and Rowan Counties in June and July, 2003. The meetings were designed to inform the public and solicit questions and comments regarding local issues and potential locations for the extension of KY 645. In addition to the information presented in this chapter, material related to the first round of public involvement meetings is included in two (2) separate notebooks on file with the KYTC Division of Highway Design and Division of Planning:

- *June 2003 Public Meeting Notebook (Lawrence, Elliott, Rowan, and Carter Counties); and*
- *July 10, 2003 Public Meeting Notebook (Martin County).*

Minutes of these public meetings may be found in **Appendix D**.

General project information, such as project location, traffic volumes, crash information and preliminary environmental maps, was presented in these meetings for review and comment. Potential corridors for KY 645 had not been identified, and therefore were not included in the meeting materials.

A short PowerPoint presentation explaining the overall project development process, a proposed typical timeline, the current status of the project, next steps, and the preliminary project goals and issues ran on a loop at each of the meetings. Attendees were given the opportunity to identify areas to avoid, areas to which access should be provided, and potential corridors for the extension of KY 645. In this forum, attendees were also able to address questions and comments with KYTC and consultant staff.

### **1. General Comments**

Attendees were invited to discuss any questions or concerns with KYTC and consultant staff. General comments included the following:

- Several attendees proposed potential northern termini along I-64 including: between Morehead (Exit 137) and Olive Hill (Exit 156), at Exit 156 in west Carter County, approximately 2 miles west of Grayson (Exit 172), and Exit 179 in east Carter County.
- Attendees noted additional access should be provided to the following: area lakes (i.e. Yatesville Lake and Grayson Lake), state parks, Blaine, Sandy Hook, and much of Elliott County.
- Others identified several reasons to develop the KY 645 extension including: increased tourism, providing access for low income populations, promotion of economic growth, increased employment opportunities, improved access for emergency service, and enhanced connection to retail services.
- Several in attendance identified areas to avoid including: homes previously relocated due to the creation of Yatesville Lake, Caney and Laurel Gorges, Daniel Boone National Forest, the existing KY 32 corridor, and the Cherokee area.
- A couple of attendees noted the importance of extending the corridor north of I-64 and connecting to KY 9 (AA Highway).

### **2. Mapping Exercise**

At each public meeting, three tables were set up with environmental footprint maps of the entire study area for attendees to draw on. At one table, participants were asked to circle areas that should have access to the new route. The areas identified included the following:

- Adams
- Big Sinking Creek
- Blaine
- Culver
- Elliotville
- Exit 156 along I-64 in Olive Hill
- Exit 161 along I-64 in Carter County
- Gimlet
- Grayson
- Grayson Lake
- I-64 west of Olive Hill
- Ibex
- Minor

- Morehead
- Morehead State University
- New Factory in Olive Hill
- Olive Hill
- Sandy Hook
- St. Claire Regional Medical Center, Morehead
- The State Reformatory, Sandy Hook
- Webbsville
- Willard
- Yatesville Lake

At another table, attendees were asked to circle areas that should be avoided or preserved by any new highway. The following areas were identified:

- Big Sinking Creek
- Caney Creek
- Caney Gorge
- Caves just north of Gimlet in Elliot County
- Daniel Boone National Forest
- Grayson Lake
- Isonville
- Laurel Creek
- Laurel Gorge
- Mines in Carter and Rowan County
- Rodburn Elementary School
- Sandy Hook
- Yatesville Lake
- Yatesville Lake Wildlife Management Area

At the third table, markers were provided for attendees to draw potential corridors for the extension of KY 645 on the project study area map. General corridors starting at the southern terminus of existing KY 645 included:

- From KY 645 to the Industrial Parkway (Exit 179 on I-64)
- From KY 645, west of Yatesville Lake and Wildlife Management Area, to the Industrial Parkway
- From KY 645 to Grayson, east of Exit 172 along I-64
- From KY 645 to Grayson, west of Exit 172 along I-64
- From KY 645, through Elliot County, to I-64 between Olive Hill and Grayson
- From KY 645, through Elliot County, to I-64 in Olive Hill
- From KY 645, through Elliot County, to I-64 near the Rowan-Carter County Line
- From KY 645, through Elliot County, to I-64 between Morehead and Olive Hill

- From KY 645, through Elliot County, to Morehead

### 3. **Public Comment Survey Responses**

As part of the public meeting handout, the KYTC supplied a survey form so that citizens of the area could provide input on the project. A similar survey was also provided at the Local Officials Meetings and CAT Meetings and the results of all surveys received as part of the initial public involvement process are included in the following results.

Responses to the six questions on the public comment survey are tabulated in **Table 13** and summarized below:

- The majority (77 of 95) of the survey respondents felt that a new connector from KY 645 to I-64 is needed.
- Ninety-three percent of the survey respondents (619 of 663) felt if a new roadway was built it would be helpful to the region. Thirty-three (33) respondents felt it would not be helpful to the region and another 11 respondents thought it would have little or no impact on the region.
- Forty percent of the respondents (229 of 568) felt the roadway should connect to I-64 at Morehead. Another 170 respondents preferred a northern terminus at Olive Hill. The next highest response rate (59) was for a location between Olive Hill and Grayson.
- The majority (347 of 647) stated they would use the new facility at least once per week. More specifically, 106 respondents felt they would use the roadway on a daily basis. Twenty-two percent of the respondents said they would use KY 645 three (3) to four (4) times per month.
- The majority (363 of 624) of the respondents felt their primary purpose for using the new route would be for personal business. Another 336 respondents would visit friends or family. It should be noted that multiple responses were recorded by several respondents.
- Over half (236 of 409) of the respondents noted that natural areas or habitats should be avoided if this new route is constructed. Nearly as many (225) respondents stated historic or cultural sites should be avoided. It should be noted that multiple responses were recorded by several respondents.

**Table 13. Public Survey Response Summary – Round I**

**Do you think a new connector from KY 645 to I-64 is needed? (95 Respondents)<sup>1</sup>**

| Yes | No  |
|-----|-----|
| 77  | 18  |
| 81% | 19% |

**If a new roadway were built, do you think it would: (663 Respondents)**

| <i>Be helpful to the region</i> | <i>Not be helpful to the region</i> | <i>Have little or no impact on the region</i> |
|---------------------------------|-------------------------------------|---|
| 619                             | 33                                  | 11  |
| 93%                             | 5%                                  | 2%  |

**If a new roadway were built, where do you think it should connect to I-64? (568 Respondents)**

| Morehead | <i>Between Morehead and Olive Hill</i> | <i>Olive Hill</i> | <i>Between Olive Hill and Grayson</i> | Grayson | <i>Between Grayson and the Industrial Parkway</i> | <i>Industrial Parkway</i> |
|----------|--|-------------------|---------------------------------------|---------|---|---------------------------|
| 229      | 49                                     | 170               | 59                                    | 26      | 10  | 25                        |
| 40%      | 9%                                     | 30%               | 10%                                   | 5%      | 2%  | 4%                        |

Note: 25 responses were too general to locate, and 6 indicated that there should be no new roadway.

**If KY 645 is extended to I-64, would you use it: (647 Respondents)**

| <i>Daily</i> | <i>3-4 times per week</i> | <i>1-2 times per week</i> | <i>3-4 times per month</i> | <i>1 time per month</i> | <i>Never</i> | <i>Other</i> |
|--------------|---------------------------|---------------------------|----------------------------|-------------------------|--------------|--------------|
| 106          | 137                       | 104                       | 142                        | 70                      | 25           | 63           |
| 16%          | 21%                       | 16%                       | 22%                        | 11%                     | 4%           | 10%          |

**If you traveled this new route, what would the primary purpose of your trips be: (624 Respondents)<sup>2</sup>**

| <i>Work or Business</i> | <i>Personal Business</i> | <i>Visit Friends or Family</i> | <i>School</i> | <i>Doctor</i> | <i>Shopping</i> | <i>Trips or Vacations</i> | <i>Other</i> |
|-------------------------|--------------------------|--------------------------------|---------------|---------------|-----------------|---------------------------|--------------|
| 300                     | 363                      | 336                            | 65            | 229           | 278             | 299                       | 31           |
| 48%                     | 58%                      | 54%                            | 10%           | 37%           | 45%             | 48%                       | 5%           |

**Are there areas that should be avoided if this new route is constructed? (409 Respondents)<sup>2</sup>**

| <i>Personal Properties or Homes</i> | <i>Businesses/ Commercial Property</i> | <i>Natural Areas or Habitats</i> | <i>Recreational Areas</i> | <i>Historic or Cultural Sites</i> | <i>Hazardous or Monitored Sites</i> | <i>Scenic Areas or Viewsheds</i> | <i>Other</i> |
|-------------------------------------|--|----------------------------------|---------------------------|-----------------------------------|-------------------------------------|----------------------------------|--------------|
| 147                                 | 95                                     | 236                              | 171                       | 225                               | 108                                 | 150                              | 31           |
| 13%                                 | 8%                                     | 20%                              | 15%                       | 19%                               | 9%                                  | 13%                              | 3%           |

<sup>1</sup>. This question was only asked at the public meetings.

<sup>2</sup>. Multiple purposes or areas were selected by several respondents.

## E. Resource Agency Coordination - Round I (July 8, 2003)

Many local, state and federal resource agencies, with diverse areas of public responsibility, were included in this planning process. Input was solicited through written requests on two occasions. For the first round of resource agency coordination, each agency was sent a copy of the project brochure, existing traffic in the study area, a vehicle crash map, and environmental footprint maps.

### Resource Agencies

- Local Agencies
- Local Interest Groups
- KYTC Division Offices
- Other State Agencies
- Federal Agencies

This section describes the input received from these organizations during the first round. The remainder of recipients did not provide a response. Response letters from the various resource agencies are located in **Appendix E** and are summarized below.

References to Corridors in the following sections are based on the alternatives identified for this project. Please see **Chapter V** for more information on the corridors. The following 23 agencies responded by offering comments or concerns regarding the project:

- American Electric Power (AEP): The proposed project will potentially cross several critical transmission and distribution lines in the project area. It will be very important to monitor and coordinate the development of this project to avoid and minimize any negative impacts. AEP would like to be informed as the project proceeds.
- Appalachian Regional Commission (ARC): US 23 is part of the Appalachian Development Highway System (ADHS) that was funded to promote economic and social development in the region. The location and design of the KY 645 project should further enhance economic and social development in the region. The ARC would like to be involved throughout the project development process.
- Carter County Board of Education: By unanimous vote, the Carter County Board of Education recommends an extension of KY 645 to Exit 156 at Smoky Valley, and secondly to Exit 161 at Pleasant Valley. The Board considers traffic flow for buses, traffic patterns, and development needs as support for these recommendations. (Note: Corridor 5 would serve Exit 156).
- Kentucky Cabinet for Workforce Development: Any action is supported that provides a better transportation system in the Carter, Elliott, Lawrence, and Rowan County area. An expanded highway system may stimulate the housing market in the region, thereby producing growth in residential home construction and sales. Such action is directly related to more and better schools in the system. The Cabinet has three major Technical School facilities in the region that would benefit from an improved roadway in this area. Improved highways could induce the construction of additional technical and/or vocational schools in the region, encourage tourism, and stimulate economic growth in the area.

- Kentucky Department of Agriculture, Office of Environmental Services: In an agricultural resource-limited area, it is important to small farms that agricultural land is protected. The Department would like to see additional project information as the corridor is more clearly defined.
- Kentucky Department of Fish and Wildlife Resources (KDFWR): There are several federally threatened and endangered species known to occur in Carter, Elliott, Lawrence, and Rowan Counties. In areas where gray bats are known to occur, any cave entrances (i.e. the right-of-way and regeneration sites) should be surveyed for potential use by gray bats. The federally endangered Indiana Bat (*Myotis sodalis*) also inhabits the project area. The Department also offers recommendations to minimize potential impacts to aquatic resources.
- Kentucky Department of Military Affairs, Office of the Adjutant General: The Department of Military Affairs existing Morehead Armory is the only facility in the study area. Any proposed route through this area would not likely impact this facility or one that is proposed.
- Kentucky Department of Parks: A new route would be beneficial to the region by improving population and business flow, and promoting tourism. Since the Division's interests lie in preserving the state's natural resources and recreational facilities, it is suggested that the new route not infringe upon the Daniel Boone National Forest. (Note: Corridor 2 falls within the forest lands).
- Kentucky Natural Resources and Environmental Protection Cabinet, Department for Surface Mining Reclamation and Enforcement: The Department has not identified any specific issues or concerns with the proposed project at this time. Due to the dynamic nature of the coal industry, the Department would like to comment on the project in future phases.
- Kentucky Environmental and Public Protection Cabinet, Division of Air Quality: The following Kentucky Administrative Regulations apply to the proposed project: 1) 401 KAR 63:010 Fugitive Emissions; 2) 401 KAR 63:005 Open Burning; 3) the Clean Air Act; and 4) Title 23 and Title 49 of the United States Code. Applicable regulations in the local governments should also be considered.
- Kentucky Division of Multimodal Programs: None of the study area counties currently have air quality restrictions. Carter County, located in the Metropolitan Statistical Area (MSA) of the Ashland Metropolitan Planning Organization (MPO), could be designated as non-attainment of the new 8-hour ozone standard by the Environmental Protection Agency (EPA), even though monitor readings are not indicating a violation, if the EPA chooses to designate all counties in a MSA as non-attainment. Implementation of the guidelines in the KYTC's 2002 Pedestrian and Bicycle Travel Policy will ensure that bicycle and pedestrian issues are considered and accommodated throughout this

project. Evaluation of the proposed KY 645 extension should consider accommodations for bicycle connectivity through use of a shoulder bikeway, which requires five feet of pavement outside the rumble strips.

