

KY 32 Alternatives Study

KY 32 between KY 504 at Elliottville (Rowan County)
and KY 7 at Newfoundland (Elliott County)

Item No. 9-192.00



FINAL REPORT
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**KY 32 ALTERNATIVES STUDY
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1. INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) has undertaken this Alternatives Study to consider the the reconstruction, relocation, or realignment of KY 32 between KY 504 at Elliottville in Rowan County and KY 7 at Newfoundland in Elliott County.

The purpose of this study is to:

- Identify known issues, concerns, and constraints, including safety, traffic, socioeconomic, environmental, geotechnical, and engineering considerations.
- Develop preliminary “purpose and need” and goals for the proposed project.
- Listen to and share information with local officials, government agencies, other interested parties, and the public.
- Develop and evaluate improvement concepts for KY 32 based on project purpose and need, including short-term “spot” improvements along the existing route.
- Make project recommendations for short-term and long-term improvements, as needed.

Through this Alternatives Study, the KYTC ensures that any future project improvements to KY 32 effectively address transportation needs and lays the groundwork for project development decisions to meet federal requirements as defined in the National Environmental Policy Act (NEPA).

A. Background

The KY 32 Alternatives Study was identified in the *Kentucky Enacted Six-Year Highway Plan FY 2006-2012* (generally referred to as the *Six-Year Plan*) as Item No. 9-192.00.

B. Project Location

The proposed project, shown in **Figure 1.1**, includes the existing roadway between KY 504 at Elliottville in Rowan County and KY 7 just east of Newfoundland in Elliott County, and extends to the north and east in the vicinity of KY 649, to the west almost to KY 173 and ending at KY 7 near the western Sandy Hook city limits, and to the south at the KY 7/KY 32 intersection just east of downtown Sandy Hook.

KY 32 is a major roadway in eastern Kentucky that connects Elliott County and other southeastern Kentucky counties with I-64, shops, resources, facilities, and services in or near the city of Morehead in Rowan County, including Morehead State University. In the East Kentucky region, KY 32 begins at Louisa in Lawrence County at the eastern boundary of Kentucky with West Virginia and extends westward past Yatesville Lake through Blaine, Sandy Hook, and Morehead. KY 32 also provides access to US 23, a major north-south corridor, which in turn provides access to and from the communities of Jenkins, Pikeville, Prestonsburg, Paintsville, and their surrounding areas, including tourist and recreational facilities at Fishtrap Lake, Jenny Wiley State Park and Paintsville Lake. From Morehead, KY 32 extends northward to Flemingsburg, goes eastward through Carlisle and Cynthiana, intersecting US 25 and I-75 near Sadieville, and then southward until it ends at US 62 at Georgetown in Scott County.

C. Study Area

The KY 32 corridor is not extensively developed. The study area is rural in nature with single family homes, family farms, cemeteries and churches scattered along the corridor.

Farmland is the majority land use in the study area. Agricultural land uses in the study area are a mixture of pasture, crops and subsistence gardens. Almost half (48.5%) of the 50,825 acres of Rowan County farmland are used for crops. Rowan County ranks 90th out of Kentucky's 120 counties in terms of the total value of agricultural products sold. On the other hand, only 37% of the farmland in Elliott County is used for crops. Elliott County ranks 98th out of Kentucky's 120 counties in terms of the total value of agricultural products sold.

Some small businesses and single and multifamily residential developments are concentrated at each end of the corridor in Newfoundland and Elliottville. A few small businesses and several homes are scattered along KY 32 and its crossroads. The study area also includes several churches and numerous cemeteries.

In the immediate study area, the corridor is used by commuters and residents to reach major destinations such as Morehead State University and Cave Run Lake in Rowan County and the Correctional Institute, Grayson Lake, and the county seat of Sandy Hook in Elliott County.

The eastern terminus of the proposed project is at KY 7, which is part of the proposed Ashland to London Corridor that passes through eight of the most economically deprived counties in the state, including Elliott County. One of the goals of that corridor is to improve access to the region to enhance economic development opportunities in those counties. The Ashland to London corridor is comprised of many segments of various routes that have been improved, are programmed, or are part of a long-range plan for future improvement.

D. Transportation Facilities

A crude oil pipeline crosses the study area just southeast of Elliottville. The pipeline belongs to Marathon Ashland Pipe Line, LLC.

There is no rail service in the immediate area since all former east-west rail lines near the study area were abandoned after that opportunity was authorized for "unprofitable" rail lines by the passage of the Staggers Rail Act in 1981. The nearest rail service is provided via the CSX Transportation rail facilities located in the Ashland and Winchester areas. There are also numerous water transportation freight facilities on the Big Sandy River and Ohio River in the Ashland area, including the newly created Greenup-Boyd County public riverport at Raceland to the east and the Maysville-Mason County public riverport to the north.

The nearest commercial airport and air cargo services are located at the Tri-State Airport in Huntington, West Virginia located approximately 47 miles from Sandy Hook. The nearest general aviation airport is the Morehead-Rowan County Airport near Farmers, Kentucky, which has a 5,500-foot asphalt runway with lights and a VOR navigation system. General aviation services for the east Kentucky region are also provided at the Ashland Regional Airport located at Raceland, about 54 miles from Sandy Hook. The Ashland Airport has a 5,602 foot runway, lights, and a VOR navigation system; and it is capable of housing and providing fuel for small jet aircraft. Another nearby general aviation airport at Olive Hill has a 2,500 foot asphalt runway and minimal services.

KY 32 is used as a school bus route to pick up and deliver students to and from elementary, middle, and high schools in both Elliott and Rowan counties. No regularly scheduled fixed route public transit system serves the immediate study area. The nearest local cab service is available in the Morehead area.

Human service transportation delivery for medical trips in the study area is provided by the LKLP Community Action Council through its subcontractor, Medicab, located in Sandy Hook. Currently, Medicab provides about 3 to 5 medical trips a day for wheelchair patients

between Sandy Hook and Morehead. However, for patient comfort, Medicab does not use KY 32 because of the winding road conditions. Instead, patients are driven via KY 7 eastward to I-64 at Grayson and then back westward on I-64 to Morehead. Each trip is about 65 miles, as compared to an approximately 28-mile trip if this service could be comfortably provided via KY 32.

The nearest long-distance passenger transportation facilities are the Greyhound Transportation bus terminal and Amtrak passenger rail terminal at Ashland, located approximately 45 miles from Sandy Hook. There is also a Greyhound terminal located at Lexington, approximately 96 miles from Sandy Hook. The Ashland Amtrak terminal is one of three Kentucky stops on Amtrak's Cardinal route that connects Chicago to Indianapolis, Cincinnati, Charleston, Washington, Baltimore, Philadelphia, and New York. The other two Kentucky Amtrak stations at South Portsmouth/South Shore and Maysville are also relatively close to the study area.

E. Socioeconomic Characteristics

The Kentucky State Data Center estimated the population of Elliott County in 2008 to be 7,280, including 723 in the City of Sandy Hook. Population projections indicate that Elliott County will have a 2030 population of about 9,680, an approximate increase of 33 percent over the next 20 years. The 2008 population estimate for Rowan County was 22,733, including 7,707 in the City of Morehead. Population projections indicate that Rowan County will have a 2030 population of about 25,690, an approximate increase of 10 percent over the next 20 years.

According to the Kentucky Cabinet for Economic Development, Rowan County had an available civilian labor force of 12,196 individuals in the year 2007 while Elliott had 3,026. This compares with a 2006 employment of 13,009 and 1,859, respectively, showing a slight surplus of available jobs in Rowan, but a scarcity of jobs in Elliott. For that reason, approximately 40% of Elliott County workers commute outside the county for employment, according to the 2000 Census, with most of those for jobs in Carter County (16.7%) and Rowan County (15.9%). This compares to 18.8% of Rowan County workers commute outside the county, with most of those going to Montgomery County (4.0%), Fayette County (3.0%), and Morgan County (1.8%).

In 2006, Elliott County had a per capita personal income (PCPI) of \$16,439. This PCPI ranked 119th in the state and was 55 percent of the state average of \$29,729 and 45 percent of the national average of \$36,714. In 2006, Rowan County had a per capita personal income (PCPI) of \$21,758. This PCPI ranked 81st in the state and was 73 percent of the state average, \$29,729, and 59 percent of the national average, \$36,714.

According to the US Bureau of Labor Statistics, total 2006 employment in Elliott County was 1,824, with a relatively high farm employment. The top employment sectors (and the percent employed in each) for jobs in Elliott County were as follows:

1. Government & Government Enterprises (30.5%), which includes the Little Sandy Correctional Complex
2. Farm Employment (26.9%)
3. Other Services, except Public Administration (8.8%)
4. Health Care & Social Assistance (7.7%)
5. Retail Trade (6.5%)

According to the US Bureau of Labor Statistics (BLS), total 2006 employment in Rowan County was 12,925, with approximately 3.7% farm and 96.3% non-farm employment. The

BLS shows the top employment sectors (and percent employed in each) for jobs in Rowan County for which data was disclosed, as follows:

6. Government & Government Enterprises (24.7%)
7. Retail Trade (12.7%)
8. Accommodation & Food Services (8.6%)
9. Manufacturing (8.1%)
10. Other Services, except Public Administration (4.7%)
11. Transportation & Warehousing (4.3%)

However, data was not disclosed by BLS for some employment sectors in Rowan County to preserve confidentiality. Of special note are educational services and health services, which would include two major employers: respectively, Morehead State University with approximately 1,100 employees and St. Claire Regional Medical Center, the second largest employer in the region, with approximately 1,300 employees in Rowan and four other nearby counties. It is assumed that the Morehead State University employment data is included as part of Government & Government Enterprises.

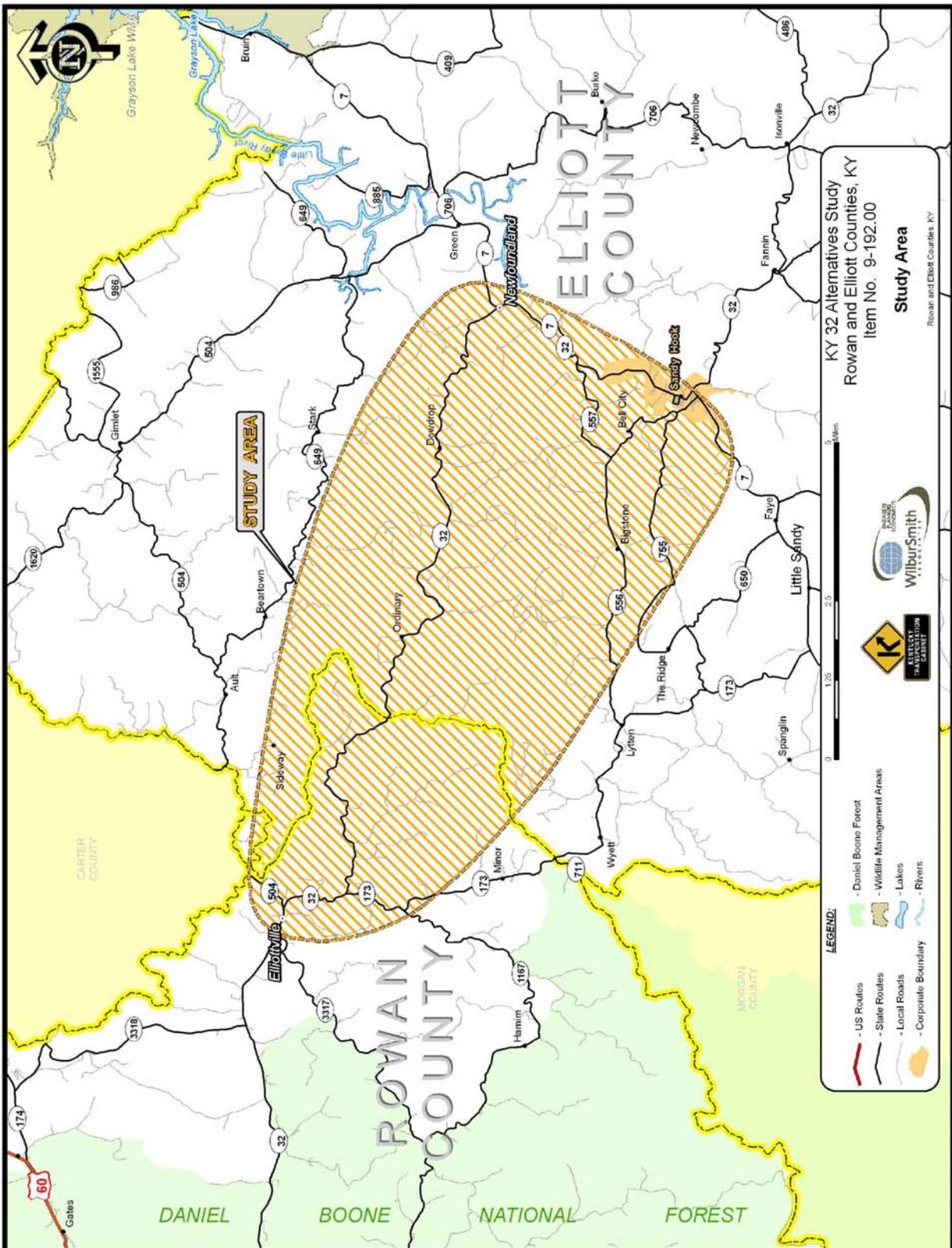
Tourism is also of major economic interest in and near the study area, with an emphasis on ecotourism, agritourism, and recreation. Approximately nine miles from the intersection of KY 32 and KY 7 is Grayson Lake State Park, located in Elliott and Carter counties. This state park offers outdoors recreation and other services, including hiking, boating, fishing, a wildlife management area, lodging facilities, and dining services. Also in Elliott County is the Laurel Gorge Cultural Heritage Center located at Newfoundland just off KY 32 on Laurel Curves Road. The center offers hands on education on the surrounding environment and diversity of the Appalachian foothills community. The Center is the beginning point of the Laurel Gorge Hiking Trail. There is also a significant crafts industry in the Elliott County area, and KY 32 is one of the routes promoted locally as one of the Kentucky Quilt Trails in this region. Local crafts and folk art are on display at the Laurel Gorge Center.

KY 32 is a major motorcycle tourism route, largely because of the numerous sharp curves along the route and the local connection to the late country singer, Keith Whitley, a Sandy Hook native and an avid motorcyclist, who died in 1991 at the age of 33. One of the major events in the area is the annual Keith Whitley Memorial Motorcycle Ride, which began in 1991. The Motorcycle Ride begins in Sandy Hook and terminates in Nashville, Tennessee.

F. Programming and Schedule

Funds totaling \$33,850,000 for planning, design, right-of-way, utility relocation, and construction are set aside in the *Six-Year Highway Plan FY 2008-2014*, with construction scheduled for 2014.

Figure 1.1 – Study Area



2. EXISTING CONDITIONS

Characteristics of KY 32 and the other state highways in the study area are identified in the following sections. Information is included about highway systems, geometric characteristics, bridges, traffic conditions, crash history, and planned highway improvements. Roadway information is summarized from the KYTC Highway Information System (HIS) database. Photographs of some features in the study area are contained in **Appendix A**.

Portions of project area roadways considered as part of this analysis are presented in **Table 2.1**. These roadways were selected because they were deemed most important to the overall transportation system in the study area. Specifically, they are the primary traffic carriers within the project area. In addition, portions of these roadways could become part of a proposed improvement between Elliottville and Newfoundland. In some cases, maps and tables may include roadway segments that fall outside the segments defined in **Table 2.1**.

Table 2.1 – Major Study Area Routes

| County | Route | Begin Milepoint | Begin Milepoint Description | End Milepoint | End Milepoint Description |
|---------|---------|-----------------|-----------------------------|---------------|---------------------------|
| Rowan | KY 32 | 16.21 | KY 3317 | 21.64 | Rowan-Elliott County Line |
| Elliott | KY 32 | 0.00 | Rowan-Elliott County Line | 8.66 | KY 7 |
| Rowan | KY 504 | 0.00 | KY 32 | 0.83 | Rowan-Carter County Line |
| Rowan | KY 173 | 2.78 | KY 1167 | 3.88 | KY 32 |
| Rowan | KY 3317 | 4.63 | 0.50 mi. beyond KY 32 | 5.13 | KY 32 |
| Elliott | KY 7 | 10.70 | 0.25 mi. beyond KY 32 | 11.20 | 0.25 mi. beyond KY 32 |

A. Highway Systems

Major highway systems information is shown in **Table 2.2**, including the State Primary Road System, Functional Classification System, National Highway System (NHS), National Truck Network (NN), Designated Truck Weight Class, and others. Major highway systems information is summarized here:

- State-maintained roads in Kentucky are categorized under the State Primary Road System, ranging from the highest order classification to the lowest as follows: State Primary Routes, State Secondary Routes, Rural Secondary Routes, 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 that can be distinguished by high traffic-carrying capacity. These routes link major urban centers within the state and/or serve as major regional corridors.

The study portion of KY 32 is currently classified as a State Secondary Route. These are shorter distance routes of regional significance that provide both access to land use activity and mobility as their functions. These routes generally serve smaller cities and county seats within a region.

Table 2.2 - Highway Systems

| County | Route | State Primary System | National Truck Network (NN) | National Highway System (NHS) | Functional Classification | Truck Weight Class | Appalachian Development Highway System | Bike Route | Coal Haul (annual tons) | Extended Weight System | Forest Highway System | Scenic Byway System |
|---------|---------|----------------------|-----------------------------|-------------------------------|---------------------------|--------------------|--|------------|-------------------------|------------------------|-----------------------|---------------------|
| Rowan | KY 32 | State Secondary | State Designated | No | Rural Major Collector | AAA | No | No | N/A | N/A | No | No |
| Elliott | KY 32 | State Secondary | No | No | Rural Major Collector | AAA | No | No | N/A | No | No | No |
| Rowan | KY 173 | Rural Secondary | No | No | Rural Major Collector | AAA | No | No | N/A | N/A | No | No |
| Rowan | KY 504 | Rural Secondary | No | No | Rural Minor Collector | A | No | No | N/A | N/A | No | No |
| Rowan | KY 3317 | Rural Secondary | No | No | Rural Local | A | No | No | N/A | N/A | No | No |
| Elliott | KY 7 | State Primary | No | No | Rural Minor Arterial | AAA | No | No | N/A | No | No | No |

Source: KYTC/HIS database, April 2008

- One of 13 functional classification categories is assigned to each state-maintained road in Kentucky, based on the function that each 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, Rural Minor Collector, Urban Collector, Rural Local, and Urban Local.

The study portion of KY 32 is classified as a Rural Major Collector. Collectors serve primarily inter-county rather than statewide travel, with travel distances shorter than on arterial routes. Rural Major Collectors link county seats, large towns and other traffic generators of inter-county importance. They also link these areas to nearby larger cities.

- The National Highway System (NHS) was first established in 1991 by the Intermodal Surface Transportation Efficiency Act. It includes the Interstate Highway System and other significant Principal Arterial roads important to the nation's economy, defense, and mobility. There are no NHS routes in the study area.
- The National Truck Network (NN) includes roads specifically 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 trailers per truck). The study portion of KY 32 does not include any NN routes.
- Kentucky Revised Statutes impose weight limits on the state-maintained highway system. There are three weight classification limits: AAA – 80,000 lbs. maximum gross vehicle weight; AA – 62,000 lbs. maximum gross vehicle weight; and A – 44,000 lbs. maximum gross vehicle weight. [NOTE: For special circumstances, occasional exceptions may be granted for over-dimensional or overweight vehicles by permits issued by the KYTC, Division of Motor Carriers.] The study portion of KY 32 has a weight classification limit of AAA.
- There are no state-designated bicycle routes or scenic byways in the study area.

B. Geometric Characteristics

Geometric characteristics for major routes in the study area are shown in **Table 2.3**, including the number of lanes, lane widths, shoulder widths, shoulder type, route speed limits, roadway type, local terrain, and pavement type. The study portion of KY 32 has the following characteristics:

- A combination of two 9-to-10-foot lanes with an undivided cross-section
- Shoulders of combination type from 2 to 4 feet wide
- Rolling and mountainous terrain
- High flexible pavement
- Posted speed limit of 55 mph



Typical view along KY 32

The significance of this data is addressed in the discussion of the project purpose and need in **Chapter 7**.

Table 2.3 - Geometric Characteristics

| County | Route | Begin MP | End MP | Length (miles) | Number of Lanes | Lane Width (feet) | Shoulder Width (feet) | Shoulder Type | % Passing Sight Distance | Speed Limit (mph) | Terrain Type | Pavement Type |
|---------|--------|----------|--------|----------------|-----------------|-------------------|-----------------------|---------------|--------------------------|-------------------|--------------|------------------|
| Rowan | KY 32 | 16.213 | 17.797 | 1.584 | 2 | 10 | 4 | Combination | 0% | 55 | Rolling | High Flexible |
| Rowan | KY 32 | 17.797 | 21.636 | 3.839 | 2 | 10 | 2 | Combination | 0% | 55 | Mountainous | High Flexible |
| Elliott | KY 32 | 0.000 | 8.656 | 8.656 | 2 | 9 | 2 | Combination | N/A | 55 | N/A | High Flexible |
| Rowan | KY 173 | 2.779 | 3.883 | 1.104 | 2 | 9 | 1 | Earth | 10% | 55 | Mountainous | High Flexible |
| Rowan | KY 504 | 0.000 | 0.828 | 0.828 | 2 | 9 | 4 | Stabilized | N/A | 55 | Rolling | Mixed Bituminous |
| Elliott | KY 7 | 10.698 | 11.198 | 0.500 | 2 | 12 | N/A | N/A | N/A | 55 | N/A | High Flexible |

Note: Data not available for KY 3317

Source: KYTC HIS database, April 2008

C. Bridges

According to the KYTC, a bridge structure is eligible for federal rehabilitation funds when it meets two criteria: the bridge has a sufficiency rating below 50.0 and the bridge is considered either structurally deficient or functionally obsolete. Structurally deficient means that the bridges cannot carry the weight they were originally designed to carry. Bridges are considered functionally obsolete if they do not meet current geometric design standards.

There are no structures along the study portion of KY 32. One structure (Bridge No. 103B00086) is located along KY 3317 at MP 5.13. It is 30 feet long with one span of pre-stressed concrete box beam or girders. It has a sufficiency rating of 83.9 and was not listed as structurally deficient or functionally obsolete in KYTC's *Bridge Inventory* (March 2006).

D. Traffic and Operational Measures

Existing (Year 2008) and estimated future (Year 2030) traffic and operational conditions for study area routes were identified and are discussed in the following subsections.

Existing Traffic Volumes (Year 2008)

Existing traffic volumes (Year 2008) for study area routes were summarized based primarily on information provided in the HIS database. Existing truck percentages were determined for the study area routes by using the KYTC default values based on the functional classification of the segment. Year 2008 traffic characteristics for all major state routes in the study area are shown in **Table 2.4** and **Figure 2.1**. Traffic volumes along existing KY 32 in the study area range between 470 and 3,670 vehicles per day (vpd). Existing truck percentages are approximately 5 percent of the total traffic along the study route.

Existing Level of Service (Year 2008)

The 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. Individual levels of service characterize these conditions in terms of speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six 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 LOS F as 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.

The study portion of KY 32 in Rowan and Elliott counties operates at LOS B to LOS C. **Table 2.4** and **Figure 2.1** show the existing LOS calculated for segments of KY 32.

Estimated Future Traffic (Year 2030) Based on Historic Growth

Year 2030 traffic was estimated using a growth rate based on KYTC's historic traffic counts for study area routes. Future transportation improvements were considered. Traffic along KY 32 was forecast with a compounded annual growth rate of 2.0 percent through Year 2030, resulting in an increase of nearly 50 percent from 2008 to 2030. Projected future year traffic volumes are shown in **Table 2.4** and **Figure 2.2**.

Estimated Future Level of Service (Year 2030) Based on Historic Growth

Level of Service is expected to remain the same along the study portion of KY 32 through the Year 2030 except for two segments (MP 17.797 to MP 18.489 in Rowan County and MP 7.633 to MP 8.656 in Elliott County). These two segments are expected to go from a LOS B to LOS C through the Year 2030. The estimated future LOS is shown for the study area in **Table 2.4** and **Figure 2.2**.

Table 2.4 - Traffic Characteristics

| County | Route | Begin MP | End MP | % Trucks | 2008 ADT | 2008 LOS | Growth Rate | 2030 ADT | 2030 LOS |
|---------|---------|----------|--------|----------|----------|----------|-------------|----------|----------|
| Rowan | KY 32 | 16.213 | 16.619 | 5.0% | 3670 | C | 2.0% | 5670 | C |
| Rowan | KY 32 | 16.619 | 17.797 | 5.0% | 2410 | C | 2.0% | 3730 | C |
| Rowan | KY 32 | 17.797 | 18.489 | 5.0% | 1000 | B | 2.0% | 1550 | C |
| Rowan | KY 32 | 18.489 | 21.636 | 5.0% | 472 | B | 2.0% | 730 | B |
| Elliott | KY 32 | 0.000 | 7.633 | 3.5% | 488 | B | 2.0% | 750 | B |
| Elliott | KY 32 | 7.633 | 8.656 | 3.5% | 956 | B | 2.0% | 1480 | C |
| Rowan | KY 504 | 0 | 0.828 | 5.0% | 900 | N/A | 1.0% | 1220 | N/A |
| Rowan | KY 173 | 2.779 | 3.883 | 0.0% | 1530 | N/A | 1.0% | 1900 | N/A |
| Rowan | KY 3317 | 4.632 | 5.132 | 0.0% | 193 | N/A | 1.0% | 240 | N/A |
| Elliott | KY 7 | 10.698 | 10.948 | 5.0% | 3300 | N/A | 2.5% | 5680 | N/A |
| Elliott | KY 7 | 10.948 | 11.198 | 5.0% | 3090 | N/A | 2.5% | 5320 | N/A |

Figure 2.1 – 2008 Average Daily Traffic and Level of Service

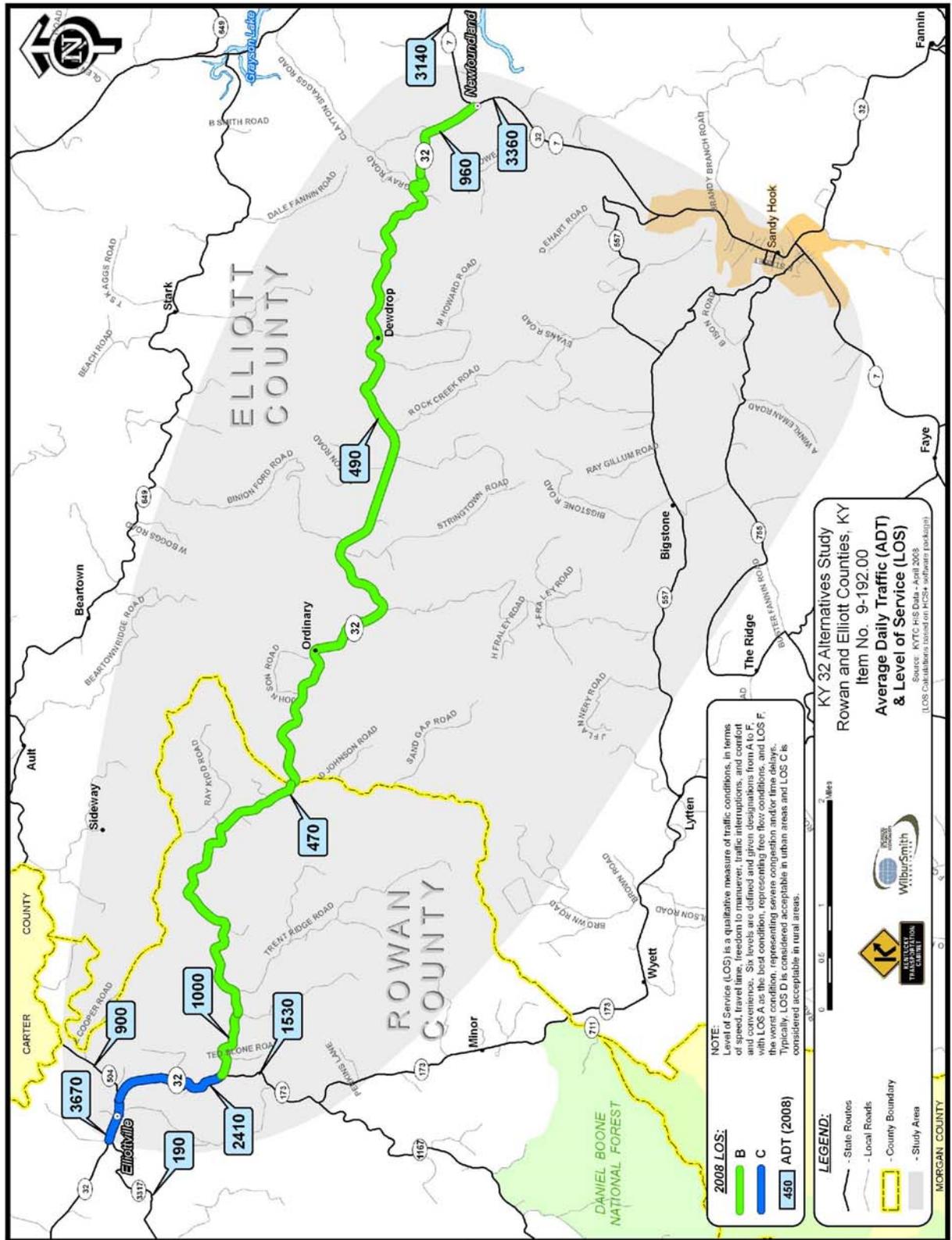
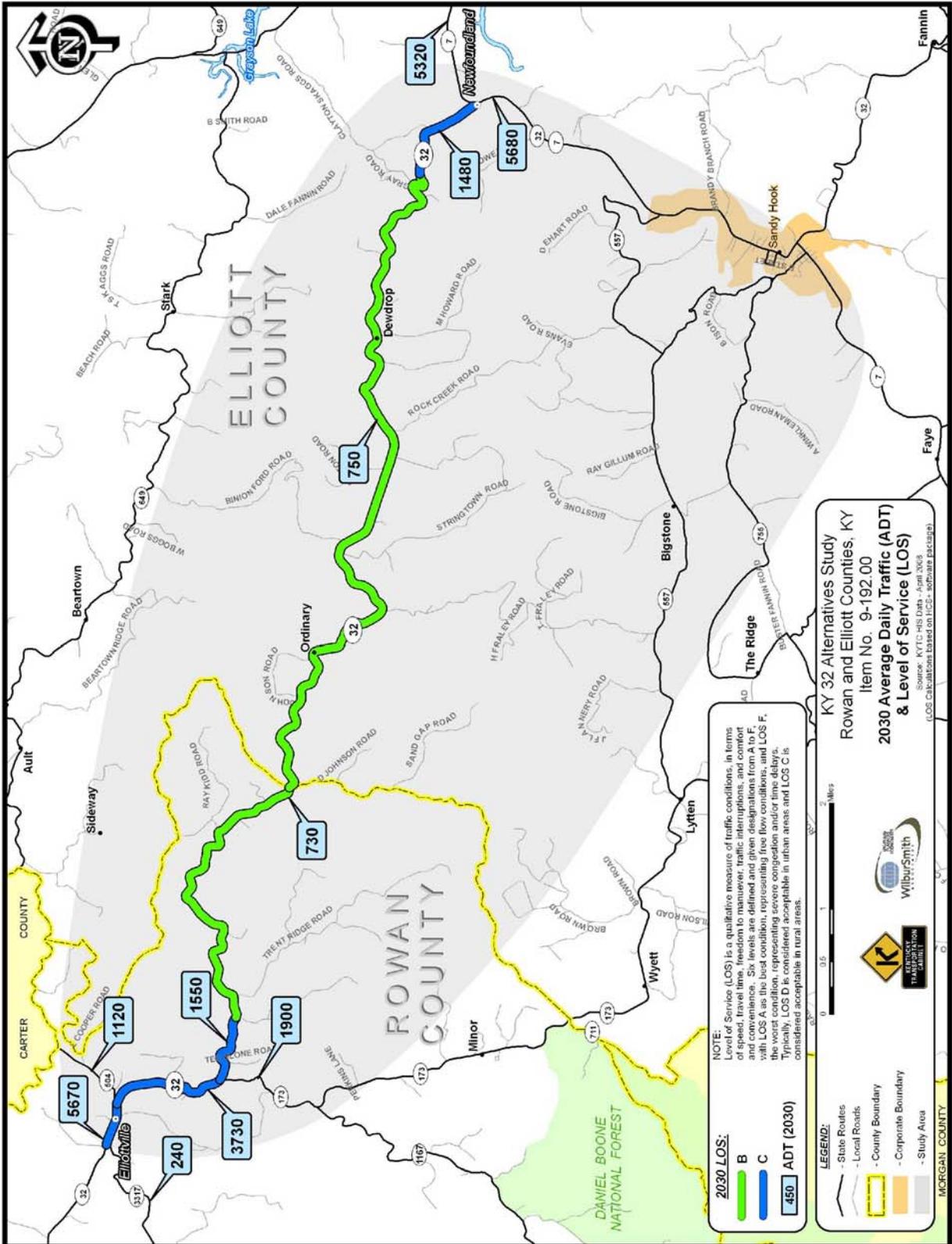


Figure 2.2 – 2030 Average Daily Traffic and Level of Service



E. Crash Analysis

Crash records were collected from KYTC for major state routes in the project area between March 2004 and December 2007. The location of crashes are shown by either corridor segment or by spot locations (0.1 miles in length) in **Table 2.5**.

A spot location or segment of roadway is considered to be a high crash location when its crash rate is higher than the average crash rate for similar roads in the state. This is measured by the critical rate factor (CRF), the ratio of the crash rate for the spot or segment compared to the critical crash rate for similar roads.

When the CFR is greater than 1.0, crashes may not be occurring randomly at a given location, so additional investigation is warranted to determine if the crashes may be due to roadway deficiencies. The CFRs are based on formulas published by the Kentucky Transportation Center.

Figure 2.3 displays the severity and location of crashes, identified high crash spots (CRF > 1.0), and other crash details. As shown, two high crash spots were identified along the study portion of KY 32. This is depicted for each study route spot, as shown in **Table 2.5**.

As part of the crash analysis process, each crash was classified into one of three categories based on the degree of severity: fatal, injury, or property-damage-only. During the period studied, one fatal, 15 injury, and 32 property-damage-only crashes were reported along the study portion of KY 32.

The significance of this data is addressed in the discussion of the project purpose and need in **Chapter 7**.

F. Adequacy Ratings

The KYTC HIS database provides an adequacy rating percentile for many major routes. The composite rating is based on the condition, safety, and service component scores of the route, as described below:

- The Condition Index, based solely on the condition of the road's pavement
- The Safety Index, based on lane width, shoulder width, median widths, alignment, and critical CRF
- The Service Index, based on the route's volume-to-capacity (V/C) ratio and access control

Table 2.6 and **Figure 2.4** depict 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 group, this indicates that a problem may exist that merits further investigation.

As shown in the figure and table, the ratings for the majority of the study area are either in the lowest percentile (0 percent to 24.9 percent) or the second lowest (25 percent to 49.9 percent).

Safety is the primary category affecting the lower ratings for KY 32, followed by pavement condition.

The significance of this data is addressed in the discussion of the project purpose and need in **Chapter 7**.

Table 2.5 – Vehicle Crash Analysis

| Spot / Segment | County | Route | Location | | Length | ADT | Crashes | | | CRF | |
|----------------|---------|---------|----------|--------|--------|-------|---------|--------|-----|-----|-------|
| | | | Begin MP | End MP | | | Fatal | Injury | PDO | | Total |
| Segment | Rowan | KY 32 | 16.213 | 16.619 | 0.406 | 3670 | 0 | 2 | 5 | 7 | 0.63 |
| Segment | Rowan | KY 32 | 16.619 | 17.797 | 1.178 | 2410 | 1 | 6 | 2 | 9 | 0.51 |
| Segment | Rowan | KY 32 | 17.797 | 18.489 | 0.692 | 1000 | 0 | 2 | 2 | 4 | 0.60 |
| Segment | Rowan | KY 32 | 18.489 | 21.636 | 3.147 | 472 | 0 | 1 | 4 | 5 | 0.45 |
| Segment | Elliott | KY 32 | 0.000 | 7.633 | 7.633 | 488 | 0 | 3 | 15 | 18 | 0.82 |
| Segment | Elliott | KY 32 | 7.633 | 8.656 | 1.023 | 956 | 0 | 1 | 4 | 5 | 0.60 |
| Spot | Elliott | KY 32 | 7.500 | 7.600 | 0.100 | 488 | 0 | 1 | 3 | 4 | 2.38 |
| Spot | Elliott | KY 32 | 8.013 | 8.113 | 0.100 | 956 | 0 | 0 | 3 | 3 | 1.34 |
| Spot | Rowan | KY 32 | 16.300 | 16.400 | 0.100 | 3670 | 0 | 1 | 2 | 3 | 0.67 |
| Spot | Rowan | KY 32 | 16.450 | 16.550 | 0.100 | 3670 | 0 | 1 | 3 | 4 | 0.89 |
| Spot | Rowan | KY 32 | 16.800 | 16.900 | 0.100 | 2410 | 1 | 2 | 0 | 3 | 0.85 |
| Segment | Rowan | KY 173 | 2.779 | 3.883 | 1.104 | 1530 | 0 | 4 | 2 | 6 | 0.49 |
| Spot | Rowan | KY 173 | 3.000 | 3.100 | 0.100 | 1530 | 0 | 3 | 1 | 4 | 1.43 |
| Segment | Rowan | KY 504 | 0.000 | 0.828 | 0.828 | 900 | 0 | 1 | 2 | 3 | 0.43 |
| Segment | Rowan | KY 3317 | 4.632 | 5.132 | 0.500 | 193 | 0 | 1 | 0 | 1 | 0.42 |
| Segment | Elliott | KY 7 | 10.698 | 11.198 | 0.500 | 3,300 | 0 | 0 | 2 | 2 | 0.17 |

Note: Analysis includes reported crashes from March 2004 through December 2007

Note: The CRF for "High Crash Spots and Segments" are shown in red.