- Kentucky Division of Traffic, Permits Branch: This project should provide for a partially controlled access facility, with access control fencing and all possible access points set on the plans in accordance with 603 KAR 5:120. The design speed should be the same as anticipated posted speed when the project is completed. The Permits Branch should be notified if the proposed route is to be placed on the National Highway System.
- Kentucky Division of Waste Management: It is requested that Pulverized Glass Aggregate (PGA) be used in roadbed construction for this project. Rowan County already has a pulverizer and would be a reliable source for the PGA.
- Kentucky Geological Survey: This project could encounter the following: karst features; pre- or post-landslide hazards; underground mining areas that may be susceptible to subsidence; unconsolidated sediments at or near stream drainage; resource conflicts such as prior ownership of property for clay, coal, limestone and ironstone; oil and gas wells; materials suitable for construction or other economic value; faults; and earthquake ground motion of 0.09g to 0.19g.
- Kentucky State Nature Preserves Commission (KSNPC): There are a significant number of KSNPC-listed species and unique natural areas that occur within the project area, which could be potentially impacted by this project. Some preliminary issues of concern include: avoidance of current tracts of natural public land, including state Wildlife Management Areas and the Daniel Boone National Forest; presence of the Indiana bat in the project area; and forest fragmentation.
- Kentucky State Police (KSP), Ashland Post: The KSP does not have any suggestions at this time, but would like continued information on the progress of this project.
- Lewis County, Office of the Judge Executive: Lewis and Carter Counties would benefit from an extension of KY 645 to I-64 at Exit 156. The route could eventually be extended to the AA Highway. (Note: Corridor 5 would serve Exit 156).
- Martin County, Office of the Judge Executive: KY 645 serves as a “lifeline” for residents of Martin County and western West Virginia to shopping areas, colleges, schools, businesses, hospitals, farms, and intermodal coal distribution points in northeastern Kentucky. The extension of KY 645 should begin at the junction with US 23 in Ulysses and travel northwesterly to a junction with I-64 approximately three (3) miles east of the Carter County/Rowan County Line, connecting the following communities and recreational areas to I-64: Yatesville Lake, Blaine, Grayson Lake, Sandy Hook, Green,

Beartown, and Upper Tygart. (Note: A drawing of this suggested corridor is included with Item 19 in **Appendix E**).

- United States Army Corps of Engineers, Huntington District: The District requests involvement in the NEPA process throughout the development of this project to ensure requirements of the Corps of Engineers and Federal Highway Administration are met. Easements will be required from the Corps to authorize construction, operation, and maintenance of the road if located on Government property. Section 10 of the River and Harbors Act of 1899 and Section 404 of the Clean Water Act must also be considered.
- United States Department of Health and Human Services: It is recommended that the following be considered and addressed during the NEPA process: air quality, water quality/quantity, wetlands and floodplains, hazardous materials/wastes, non-hazardous solid waste/other materials, noise, occupational health and safety, land use and housing, and environmental justice. Any health related topic which may be associated with the proposed project should receive consideration when developing the Environmental Impact Statement (EIS).
- United States Fish and Wildlife Service: Excessive sedimentation during construction can be prevented through Best Management Practices (BMPs). Three federally listed species may occur within the proposed project area, including: the Indiana bat, the gray bat, and the Virginia big-eared bat. The project area should be surveyed for caves, rockshelters, and underground mines to identify and avoid impacts to potential habitats for the Indiana, gray, and Virginia big-eared bat. Tree removal should be completed in a time-wise manner to avoid impacts to summer roosting Indiana bats.
- United States Forest Service, Morehead Ranger District: The Forest Service does not have any comments at this time; however, should any final corridors involve National Forest lands, the Forest Service requests further opportunity to comment.
- United States Natural Resources Conservation Service (NRCS): The proposed highway project could have potential impacts on prime farmland soils and additional farmlands of statewide importance. If federal dollars are to be used to convert farmlands from agricultural to non-agricultural use, the appropriate form must be submitted to NRCS. The NRCS can provide assistance in identifying important farmlands in the proposed project area.

## **IV. PROJECT PURPOSE AND NEED**

Through the public involvement process and collection of study area data, the need for an improved highway network has been identified in each of the four study area counties, as summarized in the following paragraphs.

- Traffic counts in Lawrence County have recorded volumes of about 6,000 vpd along KY 645 east of US 23 and about 9,700 vpd on US 23 near the KY 645 intersection. It is anticipated that an extended KY 645 could ease north-south travel along US 23 in Kentucky and US 52 in West Virginia, potentially making it a safer and more direct connection for traffic that is destined through Lawrence County to the new industrial park in Carter County or westbound on I-64.
- Extension of KY 645 into western Carter County would provide additional access to Olive Hill, surrounding communities, and the Elliott County area. Elliott County has the lowest per capita income in the study area. There are currently no National Truck Network or National Highway System routes through Elliott County, potentially limiting truck access required to attract new industry. Special consideration should be given to providing connectivity within the area while avoiding issues of concern, such as natural areas like Laurel and Caney Creeks.
- With the project terminus in Rowan County, an extended route would serve to improve access for students and local residents, as well as to serve business and economic development needs. Opportunities for improvement of existing routes, such as KY 32, could be explored as part of this study. Coordination with planned improvements in the study area, including a potential connector route between US 60 and I-64, would be an important consideration if the proposed KY 645 route terminated in Rowan County.
- Termination of the proposed route in eastern Carter County would serve economic opportunities related to industrial sites as well as connectivity for local traffic. On the west side of Grayson, a new route would provide improved connections to the surrounding lakes, recreational areas and local residents. Traffic counts in the area have recorded volumes of about 19,000 vpd along I-64 near the KY 67/Industrial Parkway interchange.

Considering the needs outlined above and results of the planning process and public involvement efforts, project goals were identified for the potential extension of KY 645. The goals listed below are based on a compilation of input from highway officials, local government agencies, interest groups, members of the general public, and the project team. These goals address accessibility, economic benefit, connectivity, and operational conditions.

- Develop a new or improved highway that provides an improved connection to I-64, while also addressing the following transportation service objectives:
  - Enhances regional accessibility and mobility
  - Improves access to isolated communities and populations

- Serves as an interstate connector from the I-73/74 corridor near Kermit, West Virginia to I-64
- Develop a highway corridor that will serve the most traffic, while also meeting the following traffic-related objectives:
  - Diverts traffic from US 23 to reduce congestion on that route
  - Optimizes and/or addresses future traffic flow on regional highways
  - Provides travel time savings in the region, including the improvement of emergency response times
- Develop a corridor that considers all study area interests, including socioeconomics, education, tourism, and the environment, while giving consideration to the following objectives:
  - Assists in promoting economic growth and development in areas that have low-income populations
  - Increases employment opportunities and gives special consideration to areas with high unemployment
  - Provides access to existing employment centers, including area industrial parks
  - Expands access to social services such as education and health care
  - Provides improved access to key tourist destinations (examples include Grayson Lake, Yatesville Lake and the new golf course in Carter County)
  - Avoids or minimizes impacts to environmentally sensitive areas (examples include the Daniel Boone National Forest, Laurel Creek, and Caney Creek)
  - Fits the natural surroundings and considers context-sensitive design

These project goals serve to define the concept for the proposed KY 645 extension. Future phases of this project, if deemed necessary, should consider these goals in the further development of corridors and alternative alignments.

## V. ALTERNATIVES DEVELOPMENT PROCESS

Following the existing conditions review and first round of public involvement, preliminary improvement alternatives were developed for the possible extension of KY 645. This chapter presents the development and refinement of the preliminary improvement alternatives, based on CAT input, a detailed Level 1 Screening, and input from the project team. **Appendix F**, which is referenced in this and the following chapters, illustrates the development of improvement alternatives for the extension of KY 645.

### A. Third Citizens' Advisory Team Meeting (August 28, 2003)

As a result of the existing conditions review and first round of public, local official, and agency input, seven (7) potential corridors for KY 645 were initially developed by the project team. These initial corridors, titled "Corridors August 2003" in **Appendix F**, were presented to the CAT on August 28, 2003 at the Lawrence County Agricultural Extension Office in Louisa, along with the no-build option, as preliminary alternatives for the potential extension of KY 645. The purpose of this third meeting of the CAT was to review activities to-date including the public meetings and provide input on the seven (7) preliminary corridors developed for KY 645. Minutes for this meeting can be found in **Appendix D** of this report.

The only change to the preliminary corridors resulting from this CAT meeting was to add an option south of Sandy Hook. This addition made a total of nine (9) preliminary alternatives, as shown in **Appendix F**, titled "Corridors September 2003".

The committee then voted on the corridors and the results were as follows:

- Fourteen (14) for the corridor terminating in Morehead;
- Nine (9) for the corridor terminating at Exit 156 in Olive Hill;
- Eight (8) for a new corridor south of Sandy Hook;
- Seven (7) for the corridor terminus at the Rowan-Carter County Line;
- Five (5) for the corridor ending on the west side of Grayson via KY 1; and
- Four (4) for the corridor terminating at Exit 161 in Olive Hill.

### B. Level 1 Screening

The first step following the CAT's consideration of the proposed alternatives, including the no build alternative, was to conduct a Level 1 Screening. The nine (9) build alternatives and the no-build option were evaluated as part of the Level 1 Screening:

- Corridor 1 begins at the terminus of the existing KY 645 route just north of Ulysses in Lawrence County. The corridor then heads west, passing north of Davisville and following the general KY 32 corridor to Isonville in Elliott County. The corridor then turns northwest and crosses the KY 32 and KY 7 intersection, passes south of Sandy Hook, then follows the general KY 32 corridor to US 60 in Rowan

County. Corridor 1 then crosses the northern tip of the Morehead city limits, terminating along I-64 near milepoint 141.

- Corridor 2 is common to Corridor 1, except that it passes north of Sandy Hook.
- Corridor 3 is common to Corridor 1 from the terminus of the existing KY 645 route to just west of Dewdrop in Elliott County. The corridor then turns northwest and follows a portion of KY 649, passing near Beartown and Ault before reaching the Elliott/Carter County line. In Carter County, the corridor continues northwest, crossing US 60 and terminating at I-64 at the Rowan/Carter County line.
- Corridor 4 is common to Corridor 3, except that it passes north of Sandy Hook.
- Corridor 5 is common to Corridor 2 from the terminus of the existing KY 645 route to the intersection of KY 7 and KY 32 north of Sandy Hook in Elliott County. The corridor then turns north, passing just west of the Little Sandy River. Corridor 3 continues northwest in Carter County, generally following the KY 1620 corridor to US 60, and terminating at I-64 at the existing interchange at Exit 156 (KY 2).
- Corridor 6 is common to Corridor 5 from the terminus of the existing KY 645 route to the intersection of KY 7 and KY 32 north of Sandy Hook in Elliott County. The corridor then turns north and terminates at I-64 at the existing interchange at Exit 161 (US 60).
- Corridor 7 is common to Corridor 2 from the terminus of the existing KY 645 route to the intersection of KY 7 and KY 32 north of Sandy Hook in Elliott County. The corridor then turns northeast, following the KY 7 corridor to a new interchange on the west side of Grayson, near milepoint 170.
- Corridor 8 is common to Corridor 1 from the terminus of the existing KY 645 route to the existing KY 201 route just north of Davisville. The corridor then turns north, passing to the west of Blaine and the Yatesville Lake Wildlife Management Area. The corridor continues north, following the general KY 201 corridor to KY 1 near the Lawrence/Carter County line. In Carter County, Corridor 8 turns northeast, following KY 1 and terminating at a new interchange on the west side of Grayson, near milepoint 170.
- Corridor 9 is common to Corridor 8 from the terminus of the existing KY 645 route to the Lawrence/Carter County line. In Carter County, the corridor continues north and east, crossing KY 773 and US 60. Corridor 4 terminates at the existing interchange at Exit 179, the Industrial Parkway (KY 67).

For the Level 1 Screening of these nine (9) corridors, criteria were developed based on the project purpose and need (based on preliminary project goals and objectives), potential environmental and community impacts, planning level cost estimates, public input, and transportation and traffic issues. Alternatives were then ranked based on how well they met these criteria. The Level 1 Screening is presented in **Appendix F**. The results of the Level

1 Screening were presented to the project team on March 10, 2004, as discussed below.

### C. Second Project Team Meeting (March 10, 2004)

The Second Project Team Meeting was conducted on March 10, 2004 at the FIVCO ADD in Catlettsburg, Kentucky. At this meeting, the nine (9) KY 645 preliminary alternatives were further discussed primarily using the results of the Level 1 Screening. A copy of the meeting minutes is included in **Appendix D**.

The project team agreed to the following recommendations for each alternative corridor:

- Corridor 1 was dismissed because it is similar to Corridor 2 and when compared to Corridor 2, it (1) would carry less traffic; (2) was longer and would be more expensive to design and construct; (3) would not provide adequate access to KY 7; and (4) would not provide direct access to the prison.
- Corridor 4 was considered similar to Corridor 3 and it was agreed only one should be carried forward. Corridor 3 was dismissed for the same reasons as Corridor 1.
- One corridor to Olive Hill should be carried forward since it was the second most selected termination point by the public in the first round of involvement activities. Corridor 5 was favored because Corridor 6 does not adequately meet project goals, that is: (1) it is expected to carry less traffic in the future; (2) it is farther away from Morehead which is where most survey respondents (round 1 of public involvement) would like the route to terminate; and (3) it does not provide direct access to KY 2, an important route to the area and a link to KY 9 (AA Highway) north of the study area.
- Corridor 7 was dismissed because it does not adequately meet the goals of the project, that is: (1) it provides improved access to the fewest number of isolated communities; (2) it is far away from Morehead; and (3) it is expected to carry the least amount of traffic of all the proposed alternatives.
- Corridor 8 was dismissed because it does not adequately meet the goals of the project, that is (1) it is far away from Morehead; and (2) it only serves two counties and, therefore, would not improve regional access.
- Corridor 9 should move forward for further consideration since it represents the original description/termini of this project in the Six-Year Highway Plan.

In summary, the Project Team decided that Corridors 1, 3, 6, 7, and 8 would not move forward and that Corridors 2, 4, 5, and 9 would be advanced for further consideration in the study process.

Corridors 2, 4, 5, and 9 are shown in **Appendix F**, titled "Corridors March 2004".

## VI. ALTERNATIVES EVALUATION

This chapter presents results of the environmental overview, geotechnical overview, Level 2 Screening, and second round of public and agency input that were conducted to further define the preliminary alternatives and ultimately recommend a preferred corridor for the extension of KY 645.

### A. Environmental Overview

This section provides a summary of the environmental issues identified in the project area based on a separate *Environmental Overview* report completed in September 2005. The full version of the *Environmental Overview* report is included in **Appendix G**. Many environmental features identified within the project area are shown on **Figure 6-A** in **Appendix A**.

Through early phases of the study process, nine (9) Build corridor alternatives were identified for analysis and evaluation. The *Environmental Overview* presents environmental information on the final four corridors remaining after five of the original nine corridors were dismissed from further consideration. These five corridors were dismissed through a preliminary Level 1 screening process, as discussed in **Chapter V**.

The Environmental Overview report in **Appendix G** has used a different numbering system for the alternates discussed in this study report, designating them as Corridors 1, 2, 3, and 4 from west to east. These corridors correspond with the corridors under consideration in the KY 645 Regional Corridor Study (shown in parentheses) as follows: Corridor 1 (Corridor 2), Corridor 2 (Corridor 4), Corridor 3 (Corridor 5), and Corridor 4 (Corridor 9). For this summary, we will use the Study report corridor numbering system, i.e., Corridors 2, 4, 5, and 9.

#### 1. Potential Issues

Within the project area, environmental issues identified for further consideration throughout future phases of this project include the following:

- **Mines:** A large number of mine locations were identified from citizen input and are included on the environmental footprint maps, **Figure 6-A** in **Appendix A**. The accuracy of this mapping was not verified and field surveys should be conducted to determine exact mine locations before design activities begin. Additional mining location information is included in the Geotechnical Overview, summarized below in **Section 2** and included in **Appendix H**.
- **Soil Types:** Hydric soil units, inclusions of Hydric soils and Highly Erodible soils have been identified in Corridors 2, 4 5 and 9 in Carter, Elliott and Rowan Counties. The Lawrence County area also consists of Prime, Important, Hydric, Hydric Inclusions, and Highly Erodible characteristics, but a soil survey book for Lawrence County has not been published.
- **Land Use:** The project setting is primarily rural with agriculture as the dominant land use. Some individual garden plots, pastureland, and tobacco base in the corridor may be negatively affected, depending

on the alternative selected. Single-family residences, commercial businesses, and institutional uses are located within the project area, including many in very close proximity to the existing corridors. Several industrial parks in the project corridors would likely benefit from the proposed project.

Land use in the project corridor is not expected to change dramatically from current uses and trends, result in unanticipated additional pressure on public services, or interfere with any zoning or development plans which might be proposed in Lawrence, Elliott, Carter, and Rowan Counties.

- Population: Between 1990 and 2000, population growth has been higher in the study area counties (4.5-11.2%) than in the study area census tracts (2.0%). According to the Kentucky State Data Center, Urban Studies Institute, the region is expected to continue modest growth by 2030. Within the project corridor, according to multiple listing service data, homes generally have a market value in the range of \$10,000 to \$100,000.
- Labor: The project corridor labor market area has the labor to support additional industry, with 2003 unemployment rates as follows: Lawrence County (9.3%), Elliott County (9.0%), Carter County (11.4%), and Rowan County (4.9%). Lawrence, Elliott and Carter Counties have higher unemployment rates than the corresponding labor market areas, Kentucky's rate of 6.2%, and the U.S. unemployment rate of 6.0%.
- Environmental Justice: According to the Bureau of Census 2002 data, 2% of the four-county population is minorities, as compared to 1.7% of the Census Tracts. In the project corridor, no concentrations of minority, ethnic, or cultural groups were observed during windshield surveys.

Any corridor through the study area will serve counties with some of the highest low-income populations in the state: 30.7 percent in Lawrence County, 25.9 percent in Elliott County, 22.3 percent in Carter County and 21.3 percent in Rowan County, all above the statewide rate of 16 percent. Environmental justice considerations related to low-income populations should be considered as future phases narrow the corridor and alignment options.

Per capita personal income in Rowan County increased 34.3% from 1997 to 2002, representing the largest increase of the four counties. The state had an increase of 22.2% over the same period; however, the state average of \$25,494 is about \$6,000 more than in Rowan County and about \$11,000 more than in Elliott County. Trends indicate that the national and state averages are higher than the study area counties.

- Air Quality: Pursuant to the 1990 Clean Air Act Amendments, the project area has been designated an attainment area for all transportation-related pollutants (CO, HC, NOx, and TSP). With respect to the latest conforming State Transportation Improvement

Program (STIP), the proposed project is located on page 223 of the STIP, Fiscal Years 2001-2006, approved in October of 2000. Mobile source air pollution is not a problem in the project area and the existing ambient air environment is well within National Ambient Air Quality Standards (NAAQS).

- Highway Noise: Highway noise levels, at this time, are not expected to be a major concern on this project. Given the rural nature of the project area, the vehicle mix, low traffic volumes, uncontrolled access, and the general absence of significant concentrations of sensitive receptors, highway noise impacts are not expected to influence project feasibility or location decisions.
- Water Resources: One wellhead protection area is located within the common corridor for Corridors 2, 4 and 5, near the intersection of KY 32 and KY 706 outside Isonville. According to the Kentucky Division of Water (KDOW), Groundwater Branch, dozens of domestic water wells and exploited springs probably exist in the area. There is one unregulated roadside spring, Andy White Spring, reported by KDOW to be located on the northern boundary of Corridor 2, west of Elliottville, in Rowan County.
- Significant Ecological Resources: The western portions of Corridors 2, 4 and 5 cross one or more large forest blocks. There are two Big Trees identified in Lawrence County: a pitch pine (*Pinus rigida*) is located west of Blaine School within Corridor 9, and a red maple (*Acer rubrum*) is approximately 100 feet outside Corridor 9 and northeast of Blaine School.

Cold Water Aquatic Habitat (CAH) designated streams in the project vicinity are Big Caney Creek and Laurel Creek in Elliott County. Reference Reach (RR) designated streams in the project vicinity are Big Sinking Creek, Big Caney Creek, Laurel Creek, Nichols Fork, Meadow Branch, Green Branch, Middle Fork of Little Sandy River, and Arabs Fork. Exceptional Water (EW) designated streams in the project vicinity are Big Sinking Creek, Big Caney Creek, and Laurel Branch.

Five (5) trout streams are identified in the study area. Big Caney Creek (Corridors 4 and 5) and Laurel Creek (Corridors 2 and 4) in Elliott County, Hood Creek in Lawrence County (Corridor 9), and North Fork of Triplett Creek and Triplett Creek in Rowan County (Corridor 2) are all trout streams.

Other important natural areas that lie outside the study corridors, but within the project area include Grayson Lake Wildlife Management Area (WMA), Yatesville Lake WMA, Yatesville Lake State Park, Tygarts State Forest WMA, Carter Caves State Resort Park, and Bat Cave, which is a federally endangered Indiana bat hibernaculum.

- Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are three (3) federally listed species that may occur within the proposed project area: Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), and Virginia big-eared

bat (*Corynorhinus townsendii virginianus*). According to USFWS records, summer roost habitat and/or winter hibernacula for the endangered Indiana bat and gray bat may exist within the proposed project area in Elliott, Lawrence, and Carter Counties, as well as the Virginia big-eared bat in Rowan County. Known hibernacula for the Indiana bat and gray bat exist less than 10 miles from the project area in Carter and Elliott Counties. Preliminary “windshield” surveys reveal potential habitat for these endangered species.

KDFWR indicates that three (3) federally listed species, thirteen (13) state endangered species, seven (7) state threatened species, eight (8) state special concern species, and two (2) state historical species have the potential to occur within the project area. The three (3) federally endangered species are: Bald Eagle (*Haliaeetus leucocephalus*), Indiana bat, and Virginia big-eared bat.

KSNPC lists seventy-six (76) occurrences of monitored plant and animal species and two (2) occurrences of exemplary natural communities known to occur within one (1) mile of the project area. KSNPC’s records show the Indiana bat and gray bat, both federally and state endangered species, occur in multiple locations within 5 miles of the western portion of the project area (Corridors 2, 4, and 5), with at least one Indiana bat location within one (1) mile. Rafinesque’s big-eared bat (*Corynorhinus rafinesquii*), a KSNPC special concern species, also occurs within 5 miles of the project area.

KSNPC specifically notes the presence of yellow troutlily (*Erythronium rostratum*), a species of special concern, which is known to occur in several locations near the Lawrence and Carter County portions of the project (Corridor 9). Within one mile of the western portion of the project area (Corridors 2, 4, and 5), Kentucky Lady’s-slipper (*Cypripedium kentuckiense*), a species of KSNPC special concern, is known to occur. Most occurrences of Kentucky Lady’s-slipper are along the North Fork of Triplett Creek and will likely be impacted by the proposed construction if the Morehead alignment (Corridor 2) is chosen. The Bald Eagle, a federally threatened and KSNPC endangered species, has been found to occur on Yatesville Lake, near Corridor 9.

The Morehead Ranger District has also provided a list of federally proposed, threatened, or endangered (PET) and sensitive species (S) that have potential to occur within the Daniel Boone National Forest. Corridor 2 encounters the Daniel Boone National Forest in Rowan County.

- **Wetlands:** Corridors 2, 4, 5 and 9 contain lacustrine, emergent, scrub-shrub, or forested wetlands and ponds. Locations for these resources are mapped in the Environmental Overview document.
- **Floodplains:** In Rowan County, Corridor 2 may encounter floodplains along Christy Creek and the North Fork of Triplett Creek. In Carter County, floodplains include Soldier Fork (Corridor 4) and Tygarts Creek (Corridor 5). In Lawrence County, the common corridor may

encounter floodplains along Hood Creek, Georges Fork, Right Fork, Blaine Creek and Upper Laurel Creek. Other floodplains include Blaine Creek, Abb Creek, Caney Fork, Cherokee Creek, Cains Creek, and Dry Caney Fork (Corridor 9). No floodplain data was available for Elliott County.

- **Cultural and Historic:** The Corridor 2 study area contains eight (8) known archaeological sites and three (3) historic sites. The Corridor 4 study area contains 13 known archaeological sites and one (1) historic site. The Corridor 5 study area contains eight (8) known archaeological sites and one (1) historic site. The Corridor 9 study area contains five (5) known archaeological sites and no known historic sites.