Figure 2.3 – Crash History

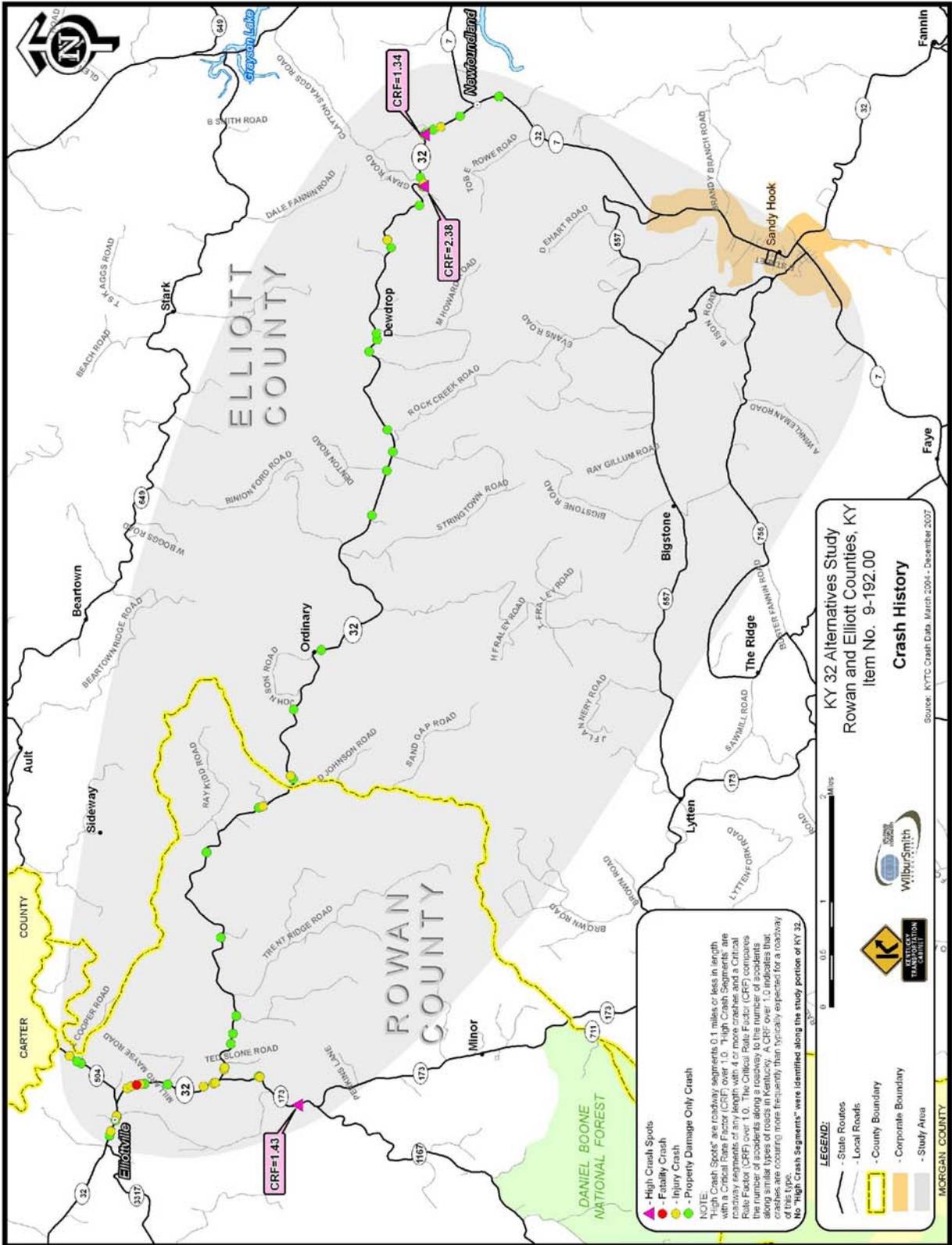


Table 2.6 - Adequacy Ratings

| County | Route | Begin MP | End MP | Section Length (miles) | Safety Component | Maximum Possible Safety Component | Service Component | Maximum Possible Service Component | Condition Component | Maximum Possible Condition Component | Composite Adequacy Rating | Composite Adequacy Percentile |
|---------|--------|----------|--------|------------------------|------------------|-----------------------------------|-------------------|------------------------------------|---------------------|--------------------------------------|---------------------------|-------------------------------|
| Rowan | KY 32 | 16.213 | 17.797 | 1.584 | 38.4 | 55.0 | 15.0 | 15.0 | 24.0 | 30.0 | 77.4 | 42.7 |
| Rowan | KY 32 | 17.797 | 21.636 | 3.839 | 22.9 | 55.0 | 15.0 | 15.0 | 24.0 | 30.0 | 61.9 | 11.9 |
| Elliott | KY 32 | 0.000 | 8.656 | 8.656 | 20.5 | 55.0 | 15.0 | 15.0 | 30.0 | 30.0 | 65.5 | 14.9 |
| Rowan | KY 173 | 2.779 | 3.883 | 1.104 | 33.0 | 55.0 | 15.0 | 15.0 | 24.0 | 30.0 | 72.0 | 26.37 |
| Elliott | KY 7 | 10.698 | 11.198 | 0.500 | 39.5 | 45.0 | 19.0 | 25.0 | 30.0 | 30.0 | 88.5 | 75.76 |

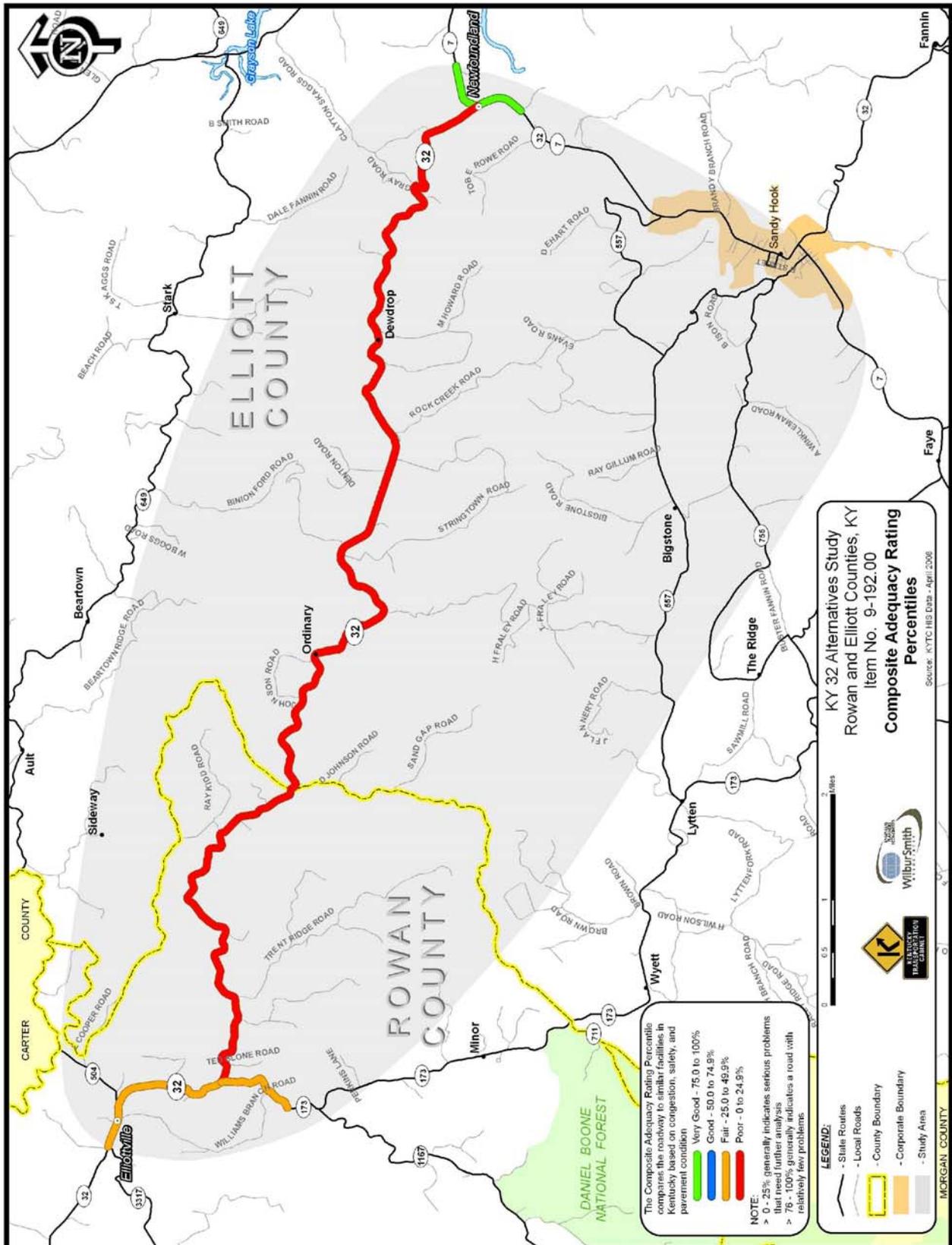
Note: Ratings unavailable for other study area routes.

Source: KYTC HIS database, April 2008

Definitions

| | |
|-------------------------------|--|
| Safety Component | The safety component is evaluated based on lane width, shoulder width, median widths, alignment, and critical crash rate factors. |
| Maximum Possible Safety | The maximum possible safety component is the best safety score a facility of this type could receive. |
| Service Component | The service component considers the route's volume-to-capacity ratio and access control. |
| Maximum Possible Service | The maximum possible service component is the best service score a facility of this type could receive. |
| Condition Component | The condition component considers only the condition of the road's pavement. |
| Maximum Possible Condition | The maximum possible condition component is the best condition score a facility of this type could receive. |
| Composite Adequacy Rating | A numerical score from 0 to 100 evaluating the current condition of a roadway segment based on congestion (service), safety, and pavement condition. |
| Composite Adequacy Percentile | A Adequacy Composite Percentile compared to similar facilities in KY. |

Figure 2.4 - Adequacy Ratings Percentiles



G. Programmed Highway Improvements

With one improvement programmed for the study portion of KY 32 (listed first below), ten other projects are planned and programmed for Elliott and Rowan Counties in KYTC's 2008 *Highway Plan*.

Included are funds for the next phase of project development for the portion of KY 32 addressed in this study, as follows:

- \$33.85 million for design, right-of-way, utility relocation, and construction activities for reconstruction of KY 32 from KY 504 to KY 7 (Item No. 09-192.00)

Four others may have some relationship to the proposed improvement project:

- \$4.22 million for right-of-way and utility relocation for a new route from US 60/KY 32 to I-64 including a new interchange (Item No. 09-301.10)
- \$8.52 million for planning, design, right-of-way, and utility relocation activities for the reconstruction of KY 377 from KY 32 to the Lewis County Line (Item No. 09-8406.00)
- \$30.83 million for right-of-way, utility relocation, and construction activities for the reconstruction of KY 7 from 0.4 miles north of KY 706 to the Carter County line (Item No. 09-126.51)
- \$1.26 million for construction activities to replace bridge and approaches on KY 32 over Middle Fork west of KY 719 (Item No. 09-1058.00)

3. ENVIRONMENT

In the summer of 2008, specialists performed data analysis and field surveys to identify key natural, cultural, and noise-related environmental features for this study. The following present the findings of these investigations. **Figure 3.1**, a map detailing these features, is located at the end of this chapter.

KY 32 is a unique, aesthetically pleasing, environmentally sensitive route. Laurel Creek and Big Caney Creek are Cold Water Habitats, Exceptional Waters and Reference Reach Streams.

A. Environmental Overview

HMB Professional Engineers conducted field visits in June 2008 throughout the project corridor to identify and locate aquatic, terrestrial, and hazardous materials resources and concerns. In addition to the field trips, databases were reviewed to provide background information on the existing status of aquatic and terrestrial species and to determine the presence and location of hazardous materials, including underground storage tanks.

Findings are documented in an Environmental Overview technical report, presented in its entirety in **Appendix B. Table 3.1** provides a summary of the potential environmental impacts that were identified within the corridor. Of special note are Laurel Creek and Big Caney Creek which are classified as Cold Water Habitats, Exceptional Waters, and Reference Reach Streams.

B. Cultural Overview

Historic Structures

Within the study area, there are over 70 structures that are over 50 years of age. If a project were to move forward, these structures would have to be documented in a Cultural Historic Study. The majority (over 50) of the structures are located along existing KY 32. The remainder (over 20) are located along roads that intersect KY 32.

Nearly all the buildings along KY 32 are single-family homes, with a few schoolhouses and commercial buildings. Along other roadways in the study area, farm complexes with several outbuildings appear in conjunction with single family homes. It appears that most structures in the study area would not be eligible for the National Register of Historic Places (NRHP). However, the Concord School could potentially be eligible since small, rural school houses not dramatically altered are becoming rare. There is one structure near



Concord School



Hogtown Voting House

the western end of the study area, just south of KY 32, on Williams Branch Road near Elliottville that is listed on the NRHP. This structure is the Hogtown Voting House.

More than 35 cemeteries are also located within the project area, ranging from small family plots with only a few graves to larger community cemeteries. Many are located on small ridgetops in the study area.

Table 3.1 - Summary of Potential Environmental Impacts

| | |
|--|--|
| Stream Crossings | A new bridge over Big Caney Creek at the southern terminus and several ephemeral and intermittent streams. |
| Floodplain Encroachment | Impacts would be associated with area streams, including the Laurel Creek and Big Caney Creek, but maps were not available on the FEMA website. Coordination with FEMA will be required to determine the extent of area floodplains. |
| Springs | No springs were located within the project area. |
| Wells | A review of Kentucky Geological Survey maps indicates that an estimated 60 to 70 oil wells are located within the project corridor. |
| Caves | No caves were evident during field trips, but the area does features caves. As alternatives are developed, caves may be identified. |
| Ponds | Several ponds exist within the proposed corridor. |
| Jurisdictional Wetlands | No wetlands were identified within the project corridor. |
| Threatened and Endangered Species | A USFWS letter indicated that the federally endangered Indiana bat, gray bat, Virginia big-eared bat, northern riffleshell mussel and pink mucket mussel could occur in the project area. The Bald Eagle is delisted, but still protected by the Migratory Bird Act. Surveys at stream crossings could be required. Mist netting for bats could be required. If species are identified, a biological assessment will be required. |
| Natural Areas | No natural areas exist within or adjacent to the project corridor. |
| Wild and Scenic Rivers | No wild and scenic river has been identified in the project area. |
| Special Waters | Laurel Creek and Big Caney Creek are Cold Water Habitats, Exceptional Waters and Reference Reach Streams. |
| Hazardous Materials/ Underground Storage Tank Sites | Sites containing hazardous materials or USTs are evident and located within communities along existing roadways. Most of these sites are gasoline/convenient stores and auto repair shops. The KYTC Elliott County maintenance garage is located along KY 32 approximately four miles west of Sandy Hook. A former gas station is located near the junction of KY 32 and KY 504 in the Haldeman quadrangle at the western limits of the project corridor. A former gas station is located on KY 32 near the middle of the Ault quadrangle. An oil spill was recorded on the Whitley lease in the northeast corner of the project corridor in the Newfoundland quadrangle. No illegal landfills and no dump sites were identified during field trips. If federal funding becomes available, a Phase I Hazardous Materials investigation, including field trips and data record searches, will be required for the build alternatives. |

Archaeological Resources

Regarding archaeological sites, there are several previously recorded sites within the study area. These include known sites ranging from the Early Archaic Period to historic farmsteads, including at least two documented prehistoric rock shelters. Although there are numerous cemeteries along KY 32, few unmarked sites have been documented in the study area. Any cemeteries that might be directly affected by a roadway improvement could require an archaeological survey.

Conclusions

Some historic sites are likely along existing KY 32 due to the number of older structures illustrated on early maps that are no longer extant, as well as the relatively large number of cemeteries in the study area. The numerous drainages and ridgetops signal a high potential for additional unrecorded prehistoric sites. Therefore, it is highly likely that additional archaeological sites will also be encountered within the KY 32 study area.

C. Noise Overview

Evaluation of existing data and field review revealed two (2) general areas within the KY 32 study area with potential noise impacts due to the reconstruction of existing KY 32 or the construction of a new route. Those areas include the communities of Elliottville and Newfoundland.

Within both of these communities, certain noise-sensitive receptors could influence the location of improvement alternatives. Noise receptors can be described as specific locations of any property or outdoor activity that is considered to have a noise-sensitive land use.

- The city of Newfoundland is located near the southernmost section of the study area near the intersection of KY 32 and KY 7. Newfoundland contains a sparse amount of “activity categories” including residential and commercial areas, as well as a school, church, park, and cemetery.
- The city of Elliottville is located at the northern end of the study area near the intersection of KY 32 and KY 504. Elliottville has fewer transportation-related noise receptors than Newfoundland. Other than small groupings of residential dwellings, only a cemetery and National Register site could possibly be viewed as noise-sensitive receptors.

Outside of these two noise-sensitive communities, the remaining study area is nearly void of any transportation-related noise concerns with the exception of many “family cemeteries.” These cemeteries are small in size, but total forty-two (42) in number, many located close to KY 32.

Logging efforts have been noted to take place, but there were no logging trucks observed along KY 32 during a field review. It is assumed that some heavy truck traffic does travel through the study area.

Many cattle farms were also observed with the majority residing in Elliott County, but these are not considered noise-sensitive elements. The residential areas located outside of Elliottville and Newfoundland are generally not grouped within clusters.

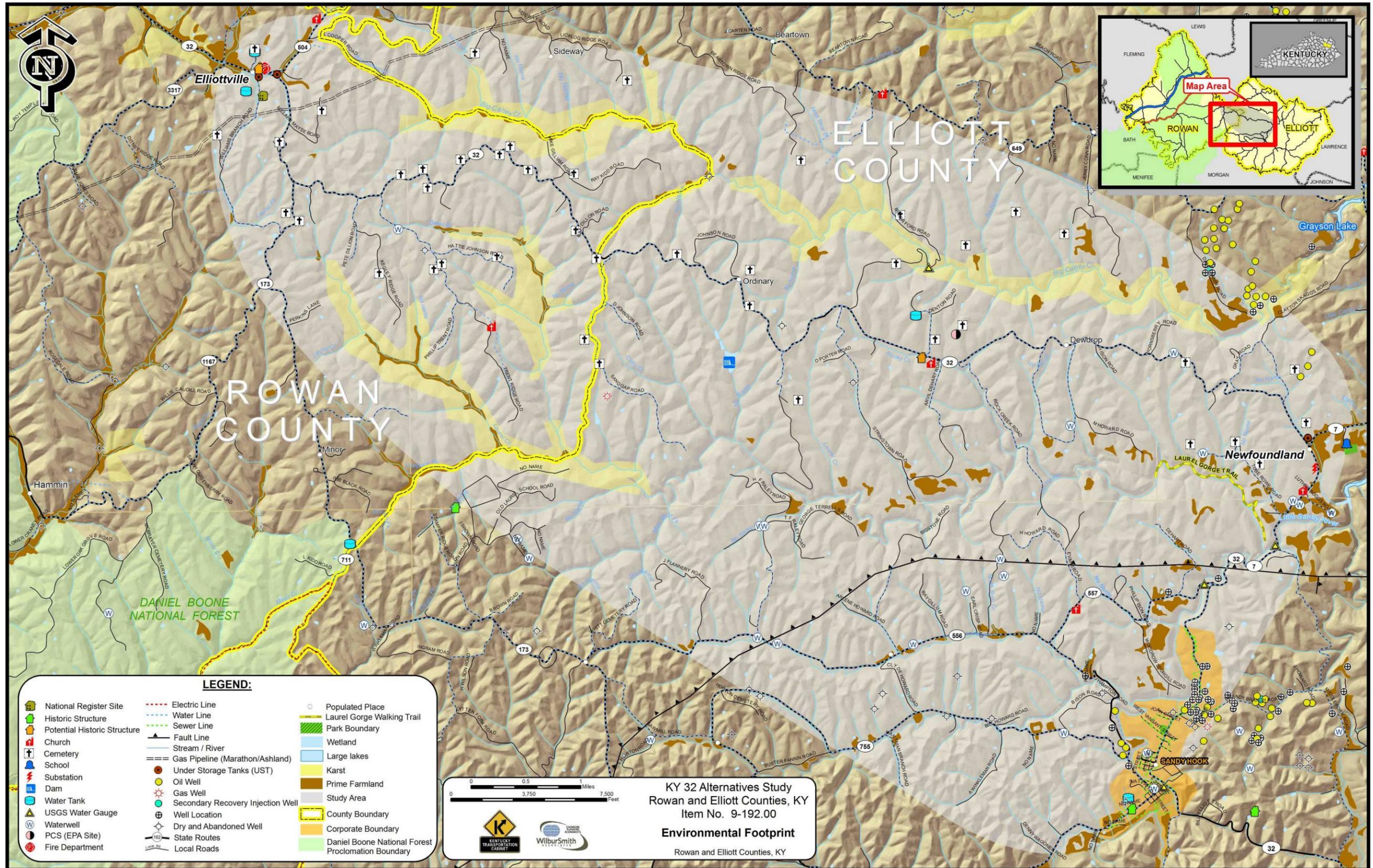


Figure 3.1 – Environmental Map

4. GEOTECHNICAL OVERVIEW

This chapter presents a summary of the findings of the geotechnical data analysis and the field review completed May 2008. A copy of the full Geotechnical Overview technical report, finalized September 2008, is included in **Appendix C**.

In the study area, KY 32 tends to follow a winding path along the ridgetops between Elliottville and Sandy Hook. The slopes between the valleys and ridges tend to be vegetated with grass and forest.

The land use along existing KY 32 was observed to be a mix of residential and pasture/farmland. Schools off Trent Ridge Road and KY 7 are present in the study area as well. Several farm ponds were observed near KY 32 and its cross roads. Several creeks, branches and wet weather ditches occupy the lower elevations of the study area.

A few rock cuts were observed along KY 32 at the eastern portion of the study area. These roadway cut areas give an indication of the relatively thin soil overburden along the ridges. While the soil overburden appeared to be less than 10 feet thick in these cut areas, no rock outcropping was observed on the ridges along KY 32 to the west of the map location designated as Ordinary. Besides areas adjacent to KY 32, rock outcropping was only observed in the study area at lower elevations of Binion Ford Road near Big Caney Creek

Based on the published U.S. Geological Survey Geologic Quadrangle for the existing alignment, the study area is located in the Pennsylvanian System of the Eastern Kentucky Coal Field physiographic province. The Pennsylvanian System consists largely of sandstone, siltstone, and shale. Coal beds and thin marine shale and limestone units are widespread and occur in most parts of the stratigraphic section. These deposits indicate that in Pennsylvanian time, Kentucky was near sea level and alternately covered by lakes, extensive swamps, shallow bays, and estuaries.