## 2. Conclusions

From an environmental standpoint, all four of the proposed corridors have the potential to impact environmental resources within the study area counties. With its proximity to Laurel and Caney Creeks, as well as the crossing of Daniel Boone National Forest lands, Corridor 2 has the most potential to impact large tracts of undisturbed forestland and ecological resources such as Cold Water Aquatic Habitats.

Opportunities to use portions of existing routes or existing route footprints would minimize the impact on the natural environment for any of the proposed corridors.

## B. Geotechnical Overview

This chapter provides a summary of the geotechnical issues identified in the project area based on a separate Geotechnical Overview Report completed in May 2005. This report, which includes topographic and geologic maps, is included in **Appendix H** and has used a different numbering system for the alternates discussed in this study report, designating them as Corridors 1, 2, 3, and 4 from west to east. These corridors correspond with the corridors under consideration in the KY 645 Regional Corridor Study (shown in parentheses) as follows: Corridor 1 (Corridor 2), Corridor 2 (Corridor 4), Corridor 3 (Corridor 5), and Corridor 4 (Corridor 9). For this summary, we will use the Study report corridor numbering system, i.e., Corridors 2, 4, 5, and 9.

The four proposed corridors for KY 645 lie within Lawrence, Elliott, Carter, and Rowan Counties. Each of the four corridors heads in a northwest or north direction. This area of eastern Kentucky is characterized by moderately to steeply sloping terrain with narrow valleys.

### 1. Potential Issues

Within the project area, geotechnical issues identified for further consideration throughout future phases of this project include the following:

- **Fault Zones:** The Walbridge Fault, the Little Sandy Fault, and some un-named faults are present on the geologic maps. The two major fault zones were identified on the geologic maps. It is advisable for the corridors to cross faults in a perpendicular manner. Each of the

proposed corridors appears to cross the faults at nearly perpendicular angles.

- **Karst Activity:** Although no caves were denoted on any of the available maps, there is the possibility of caves within the areas where limestone occurs. Further research and input from local caving societies will be needed once a final corridor is selected.
- **Gas and Oil Wells:** Numerous wells were noted to exist within the four proposed corridors. The majority of the wells are concentrated in the oil and gas well field located between Martha and Mazie on the Mazie Quadrangle. This particular concentration of wells affects Corridors 2, 4, and 5. Another high density area of wells is located near Isonville. It is common in eastern Kentucky to have the oil and gas rights split from the surface land ownership. In addition, water injection wells to improve oil recovery are used in these fields. Therefore, removal of a single well in a flood field can impact other recovery wells.
- **Mining:** Based on a review of USGS topographic and geologic maps, as well as the Kentucky Department of Mines and Minerals Maps for Coal Mining, there is evidence of surface (strip) mining, deep mine adits (openings), and quarries within the proposed corridors. Also, there is evidence of flint clay mining by stripping and underground mining. Strip mined areas have inherent problems (poor backfilling practices, random fill particle size, inadequate fill placement/compaction procedures, and acid mine drainage). Underground mined areas carry a risk of subsidence or sudden collapse due to the old mine works.

## **2. Conclusions**

From a geotechnical and constructability standpoint, the proposed corridor should avoid problem areas or potential geotechnical problems, as discussed above. The project faces constructability issues which are inherent to the local terrain. However, these issues cannot be eliminated and sound engineering solutions are available to address them.

The most favorable corridor should avoid strip or underground mined areas and be along the up-dip side of hill cut areas to lessen the possibility of groundwater and slope instability problems.

The corridors have been ranked, from a geotechnical perspective, in order from most favorable to least favorable as follows: Corridor 5, Corridor 2, Corridor 4 and Corridor 9.

## **C. Level 2 Screening**

A Level 2 Screening was conducted to help further define the alternatives and identify a preferred corridor. This process began with conducting the environmental and geotechnical overviews, as previously discussed in this chapter. The Level 2 screening is presented in **Appendix F**, and includes a summary for each corridor and the no-build option for the following items:

- Cost estimates;
- Travel savings;

- Cultural/Historic occurrences within 2000-feet of the centerline;
- Environmental resources within the corridor boundaries, such as water resources, natural or forested areas, wetlands, floodplains, sensitive habitats, monitored sites, soil types, mines, cemeteries, and others; and
- Geotechnical issues.

The following conclusions can be drawn from the Level 2 screening exercise:

- The No Build option has no financial cost, no environmental impacts from construction, and no maintenance costs for new state highway mileage. At the same time, this option does not meet the project goals and objectives, does not provide improved travel time or access, and it ranked the lowest through the public input process. With the No Build option, other existing roads may need upgrading to improve safety and Level of Service.
- In general, the Build options meet most of the project goals and objectives, and meet the expectations of the public involvement participants. The Build options also have construction costs from \$309.5 to \$413.1 million, the potential to impact the natural environment, and increased maintenance costs for new state highway mileage.
- Corridor 2 has the highest average traffic volume along the corridor, provides the most access to key tourist destinations (along with Corridor 5), serves the most areas with high unemployment and low-income populations, provides the most access to education and health care facilities, and ranked second highest through the Round 2 public input process. This corridor can be upgraded largely along existing roads for easier project phasing.

Corridor 2 is also the most expensive build option at \$413.1 million, has the most potential for environmental impacts, crosses Daniel Boone National Forest (DBNF) lands and large forest blocks, crosses Big Caney Creek and tributaries of Laurel Creek, crosses the most wetland areas, is located within 1 mile of endangered and threatened species, and has the potential to cause the most residential displacements.

- Corridor 4 provides the most access to existing employment centers (along with Corridor 5) and serves the Morehead area while avoiding DBNF lands. This corridor also serves an area without existing highway access.

This corridor also crosses Big Caney Creek and tributaries of Laurel Creek, crosses large forest blocks, is located within 1 mile of endangered and threatened species, and is ranked third in the public input process. Corridor 4 also terminates in a very lightly developed area.

- Corridor 5 has the least potential for geotechnical issues, provides the most access to key tourist destinations (along with Corridor 2),

provides the most access to existing employment centers (along with Corridor 4), crosses the fewest wetland areas, and ranked the highest through the Round 2 public input process. This corridor can be upgraded largely along existing roads for easier project phasing and provides the potential for future connection to KY 9 (AA Highway) north of the study area.

This corridor also has the lowest average traffic volume along the corridor, lowest traffic volume at the northern terminus, does not serve the far western part of the study area, crosses Big Caney Creek and tributaries of Laurel Creek, crosses large forest blocks, and is located within 1 mile of endangered and threatened species.

- Corridor 9 serves the description and terminus defined in the Six Year Highway Plan, is the least expensive Build option, attracts the most traffic to its northern terminus, diverts more traffic from US 23, and has fewer potential impacts to environmental resources.

This corridor also has the most potential geotechnical issues, provides less access to key tourist destinations and employment centers, provides less access to education and health care facilities, is ranked lower through both rounds of public involvement, and does not provide a regional corridor concept.

Following the conclusion of the Level 2 Screening, the second round of public and agency input was conducted and is described below. The input received as part of these activities was summarized and presented to the project team for discussion, which resulted in the recommendation of a preferred corridor, as discussed below.

#### **D. Second Round of Local Officials Meetings (October 2004)**

As part of the public involvement portion of this study, five meetings were held between October 12, 2004 and October 21, 2004 with local officials and agencies. The purpose of the meetings was to update local officials about what took place after the first round of community involvement activities. Information was provided and input solicited about proposed alternatives, environmental issues, geotechnical issues, estimated costs, and project goals. Copies of the meeting minutes are included in **Appendix D**.

##### **1. Local Officials Meeting – Lawrence County (October 12, 2004)**

The first meeting was held October 12, 2004 at the Lawrence County Fiscal Court Room in Louisa. A total of 14 persons attended the local officials meeting to discuss the Alternatives Study, including project team members. Individual comments and local issues identified were as follows:

- KY 645 should be a 4-lane facility instead of a 2-lane facility that would have to be upgraded in the future.
- An overpass at KY 645 and US 23 should be considered for safety reasons;

- Corridor 9 would reduce congestion in the Catlettsburg area, it would be easier to build, and it would be in the best interest for Lawrence County;
- Concern was expressed over whether or not the Industrial Parkway (KY 67) could handle diverted traffic;
- The transportation system in Morehead is much more adequate than in other parts of the study area where new roads are needed;
- Any corridor that passes through Elliott County would be beneficial; and
- Corridor 2 provides improved access to Morehead State University and the University of Kentucky.

In addition, project surveys were distributed at the meeting to solicit input about the proposed corridors. Of the four surveys submitted, Corridor 9 ranked the highest and Corridor 4 ranked the lowest.

### **2. Local Officials Meeting – Martin County (October 12, 2004)**

The second meeting was held October 12, 2004 at the Martin County Fiscal Court Room in Inez. A total of 16 persons attended the local officials meeting to discuss the Alternatives Study, including project team members. Individual comments and local issues identified were as follows:

- The Daniel Boone National Forest is a concern and may slow down the approval process for the proposed route;
- The potential impacts to Yatesville Lake should be considered;
- Corridor 9 does not benefit education or a regional transportation concept;
- Corridor 2 would be best for Martin County; and
- Corridors 2, 4, and 5 would decrease travel time to and from Lexington.

In addition, project surveys were distributed at the meeting to solicit input about the proposed alternatives. Of the seven surveys submitted, Corridor 2 ranked the highest and the No-Build option ranked the lowest.

### **3. Local Officials Meeting – Carter County (October 13, 2004)**

The third meeting was held October 13, 2004 at the Carter County Courthouse in Grayson. A total of 20 persons attended the local officials meeting to discuss the Alternatives Study, including project team members. Individual comments and local issues identified were as follows:

- Corridor 5 would provide the best connection to KY 9 (AA Highway) and Carter Caves;
- A new interchange for I-64 on the west side of Grayson would benefit the area;

- Corridor 5 would provide economic benefit to the Olive Hill area;
- Corridor 4 appears to be a good compromise between Corridors 2 and 5; and
- Corridor 2 would provide the greatest economic boost to Elliott County by making educational opportunities greater with better access to Morehead State University.

In addition, project surveys were distributed at the meeting to solicit input about the proposed alternatives. Of the ten surveys submitted, Corridor 5 ranked the highest and Corridor 2 ranked the lowest.

#### **4. Local Officials Meeting – Rowan County (October 21, 2004)**

The fourth meeting was held October 21, 2004 at the Carl D. Perkins Community Center in Morehead. A total of 13 persons attended the local officials meeting to discuss the Alternatives Study, including project team members. Individual comments and local issues identified were as follows:

- Corridor 2 would best serve Morehead and could be coordinated with the proposed Morehead Connector project; however, Corridor 4 would be a good compromise to serve Morehead and avoid the Daniel Boone National Forest;
- Arguments were made for and against going through the Daniel Boone National Forest;
- A connection to KY 377 would reduce the safety hazard on this existing road by providing an alternate route;
- Local and regional industrial parks in the Morehead area would benefit from a new route;
- Providing access to the Saint Claire Regional Medical Center would benefit neighboring communities;
- The proposed corridor should be considered on a broader scope as providing connection into West Virginia and the I-74 corridor (existing US 52); and
- Even if traffic doesn't warrant a four-lane facility, right-of-way should be purchased so that expansion to four lanes is feasible in the future.

In addition, project surveys were distributed at the meeting to solicit input about the proposed alternatives. Of the four surveys submitted, Corridor 2 ranked the highest and Corridor 9 ranked the lowest.

#### **5. Local Officials Meeting – Elliott County (October 21, 2004)**

The final Local Officials Meeting was held October 21, 2004 at the Elliott County Courthouse in Sandy Hook. A total of 8 persons attended the local officials meeting to discuss the Alternatives Study, including project team members. Individual comments and local issues identified were as follows:

- Corridor 2 would be the best alternative for Sandy Hook, with Corridor 4 the second choice. These alternatives would provide a shorter distance for trucking routes and would provide the opportunity for economic development in Elliott County;
- The Daniel Boone National Forest is not as pristine as it used to be;
- The project should be coordinated with the proposed Morehead Connector project to provide financial efficiencies;
- Corridor 9 would not reduce travel time, provide a Morehead bypass, or upgrade the KY 32 corridor (the latter two are identified in the FIVCO 10-Year Plan); and
- The London-to-Ashland connector was supposed to come through Sandy Hook and did not. If KY 645 does not come through Sandy Hook, local leaders do not have much hope for another road in the future.

In addition, project surveys were distributed at the meeting to solicit input about the proposed alternatives; however, no surveys were returned.

### **E. Public Information Meetings – Round 2**

Between November 29, 2004 and December 16, 2004, five (5) public involvement meetings were held in each of the five (5) counties. The meetings were held from 5:00 p.m. to 7:00 p.m. The purpose of the meetings was to update the local citizens about the project activities since the first round of community involvement activities. A total of 25, 24, 42, 141, and 28 persons registered their attendance at the two-hour public sessions in Inez, Sandy Hook, Blaine, Olive Hill, and Morehead, respectively, including KYTC, ADD, and consultant staff. Minutes for each meeting are included in **Appendix D**.