The study area is underlain by several different geologic formations, including the Breathitt Formation, Lee Formation, Newman Limestone and associated quaternary alluvium along the valleys. The approximate locations of these formations are shown on the Geologic Map (in the Geotechnical Overview Report shown **Appendix C** of this report) and on a similar map prepared by the KYTC Geotechnical Branch (**Appendix C**).



Rolling Terrain Adjacent to KY 32 at Eastern End of Study Area



Rolling Terrain Adjacent to KY 173 at Western End of Study Area



Rock Cut Slope off KY 32 Near Gray Road

The Breathitt Formation is comprised mostly of shale, but other materials are present including siltstone, sandstone and coal. The ridgetops in the study area are comprised of materials from the Breathitt Formation; therefore, most of the current KY 32 alignment is immediately underlain by the Breathitt Formation. Several coal seams have been identified within the Breathitt Formation in the study area, including the Mudseam, Fire Clay, Cannel City, Little Caney, and Bruin. These coal beds have irregular thicknesses between 0 and 85 inches.

The Lee Formation is comprised primarily of conglomeritic sandstone and minor amounts of shale in the study area. The Lee Formation lies beneath the Breathitt Formation and outcrops on the slopes in the lower elevations of the study area. The Olive Hill Clay Bed of Crider, a semiflint clay and flint clay bed, is identified by the KYTC Geotechnical Branch's geologic map along several slopes in the western half of the study area.

The Newman Limestone lies beneath the Lee Formation. This massive limestone outcrops in most of the valleys or is underlain by Quaternary Alluvium.

Quaternary Alluvium is located along the rivers and tributaries. The alluvium primarily consists of sands, silts, and gravels.

The most significant geotechnical challenges appear to be:

- **Slope Stability:** Stability of major cuts into hillsides would require close scrutiny before and during construction to minimize risk of failure due to groundwater seepage, unfavorably jointed bedrock, and layers of weak materials. As recommended by the KYTC Geotechnical Branch, new roadway(s) should cross perpendicular to the Little Sandy Hook Fault to minimize slope design and maintenance issues.
- **Unidentified Mines:** Since unidentified mines for coal and the Olive Hill Clay Bed of Crider exist in the study area, the impacts to design and construction costs could be significant based on when and where such mines may be discovered. The risk of new alignments intersecting undocumented mine activity in the study area does not appear to be quantifiable.
- **Oil, Gas and Water Wells:** Avoidance of routes that would pass in close proximity to oil, gas, and water wells is strongly recommended.

The shallow depth to bedrock across the study area will impact the construction costs associated with mass grading. Deeper cuts will extend into bedrock requiring potentially mixed face (i.e., soil/rock) slope designs and/or encounter zones of weathered rock that require special consideration.

Where shale is more prevalent, ripping by large excavation equipment may be feasible. We anticipate that areas comprised mostly of sandstone, siltstone or limestone will likely require blasting to allow efficient excavation.

It appears likely that roadway alternatives will involve construction of structures at stream crossings. While construction of these structures may be adversely impacted by shallow groundwater or weak bearing soils, the long-term impact of potential corrosion of steel components should also be considered. Concerns over corrosion can likely be mitigated by a complete geotechnical exploration and incorporating corrosion resistance measures into the design of structures.

5. ENVIRONMENTAL JUSTICE OVERVIEW

This chapter presents a summary of the findings of an Environmental Justice assessment conducted by the FIVCO Area Development District to identify community characteristics within the KY 32 study area, with some modifications to address data anomalies.

A 1994 Executive Order directed every Federal agency to make Environmental Justice (EJ) part of its mission. Regarding transportation projects, there are three fundamental EJ principles: (1) avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations; (2) ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and (3) prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

The primary methodology for the KY 32 Environmental Justice assessment was a review of the US Census data for the study area. As shown in **Figure 5.1**, this includes two Census Tracts and five Block Groups: Census Tract 9504, Block Group 3 in Rowan County and Census Tract 9802, Block Groups 2, 3, 4, and 5 in Elliott County. Analysis of the Census data was supplemented by discussions with local officials and a field review. Statistics were compiled for key environmental justice issues – Race, Poverty Level, and Age Group. Findings are summarized in the following sections.

A. Population by Race

According to the 2000 Census, Elliott County had a population of 6,748 people, with 5,940 included in Census Tract 9801 (which lies east of KY 7 immediately adjacent to the study area) and 9802 (the only Elliott County census tract in the study area). Of these, 5,900 are "White alone." The 40 remaining were designated as "Two or more races." Of these, 36 are in Census Tract 9802, Block Group 1, which does not adjoin KY 32, leaving four persons that are located in Census Tract 9802, Block Group 5, which encompasses the city of Sandy Hook and is just south of the project. The 40 minorities represent 0.6% of the Elliott County population, and none of these are in close proximity to the proposed project. For Kentucky, the minority population was reported as approximately 10 percent of the total state population.

From the 2000 Census, Rowan County had a population of 22,094 people, with 941 included in Census Tract 9504, Block Group 3, the only Rowan County Census geography encompassed by the study area. Of these, all are designated as "White alone."

Based on the data, contacts with local officials, and a field review, it appears that there are no "Hispanic or Latino" people in the study area.

Therefore, there appear to be no minority concentrations within or surrounding the immediate study area. Therefore, the implementation of an improvement project should not have a disproportionate effect on minorities residing in the study area.

B. Population by Poverty Level

The 2000 population in Elliott County with incomes below the poverty level totaled 1,469, which represents 21.8 percent of the total county population. The 18-to-64 age group, or those who made up the majority of the work force, included 853 people, or approximately 59%, under the poverty level. Of the 22,094 persons reported as living in Rowan County, 4,042 people (18.3%) were below the poverty level. Of these, only 190 were in Census

Tract 9504, Block Group 3 in the study area. These make up 0.9% of the total population of the county. This compares to the overall Kentucky percentage of 15.8% of persons below poverty level.

Based on the data, contacts with local officials, and a field review, it appears that an improvement project in the study area is not expected to disproportionately impact families or communities living in poverty. Instead, an improvement in the KY 32 corridor could enhance economic growth in Elliott County and, therefore, lead to more jobs or other economic opportunities for this area with relatively high poverty levels.

C. Population by Age Group

Based on the 2000 Census data, the Elliott County elderly population, 65 and over, in Census Tract 9802 was 804 people (11.9% of the county population), with 753 in Households and 51 in Group Quarters. When removing Census Tract 9802, Block Groups 1 and 5, which are just outside the study area, the elderly population dropped to 531 (7.9% of the county population). The Rowan County elderly population for the study area totaled 62 people, all of whom lived in households. These people accounted for 0.3% of the population of the county. For comparison, 12.5% of the total Kentucky population was listed as age 65 and over.

Based on the data, contacts with local officials, and a field review, it appears that no elderly residents living within the study area would be disproportionately affected by this project.

D. Population by Disability

According to the 2000 Census data, the total non-institutionalized population over 5 years old was 6,253 in Elliott County. Of these, 2,138 persons (34.2%) were listed as disabled, including 963 persons in Census Tract 9802, Block Groups 1 through 3, located in the study area, which represents 22.7% of the 4,237 persons in Census Tract 9802. In Rowan County, 5,808 (28.2%) of the 20,601 non-institutionalized persons over 5 years old were listed as disabled, but only 194 in the study area, or 20.6% of the population in the Block Group. These compare to the statewide percentage of 23.7% for the same population.

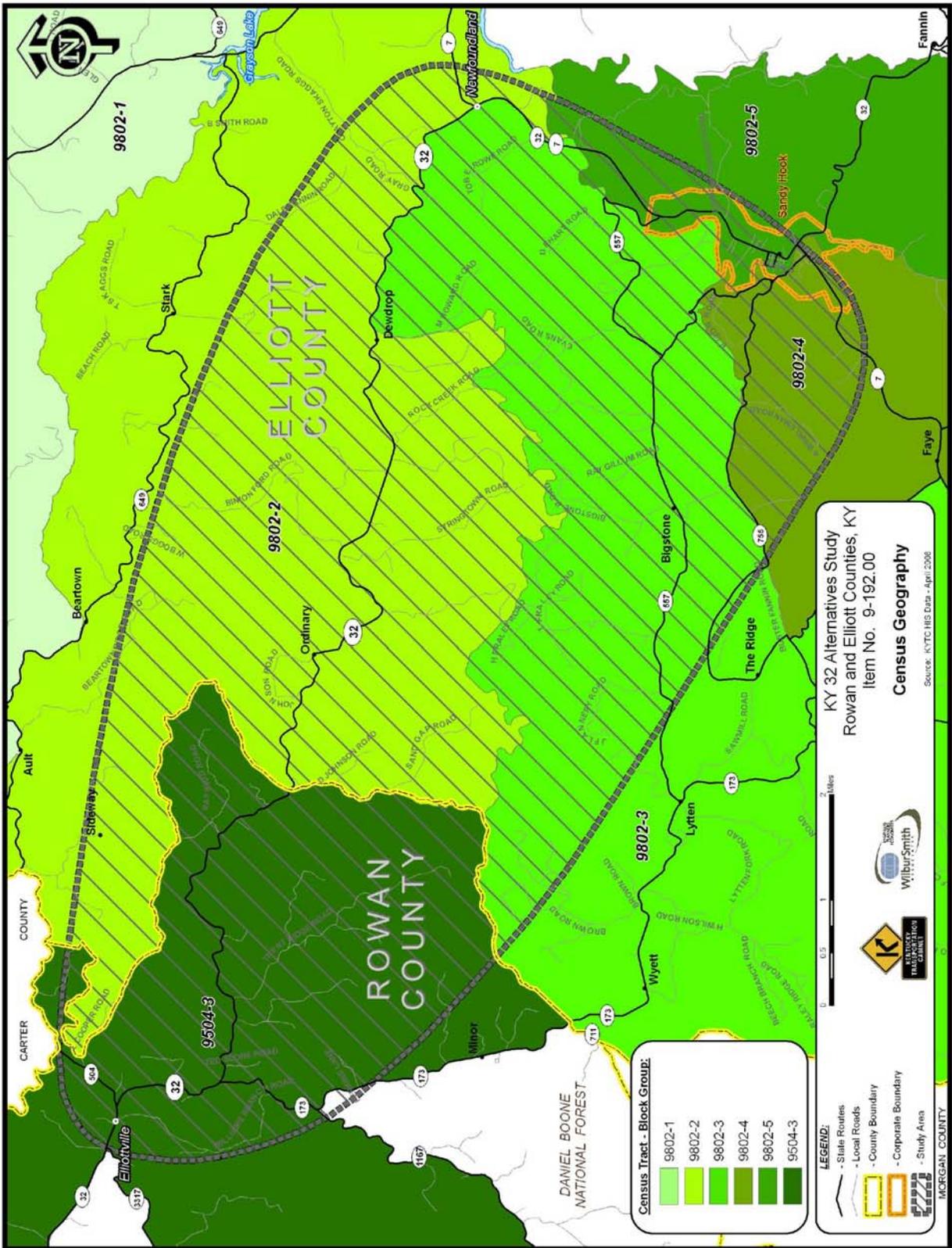
Based on the data, there may be a potential for impacts on disabled residents living within the study area, so further research is needed in the next phase of project development.

E. Conclusions

Based on the data, contacts with local officials, and a field review, it appears that there should be no disproportionate impacts on environmental justice populations due to race, poverty, or age. However, there may be a potential for impacts on disabled persons.

Confirmation of these findings should be addressed in the next phase of project development, especially the verification of data and further research for the disabled population.

Figure 5.1 – Census Geography



6. INITIAL CABINET, PUBLIC, AND AGENCY INPUT

Throughout the course of the KY 32 Alternatives Study, information was shared with and input solicited from local citizens, public officials and resource agency representatives. This chapter summarizes the first KYTC project team meeting and the first round of public, local official and resource agency involvement. KYTC project team meetings and activities conducted during the second round of local, public, and agency involvement are summarized in **Chapter 9** as they relate to the evaluation of potential improvements. Meeting minutes are presented in **Appendix D** for each meeting discussed in this chapter. Details of public meetings are included in public meeting notebooks on file with KYTC.

KY 32 Alternatives Study Public and Agency Outreach Efforts Included:

- Project Team Meetings
- Local Elected Officials and Stakeholders Meetings
- Public Information Meetings
- Public Comment Surveys
- Resource Agency Coordination

A. Project Team Meeting (May 7, 2008)

The first project team meeting was held on May 7, 2008, at the KYTC District 9 office building in Flemingsburg, 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 study needs.

The majority of the meeting discussion focused on project issues. The group agreed that the primary purpose of the project appeared to be improving safety and geometrics, including improving sight distance at school bus stops. The meeting minutes are included in **Appendix D**.

B. Local Officials and Stakeholders Meetings (June 6, 2008)

As part of the initial public involvement, meetings were held with local officials and stakeholders on June 6, 2008 in Morehead (Rowan County) and Sandy Hook (Elliott County). The purpose of these meetings was to inform these groups about the project and to discuss potential project issues and concerns.

A number of important issues were identified, including problem locations, economic development, and important environmental and community features. The comments are summarized in the meeting minutes, which can be found in **Appendix D**.

C. Public Information Meeting (July 31, 2008)

A public involvement open house meeting was held on Thursday, July 31, 2008, from 5:00 p.m. to 7:00 p.m. at the Elliottville Baptist Church Meeting Facility in Elliottville, Kentucky. Minutes of this public meeting may be found in **Appendix D**. A total of 152 persons signed an attendance sheet at the two-hour public session. Twelve (12) Kentucky Transportation Cabinet (KYTC), Area Development District (ADD), and consultant staff were also in attendance. In addition to the information presented in this chapter, material related to the first public involvement meeting is included in a separate public meeting notebook on file with the KYTC Division of Highway Design and Division of Planning.

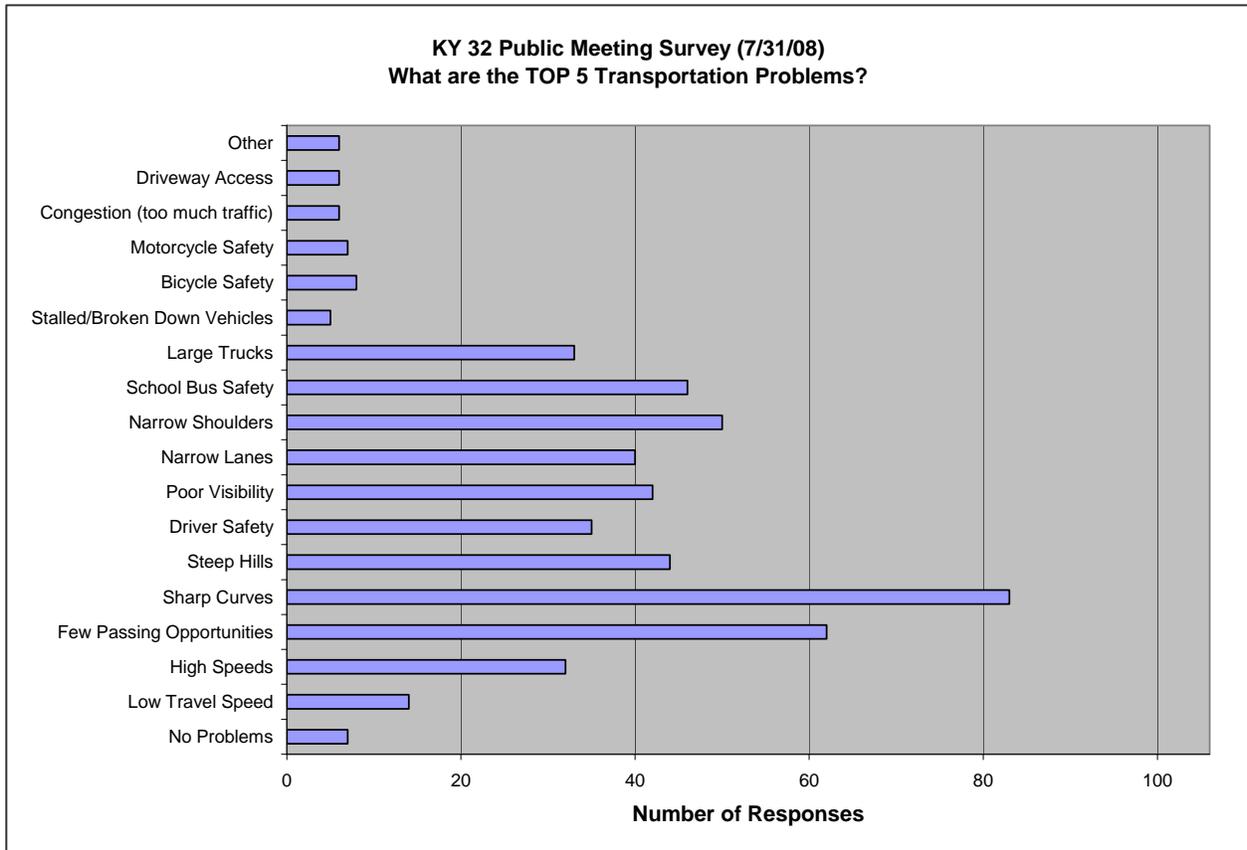
The purpose of the meeting was to provide preliminary information to the public on the proposed project and to get public input on possible issues, impacts, and alternates.

The public meeting was arranged with display boards along the walls so the public could view exhibits with existing conditions data, such as environmental features, average daily traffic, and crash history.

A brief presentation was given on the proposed project and study process. Attendees were invited to view the project exhibits and discuss any questions or concerns with staff. Two tables were set up with study area maps for attendees to draw on. Some attendees used markers and post-it notes to identify potential areas of impact, existing problem locations along the existing route, improvement options, and general comments. One-hundred-one (101) survey forms were returned during and after the meeting. The following summarizes the input received by way of the survey forms.

Survey Summary

86% of survey respondents indicated that KY 32 needs to be improved. The top five transportation problems along KY 32 were sharp curves, few passing opportunities, narrow shoulders, school bus safety, and steep hills, as shown in the following chart:



43% of the survey respondents drive the study portion of KY 32 daily. As shown below, the most sensitive resources to be considered or avoided were identified as (1) churches/schools/cemeteries and (2) homes or personal properties. Also mentioned were (3) natural areas or wildlife habitat, (4) scenic areas and (5) farmland.

Are there sensitive areas that should be considered or avoided if a new or improved route is constructed in the study area?

| Homes or Personal Properties | Farmland | Churches/Schools/Cemeteries | Business/Commercial Properties | Natural Areas or Wildlife Habitat | Scenic Areas | Recreational Areas or Parks | Historic or Archaeological Sites | Hazardous Waste Sites | Other |
|------------------------------|----------|-----------------------------|--------------------------------|-----------------------------------|--------------|-----------------------------|----------------------------------|-----------------------|-------|
| 45 | 28 | 47 | 11 | 33 | 32 | 12 | 19 | 0 | 7 |
| 45% | 28% | 47% | 11% | 33% | 32% | 12% | 19% | 0% | 7% |

D. Resource Agency Coordination - Round I (July 2008)

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 by letter on two occasions. For the first round of Resource Agency Coordination, copies of the informational letter of request from KYTC and response letters from resource agencies are located in **Appendix E** and are summarized here:

- City of Morehead – An improved KY 32 corridor would benefit the area. A number of citizens from the greater Sandy Hook area commute to Morehead and beyond for work and/or school on a daily basis. Any effort to improve safety for these people would be a positive step forward. Improvements could also reduce drive times and therefore, the cost of commuting.
- Division for Air Quality, Kentucky Environmental and Public Protection Cabinet – Precautions should be taken to prevent particulate matter from becoming airborne, including covering open-bodied trucks and avoiding depositing earth onto paved roadways. Open burning is prohibited for all but the express purposes detailed in the Open Burning Fact Sheet. It is encouraged to use chipping or grinding in order to avoid excessive particulate emissions in the direct vicinity of the project. The project must meet the conformity requirements of the Clean Air Act and the transportation planning provisions of Titles 23 and 49 of the US Code. The division suggests investigating local government requirements as well.
- Department of Fish & Wildlife Resources, Kentucky Environmental and Public Protection Cabinet – The Kentucky Fish and Wildlife Information System indicates that the following federally endangered species are known to occur within close proximity to the project are: Virginia big-eared bat, or *Corynorhinus townsendii virginianus*; gray bat, or *Myotis grisescens*; and Indiana bat, or *Myotis sodalis*. Due to the close proximity of several federally listed species, the Kentucky Transportation Cabinet should work closely with the US Fish and Wildlife Service to avoid and/or minimize impacts to federally listed species.