The public involvement meetings were arranged with multiple project information stations, and KYTC, ADD, and consultant staff members were available to answer questions and discuss issues. Upon arrival, attendees were given a survey questionnaire, project goals list, map of the four (4) corridors, an evaluation matrix for the four (4) corridors, and information regarding KYTC roadway projects.

In one area of the room, a PowerPoint slide presentation was played continuously during the public involvement session. The presentation included information such as: project activities to-date; identified project goals; corridors identified for consideration; and evaluation criteria established for the corridor analysis.

Another section of the room was set up with an arrangement of project exhibits, including the following:

- Study Area Map
- Regional Area Map
- Project Goals
- Existing Traffic and Level of Service (LOS) Map
- Future Traffic and LOS Map

- High Crash Locations Map
- Environmental Overview Maps
- Map with 9 Preliminary Corridors
- Level 1 Screening Matrix
- Map with 4 Corridors for Further Consideration
- Level 2 Screening Matrix

Attendees were asked to complete the survey questionnaire prior to leaving the meeting, or return it to the KYTC at a later date in the postage-paid envelope provided. A table was available to attendees to fill out their survey form and read over the project materials. Refreshments were also provided.

### 1. General Comments

Attendees were invited to discuss any questions or concerns with KYTC and consultant staff. General comments, by location, included the following:

#### Inez

- Corridor 9 parallels US 23 and would serve the same primary purpose;
- A corridor through the study area could be a boost in tourism to the lakes; and
- The proposed route should be located as far west as possible.

#### Sandy Hook

- The selected corridor should come close enough to Sandy Hook to be beneficial (less than one mile);
- The two gorges and pristine creeks (Big Caney Creek and Laurel Creek) in Elliott County should be avoided;
- KY 32 needs to be improved, although there is also concern about displacement of residents who live along the existing KY 32 alignment;
- Corridor 5 would provide Sandy Hook with the needed access to I-64;
- The route should be located south of and closer to Sandy Hook, along existing KY 173; and
- Corridor 5 would avoid more Cold Water Habitats than Corridors 2 or 4.

#### Blaine

- Corridor 9 would serve Blaine and Lawrence County the best;
- Better access to Morehead State University is important; and
- Corridors 2, 4, and 5 would relieve some traffic on the Mountain Parkway.

#### Olive Hill

- Corridor 9 would relieve US 23 and truck traffic in Ashland and would provide for improvements along KY 201, a heavily traveled shortcut for trucks going north-south;
- The Grayson area needs another interchange along I-64;
- Fresh and Ready Foods needs access for farmers south from Ulysses to supply their plant and Corridor 5 would provide this;
- Corridor 5 would open up Elliott and Lawrence Counties and help Olive Hill with economic development;
- Corridor 2 should not be considered, particularly any portions that would change existing KY 32; and
- Access should be provided to areas that need economic development, particularly Sandy Hook, the prison, and tourist attractions.

#### Morehead

- From a traffic and access standpoint, Corridor 2 would best serve the study area;
- From an environmental standpoint, Corridor 2 should be avoided; and
- Additional funding should be added for the project in the next Six-Year Highway Plan.

### **2. Public Comment Survey Responses**

As part of the public meeting handout, the KYTC supplied a survey form so that citizens of the area could provide input on the project. The KYTC collected surveys for each of the five (5) public meetings. Responses were also included from the local officials meetings and KYTC project website. Each individual was asked to rank the four (4) corridors, as well as the No Build option, from one (1) to five (5). Responses are summarized below:

- Of the 664 responses, 369 ranked Corridor 5 as their highest ranked alternative. Overall, the average rank for Corridor 5 was 1.5.
- Corridors 2 and 4 both received an average rank of 2.5; however, Corridor 2 received considerable more first place votes than Corridor 4 (244 votes compared to 16 votes).
- The No-Build Alternative received the lowest average rank at 4.8. Sixty-two percent identified it their lowest ranked alternative.

### **F. Second Round of Resource Agency Coordination (December 2004)**

Input was solicited from many local, state, and federal resource agencies a second time through written requests. Each agency was sent a packet of materials including project goals, environmental maps, a map of the four (4) corridors, and the Level 1 and 2 Screenings for review. Response letters

from the 33 responding resource agencies are located in **Appendix I** and are summarized below:

- Carter County Board of Education: The Carter County Board of Education unanimously supports Corridor 5, with a terminus at I-64 Exit 156 at Smoky Valley. This route will bring long needed development to the area. None of the proposed routes are likely to adversely affect the Carter County Schools' operations; although care should be taken to avoid adding more traffic to Carol Malone Boulevard in Grayson.
- City of Grayson, Office of the Mayor: Another exit from I-64 on the west side of Grayson would help with traffic control along Carol Malone Boulevard, and would promote economic growth, development and tourism.
- City of Olive Hill, Office of the Mayor: This project is very important to the Olive Hill area and would give the town a chance to expand tourism and industry. Some examples include: 1) tourism for Carter Caves State Park; 2) access for a major food processing plant which is under construction and will employ 350-500 people; 3) access to another prospective plant that would employ around 50 people; and 4) tourism for the local Bluegrass Festival and Horse Show Events. (Note: Corridor 5 would serve Olive Hill).
- Elliott County Medical Clinic: Corridor 2 would best benefit the patient population in the area. The Center is a Rural Health Clinic and a member of the University of Kentucky Rural Health Residency Program, serving about 17,000 patients per year. The clinic physicians live in Morehead and the Center's patients are admitted to St. Claire Regional when hospital care is needed. A new route between the Center and Morehead would improve travel time.
- Kentucky Airport Zoning Commission: No conflicts with air navigation are expected from the proposed project; however, construction equipment can fall in jurisdiction if it exceeds 602 KAR 50:030.
- Kentucky Cabinet for Health and Family Services: Significant impacts to offices or daily operations due to this project are not anticipated.
- Kentucky Department of Agriculture: The Agency has no specific concerns or issues concerning the project.
- Kentucky Department of Fish and Wildlife Resources: Federal and state threatened and endangered species are known to occur within the study area. Recommendations are provided relative to habitats for Indiana bats, gray bats, Virginia big-eared bats and mussel species. The proposed project should avoid impacts to six trout streams in the area, and minimize impacts to wetlands and waterways.
- Kentucky Department of Highways, Division of Construction: Travel in this area is slow and dangerous. A new route would open the area to

development, reduce traffic on US 23, and provide safer travel for local rural traffic.

- Kentucky Department of Military Affairs: This project would reduce travel time from armories along the I-64 corridor and points west of Morehead, improving emergency response times. It would also benefit the recruiting goals of the Kentucky Army National Guard by opening up markets that are currently difficult to reach, providing increased economic options for residents in the region.
- Kentucky Department for Natural Resources: There are three non-coal permits near Exit 156 on I-64 in Carter County: two for Valley Stone, LLC and one for Messer Clay Company. These operations have the potential to produce a substantial amount of traffic in the area. (Note: Corridor 5 would serve Exit 156).
- Kentucky Department for Natural Resources: The Kentucky Heritage Land Conservation and the City of Olive Hill are working to preserve a 220-acre area, approximately two miles northwest of Olive Hill in Carter County, which Corridor 5 could affect. The Olive Hill Preservation Project would provide a vegetated buffer that enhances the water quality for the Olive Hill Reservoir. The property also provides suitable habitat for Rafinesque's big-eared bat, the Indiana bat, the gray bat, black bear, and eight (8) endangered/threatened plants. This is also an area of known oil and natural gas exploration activity.
- Kentucky Department of Parks: The study area is near several parks (Carter Caves State Resort Park, Grayson Lake State Park and Yatesville Lake State Park, but will not directly impact any of the facilities. The Agency's mission is to protect the environment associated with their facilities and environmental impacts for the Commonwealth.
- Kentucky Department of Travel: None of the Corridors appear to have a significant negative impact on areas or structures deemed sensitive. Corridors 4 and 5 appear to have the most positive impact on two state parks in the area. Corridor 4 would likely be the most beneficial overall due to a number of reasons: 1) the cost remains within the median range of the alternatives presented; 2) it has the second lowest potential impact upon historic sites, archaeological sites, wildlife and forested areas; 3) it eases travel from the west to Grayson Lake State Park and Yatesville Lake State Park; and 4) it does not divert traffic from US 23, which is a corridor currently providing access to Yatesville Lake State Park (maintaining existing traffic flow while growing future traffic flow to these areas is of significant importance to the Cabinet).
- Kentucky Department of Vehicle Enforcement: The new route will provide relief for coal truck traffic from US 23. The trucking industry in and around the area would use this new route tremendously.

- Kentucky Division of Air Quality: The following Kentucky Administrative Regulations apply to the proposed project: 1) 401 KAR 63:010 Fugitive Emissions; 2) 401 KAR 63:005 Open Burning; 3) the Clean Air Act; and 4) Title 23 and Title 49 of the United States Code. Applicable regulations in the local governments should also be considered.
- Kentucky Division of Conservation: There are no agricultural districts established in the study area. Prime farmland and farmland of statewide importance could be impacted by this project and the Division lists four documents that identify these farmland designations. Best management practices should be used during construction to prevent non-point source water pollution.
- Kentucky Division of Materials, Geotechnical Branch: The Branch has no further comments on the project.
- Kentucky Division of Water: Special use waters represent only 0.2 percent of the stream miles in the Commonwealth, and are worthy of the highest environmental protections. Caney Creek and Laurel Creek are the only two streams of this caliber in the eastern section of the state. These streams are Cold Water Habitats, Exceptional Waters and Reference Reach Streams. Proposed Corridors 2 and 4 should not be considered due to the devastating impact they would have on the two creeks. These streams are so sensitive to environmental impacts that they should be avoided.
- Kentucky Education Cabinet: The Cabinet has reviewed the study and has no comments at this time.
- Kentucky Heritage Council, State Historic Preservation Office: The project has the potential to impact historic structures or archaeological sites listed or eligible for the National Register of Historic Places. Cultural and archaeological surveys should be conducted once the corridors are better defined.
- Kentucky House of Representatives: Corridor 2 would serve students and parents traveling to Morehead State University, and would provide opportunities for economic development in the study area.
- Kentucky State Nature Preserves Commission (KSNPC): A corridor should be chosen that minimizes impacts to the natural resources of this region. This would include consideration of simply improving the existing roads in the area.
- Morehead Utility Plant Board: Corridor 2 could affect the water, sewer, and gas lines in the Rodburn area east of Morehead and the lines may need to be relocated.
- Our Lady of Bellefonte Hospital: Corridor 9 provides the most benefits to the people of Eastern Kentucky, based on the following: 1) it is the least expensive of the options; 2) it interferes with the least amount of historic, archaeological and environmental sites; 3) it diverts the largest amount of traffic from US 23; 4) it improves access to the new

industrial park in Carter County; 5) it does not disrupt the Daniel Boone National Forest, Laurel Creek or Caney Creek; 6) it improves access to healthcare and educational resources; and 7) it provides another north-south highway in Eastern Kentucky.

- St. Claire Regional Medical Center: Corridor 2 appears to provide the greatest benefit for those served by the medical center, in terms of quality of life enhancement, access, and economic stimulus.
- Three Rivers Medical Center: A better road from Blaine to Louisa would improve access to the health care facility and would provide economic development opportunities for Lawrence and Martin Counties. An improved route would also improve travel time to Lexington.
- United States Army Corps of Engineers, Huntington District: The proposed corridor appears to pass through a portion of the Yatesville Lake's flowage easement property and steps would have to be taken to prevent the loss of water storage capability. Due to the close proximity of the Lake, construction methods should be used to prevent silt from entering the Lake. Once the corridors are more defined, the Corps would like to provide more detailed comments on fee lands in the area.
- United States Army Corps of Engineers, Louisville District: In Rowan County, the Licking River and its tributaries are in the Louisville District's jurisdiction. The Corps can provide information related to the elevation of Ordinary High Water (OHW) and floodplains. Any impacts to wetlands, historic properties or waters of the United States should be reviewed by the Corps.
- United States Department of Health and Human Services: The following areas of potential public health concern should be considered during the NEPA process: air quality, water quality/quantity, wetlands and floodplains, hazardous materials/wastes, non-hazardous solid waste/other materials, noise, occupational health and safety, land use and housing, and environmental justice. The Agency would like to review the draft NEPA document, when complete.
- United States Environmental Protection Agency, Region 4: The EPA's review of the NEPA document developed for this project will include evaluation of potential environmental impacts. Direct and secondary/indirect impacts to Environmental Justice populations should be evaluated.
- United States Forest Service, Daniel Boone National Forest: The consideration of Corridor 2 should be guided by the Memorandum of Understanding (MOU) between the Forest Service and the Federal Highway Administration (FHWA). The Forest Service will determine if the appropriation of land for the highway project is consistent with the Forest Land and Resource Management Plan for the study area or with the best interest of the public.