Located within the project corridor are Laurel Creek and Big Caney Creek. Both are listed as “Exceptional Use Waters” by the Kentucky Division of Water. Direct impacts to both streams and their tributaries should be avoided. If impacts cannot be avoided, mitigation sites need to be identified within both watersheds.

The appropriate US Army Corps of Engineers office and the Kentucky Division of Water should be contacted prior to any work within the waterways or wetland habitats of Kentucky.

- Division of Water, Kentucky Environmental and Public Protection Cabinet – Water Quality Branch - This will require an Individual Water Quality Certification. This project could not be in a worse place to make improvements to KY 32. It runs between two special waters in the area of Big Caney Creek and Laurel Creek, which are both Coldwater Aquatic Habitats.

Fugitive sedimentation and siltation of these habitats can be devastating. Suffocating instream habitat and insects, increasing temperatures in the CAH's, and bank failure due to the change in hydrology are just some potential devastations. Off-project sedimentation and siltation need to be avoided or kept at a minimum.

Heavy silt and sedimentation loads are usually created by this type of road construction. This could affect the Grayson Lake area.

- Division of Water, Kentucky Environmental and Public Protection Cabinet – Watershed Management Branch – Proper abandonment of any water or monitoring wells that may be destroyed needs to be done properly. Any construction, alteration, repairs, or plugging of wells should be done by a certified Kentucky driller in accordance with KRS 223.400 460 and 401 KAR 6:310 and 320.
- Division of Water, Kentucky Environmental and Public Protection Cabinet – Groundwater Branch – Any water or monitoring wells that may be destroyed by the project will need to be abandoned properly. All water well and monitoring well construction, alteration, repair or plugging must be done by a Kentucky certified driller in accordance with KRS 223.400 460 and 401 KAR 6:310 and 320.
- Division of Water, Kentucky Environmental and Public Protection Cabinet – Surface Water Permits Branch – Stream construction permit not required.
- Division of Water, Kentucky Environmental and Public Protection Cabinet – Water Resources Branch – No stream construction permit required.
- Department for Natural Resources, Kentucky Environmental and Public Protection Cabinet – Any disturbed soils would be subject to severe erosion into numerous drainages impacting the water quality of streams. To help with erosion and stream impacts, it is suggested that tree seedlings be planted upon completion of road improvements.
- Federal Aviation Administration – There are no apparent issues or concerns that would affect the nearest airport (Morehead-Rowan County Airport).
- Kentucky State Nature Preserve Commission, Kentucky Environmental and Public Protection Cabinet – A broad biological survey is recommended to assure that no populations of rare plant or animal species known from the general vicinity of the project area are impacted.
- Kentucky Heritage Council, Kentucky Commerce Cabinet – In the vicinity of the project, records show that there are many recorded archaeological resources, including an Early Archaic and historic farm site (15RO145) and two prehistoric rock shelters (15EL14 & 15EL15), as well as several cemeteries and other archaeological resources that have not been evaluated yet. In addition, there are many historic building sites within the study area. Full surveys of both architectural and archaeological resources should be conducted and submitted to the State Historic Preservation Office. A historic consultant be hired to conduct a literature search and survey of historic properties within or adjacent to the proposed corridor.
- Kentucky Department of Education – This project will not directly affect the Education Cabinet and its agencies. It was recommended that the KYTC advise Mr. John Williams (Superintendent for Elliott County Schools) and Mr. Marvin Moore (Superintendent for Rowan County Schools).
- Kentucky State Police – An improved KY 32 corridor would benefit the area. Troopers complain that the road is too curvy and dangerous especially during inclement weather. The proposed project will better serve the citizens of Elliott and Rowan counties.
- Department of Vehicle Enforcement, Kentucky Justice and Public Safety Cabinet – This agency had no concerns for the planning study at this time.

- Kentucky Airport Zoning Commission – No adverse affects to air navigation are anticipated due to developments in the study area. If any structure or construction equipment exceeds 200 feet in height, a permit from this office will be required.
- Kentucky Geological Survey – The study area is in the Eastern Kentucky Coal Field physiographic region, underlain by gravel, sand, silt, clay, sandstone, argillaceous sandstone, conglomeritic sandstone, calcareous sandstone concretions, shale, silty shale, siltstone, limestone, dolomite, coal, and underclay. Karst may be encountered, such as sinkholes or caves. The study area will likely encounter pre- or post-landslide hazards. Landslides in the red and green shales of the Muldraugh Formation could be initiated or accentuated by removal of material at the base of the slope. Unconsolidated sediments will be encountered at or near stream drainage areas. There may be resource conflicts such as prior ownership to oil and gas wells or coal property for mining. The study area may contain deep mining areas with underground voids, a possible subsidence hazard. No construction-suitable stone is found in the study area. The Little Sandy Hook Fault lies in the southeastern end of the study area. There is probable peak ground acceleration due to earthquake ground motion of 0.09g. There is a low to moderate potential for slope liquefaction or failure in unconsolidated sediments.
- Kentucky Transportation Cabinet, Office of Local Programs – There are no designated state bike routes on KY 32, nor any local routes. There is a low ADT on this road, and it would not likely be used by many pedestrians; therefore there is no anticipation for bicycle or pedestrian facilities to be included in the project.
- Division of Structural Design, Geotechnical Branch, Kentucky Transportation Cabinet – The study area is underlain by Pennsylvanian rocks of the Breathitt and Lee Formations and the Mississippian rocks of the Newman Limestone Formation.

Coal beds may be encountered in the study area, and some the beds have been extensively strip and deep mined south of the study area. Due to the inconsistencies in the thickness of the beds, economic mining within the study area has been discouraged.

The general dip of the bedrock is to the south-southeast direction. The alignment should stay on the north side of the hills to reduce encounters with spring lines. The Sandy Hook Anticline is located in the southeast part of the study area. Side-hill cut and fill situations should be avoided if possible. The Little Sandy Hook Fault directly north of the Sandy Hook Anticline should also be avoided. Any corridors that encounter faults should be crossed perpendicular to the fault line.

Oil and gas wells are present within the study area mainly on the north and east side of Sandy Hook. All oil and gas wells should be avoided with any corridors.

Normal cut and fill slopes should be adequate for the project. The project is located in the seismic risk zone 1 where minimal earthquake damage could occur.

- Morehead State University – This is a major access road for hundreds of employees, students, parents and other visitors on a daily basis. A major concern is emergency response vehicles that travel the road. Shoulders are not wide enough for a vehicle to get out of the traffic flow if necessary.
- Mountain Telephone – A list of Mountain Telephone Facilities in the proximity of the planned construction of KY 32 in Elliott County was provided.
- Natural Resources Conservation Service, US Department of Agriculture – This project may create potential impacts to prime farmland soils and other farmlands of statewide

significance. If federal funds are used to convert important farmlands to non-agricultural uses, Form NRCS-CPA-106 or Form AD-1006 must be submitted. A file containing the GIS information for Elliott and Rowan County soils was attached with the response letter. This data was mapped and is attached to the response letter in Appendix E.

- Sandy Hook Water District – Main lines are currently from Sandy Hook down Route 7 to the Little Sandy Correctional Facility and from Route 7 down Route 32 to the Rowan County line. All lines are within a few feet of the current road so any relocation of the road would affect our supply lines.
- Division of Waste Management, Kentucky Environmental and Public Protection Cabinet – A list of facilities throughout the study area and their current status is included with the response letter. There are 42 registered underground storage tanks (UST) as well as two underground storage tanks that are not regulated by the UST Branch and are listed as exempt. Out of the 42 USTs, 24 have been removed and 18 are still active. Three USTs are undergoing corrective actions. If asbestos, lead paint and/or other contaminants are encountered, they must be addressed in agreement with the pertinent regulations and statutes.
- Kentucky Department of Military Affairs – No issues or concerns affecting the study area have been identified that affect the development of the project.
- US Department of the Army, Army Corps of Engineers – A hydrology study is recommended showing how the project will affect FEMA's Flood Insurance Rate Map for the area as well as a study of the as-built project incorporated into the existing FEMA FIRM. If any property acquired is determined to belong to the United States, an easement may be required at a later date. The Huntington District needs to be informed of any changes in alignment and progress as there will likely be permitted actions under the Section 404 program required.
- US Department of Homeland Security, United States Coast Guard – No bridges over navigable waters of the United States are involved; therefore, a bridge permit is not required.

7. PROJECT PURPOSE AND NEED

The general scope of the KY 32 Alternatives Study is to consider the reconstruction, relocation, or realignment of the portion of KY 32 from KY 504 near Elliottville in Rowan County to KY 7 near Newfoundland in Elliott County. This is perhaps the most deficient section of KY 32 in the region, so its improvement will provide significant benefits to the traveling public as a Section of Independent Utility.

A. Project Purpose

The purpose of the proposed KY 32 project is to improve highway access and safety for the traveling public to and from Sandy Hook, Elliott County, and southeastern Kentucky to businesses, medical facilities, post-secondary education facilities, other services or attractions, and I-64 at Morehead through improved travel time, improved travel conditions at high crash locations, and improved travel conditions for emergency medical services and school buses.

**“Purpose and Need”
drives improvement
alternatives
development, analysis,
and selection.**

System Connectivity

This portion of KY 32 is classified as a Rural Major Collector and is a major route that connects and provides access between the two county seats of Rowan and Elliott counties, respectively, Morehead and Sandy Hook. Traffic volumes are relatively low, due in part to the poor driving conditions. Nonetheless, this route is a significant access road for southeastern Kentucky residents to and from jobs, businesses, services, and health, educational, and recreational facilities at Morehead, including Morehead State University which attracts a significant amount of student commuter traffic from throughout southeastern Kentucky. KY 32 is also a major access route to I-64, an east-west interstate route between Ashland and Louisville. Of special importance, I-64 is a direct route to Lexington, a major location of some types of jobs, businesses, services, and health, educational, and recreational facilities that are not available at Morehead.

Southeast Kentucky is a relatively low-income area with limited job and educational opportunities, so good highway access is important to the region for economic viability, access to higher education, and a good quality of life. Good highway access is available to the east from Sandy Hook via KY 7, but north-south access and access to the west is only available via highways with relatively poor or circuitous routes. This presents a problem for area residents since Morehead and Lexington to the north and west are major destinations of choice because of the facilities and services located in those cities.

Improve Safety

KY 32 was constructed as one of the early roadways in Elliott and Rowan Counties and has not had a major upgrade. As such, many roadway features, such as horizontal and vertical curves, lane widths, and shoulders, do not meet recommended design standards

Existing KY 32 between KY 7 and KY 504 is a two-lane, undivided highway with narrow lanes and minimal shoulders. There are an inordinately large number of horizontal and vertical curves, resulting in poor driving conditions that restrict sight distances and travel time. Of the 112 horizontal curves along this portion of KY 32, 99 (88.4%) do not meet the minimum design requirements (based on a 55 miles per hour design speed). Also, 118 of the 134 vertical curves (88.1%) do not meet minimum design requirements (based on a 55

miles per hour design speed). Although the posted speed limit is 55 miles per hour along the route, the actual average travel speed is estimated at approximately 40 miles per hour.

These substandard geometrics restrict sight distance and/or allow no latitude for recovery in case of a mistake or unexpected event. This is a likely contributor to some crashes, including fatalities, that have occurred along existing KY 32, as discussed in **Chapter 2**.

Special concerns from the public include improved travel and safety for school bus traffic and emergency vehicles, not only for the driving conditions, but also for the limited sight distance for drivers who may encounter school buses or emergency vehicles stopped on the roadway. Also, maintenance or repair work to the road or utilities along the road can present potential safety problems since there are no shoulders for repair vehicles or equipment and sight distance limitations may create a hazardous condition for workers.

B. Other Project Goals

As improvement plans are made for KY 32, other important goals should be considered. These goals were identified by the technical analysis and in consultation through the public involvement and agency coordination processes.

- Support, preserve, or enhance economic opportunities in Elliott County and the surrounding region by providing improved access for:
 - Commuters, delivery vehicles, work-related travel, and visitors to the Little Sandy Correctional Complex;
 - Commuters, delivery vehicles, work-related travel, and customers or clients of existing businesses and commercial or professional services;
 - Local citizens, delivery vehicles, work-related travel, and clients of locally-based city, county, state, and federal government services or other public services, particularly to the two county seats, Morehead and Sandy Hook; and
 - Potential new businesses, services, or attractions that may locate in Sandy Hook, Elliott County, or the surrounding area.
- Support, preserve, or enhance tourism in the region through improved access to Laurel Gorge and Grayson Lake, as well as for agritourism, ecotourism, local arts and crafts, scenic tours, and motorcycle tours and rallies.
- Incorporate context sensitive design features as appropriate to preserve and/or complement the existing character and context of the KY 32 study area.

8. PROPOSED IMPROVEMENTS: CORRIDOR CONCEPTS TO FINAL ALTERNATIVES

Following the existing conditions review and first round of public involvement, preliminary improvement “concepts” were developed for the KY 32 corridor. This chapter presents a brief discussion of the development and refinement of the preliminary “concepts”, a detailed Level 1 Screening, input from the project team, and the resulting final improvement “alternatives.”

A. Proposed Corridor Concepts

In developing potential alternative corridors, careful consideration was given to terrain, environment, traffic, crash history, alternatives proposed by the local officials, alternatives proposed by the public and, most important, the purpose and need for the project. Particular care was taken to consider potential alternatives that would avoid or minimize proximity to Laurel Creek and Big Caney Creek, which are classified as “Exceptional” waterways.

Fourteen “Corridor Concepts” were developed by combining various improvement segments identified. For organizational purposes, beginning and ending points were assigned letters (A-D), while points where improvement segments intersected were assigned numbers (1-14). All of the preliminary alignments originate at a point near Elliottville, referred to as Point D. Three different termini points along KY 7 were considered, referred to as A, B, and C.

The 14 Corridor Concepts, shown in **Figure 8.1**, included improvements to the existing alignment (Concept 1), three new northern alignments (Concepts 2, 3, and 14), six new southern alignments (Concepts 6, 7, 10, 11, 12, and 13), and four new alignments that cross KY 32 (Concepts 4, 5, 8, and 9). The “No Build” alternative was also recognized during this planning process. **Section C** of this chapter presents an overview of each Corridor Concept as discussed at the September 29, 2008 Project Team Meeting.

Level 1 Screening

A level 1 screening was undertaken to evaluate the 14 Corridor Concepts and the “No Build” alternative. The purpose of the Level 1 Screening process was to identify concepts that did not warrant further consideration before undertaking a more detailed analysis. For the Level 1 Screening, criteria were developed based on how well the corridor concepts:

- Satisfied the project purpose and need and/or additional project goals;
- Appeared to have fewer potential environmental and community impacts; and
- Appeared feasible with regard to constructibility and planning level cost estimates.

The alternatives were given a comparative review using quantitative and qualitative evaluations based on the existing conditions data and input from both resource agencies and the public. Based on these comparisons, each corridor alternative was assigned a High, Medium, or Low rank for each category related to potential impacts and a Satisfactory, Average, or Least Desirable rating for other evaluation criteria, such as satisfying project purpose and need.

The Level 1 Screening, shown in **Table 8.1**, was presented to the Project Team on September 29, 2008, as discussed in **Section C** of this Chapter.

B. Preliminary Proposed Spot Improvements

Spot improvement project locations were identified by analyzing crash and geometric deficiency data, considering public input, and conducting field reconnaissance. Ten locations were initially identified, as shown in **Figure 8.2**. The proposed spot locations were discussed at the September 29, 2008 Project Team Meeting, outlined in **Section C** of this Chapter.

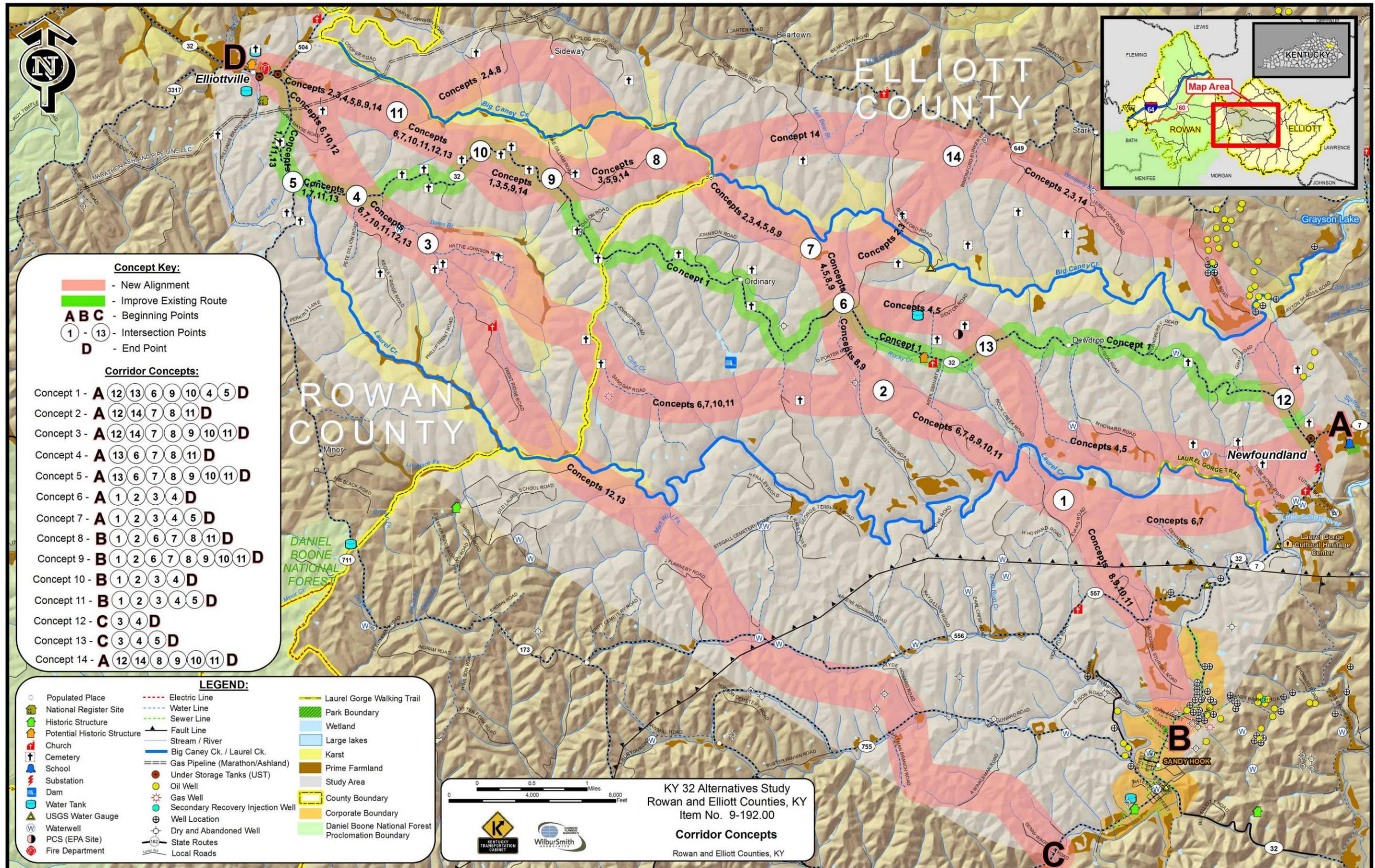


Figure 8.1 – Corridor Concepts

KY 32 Alternatives Study
Level 1 Screening Evaluation Matrix

Table 8.1 – Level 1 Screening

| Corridor | Segments | Distance (miles) | Addressing Purpose and Need | | | | | Addressing Other Project Goals | | | Community Impacts | | | | | | |
|------------|-----------------------|------------------|---|-------------------|---------------------------------|---|---|---|--|---|-------------------|------------|-----------|-----------|-----------|------------|----------------------------|
| | | | Improve Access and Safety through Improved: | | | | | Support, Preserve, and Enhance Economic Development Opportunities | Support, Preserve, and Enhance Tourism in the Region | Incorporate Context Sensitive Design Features to Support Scenic Byway Establishment | ROW Impacts | | Schools | Parks | Churches | Cemeteries | Laurel Gorge Walking Trail |
| | | | Travel Time (minutes) | | | Travel Conditions at High Crash Locations | Travel Conditions for Emergency Medical Services and School Buses | | | | Homes | Businesses | | | | | |
| | | | Between Termini (A, B, or C to D) | From Newfoundland | From KY 7/32 Jct. at Sandy Hook | | | | | | | | | | | | |
| No Build | NA | 14.1 | 21.2 | 21.2 | 26.3 | No Improvements | Least Desirable | Least Desirable | Least Desirable | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | |
| Concept 1 | A 12 13 6 9 10 4 5 D | 13.7 | 14.9 | 14.9 | 20.6 | Satisfactory | Satisfactory | Satisfactory | Satisfactory | High | High | 0 | Low | 1 | 15 | No Impact | |
| Concept 2 | A 12 14 7 8 11 D | 13.1 | 14.2 | 14.2 | 19.9 | Average | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 5 | No Impact |
| Concept 3 | A 12 14 7 8 9 10 11 D | 12.2 | 13.3 | 13.3 | 19.0 | Average | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 9 | No Impact |
| Concept 4 | A 13 6 7 8 11 D | 12.3 | 13.4 | 13.4 | 19.1 | Least Desirable | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 8 | High |
| Concept 5 | A 13 6 7 8 9 10 11 D | 11.5 | 12.5 | 12.5 | 18.2 | Least Desirable | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 12 | High |
| Concept 6 | A 1 2 3 4 D | 11.5 | 12.5 | 12.5 | 18.2 | Least Desirable | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 8 | High |
| Concept 7 | A 1 2 3 4 5 D | 12.1 | 13.2 | 13.2 | 18.9 | Average | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 8 | High |
| Concept 8 | B 1 2 6 7 8 11 D | 12.6 | 13.7 | 18.4 | 14.7 | Least Desirable | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 2 | No Impact |
| Concept 9 | B 1 2 6 7 8 9 10 11 D | 11.7 | 12.8 | 17.5 | 13.8 | Least Desirable | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 6 | No Impact |
| Concept 10 | B 1 2 3 4 D | 11.4 | 12.4 | 17.1 | 13.4 | Least Desirable | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 6 | No Impact |
| Concept 11 | B 1 2 3 4 5 D | 12.0 | 13.1 | 17.8 | 14.1 | Average | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 6 | No Impact |
| Concept 12 | C 3 4 D | 10.8 | 11.7 | 20.1 | 13.5 | Least Desirable | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 1 | 3 | No Impact |
| Concept 13 | C 3 4 5 D | 11.4 | 12.5 | 20.8 | 14.2 | Average | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 1 | 3 | No Impact |
| Concept 14 | A 12 14 8 9 10 11 D | 11.2 | 12.2 | 12.2 | 17.9 | Average | Average | Satisfactory | Satisfactory | Least Desirable | Medium | Medium | 0 | Low | 0 | 8 | No Impact |

NOTE: Distance from KY 7/32 to A is 4.27 miles, to B is 0.74 miles, and to C is 1.32 miles.

| Corridor | Segments | Distance (miles) | Environmental Impacts | | | | | | | Engineering Issues | | | | |
|------------|-----------------------|------------------|-----------------------|---------------------|-------------------|------------------------|----------------------------|---------------------------|-------------------------------|--------------------|--------------|------------|-----------|-----------------------------|
| | | | Prime Farmlands | Historic Properties | Archaeology Sites | Stream Crossings | | | | UST Sites | Gas Pipeline | Fault Line | Karst | Cost Estimate (\$ millions) |
| | | | | | | Laurel Creek Crossings | Other Laurel Creek Impacts | Big Caney Creek Crossings | Other Big Caney Creek Impacts | | | | | |
| No Build | NA | 14.1 | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | Impact | No Impact | No Cost |
| Concept 1 | A 12 13 6 9 10 4 5 D | 13.7 | Low | 1 PHS | 1 | 0 | Medium | 0 | Low | 7 | 3 | High | Low | \$82.0 |
| Concept 2 | A 12 14 7 8 11 D | 13.1 | High | 0 | 0 | 0 | Low | 4 | Medium | 12 | 3 | High | Low | \$92.4 |
| Concept 3 | A 12 14 7 8 9 10 11 D | 12.2 | High | 0 | 0 | 0 | Low | 2 | Medium | 12 | 3 | High | Low | \$85.3 |
| Concept 4 | A 13 6 7 8 11 D | 12.3 | High | 0 | 0 | 0 | Medium | 2 | Medium | 14 | 3 | High | Low | \$86.9 |
| Concept 5 | A 13 6 7 8 9 10 11 D | 11.5 | High | 0 | 0 | 0 | Medium | 0 | Medium | 14 | 3 | High | Low | \$79.9 |
| Concept 6 | A 1 2 3 4 D | 11.5 | High | 0 | 3 | 2 | Low | 0 | Low | 11 | 3 | High | Low | \$79.8 |
| Concept 7 | A 1 2 3 4 5 D | 12.1 | High | 0 | 3 | 2 | Medium | 0 | Low | 11 | 3 | High | Low | \$82.8 |
| Concept 8 | B 1 2 6 7 8 11 D | 12.6 | High | 0 | 0 | 1 | Low | 0 | Medium | 9 | 2 | High | High | \$86.4 |
| Concept 9 | B 1 2 6 7 8 9 10 11 D | 11.7 | High | 0 | 0 | 1 | Low | 0 | Medium | 9 | 2 | High | High | \$79.4 |
| Concept 10 | B 1 2 3 4 D | 11.4 | High | 0 | 3 | 1 | Low | 0 | Low | 10 | 2 | High | High | \$79.1 |
| Concept 11 | B 1 2 3 4 5 D | 12.0 | High | 0 | 3 | 1 | Medium | 0 | Low | 10 | 2 | High | High | \$82.0 |
| Concept 12 | C 3 4 D | 10.8 | Medium | 0 | 3 | 1 | Low | 0 | Low | 8 | 2 | High | High | \$82.1 |
| Concept 13 | C 3 4 5 D | 11.4 | Medium | 0 | 3 | 1 | Medium | 0 | Low | 9 | 2 | High | High | \$85.0 |
| Concept 14 | A 12 14 8 9 10 11 D | 11.2 | High | 0 | 0 | 0 | Low | 2 | Low | 14 | 3 | High | Low | \$83.7 |

* It is important to note that crossings of "other streams and tributaries" will likely impact Laurel and Caney Creeks.

KEY:

| | |
|----------------------|---|
| Low/Satisfactory | Lowest likely impacts; Satisfactory for this measure. |
| Medium/Average | Mid-range of impacts; Somewhat unsatisfactory for this measure. |
| High/Least Desirable | High likely impacts; Least Desirable for this |

C. Project Team Meeting (September 29, 2008)

A project team meeting for the KY 32 Alternatives Study in Rowan and Elliott Counties was held on September 29, 2008, at the Fleming County Library in Flemingsburg, Kentucky. The purposes of the meeting were to discuss progress to date, discuss preliminary Corridor Concepts and the Level 1 evaluation of those concepts, make decisions on final alternatives to be carried forward for Level 2 Evaluation, and discuss preliminary information on proposed spot improvements along existing KY 32.

Discussion of the Level 1 Screening and decisions on the Corridor Concepts by the group are presented here, organized by key decisions made at the meeting:

Decision 1 - Concepts with 4-5-D should advance over concepts with 4-D (eliminating Concepts 6, 10, and 12) for the following reasons:

- 4D and 4-5-D are somewhat redundant, one on new alignment and one on the existing roadway. However, 4-D would not provide a connection with KY 173, which is a major traffic split with most of the traffic going along KY 173. 4-5-D maintains and provides an improvement for KY 173 connection.
- 4-5 is on new alignment and will, therefore, have “new” impacts and add miles to the state system.
- 4-5-D will not be too difficult to improve and will retain existing access to homes and the McBrayer store, a local landmark, at the KY 32-KY 173 intersection and maintain the current “community” context.
- However, 4-5 is at the headwaters of Laurel Creek, so care will be needed to avoid impacts.

Decision 2 - Concepts using 8-9-10-11 should advance over concepts using 8-11 (eliminating Concepts 2, 4, and 8) for the following reasons:

- These are functionally the same, but 8-11 crosses Big Caney Creek twice, 8-9-10-11 does not cross Big Caney Creek
- However, five cemeteries are located between or near points 9-10 so care will be needed to choose an alignment to avoid those cemeteries. This appears to be possible within the wide corridor shown in this area.
- Note: Concept 2 crosses Laurel Creek 4 times and should be eliminated for that reason alone.

Decision 3: Concept 14 should advance, Concept 3 should not for the following reasons:

- These are both similar new northern alignments, so they are somewhat duplicative.
- The differences are for segment 14-8 for Concept 14 and 14-7-8 for Concept 3.
- In this area, Concept 3 crosses Big Caney Creek and then parallels and runs in close proximity to the creek and the karst area in the stream bottom for over a mile. This could cause greater impacts to the stream and create additional potential problems in dealing with the karst. Concept 14 crosses the stream in a less intense karst area, and it does not follow the stream after crossing so it could lessen potential impacts.
- Concept 3 is longer and a little more expensive.

Decision 4: Concept 5 should advance, and Concept 9 should not for the following reasons:

- These have different termini on KY 7, but they are the same from points 6 to D. Both start south of KY 32 and cross to run north of KY 32.
- Concept 5 does not cross Laurel or Big Caney Creek, one of only 4 alternatives that avoid direct impacts to these two resources (one of which, Concept 12, is already recommended for dismissal, leaving Concepts 1, 5, and 13). Concept 9 crosses Laurel Creek once.

Decision 5: Concept 14 should not move forward for the following reasons:

- It does not adequately meet the scope and purpose of the project.
- There are not many locations that would be logical to terminate a construction section in the 12-14-8 section.
- This section crosses many of the tributaries to Big Caney Creek.

Decision 6: Concept 13 should not move forward for the following reasons:

- It does not adequately meet the scope and purpose of the project.
- There are not many tie-down points in the C-3 section – it would be difficult to identify construction segments.
- It crosses the fault line.

Decision 7: Concept 11 should not move forward for the following reasons:

- It will not pull traffic from KY 32 and, therefore, does not adequately meet the project purpose.
- Terminating the route at B would not provide for future continuation of a route to the east of Sandy Hook.

Decision 8: Concept 7 should be revised slightly by changing the path to A-2-3-4-5-D for the following reason:

- This eliminates 2 crossings of Laurel Creek and 1 crossing of Laurel Gorge Trail on the east end of the corridor.

Other special considerations were discussed during the meeting, as follows:

- There are some known archaeology sites between junctions 3 and 4 (Concept 7). These can likely be avoided, although additional sites may be uncovered as the project moves forward. The route shown between 3 and 4 is the best opportunity to connect with KY 32 at the right elevation.
- The headwaters of Laurel Creek are located between junctions 4 and 5 (Concepts 1 and 7) and may require special erosion control measures.

As a result of the discussion and decisions at this meeting, the project team agreed that Corridor Concepts 1, 5, and 7 (revised) would move forward for further evaluation. For organizational and presentation purposes, it was decided that these concepts would move forward as Alternatives 1, 2, and 3, respectively.

The group also agreed that further consideration should be given to the No Build alternative.

Preliminary Proposed Spot Improvements

The project team briefly discussed the spot improvement locations. These locations were identified primarily based on crash history and locations with less than a 25 mph design speed. The group agreed that further consideration should be given to Spot Improvement alternatives. KYTC District 9 staff members were asked to review the proposed spot locations more closely and provide feedback to the project consultant (WSA) within two weeks. Revised Proposed Spot Improvements are discussed in **Section E** of this Chapter.

D. Proposed Improvement Alternatives

After the September 29, 2008 project team meeting, preliminary maps of the proposed improvement alternatives were prepared for project team review. As a result, KYTC Division of Planning suggested expanding the corridor study area near the KY 32-KY 7 intersection for Alternative 2 (Corridor Concept 5) and Alternative 3 (Corridor Concept 7 revised).

Based on follow-up discussions, these two alternatives were modified to include two options for tying into KY 7:

- One that includes a portion of the existing route at the eastern (southern) end from KY 7 to approximately milepoint 6.8 (Option A) with a short connector to the new alignment presented at the meeting; and
- One totally on new alignment (Option B), as presented at the September 29th project team meeting.

Proposed Improvement Alternatives 1, 2, and 3 are shown in **Figure 8.3**.

Alternative 1P

A practical solution alternative, Alternative 1P, was developed as a potential for saving costs while still improving the existing roadway. Alternative 1P is a combination of completing all the proposed spot improvements and minor widening of the remaining sections. Alternative 1P is shown as **Figure 8.4**.

Traffic Forecasts

Traffic forecasts were completed for the four proposed improvement alternatives using historic growth rates and the Kentucky Statewide Traffic Model. Traffic forecasts are shown for the four proposed improvement alternatives in **Figures 8.5 through 8.8**.

Level 2 Screening

A detailed Level 2 Screening was conducted for the four proposed Improvement Alternatives, as shown in Table 8.2. As with the Level 1 Screening, each corridor alternative was assigned a High, Medium, or Low rank for each category related to potential impacts and Satisfactory, Average, or Least Desirable for the other criteria, such as addressing project purpose and need.

While Level 1 cost estimates were based on historical per mile costs from similar road construction in the region, Level 2 costs were estimated by looking at each proposed alternative in more detail, using site specific information to calculate each estimate.

E. Proposed Spot Improvements

Projects were further defined within the identified spot improvement locations. Details, including cost estimates, are shown in **Table 8.3**.

F. Project Team Meeting (November 19, 2008)

A project team meeting was held on November 19, 2008, at the Gateway Area Development District Office in Morehead, Kentucky. The purpose of the meeting was to discuss progress to date, discuss proposed improvement alternatives and a Level 2 evaluation of those alternatives, present detailed information on proposed spot improvements along existing KY 32, and discuss the second public meeting for the project.

Proposed Improvement Alternatives

The group agreed that Alternatives 1, 1P, 2, and 3 should move forward for consideration by local elected officials, stakeholders, the public, and resource agencies.

The project team discussed several design parameters to use for the purpose of estimating the costs of each alternative. Improved KY 32 would have two driving lanes with turn lanes at major intersections. For the purpose of developing cost estimates, the project team agreed on a typical section with 12-foot driving lanes, 8-foot graded shoulders (6-foot paved) and 12-foot recoverable ditch or fill slopes for all alternatives except for Alternative 1P.

For Alternative 1P, the “practical solution” alternative, the shoulder width would be reduced by two feet leaving 6-foot paved and graded shoulders.

KY 32 is a Rural Major Collector with mountainous terrain. The assumed design speed for cost estimation was 55 mph, except for Alternative 1P. Alternative 1P, a combination of spot improvements and minor widening, would involve the reconstruction of eight horizontal curves and 15 vertical curves, which would improve locations with less than a 25 mph design speed. The project team discussed upgrading curves with a 35 mph design speed for the Alternative 1P alternative; however, this would involve reconstruction of 51 additional horizontal curves and 46 additional vertical curves, which would significantly increase the cost of the project. Therefore, the project team agreed that upgrading curves with a design speed of 25 mph or less was an appropriate assumption for this “practical solution” alternative.

It was agreed by the project team that these assumptions are for planning-level cost estimation purposes only. The final decisions regarding the typical section and the design speed should be made in the next phase of project development as additional information becomes available.

Cost estimates were revised based on this discussion and included in the Level 2 Screening, discussed below.

Level 2 Screening

The project team reviewed and discussed the Level 2 Screening of the proposed improvement alternatives. The goal was not to draw conclusions from the evaluation, but to ensure that it accurately reflects each of the alternatives. Conclusions were to be deferred until public and resource agency input was received on the proposed alternatives.

The group agreed with the results but asked that an evaluation measure related to constructability (phasing and scheduling) be added to the Level 2 evaluation criteria in determining the final recommendations. The revised Level 2 Screening Matrix (including this addition) was presented for additional KYTC, resource agency, and public input, as discussed in **Chapter 9**.

Proposed Spot Improvements

The proposed spot improvements, as previously shown in **Figure 8.2**, and shown with details in **Table 8.3**, were discussed at the project team meeting. The project team agreed that the spot improvements should move forward for additional KYTC, resource agency, and public input.

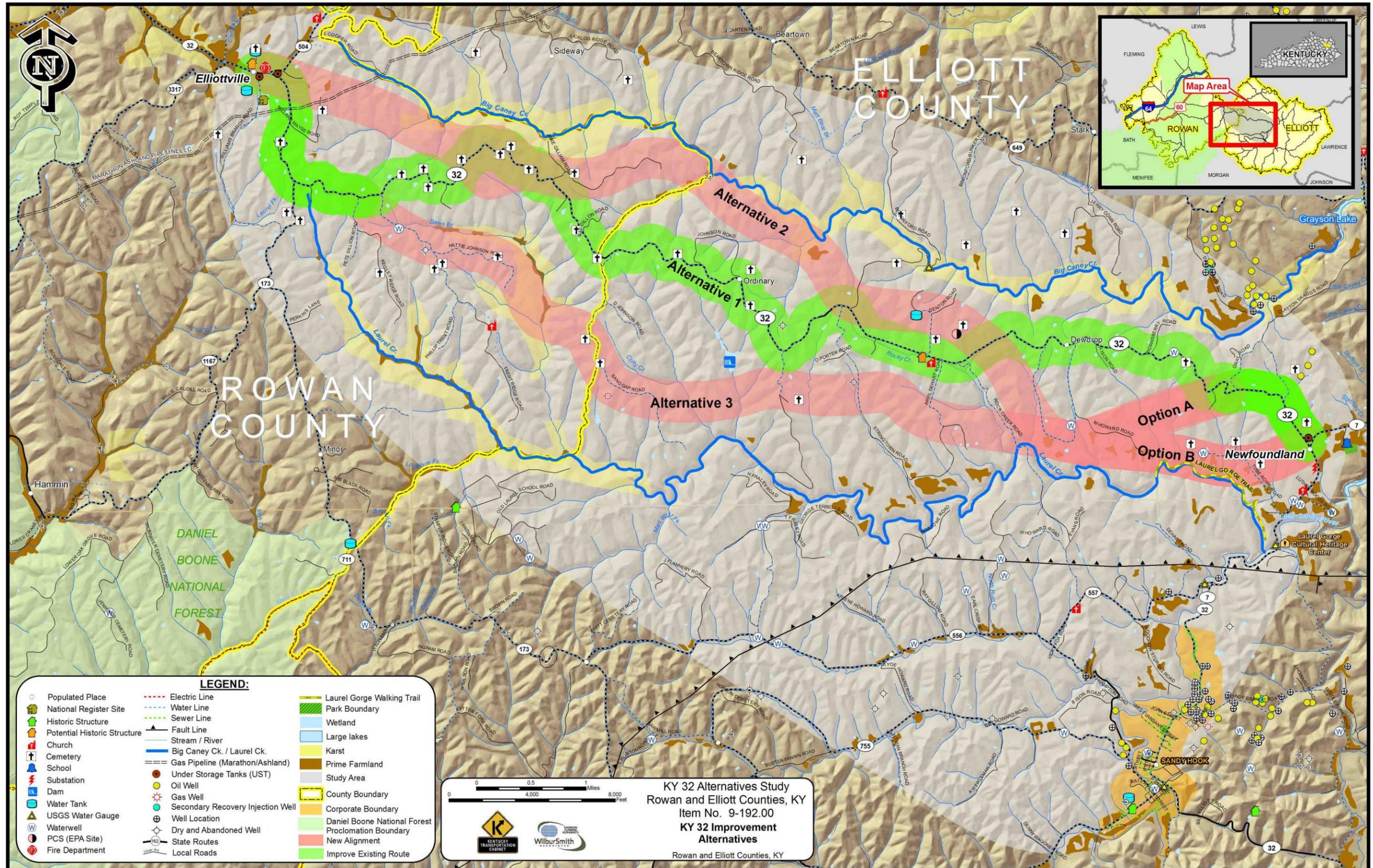


Figure 8.3 – Initial Proposed Improvement Alternatives (1, 2, and 3)