Corridor 2 divides the second largest contiguous block of National Forest System land in the Morehead Ranger District and has the potential to significantly affect wildlife habitat and change public use of the area. Woodland ponds within Corridor 2 generally provide habitat for the endangered India bat. If Corridor 2 is moved forward, mitigation may be necessary to add lands to the National Forest System and construct replacement water resources.

If the forest lands are deemed necessary for the project, it will be necessary to comply with the NEPA process, the Endangered Species Act, and the Archaeological Resources Protection Act. A Biological Assessment/Evaluation and Cultural Resources Report will be required.

- United States Natural Resources Conservation Service (NRCS): The proposed project could have potential impacts to prime farmland soils and additional farmlands of statewide importance. If federal dollars are used to convert important farmlands to non-agricultural uses, a Form AD-1006 must be submitted to the local NRCS office. The NRCS can help in identifying important farmlands in the proposed project area.

#### **G. Final Citizens' Advisory Team Meeting (March 28, 2005)**

This final meeting with the Citizens' Advisory Team (CAT) for the KY 645 Regional Corridor Study, held on March 28, 2005 in Morehead, Kentucky, concluded the public involvement process for the KY 645 Regional Corridor Study. The purpose of this final meeting was to review the public input on the improvement alternatives, review input from resource agencies, discuss the pros and cons of the final four corridors, and poll the Citizens Advisory Team on its preferred alternate(s). Minutes from this meeting can be found in **Appendix D**. Included with the minutes is a pros and cons list for the identified corridors.

After reviewing the public and resource agency input to date, as well as the pros and cons of each proposed alternative, the CAT worked to identify a preferred corridor. Through a phased balloting procedure, the CAT meeting attendees recommended Corridor 2, the western-most corridor, as the preferred route for the KY 645 extension. It should be noted that a number of the meeting attendees were from Rowan County, while the other counties had fewer attendees and Lawrence County was not represented at all. Those voting for Corridor 2 in the final ballot of this four phase balloting procedure were from the following counties: eight (8) from Rowan County, one (1) from Martin County, five (5) from Carter County and two (2) legislative representatives who serve more than one (1) county.

The CAT recommendation was considered by the project team along with input from the public and resource agencies, goals and objectives established during this study, and other findings of this Regional Corridor Study, as discussed below.

#### **H. Project Team Meeting (May 3, 2005)**

The third project team meeting for the KY 645 Regional Corridor Study was conducted on Tuesday, May 3, 2005 at the FIVCO Area Development District

(ADD) Catlettsburg, Kentucky. The purposes of the meeting were to discuss the KY 645 improvement alternatives and to develop recommendations for the outcome of the study. Minutes from this meeting can be found in **Appendix D** of this report.

The Project Team members agreed that Corridor 4 serves a similar purpose as Corridors 2 and 5, and all three of these corridors should not move forward for further consideration. Since Corridor 4 received very little public support, it was agreed that Corridor 4 should not move forward. It was also agreed that Corridor 9 would not move forward for further consideration, since it does not meet the goal of providing a regional corridor through the project area.

The pros and cons of Corridors 2 and 5 were then discussed by the Project Team as they relate to the project goals established through the corridor study process. Based on the discussion, either Corridor 2 or Corridor 5 was identified as the alternative best meeting that project goal or issue (additional detail related to this analysis is provided in **Chapter VII**). Since Corridors 2 and 5 are identical from US 23 to Sandy Hook, the discussion generally centered around their differences and inherent advantages and disadvantages in getting from Sandy Hook to I-64 at either Morehead or Olive Hill. The project team agreed that being able to avoid the Daniel Boone National Forest gave Corridor 5 a slight advantage over Corridor 2 and that Corridor 5 be recommended to move forward to the next phase of project development.

The Project Team identified priority sections for Corridor 5, beginning at the existing terminus of KY 645 at US 23 and moving northwest. In future studies, consideration could be given to using the existing bridge over Laurel Gorge for this route, in order to reduce potential impacts on Laurel Creek.

## VII. RECOMMENDATIONS

This chapter provides conclusions and recommendations for the extension of the KY 645 corridor. Following the May, 2005 project team meeting, further discussions of the identified corridors for KY 645 were undertaken within the Cabinet and served to finalize the recommendations. All of the elements of the alternatives analysis presented in **Chapter VI** were considered in the decision-making process, including:

- Environmental Overview findings;
- Geotechnical Overview recommendations;
- Level 2 Screening of the four (4) identified corridors;
- Input from the Local Officials Meetings and Local Agency Meetings;
- Input from the Public Involvement Meetings;
- Resource Agency comments and suggestions;
- Citizen's Advisory Team (CAT) recommendations; and
- Project Team findings and conclusions.

The project goals, or purpose and need, developed through the study process and summarized in **Chapter IV** were also considered in the evaluation of each potential corridor.

### A. Corridors Not Moved Forward for Further Consideration

Based on the input and findings from all of these sources and the information gathered throughout the KY 645 Regional Corridor Study, it is recommended that Corridors 4 and 9 not move forward for further consideration.

Corridors 2, 4, and 5 serve the same general purpose, and it was decided by the project team that all three of these corridors should not move forward for further consideration. Since Corridor 4 received very little public support, unlike Corridors 2 and 5, it was agreed that Corridor 4 should not move forward.

It was also agreed that Corridor 9 would not move forward for further consideration, since it generally serves approximately the same area as existing US 23 and does not meet the goal of providing a regional corridor through the project area.

### B. Corridors Moved Forward for Further Consideration

As the project team discussed and reviewed the goals and issues identified through the study, it became obvious that both Corridors 2 and 5 have potential benefits and are almost equal in many respects.

Corridor 2, as previously described, generally follows existing KY 32 and terminates at I-64 in the vicinity of Morehead in Rowan County. Corridor 5 terminates on I-64 at Exit 156, on the west side of Olive Hill in Carter County.

The project team had a difficult time selecting one corridor over another, and developed the following analysis based on the project goals for further consideration of Corridors 2 and 5.

**1. Develop a new or improved highway that provides an improved connection to I-64, while also addressing the following transportation service objectives:**

- Enhances regional accessibility and mobility - Slight Advantage to Corridor 2

Corridor 2 provides a more direct access to Morehead with its educational, medical, recreational, industrial, and commercial facilities. It provides more travel time savings and a greater reduction in vehicle miles of travel for the study area than Corridor 5.

Corridor 5 could also provide regional connections in the study area, such as (1) a north-south connection to KY 2 which could provide access to another major regional highway, KY 9 (AA Highway), or (2) new freight traffic connections and better access to the riverport at Wurtland.

- Improves access to isolated communities and populations - Slight Advantage to Corridor 5

Corridor 5 would improve access to an area between Sandy Hook and Olive Hill which is currently only served by county roads or by state routes with a lower classification on the state or functional highway classification system, or not served by a road at all.

Corridor 2 follows a corridor already served by KY 32. Therefore, this corridor falls within an area that already has highway access. Since Corridor 2 follows portions of the existing KY 32 route and crosses the Morehead urban area, there will likely be more relocations and higher property values for right-of-way purchases.

A count of small communities falling within two miles of the Corridors indicates that Corridor 5 would improve access to 8 isolated communities and Corridor 2 would improve access to 7. More important, Corridor 5 serves an area without a connection to I-64, while Corridor 2 follows an existing route.

- Serves as an interstate connector from the I-73/74 corridor near Kermit, West Virginia to I-64 – Corridors 2 and 5 Are About Equal

For interstate travelers, such as traffic from southern West Virginia, Corridor 2 provides a more direct access to I-64 at Morehead and points farther west. For interstate travelers, Corridor 5 provides a more direct connection to I-64 at Olive Hill and on to the AA Highway (KY 9) and points farther north.

From the regional perspective and beyond, Corridors 2 and 5 serve the same purpose, and it will not likely matter if the terminus is 16 miles farther west on I-64.

**2. Develop a highway corridor that will serve the most traffic, while also meeting the following traffic-related objectives:**

- Diverts traffic from US 23 to reduce congestion on that route – Corridors 2 and 5 Are About Equal

According to traffic forecasts, neither Corridor 2 nor Corridor 5 will divert any significant traffic volumes from US 23. Only Corridor 9, which would parallel and be much closer to US 23, would divert any significant traffic.

With improvements to KY 2, north of I-64, Corridor 5 could be extended sometime in the future to provide a north-south connection to KY 9 (AA Highway). This north-south connection would parallel the US 23 route and could potentially attract truck trips from US 23 in the future. However, while an extension of Corridor 5 north of the study area could be proposed as a future separate project, it is not part of the proposed project addressed in this study.

- Optimizes and/or addresses future traffic flow on regional highways - Slight Advantage to Corridor 2

Corridor 2 could provide an improvement of the KY 32 corridor between Sandy Hook and Morehead. Therefore, it would provide an improved facility for both current and future traffic using KY 32.

Corridor 5 is an improvement that crosses or coincides with segments of KY 174, KY 1620, and KY 504 between Sandy Hook and Olive Hill. These are currently more lightly traveled roads than KY 32, and a new road in this corridor could provide little improvement for traffic on these highways.

Corridor 2 will likely serve more traffic in the future. Much of the KY 32 traffic would divert to Corridor 2 and the terminus at Morehead has a larger population and offers more services. Corridor 5 also has the potential to attract some traffic from the lower classified state roads and county routes between Sandy Hook and Olive Hill, as well as the regional traffic that either corridor would attract with a new connection to I-64.

- Provides travel time savings in the region, including the improvement of emergency response times - Advantage to Corridor 2

Corridor 2 provides greater travel time savings over the roadway network in the study area. According to the results derived from the Kentucky Statewide Traffic Model (KYSTM), Corridor 2 would save more vehicle hours of travel (VHT) and vehicle miles of travel (VMT) per year than Corridor 5. Corridor 2 would save 277,000 VHT and 19.7 million VMT per year; Corridor 5 would save 38,700 VHT and 10.7 million VMT per year.

With higher travel time savings, Corridor 2 will provide improved travel times for the study areas as a whole, including emergency response teams. Corridor 2 also provides a more direct route to the regional medical facilities at Morehead. Areas not served by Corridor 2, such as the section between Sandy Hook and Olive Hill, will still rely on the existing state and local routes for connection to the improved route.

**3. Develop a corridor that considers all study area interests, including socioeconomic, education, tourism, and the environment, while giving consideration to the following objectives:**

- Assists in promoting economic growth and development in areas that have low-income populations - Slight Advantage to Corridor 5

Any corridor through the study area will serve counties with some of the highest low-income populations in the state: 30.7 percent in Lawrence County, 25.9 percent in Elliott County, 22.3 percent in Carter County and 21.3 percent in Rowan County, all above the statewide rate of 16 percent.

Corridor 5 would improve access through Lawrence, Elliott, and Carter Counties, and the areas between Sandy Hook and Olive Hill. Citizens Advisory Team (CAT) members from Olive Hill have described the ongoing efforts to bring industry to the western portion of Carter County to improve economic growth in the area. A local company is in the process of starting a produce processing and distribution business in Olive Hill, which would be served by Corridor 5.

Corridor 2 would also serve low-income populations in Lawrence, Elliott, and Rowan Counties and provide improved transportation access for existing industries in Morehead. However, the need for economic development does not appear to be as great in Morehead as that in the Olive Hill area.

- Increases employment opportunities and gives special consideration to areas with high unemployment - Slight Advantage to Corridor 5

The study area counties also have higher unemployment rates than is average for the state of Kentucky (4.1%): Lawrence (11.5%), Elliott (10.5%), Carter (4.4%) and Rowan (8.1%) Counties. While both Corridors serve these disadvantaged areas, Corridor 5 provides the important connection between Sandy Hook and Olive Hill that does not exist now.

- Provides access to existing employment centers, including area industrial parks - Slight Advantage to Corridor 2

Corridor 2 serves the Rowan County and Morehead area, which has more existing employment centers already established. In 2001, there were 9,075 employees in Rowan County, which was about 40% of the total study area jobs.

- Expands access to social services such as education and health care - Slight Advantage to Corridor 2

Corridor 2 serves a larger urban area, with more available services already established. Services in Morehead include Morehead State University, Rowan Technical College, St. Claire Medical Center, and the Life Care Center of Morehead. For areas between Sandy Hook and Olive Hill, Corridor 5 improves connections to roads leading to Morehead, Lexington, and areas with other existing services. Corridor 5 also provides access to the Carter County Vocational School.