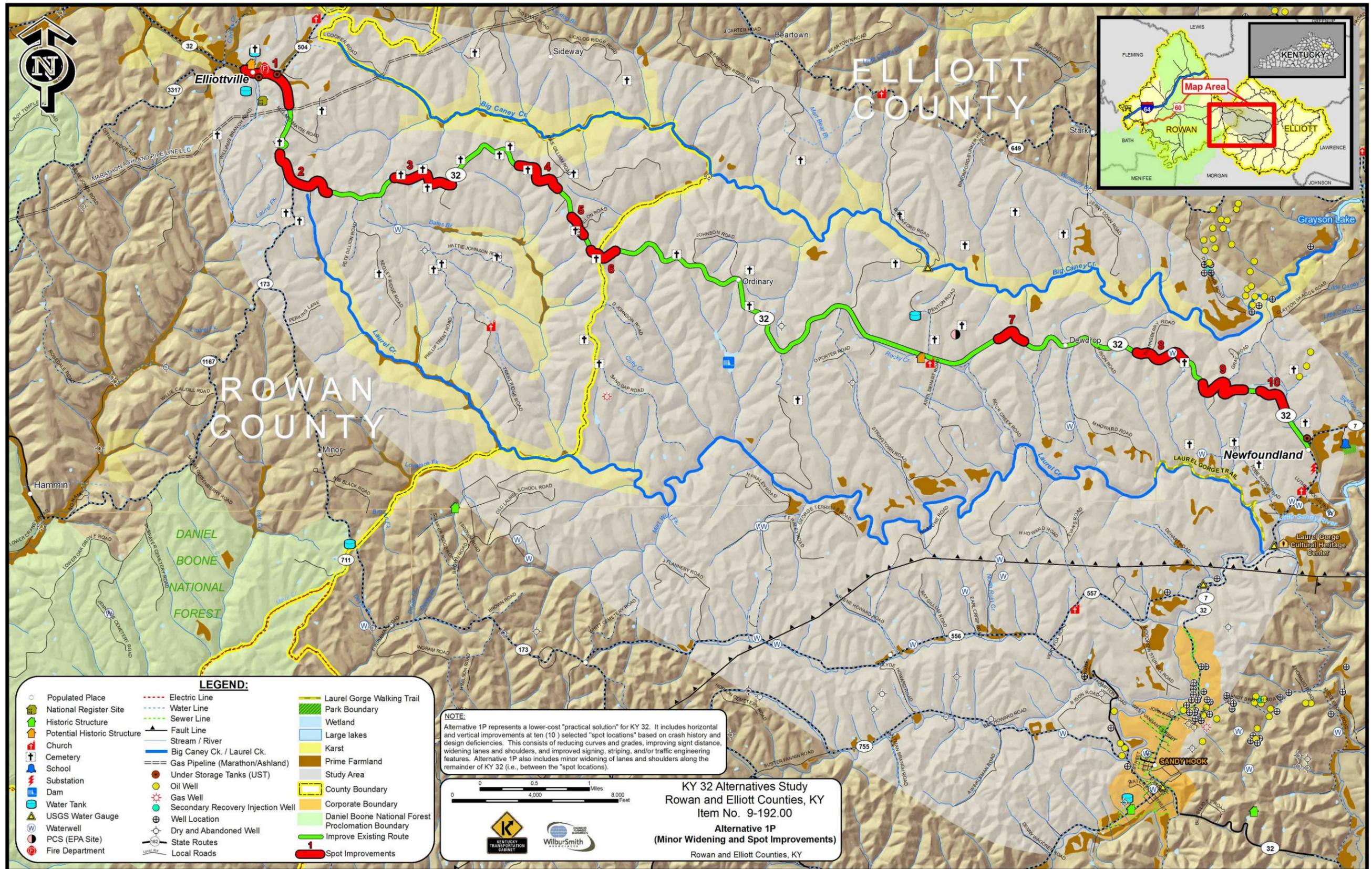


Figure 8.4 – Initial Proposed Improvement Alternative 1P

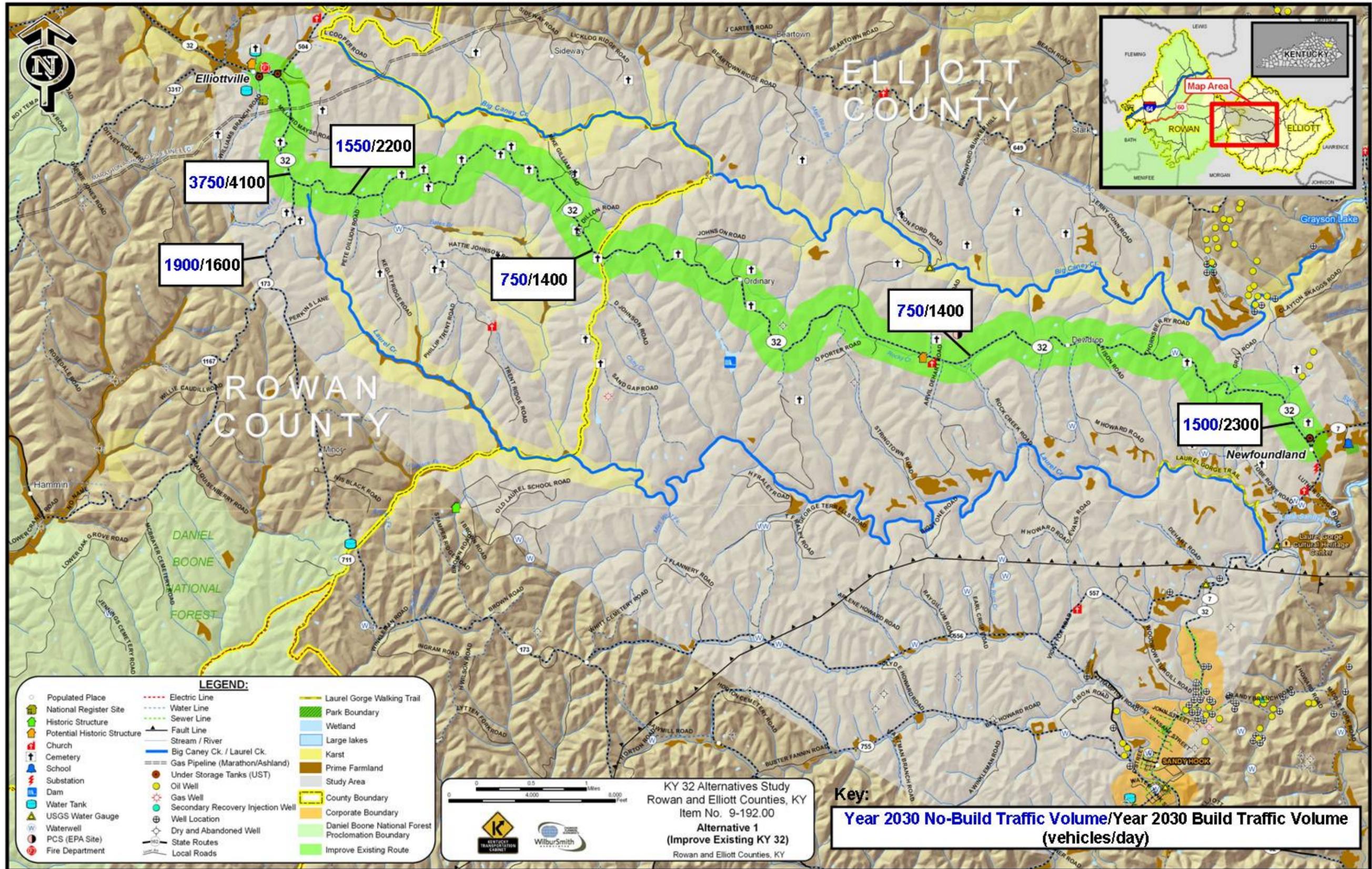


Figure 8.5 – Initial Proposed Improvement Alternative 1 (with Traffic)

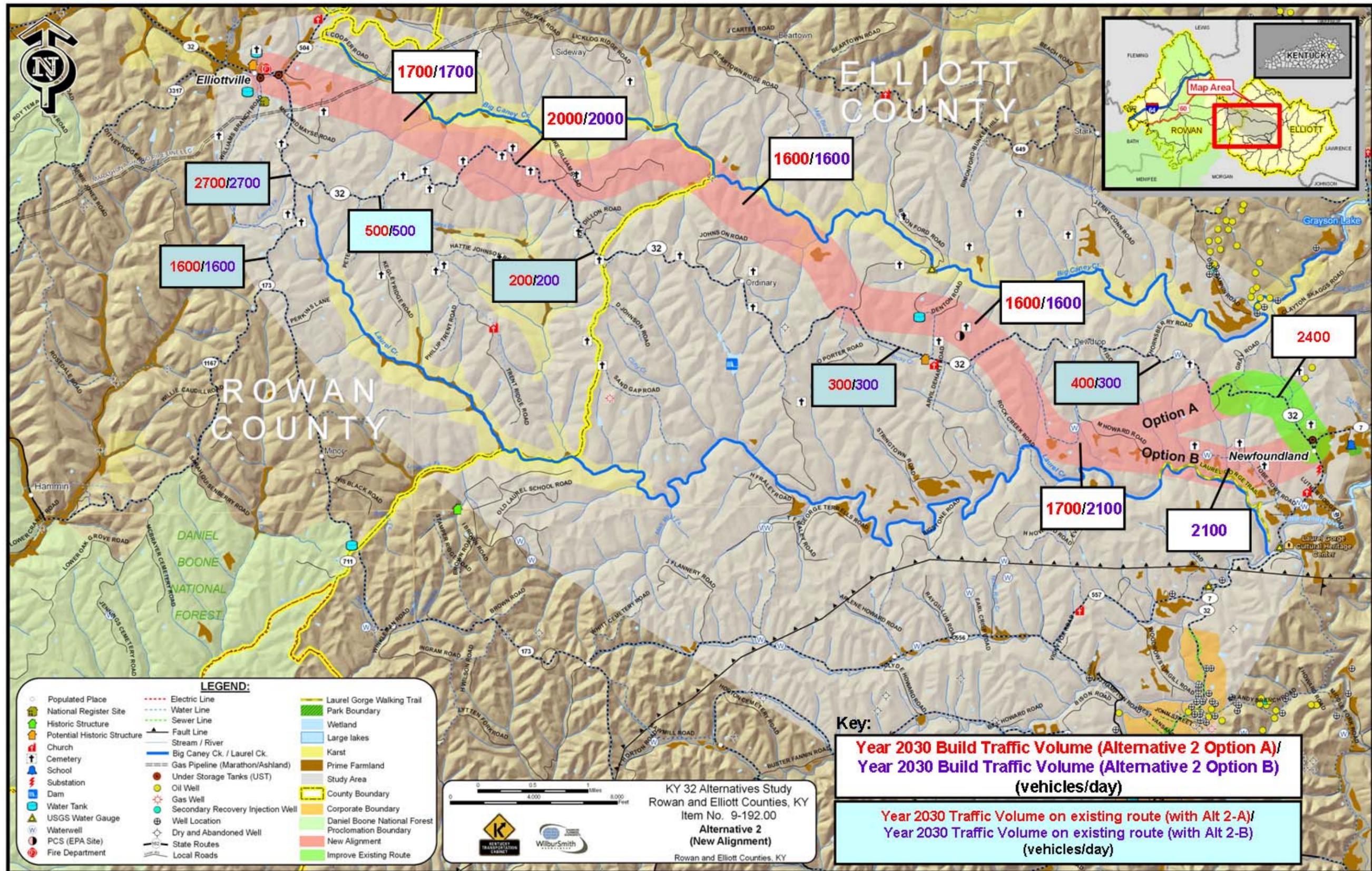


Figure 8.6 – Initial Proposed Improvement Alternative 2 (with Traffic)

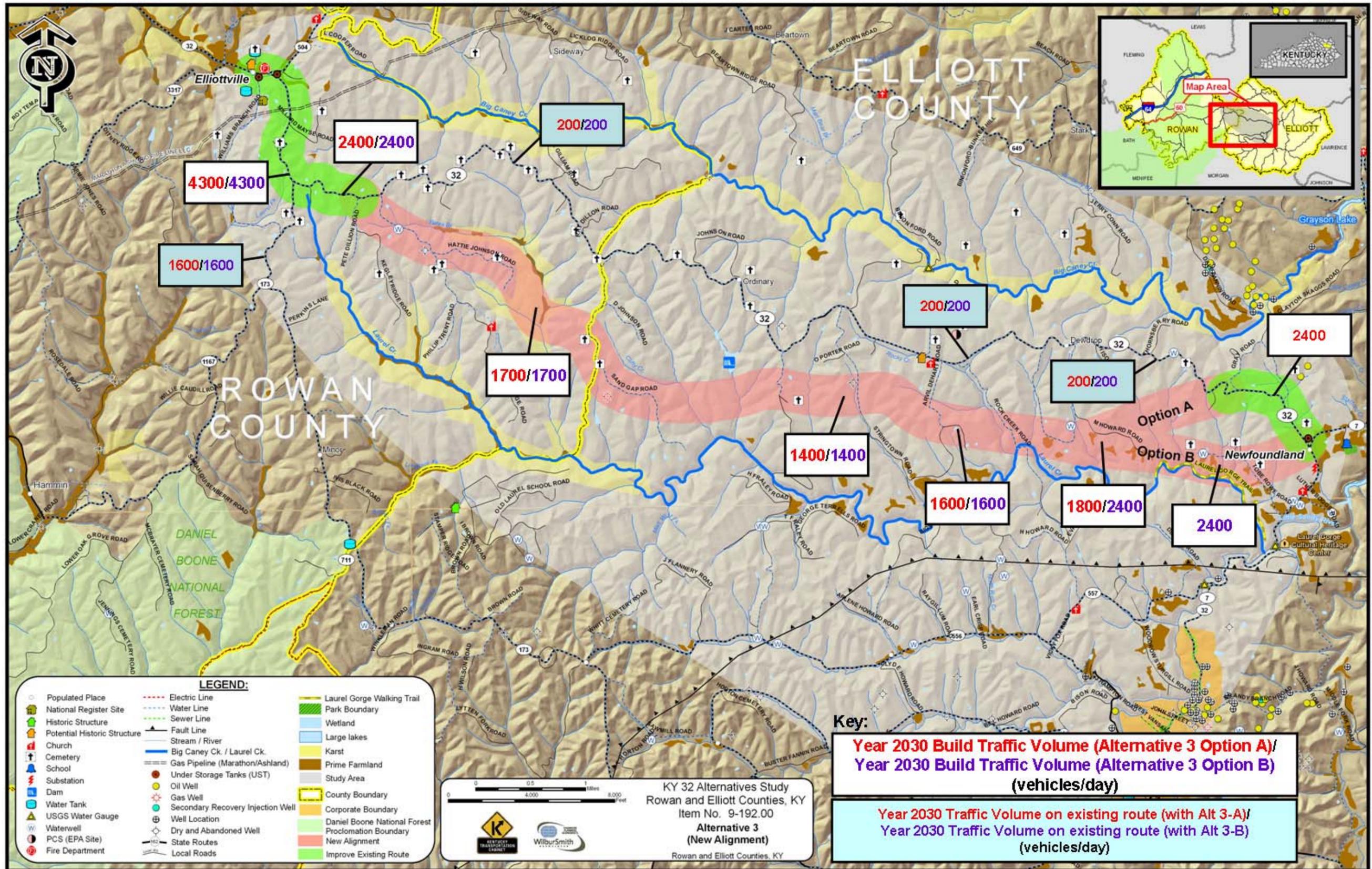


Figure 8.7 – Initial Proposed Improvement Alternative 3 (with Traffic)

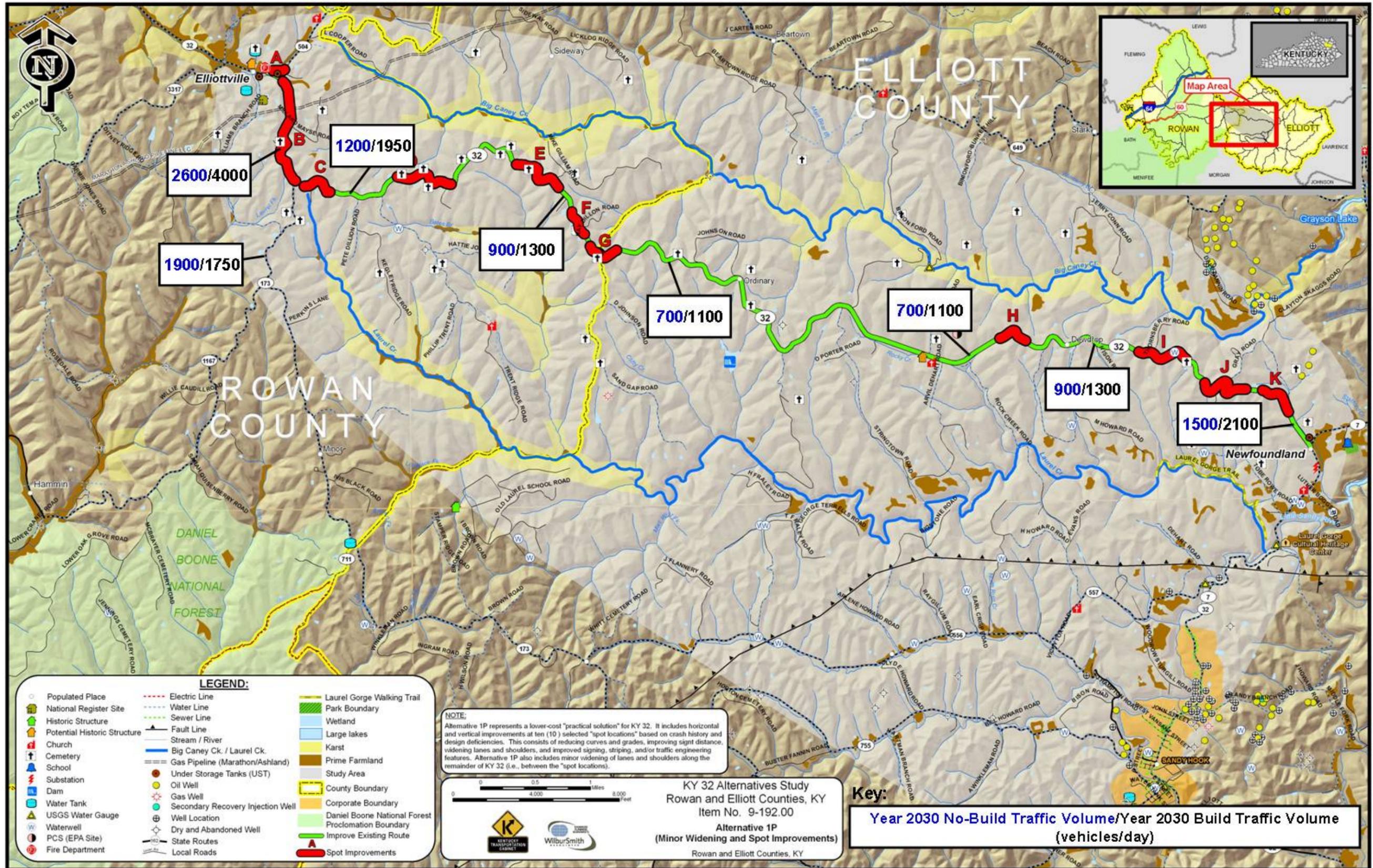


Figure 8.8 – Initial Proposed Improvement Alternative 1P (with Traffic)

Table 8.2 – Initial Level 2 Screening

| LEVEL 2 SCREENING SUMMARY | | | | | | | | |
|---------------------------|------------------|--------------------------------|--------------------|-----------------------------|--|-------------------------------------|--------------------------------|-----------------------------------|
| Alternative | Distance (miles) | Purpose and Need/Project Goals | Traffic Operations | Potential Community Impacts | Potential Environmental Resource Impacts | Potential Cultural Resource Impacts | Potential Geotechnical Impacts | Total Cost Estimate (\$ millions) |
| No Build | 13.7 | Least Desirable | Least Desirable | No Impact | No Impact | No Impact | Low | \$0 |
| Alternative 1 | 12.1 | Satisfactory | Average | High | Low | Medium | Low | \$97.5 |
| Alternative 1P | 13.7 | Satisfactory | Average | Medium | Low | Medium | Low | \$45.0 |
| Alternative 2 (Option A) | 11.8 | Average | Average | Medium | Medium | Medium | Medium | \$89.1 |
| Alternative 2 (Option B) | 11.4 | Average | Average | Medium | High | Medium | Medium | \$91.3 |
| Alternative 3 (Option A) | 12.1 | Satisfactory | Satisfactory | Medium | Medium | High | Medium | \$93.4 |
| Alternative 3 (Option B) | 11.8 | Average | Satisfactory | Medium | High | High | Medium | \$95.5 |