- Provides improved access to key tourist destinations (examples include Grayson Lake, Yatesville Lake and the new golf course in Carter County) – Corridors 2 and 5 Are About Equal

Based on the proximity to key tourist destinations in the study area, Corridor 2 and Corridor 5 provide roughly the same service to the major attractions, such as the Yatesville Lake State Park and Grayson Lake State Park areas. Corridor 2 would provide better access to the Daniel Boone National Forest area and the Eagle Trace Golf Course in Morehead. Corridor 5 would provide better access to the Carter Caves State Resort Park and new Carter Caves Golf Course in Carter County.

- Avoids or minimizes impacts to environmentally sensitive areas (examples include the Daniel Boone National Forest, Laurel Creek, and Caney Creek) – Advantage to Corridor 5

Corridor 2 follows the ridge line between Laurel Creek and Caney Creek in Elliott County. These are both considered to be Cold Water streams and Exceptional Waters, and local groups have expressed concern about additional runoff to the streams from a new road in this area. The Kentucky Department for Environmental Protection, Morehead Regional Office, has indicated that Corridor 2 should be avoided due to impacts on these streams. Some attendees of the recent CAT meeting suggested that Corridor 2 be moved south away from these streams and associated gorges to reduce impacts.

Corridor 5 also passes through the area of Caney Creek and Laurel Creek. This corridor would cross the creeks and would require major bridge structures to span the gorges, but may provide fewer impacts than a route that parallels them, like Corridor 2. Corridor 5 is situated at the eastern end of the Cold Water and Exceptional Water sections of the creeks, near where they empty into the Little Sandy River.

Corridor 2 passes through the Daniel Boone National Forest (DBNF) just east of Morehead, and Corridor 5 does not cross DBNF lands. Additional discussion related to the DBNF is included below in **Section 4**.

- Fits the natural surroundings and considers context-sensitive design – Corridors 2 and 5 Are About Equal

Context Sensitive Design that fits the natural surroundings could be accomplished for either corridor during the design phase of project development.

#### **4. Other Issues**

- Public Input - Slight Advantage to Corridor 5

The Olive Hill terminus for the route (Corridor 5) received the most overall public votes (539) throughout the public involvement process, followed by the Morehead terminus (Corridor 2) with 473 votes. Corridor 5 also received the most public support at any one meeting,

with about 140 attendees at the Olive Hill public meeting in the winter of 2004.

- Citizen Advisory Team (CAT) Recommendation – Slight Advantage to Corridor 2

Through a phased balloting procedure, the CAT meeting attendees recommended Corridor 2. The four CAT meetings were rotated through the four study counties and Morehead was scheduled for the last meeting. A number of the meeting attendees were from Rowan County, while other counties had fewer attendees and Lawrence County was not represented at all. In the final ballot for Corridor 2, most of the votes came from Rowan County representatives.

- Traffic Service – Big Advantage to Corridor 2

The Kentucky Statewide Traffic Model indicates that Corridor 2 would carry about 10,800 vehicles per day (vpd) in the future while Corridor 5 would only carry about 2,600 vpd. Much of the traffic along Corridor 2 would be vehicles that are diverted from KY 32 to the new road. Although the precision of these numbers may be in question because the traffic model is not particularly detailed in the study area, the magnitude of the difference indicates that Corridor 2 has a definite advantage in traffic service. Additional traffic forecasts completed in the future when more detailed data is available may indicate greater traffic volumes for Corridor 5. However, it is anticipated that any future traffic forecasts will continue to show Corridor 2 serving a greater traffic volume because of its direct connection to a larger population center with more services.

- Daniel Boone National Forest – Big Advantage to Corridor 5

Corridor 5 does not impact the National Forest. However, Corridor 2 passes through the Daniel Boone National Forest (DBNF) just east of Morehead. Another proposed project in the area, the Proposed Morehead Connector project, an eastern connection for Morehead to I-64 from US 60 in this same area, has not moved forward. The use of DBNF property for this connector has been protested by environmental interest groups who will likely oppose Corridor 2 as well. Corridor 2, similar to the connector, would require a new interchange at I-64 and require additional right of way within the DBNF. It is possible that the regional concept of Corridor 2 and its cross-county connection may provide more of a reason to go through the DBNF than the connector project. However, many of the environmental interest groups are concerned about taking any property from the National Forest for any reason.

### C. Recommendations

Based on the benefits expected from either corridor, it is recommended that two (2) alternatives be advanced for further consideration in the next phase of project development: Corridors 2 and 5. The recommended corridors are shown in **Appendix F**, and titled “Preferred Corridors.”

As mentioned above, it was agreed that Corridor 9 would not move forward for further consideration, since it generally serves approximately the same area as existing US 23 and does not meet the goal of providing a regional corridor through the project area. Although this corridor was not moved forward for further study, local interest was expressed for new access and connections in the eastern portion of the study area, and particularly in Grayson. It is recommended that a small urban study of the Grayson area be undertaken in the future to address these local concerns.

#### **D. Potential Design Criteria and Considerations**

Potential design criteria and considerations for the proposed KY 645 extension are noted here for planning purposes only, including construction sections, typical section and traffic forecast information. These criteria are general recommendations based upon the information gathered through this planning phase of study. Specific geometric parameters should be defined during future design phases of the project, once more detailed information is available.

##### **1. Construction Sections**

The Project Team identified priority sections for Corridors 2 and 5, beginning at the existing terminus of KY 645 at US 23 and moving northwest. Section priorities for the two preferred corridors are shown in **Appendix F**, and titled "Preferred Corridors." The first four priority sections are common to both Corridors 2 and 5:

- Priority 1 begins at US 23 near Ulysses and ends at KY 201 north of Davisville (about 9.9 miles). This section would be constructed on new alignment.
- Priority 2 begins at KY 201 and ends near Mazie, with a section length of about 7.7 miles. This section would be constructed primarily on new alignment.
- Priority 3 begins near Mazie and ends near the intersection of KY 32 and KY 706 at Isonville (about 5.2 miles). It may be possible to use portions of the existing KY 32 alignment in the construction of this section.
- Priority 4 begins near Isonville and ends near the intersection of KY 32 and KY 7 on the north side of Sandy Hook (about 4.9 miles). This section would be constructed primarily on new alignment, although consideration may be given to using the existing bridge over Laurel Gorge for this route, in order to reduce potential impacts on Laurel Creek.

The next three priority sections for Corridor 2 include the following:

- Priority 5 begins at the intersection of KY 32 and KY 7 and ends at KY 32, south of Elliottville. This section is about 9.5 miles in length. It may be possible to use portions of the existing KY 32 alignment in the construction of this section, although much of the route will likely be constructed on new alignment.

- Priority 6 begins at KY 32 on the south side of Elliottville and ends at the intersection of KY 32 and US 60 on the east side of Morehead (about 8.3 miles). It may be possible to use portions of the existing KY 32 alignment in the construction of this section.
- Priority 7 begins at the intersection of KY 32 and US 60 and ends at I-64 near milepoint 141 (about 3.5 miles). This section would be constructed primarily on new alignment and would include a new interchange with I-64.

The next three priority sections for Corridor 5 include the following:

- Priority 5 begins at the intersection of KY 32 and KY 7 and ends near the intersection of KY 504 and KY 1620 (about 7.2 miles). It may be possible to use portions of the existing KY 504 alignment in the construction of this section, including the existing crossing location of the Little Sandy River, near the mouth of Caney Creek.
- Priority 6 begins near the intersection of KY 504 and KY 1620 and ends near the intersection of KY 174 and US 60. This section is about 6.1 miles in length. It may be possible to use a combination of existing (KY 1620 and KY 174) alignment and new alignment in the construction of this section.
- Priority 7 begins near the intersection of KY 174 and US 60 and ends at Exit 156 on I-64 (about 3.0 miles). It may be possible to use portions of the existing KY 2 alignment as well as the existing interchange in the construction of this section.

## **2. Typical Section**

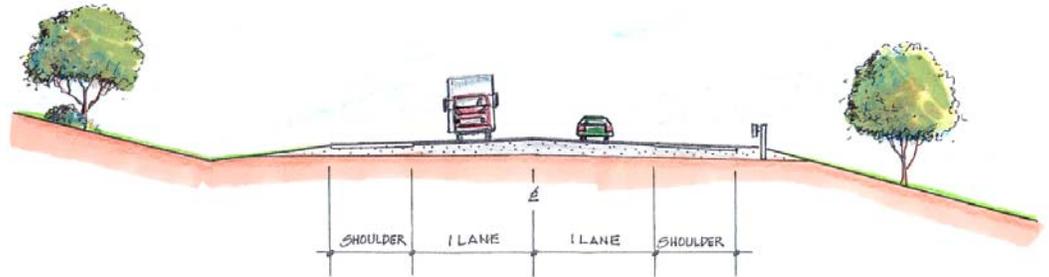
Based on the traffic forecasts, the typical section would include:

- Two (2) 12-foot lanes;
- Usable shoulder widths of 10 feet;
- Turning lanes, acceleration lanes, and truck-climbing lanes, where needed; and
- A design speed of 60-65 miles per hour.

Implementation of the guidelines in the KYTC's 2002 Pedestrian and Bicycle Travel Policy will ensure that bicycle and pedestrian issues are considered and accommodated throughout this project. Evaluation of the proposed KY 645 extension should consider accommodations for bicycle connectivity through use of a shoulder bikeway, which requires five feet of pavement outside the rumble strips.

According to the Kentucky Division of Traffic, Permits Branch, this project should provide for a partially controlled access facility, with access control fencing and all possible access points set on the plans in accordance with 603 KAR 5:120.

An artistic rendering of the two-lane section of the proposed corridor is shown below:



### 3. Traffic Forecast

Using the Kentucky Statewide Travel Demand Model and assuming that improvements are made throughout the corridor between US 23 and I-64, the Average Daily Traffic (ADT) along the improved sections of KY 645 in 2030 would range from:

- About 14,000 vpd at the southern terminus, and 10,300 vpd at the northern terminus, with a corridor average of about 10,800 vpd for Corridor 2; and
- About 8,600 vpd at the southern terminus, and 2,600 at the northern terminus, with a corridor average of about 1,800 vpd for Corridor 5.

Based on the 2025 No Build traffic forecast derived in **Chapter II**, the existing portion of KY 645 would have an ADT of approximately 9,900 vpd. For the No Build alternate, future 2025 traffic on other major routes and routes near the projected Corridors 2 and 5 would be as follows:

- Traffic along US 23 near the existing KY 645 terminus is expected to reach about 13,800 vpd.
- Between Lawrence County and Sandy Hook, traffic volumes on KY 32 are expected to range from about 500 vpd to 3,500 vpd near Louisa.
- Between Sandy Hook and Morehead, traffic volumes on KY 32 are forecasted to range from about 700 vpd in Elliott County to about 7,300 vpd on the eastern outskirts of Morehead.
- Between Sandy Hook and Olive Hill, traffic volumes on KY 504 and KY 174 range from about 500 vpd to 3,000 vpd near Olive Hill.
- On the western side of Olive Hill, near the terminus of Corridor 5, traffic on KY 2 is expected to average about 8,400 vpd.
- Traffic along US 60 between Olive Hill and Morehead ranges from about 4,700 vpd to about 13,900 vpd just east of Morehead.

**E. Phase Costs**

Preliminary cost estimates for each priority section are listed in **Table 14** below, including phase costs for design, right-of-way, utility relocation, and construction activities. Quantities estimated for the phase costs include the following:

- Two-lane roadway over 65% of the project length;
- Three-lane roadway for truck-climbing lanes over 35% of the project length;
- Major and minor bridge structures, and slope protection;
- Interchange construction;
- Light poles and high-mast lighting;
- Guardrail, end treatments, and barrier rail; and
- Drainage and erosion control.

The total cost of Corridor 2 is anticipated to be approximately \$413.1 million, with priority section costs ranging from about \$42.2 million to \$78.9 million. The total cost of Corridor 5 is anticipated to be about \$363.5 million, with section costs ranging from about \$25.5 million to \$78.9 million.

**Table 14. Phase Costs**

| Priority Section           | Length (miles) | Design (\$ million) | Right-of-Way (\$ million) | Utilities (\$ million) | Construction (\$ million) | Total Cost (\$ million) |
|----------------------------|----------------|---------------------|---------------------------|------------------------|---------------------------|-------------------------|
| <b>Common Sections</b>     |                |                     |                           |                        |                           |                         |
| 1                          | 9.9            | 3.9                 | 5.7                       | 4.2                    | 65.1                      | 78.9                    |
| 2                          | 7.7            | 3.1                 | 4.4                       | 3.3                    | 51.1                      | 61.9                    |
| 3                          | 5.2            | 2.2                 | 3.0                       | 2.2                    | 37.1                      | 44.5                    |
| 4                          | 4.9            | 2.1                 | 2.8                       | 2.1                    | 35.2                      | 42.2                    |
| <b>Corridor 2 Sections</b> |                |                     |                           |                        |                           |                         |
| 5                          | 9.5            | 3.8                 | 5.5                       | 4.0                    | 62.5                      | 75.8                    |
| 6                          | 8.3            | 3.3                 | 4.8                       | 3.5                    | 53.9                      | 65.5                    |
| 7                          | 3.5            | 2.2                 | 2.0                       | 1.7                    | 38.4                      | 44.3                    |
| <b>Total</b>               | <b>49.0</b>    | <b>20.6</b>         | <b>28.2</b>               | <b>21.0</b>            | <b>343.3</b>              | <b>413.1</b>            |
| <b>Corridor 5 Sections</b> |                |                     |                           |                        |                           |                         |
| 5                          | 7.2            | 3.0                 | 4.1                       | 3.1                    | 50.8                      | 61.0                    |
| 6                          | 6.1            | 2.5                 | 3.5                       | 2.6                    | 40.9                      | 49.5                    |
| 7                          | 3.0            | 1.3                 | 1.7                       | 1.3                    | 21.2                      | 25.5                    |
| <b>Total</b>               | <b>44.0</b>    | <b>18.1</b>         | <b>25.2</b>               | <b>18.8</b>            | <b>301.4</b>              | <b>363.5</b>            |

This study of the KY 645 corridor was scheduled in the FY 2002 (2000-06) Six Year Highway Plan, with committed funds of \$500,000. Subsequent phases of project development, including Design, Right-of-Way Acquisition, Utility Relocation, and Construction, are not scheduled in the most recent legislatively approved *Kentucky Six-Year Highway Plan FY 2005-2010*.

#### **F. Summary of Environmental Issues for Future Phases**

A number of issues related to environmental factors and sensitive land uses were identified through the course of this study that should be considered as this project moves into future phases. These issues have been discussed in greater detail throughout earlier portions of this report; however, several important issues include:

- US 23 is part of the Appalachian Development Highway System (ADHS) that was funded to promote economic and social development in the region. The location and design of the KY 645 project should further enhance economic and social development in the region. The Appalachian Regional Commission (ARC) would like to be involved throughout the project development process.
- In an agricultural resource-limited area, it is important to small farms that agricultural land is protected. The Kentucky Department of Agriculture, Office of Environmental Services, would like to see additional project information as the corridor is more clearly defined.
- There are several federally threatened and endangered species known to occur in Carter, Elliott, Lawrence, and Rowan Counties. In areas where gray bats are known to occur, any cave entrances (i.e. the right-of-way and regeneration sites) should be surveyed for potential use by gray bats. The federally endangered Indiana Bat (*Myotis sodalis*) also inhabits the project area. The Kentucky Department of Fish and Wildlife Resources (KDFWR) also offers recommendations to minimize potential impacts to aquatic resources.
- The United States Fish and Wildlife Service identifies three federally listed species within the proposed project area, including: the Indiana bat, the gray bat, and the Virginia big-eared bat. The project area should be surveyed for caves, rockshelters, and underground mines to identify and avoid impacts to potential habitats for the Indiana, gray, and Virginia big-eared bat.
- There are a number of species and unique natural areas identified by the Kentucky State Nature Preserves Commission (KSNPC) that occur within the project area, which could be potentially impacted by this project. Some preliminary issues of concern include: avoidance of current tracts of natural public land, including state Wildlife Management Areas and the Daniel Boone National Forest; presence of the Indiana bat in the project area; and forest fragmentation.
- The Kentucky Department of Park's interests lie in preserving the state's natural resources and recreational facilities; therefore, the Department suggests that the new route not infringe upon the Daniel Boone National Forest.

- The United States Department of Health and Human Services recommends that the following be considered and addressed during the NEPA process: air quality, water quality/quantity, wetlands and flood plains, hazardous materials/wastes, non-hazardous solid waste/other materials, noise, occupational health and safety, land use and housing, and environmental justice. Any health related topic which may be associated with the proposed project should receive consideration when developing the Environmental Impact Statement (EIS).
- The proposed highway project could have potential impacts on prime farmland soils and additional farmlands of statewide importance. If federal dollars are to be used to convert farmlands from agricultural to non-agricultural use, the appropriate form must be submitted to the United States Natural Resources Conservation Service (NRCS). The NRCS can provide assistance in identifying important farmlands in the proposed project area.
- Permits that will be necessary if there are stream or jurisdictional wetland impacts are the USACE Nationwide Permit #14 under Section 404 of the Clean Water Act and a 401 Water Quality Certification from the Kentucky Environmental and Public Protection Cabinet Division of Water (KEPPC-DOW).
- Impacts greater than those for a Nationwide Permit #14 will require an Individual Permit. Wetland encroachment with any placement of fill material will require cooperation with the KDOW and may require a 401 Permit. Under Section 404, a permit is needed to discharge dredged or fill material into any waters of the United States. A 401 certification is needed before conducting any activity that may result in a discharge of pollutant into the waters of the United States.
- These permits will be necessary before any activity occurs that obstructs or alters any of the waters of the United States, including navigable water and wetlands. The potential for 404 and 401 permits is present on all study corridors. Additional evaluations of these issues, along with avoidance, minimization, and mitigation measures will be required in subsequent project phases.
- There are a number of cemeteries documented or observed within the project area. Other cemeteries may be unmarked and are likely to be encountered during construction in this area.
- The Kentucky Heritage Land Conservation and the City of Olive Hill are working to preserve a 220-acre area, approximately two miles northwest of Olive Hill in Carter County. The Olive Hill Preservation Project would provide a vegetated buffer that enhances the water quality for the Olive Hill Reservoir. The property also provides suitable habitat for Rafinesque's big-eared bat, the Indiana bat, the gray bat, black bear, and eight (8) endangered/threatened plants.
- Special use waters represent only 0.2 percent of the stream miles in the Commonwealth, and are worthy of the highest environmental protections. Caney Creek and Laurel Creek are the only two streams

of this caliber in the eastern section of the state. These streams are Cold Water Habitats, Exceptional Waters and Reference Reach Streams. These streams are so sensitive to environmental impacts that they should be avoided.

### **G. Construction Considerations**

A number of issues were identified through the course of this study that should be considered as part of future construction phases. Potential issues related to the construction of the proposed corridor include:

- In the interest of minimizing impacts to the Laurel Gorge area, future consideration should be given to using the existing gorge crossing on KY 7 northeast of Sandy Hook.
- The proposed project will potentially cross several critical transmission and distribution lines for American Electric Power (AEP) in the project area. It will be very important to monitor and coordinate the development of this project to avoid and minimize any negative impacts. AEP would like to be informed as the project proceeds.
- According to the Kentucky Environmental and Public Protection Cabinet, Division of Air Quality, the following Kentucky Administrative Regulations apply to the proposed project: 1) 401 KAR 63:010 Fugitive Emissions; 2) 401 KAR 63:005 Open Burning; 3) the Clean Air Act; and 4) Title 23 and Title 49 of the United States Code. Applicable regulations in the local governments should also be considered.
- The Kentucky Division of Waste Management has requested that Pulverized Glass Aggregate (PGA) be used in roadbed construction for this project. Rowan County already has a pulverizer and would be a reliable source for the PGA.
- According to the Kentucky Geological Survey, this project could encounter the following: karst features; pre- or post-landslide hazards; underground mining areas that may be susceptible to subsidence; unconsolidated sediments at or near stream drainage; resource conflicts such as prior ownership of property for clay, coal, limestone and ironstone; oil and gas wells; materials suitable for construction or other economic value; faults; and earthquake ground motion of 0.09g to 0.19g.
- The United States Army Corps of Engineers, Huntington District, requests involvement in the NEPA process throughout the development of this project to ensure requirements of the Corps of Engineers and Federal Highway Administration are met. Easements will be required from the Corps to authorize construction, operation, and maintenance of the road if located on Government property. Section 10 of the River and Harbors Act of 1899 and Section 404 of the Clean Water Act must also be considered.
- According to the United States Fish and Wildlife Service, excessive sedimentation during construction can be prevented through Best Management Practices (BMPs). Tree removal should be completed

in a time-wise manner to avoid impacts to summer roosting Indiana bats.

- Based on the geotechnical overview for the study area, there is evidence of surface (strip) mining, deep mine adits (openings), and quarries within the proposed corridors. Also, there is evidence of flint clay mining by stripping and underground mining. Strip mined areas have inherent problems (poor backfilling practices, random fill particle size, inadequate fill placement/ compaction procedures, and acid mine drainage). Underground mined areas carry a risk of subsidence or sudden collapse due to the old mine works.
- Further refinement of the project corridor should avoid strip or underground mined areas, and oil and/or gas wells due to the inherent problems associated with these. Also, the most favorable corridor should avoid problematic geology areas (such as the Conemaugh or Monongahela Formations) and be along the up-dip side of side hill cut areas to lessen the possibility of groundwater and slope instability problems.
- The Walbridge Fault, the Little Sandy Fault, and some un-named faults are present on the geologic maps. It is advisable for the corridors to cross faults in a perpendicular manner.
- Deep cut slopes in rock are expected for this project. Cut slopes in massive, durable sandstone or limestone are typically stable on cut slope angles greater than  $\frac{1}{4}$ H:1V. Cut slopes in durable shale, poor limestone, or fractured sandstone are typically less stable and require cut slope angles at  $\frac{1}{2}$ H:1V. Cut slopes in non-durable shale will require even flatter cut slopes – typically flatter than  $\frac{1}{2}$ H:1V.
- Pre-splitting will likely be required below the rock disintegration zone (RDZ). An overburden bench and flattened cut slopes will be required above the RDZ.
- No geotechnical work has been performed to-date for this project. Rock coring and a geologic evaluation will be required before specific cut slope recommendations can be presented. However, it should be noted that shales from the Monongahela Formation, Conemaugh Formation, Pennington Formation (Upper Mississippi Rocks), Crider Clay bed, or New Providence Shale (Borden Formation) will likely require 2H:1V cut slopes due to their very poor engineering properties.
- Fill for embankments will likely consist primarily of shot rock from the Breathitt Formation, Lee Formation, Newman Limestone, Borden Formation, Carter Cave Sandstone, Muldraugh Formation, Brodhead Formation, Conemaugh Formation or the Monongahela Formation. Shot rock fill can be placed according to requirements as specified in the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction (latest edition). However, it should be noted that shales from the Monongahela Formation, Conemaugh Formation, Pennington Formation (Upper Mississippi Rocks), Crider Clay bed, or New

Providence Shale (Borden Formation) will likely require 3H:1V fill slopes due to their very poor engineering properties.

- Shrink/swell of newly placed fill should not be of significant concern in most areas. Newly placed fill will need to be placed with proper moisture controls and compaction. However, consolidation of soft, alluvial soils near the valley bottoms may present some settlement concerns for embankments or for box culverts or other drainage structures. Undercutting and stabilization of soft/wet alluvial soils will likely be required when the roadway crosses alluvial areas.
- A mixture of soil and shot rock fill is expected to be used for the majority of the roadway subgrade. The roadway subgrade could be constructed with durable rock if a more stable road base is desired. The local geology suggests that there may be some durable limestone or sandstone available within certain portions of the proposed corridors; however, there will not likely be sufficient volume to provide a durable rock roadbed without importing additional material.
- It is recommended that the selected corridor avoid contour strip or deep mined areas if possible. Acid mine drainage is of concern for these areas and could be encountered either from new cuts or from old mined areas. Special construction considerations such as limestone lined ditches may be required to mitigate the acid mine drainage. Additionally, cuts extending across deep mined areas may need to be over-excavated to the base of the coal seam elevation and backfilled to eliminate the possibility of future subsidence.
- Groundwater seeps or springs should be expected in down-dip cut areas, especially those cuts that intersect the soil/rock interface. Special construction considerations will likely be required to collect and pipe groundwater in these areas if significant groundwater flows are anticipated or encountered.
- A mixture of soil and shot rock fill is expected to be used for fill slopes, thus the fill slopes will need to be engineered based upon the shear strength parameters of the applicable fill material. Rock toe buttresses may be required at the toe of fill slopes in deep alluvium soil areas.
- Box culverts (or other minor structures) can probably be located on shallow foundations bearing on either soil or rock. Bridge foundations will need to bear on rock, either shallow foundations on rock or driven steel piling or drilled shafts. A detailed geotechnical exploration is warranted for each structure to assess the foundation bearing conditions.
- All four counties are designated as seismic design category "B" according to these tables. Seismic design category B is defined as areas where slight to moderate damage occurs.

## **VIII. ACKNOWLEDGEMENTS AND CONTACTS**

A number of individuals are responsible for the success of this important project. This study would not have been possible without the time, effort, and knowledge of these individuals:

- Each member of the Citizens' Advisory Team is greatly appreciated for their time, effort, and commitment to this project. This group provided local information that proved invaluable to this study and volunteered their time and talents to make this project a success.
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- Additional information regarding the KY 645 Regional Corridor Study can be obtained from the following KYTC Division of Planning staff members:
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