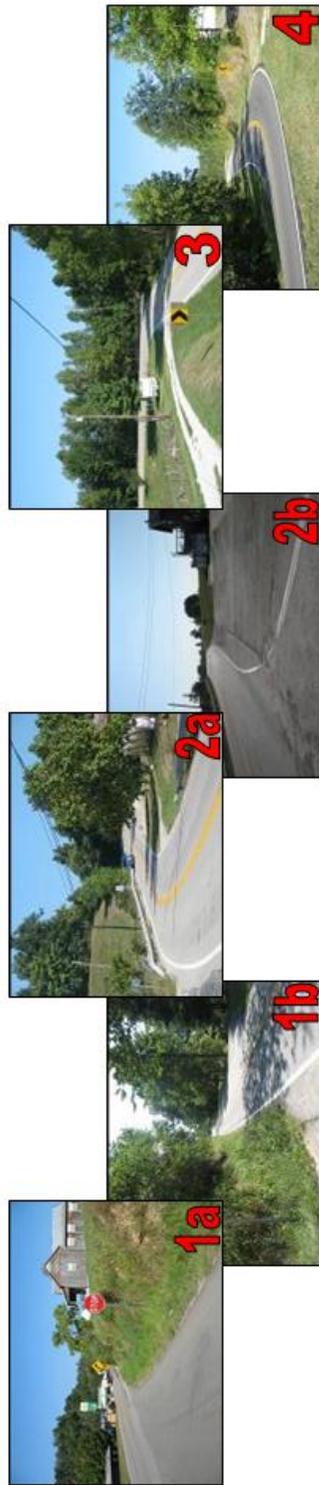
KEY:

| | |
|----------------------|---|
| Low/Satisfactory | Lowest likely impacts; Satisfactory for this measure. |
| Medium/Average | Mid-range of impacts; Somewhat unsatisfactory for this measure. |
| High/Least Desirable | High likely impacts; Least Desirable for this measure. |

| Alternative | Distance (miles) | Addressing Purpose and Need | | | Addressing Other Project Goals | Traffic Operations | | Potential Community Impacts | | | | Potential Environmental Impacts | | | Potential Cultural Resource Impacts | | | | Potential Geotechnical Impacts | | | |
|--------------------------|---|---|-----------------|-----------------|--------------------------------|---|---|---|---------------------------------------|------------------------------|--------------------------------------|--|---|---|---|--|---|---------------------------------------|--------------------------------|---|---|---|
| | | Improve Access and Safety through Improved: | | | | Support, Preserve, and Enhance Economic Development Opportunities and Tourism and Incorporate Context Sensitive Design Features, as appropriate, to Preserve and/or Complement the Existing Character and Context of the KY 32 Study Area | Estimated 2030 Traffic Volume on Existing KY 32 (KY 7 - KY 173 / KY 173 - KY 504) | Estimated 2030 Traffic Volume on Proposed Alternative | Possible Relocations/Homes/Businesses | Possible Impacts to Churches | Possible Impacts to Known Cemeteries | Potential Impact to Laurel Gorge Walking Trail | Environmental Justice Communities | Streams | Threatened and Endangered Species - Mammals | Threatened and Endangered Species - Mollusks | Hazardous Materials/Underground Storage Tanks | National Register Historic Properties | | Likelihood of additional National Register of Historic Properties | Known Archaeological Sites | Likelihood of Additional Archaeological Sites |
| Travel Time (minutes) | Travel Conditions at High Crash Locations (on existing KY 32) | Travel Conditions for Emergency Medical Services and School Buses | | | | | | | | | | | | | | | | | | | | |
| No Build | 13.7 | 18.3 | Least Desirable | Least Desirable | Least Desirable | 730 to 3750 | NA | 0/0 | 0 | 0 | No Impact | None | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| Alternative 1 | 12.1 | 13.2 | Satisfactory | Satisfactory | Satisfactory | 1400 to 4100 (approximately 300 vpd diverted from KY 173) & approximately 350 new trips | | 13/2 | 1 | 4 | No Impact | None | Avoids Caney Creek and Laurel Creek. 41 named and unnamed streams are located within this corridor. Most are the headwaters of streams that feed Laurel and Caney Creeks. Not all of the streams would be impacted within the corridor. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana gray and Virginia big-eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that between 8 to 9 sites should be mist netted for bats. Final sites will be determined when preliminary design sites are determined and in consultation with the KYTC Division of Environmental Analysis. | None were reported in the USFWS database for the area along the existing roadway. | A total of two sites exist – a gas station in Elliottville along existing KY 32 at the western terminus; the second site is located in Newfoundland just north of the eastern terminus where KY 32 junctions with KY 7. | 0 | Medium | 1 | High | 1 water well, 1 dry and abandoned well | |
| Alternative 1P | 13.7 | 16.4 | Satisfactory | Satisfactory | Satisfactory | 1100 to 4000 (approximately 150 vpd diverted from KY 173) & approximately 250 new trips | | 6/0 | 0 | 2 | No Impact | None | Same as 1 | Fewer impacts than Alternative 1 | Same as 1 | Same as 1 | 0 | Low | 1 | High | 1 water well, 1 dry and abandoned well | |
| Alternative 2 (Option A) | 11.8 | 12.9 | Average | Average | Satisfactory | 200 to 2700 | 1600 to 2400 (2400 on Option A segment) | 5/1 | 0 | 2 | No Impact | None | Two areas of Caney Creek are situated along the northernmost edges of the project corridor – the first area (app. 0.6 miles) is located within Rowan County app. 1.8 miles east of Elliottville. The second area (app. 1.7 miles) is located on either side of the Rowan/Elliott County line. In addition, 28 named and unnamed streams exist within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana gray and Virginia big-eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be mist netted for bats. Final sites will be determined when preliminary design sites are determined and in consultation with the KYTC Division of Environmental Analysis. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. | A total of two sites exist – a gas station in Elliottville along existing KY 32 at the western terminus; the second site is located in Newfoundland just north of the eastern terminus where KY 32 junctions with KY 7. | 0 | Medium | 0 | Medium | 1 water well, potential for mines | |
| Alternative 2 (Option B) | 11.4 | 12.5 | Least Desirable | Least Desirable | Satisfactory | 200 to 2700 | 1600 to 2100 (2100 on Option B segment) | 7/0 | 0 | 2 | Medium | None | Two areas of Caney Creek and Laurel Creek would likely be impacted. The portion of Laurel Creek that could be impacted is located in the area where Option B separates from Option A in the eastern most portion of the corridor. A total of 27 named and unnamed streams are located within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana gray and Virginia big-eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be mist netted for bats. Final sites will be determined when preliminary design sites are determined and in consultation with the KYTC Division of Environmental Analysis. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. Laurel Creek and its tributaries in the eastern area of the corridor are very likely to include habitat suitable to these species. | A total of two sites exist – a gas station in Elliottville along existing KY 32 at the western terminus; the second site is located in Newfoundland just north of the eastern terminus where KY 32 junctions with KY 7. | 0 | Medium | 1 | Medium | 2 water wells, potential for mines | |
| Alternative 3 (Option A) | 12.1 | 13.2 | Satisfactory | Satisfactory | Satisfactory | 200 | 1400 to 4300 (2400 on Option A segment) | 5/1 | 0 | 1 | No Impact | None | Although a portion of Laurel Creek, including the headwater, exists within the first section of this option. A total of 37 named and unnamed streams, including Laurel Creek, exist within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana gray and Virginia big-eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be mist netted for bats. Final sites will be determined when preliminary design sites are determined and in consultation with the KYTC Division of Environmental Analysis. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. | There are 3 Hazardous Materials sites in this Alternative Corridor. A gas station in Elliottville along existing KY 32; the second site is located in Newfoundland where KY 32 junctions with KY 7, and an oil spill that was reported by the EPA within their database website (located North of KY 32 and Rocky Creek between two cemeteries). | 0 | Medium | 3 | High | 2 water wells, 1 gas well, 1 dry abandoned well | |
| Alternative 3 (Option B) | 11.8 | 12.8 | Least Desirable | Least Desirable | Satisfactory | 200 | 1400 to 4300 (2400 on Option B segment) | 7/0 | 0 | 1 | Medium | None | Laurel Creek would likely be impacted if Option B of this alternative is selected. The portion of Laurel Creek that could be impacted is located in the area where Option B separates from Option A in the eastern most portion of the corridor. Caney Creek is avoided. A total of 35 named and unnamed streams are located within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana gray and Virginia big-eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be mist netted for bats. Final sites will be determined when preliminary design sites are determined and in consultation with the KYTC Division of Environmental Analysis. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. Laurel Creek and its tributaries in the eastern area of the corridor are very likely to include habitat suitable to these species. | There are 2 hazardous materials sites in this corridor. A gas station in Elliottville along existing KY 32, and an oil spill that was reported by the EPA within their database website (located North of KY 32 and Rocky Creek between two cemeteries). | 0 | Medium | 4 | High | 3 water wells, 1 gas well, 1 dry and abandoned well | |

| Alternative | Distance (miles) | Cost Estimates | | | | | |
|--------------------------|------------------|----------------------|-------------------|-----------------------|----------------------------|--------------------------|-------------------------|
| | | Design (\$ millions) | ROW (\$ millions) | Utility (\$ millions) | Construction (\$ millions) | Total Cost (\$ millions) | Cost/Mile (\$ millions) |
| No Build | 13.7 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |
| Alternative 1 | 12.1 | \$6.4 | \$16.5 | \$10.9 | \$63.7 | \$97.5 | \$8.1 |
| Alternative 1P | 13.7 | \$2.3 | \$9.1 | \$10.9 | \$22.7 | \$45.0 | \$3.3 |
| Alternative 2 (Option A) | 11.8 | \$6.1 | \$12.3 | \$9.4 | \$61.3 | \$89.1 | \$7.6 |
| Alternative 2 (Option B) | 11.4 | \$6.4 | \$11.9 | \$9.1 | \$63.9 | \$91.3 | \$8.0 |
| Alternative 3 (Option A) | 12.1 | \$6.5 | \$12.6 | \$9.7 | \$64.6 | \$93.4 | \$7.7 |
| Alternative 3 (Option B) | 11.8 | \$6.7 | \$12.2 | \$9.4 | \$67.2 | \$95.5 | \$8.1 |

Table 8.3 – Proposed Spot Improvements



KY 32 Proposed Spot Improvements

| Spot Improvement ID | County | Begin Milepoint | End Milepoint | Description | Construction Cost | ROW Cost | | Utility Cost | Design Cost | Total Cost |
|---------------------|-------------------|------------------|-------------------|---|---------------------|---------------------------------|--------------------|--------------------|--------------------|---------------------|
| | | | | | | Number of Property Acquisitions | Cost | | | |
| 1a | Rowan | 16.62 | 16.62 | Realign KY 504 at the KY 32 intersection. Add eastbound and westbound passing lanes just east of KY 504 (includes intersection with Cox Cemetery Road). | \$600,000 | 0 | \$120,000 | \$80,000 | \$60,000 | \$860,000 |
| 1b | Rowan | 16.85 | 17.25 | | \$1,400,000 | 0 | \$480,000 | \$320,000 | \$140,000 | \$2,340,000 |
| 2a | Rowan | 17.55 | 17.75 | Realign KY 32 just west of KY 173. | \$1,100,000 | 1 | \$390,000 | \$160,000 | \$110,000 | \$1,760,000 |
| 2b | Rowan | 17.70 | 18.00 | Realign KY 32 just east of KY 173. | \$2,900,000 | 1 | \$630,000 | \$320,000 | \$290,000 | \$4,140,000 |
| 3 | Rowan | 18.80 | 19.55 | Realign KY 32 (includes intersections with Freley Cemetery Road and Adkins Road). | \$2,900,000 | 1 | \$750,000 | \$400,000 | \$290,000 | \$4,340,000 |
| 4 | Rowan | 20.35 | 20.85 | Realign KY 32 (includes intersection with Lower Caney Creek Road). | \$1,000,000 | 1 | \$510,000 | \$240,000 | \$100,000 | \$1,850,000 |
| 5 | Rowan | 21.15 | 21.35 | Realign KY 32 (includes intersection with Alexandra Drive). | \$1,000,000 | 0 | \$240,000 | \$160,000 | \$100,000 | \$1,500,000 |
| 6 | Rowan/ Elliott | 21.50 (Rowan) | 0.20 (Elliott) | Realign KY 32 (includes intersection with Sand Gap Road). | \$1,500,000 | 0 | \$480,000 | \$320,000 | \$150,000 | \$2,450,000 |
| 7 | Elliott | 4.85 | 5.05 | Realign KY 32 in near Dewdrop. | \$600,000 | 0 | \$120,000 | \$80,000 | \$60,000 | \$860,000 |
| 8 | Elliott | 6.30 | 6.80 | Realign KY 32 between George Johnson Road and Thornberry Road. | \$2,800,000 | 1 | \$750,000 | \$400,000 | \$260,000 | \$4,010,000 |
| 9 | Elliott | 7.05 | 7.65 | Realign KY 32 (includes western end of Simmons Loop). | \$1,400,000 | 0 | \$480,000 | \$320,000 | \$140,000 | \$2,340,000 |
| 10 | Elliott | 7.80 | 8.20 | Realign KY 32 (includes eastern end of Simmons Loop). | \$2,700,000 | 2 | \$860,000 | \$240,000 | \$270,000 | \$3,870,000 |
| TOTAL | - | - | - | - | \$19,700,000 | 7 | \$5,610,000 | \$3,040,000 | \$1,970,000 | \$30,320,000 |



9. ADDITIONAL CABINET, PUBLIC, AND AGENCY INPUT

A second round of coordination activities was held with local officials, stakeholders, the public, and resource agencies to update them on study findings and to seek input. Summary information was provided on the existing conditions, all technical analyses, the improvement development and evaluation process, and final proposed improvements for consideration. Copies of the meeting minutes are included in **Appendix D**.

A. Local Officials and Stakeholders Meeting (December 11, 2008)

A second round of meetings with local elected officials and stakeholders was conducted on December 11, 2008, in Morehead (Rowan County) and Sandy Hook (Elliott County). The proposed improvements, discussed in **Chapter 8**, were presented along with project purpose and need (see **Chapter 7**). Meeting minutes can be found in **Appendix D**.

The local officials and stakeholders in attendance did not express any major concerns with any of the final proposed improvement alternatives. It was agreed that Improvement Alternatives 1, 2, and 3 should move forward for further consideration by the public.

It was decided that the proposed spot improvements should be revised to more adequately address the improvement of Hogtown Hill, just north of KY 173, which is an area of primary concern for the public. This change also affected the practical solution, Alternative 1P, because Alternative 1P is a combination of the spot improvements and minor widening.

In summary, after the Local Officials and Stakeholders Meeting, the following moved forward for consideration by the Public (as discussed in **Section B** below):

- Proposed Improvement Alternatives 1, 2, and 3 (shown in **Figure 9.1** and previously as **Figure 8.3**)
- The No Build Alternative
- Revised Practical Solution Alternative 1P (shown in **Figure 9.2**)
- Level 2 Evaluation Matrix (shown as **Table 9.1**)
- Revised Spot Improvements (shown in **Figure 9.3** and **Table 9.2**)

B. Public Information Meeting (March 24, 2009)

A second public meeting was held at the Elliott County High School Gymnasium in Sandy Hook, Kentucky on March 24, 2009. The meeting was designed to communicate the study process and findings to the public and solicit input on the proposed alternatives.

Meeting minutes can be found in **Appendix D**. Additional details of the meeting are included in a second public meeting summary notebook on file with KYTC's Division of Highway Design and Division of Planning.



Project team members escorted attendees in groups of 3 to 4 on guided tours of the exhibit boards displaying the final proposed improvements, listed in **Section A** of this Chapter, along with the final proposed spot improvements and project purpose and need (see **Chapter 7**).

Once a tour was completed, each attendee was given three small pieces of paper: one red, one green, and one yellow. Each was then asked to indicate their preferences as to which alternatives were his or her most favorite (green sheet), second most favorite (yellow sheet), and least favorite (red sheet) by placing the sheets into boxes marked with the name of each proposed alternative.

A station with background information (e.g., environmental features and crash history) was set up with project team members available to answer questions or concerns about the study process and findings.

A total of 68 persons signed an attendance sheet at the two-hour public session. Forty-six (67.6%) of the attendees cast votes at the Alternative Preference station, and 36 (52.9%) completed and returned survey forms. One e-mail with input was also received after the meeting. All surveys and comments are included in the public meeting summary notebook on file with KYTC's Division of Highway Design and Division of Planning.

At the voting station, Alternatives 1P and 2B tied for the most preferred alternative, and the No Build Alternative was the least preferred alternative.

Thirteen (13) survey forms were returned during the meeting. An additional 23 surveys were received after the meeting, for a total of 36. Surveys returned by attendees resulted in the following:

- According to points assigned for the attendees' preferences, Alternative 1P was the most preferred, and Alternative 2B was the second most preferred. Alternatives 3A and the No Build Alternative received the fewest points.
- The No Build appeared to be the least preferred alternative.
- For spot improvement locations, the attendees preferred Spot Improvements J, K, and B.

C. Resource Agency Coordination - Round 2 (December 2008)

Prior to the public meeting, coordination with resource agencies was undertaken a second time to get input on the proposed Improvement Alternatives developed from the KY 32 Alternatives Study. A copy of the informational letter distributed by the KYTC and response letters from various resource agencies are located in **Appendix F** and are summarized here:

- Department for Natural Resources, KY Energy and Environmental Cabinet, Division of Mine Permits - No mine-related issues were identified that would be expected to impact the project.
- Department for Natural Resources, KY Energy and Environmental Cabinet - Mining operations occurred southeast of this project in the early 1900's, with the closest inactive mines around Sandy Hook. Wetland and endangered species may be an environmental concern for the study area. Several oil and gas wells exist within the area. There are no conservation or development plans proposed within the study area.
- Division for Air Quality, Kentucky Environmental and Public Protection Cabinet - Precautions should be taken to prevent particulate matter from becoming airborne, including covering open-bodied trucks and avoiding depositing earth onto paved roadways. Open burning is prohibited for all but the express purposes detailed in the Open Burning Fact Sheet. It is encouraged to use chipping or grinding in order to avoid excessive particulate emissions in the direct vicinity of the project. The project must

meet the conformity requirements of the Clean Air Act and the transportation planning provisions of Titles 23 and 49 of the US Code. The division suggests investigating local government requirements as well.

- Division of Water, Kentucky Environmental and Public Protection Cabinet – Water Quality Branch - Has reservations concerning major road improvements due to it being located in two Reference Reach watersheds, Laurel Creek and Big Caney Creek. Alternatives 1 or 1P would be best since Alternatives 2 and 3 would impact Laurel Creek, Big Caney Creek, or both.
- Division of Water, Kentucky Environmental and Public Protection Cabinet – Groundwater Branch - Any water or monitoring wells that may be destroyed by the project will need to be abandoned properly. All water well and monitoring well construction, alteration, repair or plugging must be done by a Kentucky certified driller in accordance with KRS 223.400 460 and 401 KAR 6:310 and 320.
- Division of Water, Kentucky Environmental and Public Protection Cabinet – Compliance and Technical Assistance Branch - Big Caney Creek and Laurel Creek are both listed as Cold Water Habitats by 401 KAR 10:026 and Exceptional Waters by 401 KAR 10:030; therefore, special considerations should be given to the impacts on the streams. Several alternatives will place the new road in close proximity to Big Caney and Laurel Creeks, which would result in direct impacts and the need for mitigation.

Alternatives 1 and 1P are supported since either would keep primary construction at the farthest distance possible from both creeks. Erosion and sediment controls could be implemented on a smaller scale to keep sediment out of the headwater tributaries of both creeks.

Alternatives 2 and 3 were reviewed and both represent negative impacts to either Big Caney or Laurel Creek. Tributaries at these lower elevations would also be negatively impacted by sediment and channel changes from the construction.

- Division of Structural Design, Geotechnical Branch, Kentucky Transportation Cabinet - A previous report was completed for the project on July 31, 2008, report # P-005-2008. The primary concern is with Alternative 2. This could encounter the Olive Hill Clay Bed of Crider. This is semi-flint clay and flint clay that has been extensively stripped and underground mined along Big Caney Creek. It is recommended that areas directly on top of and around this bed should be avoided.
- Federal Aviation Administration - No apparent issues or concerns exist that would affect the nearest airport (Morehead-Rowan County Airport).
- Kentuckians for the Commonwealth, Rowan Chapter - Alternatives 2 and 3 would do irreparable harm to Big Caney Creek and Laurel Creek. Both streams are Reference Reach, Outstanding State Resource Waters, and rare cold water aquatic habitats. Either of the alternatives would expectedly lead to new development and deforestation which would lead to pollution in the streams. Alternative 1 would be far superior to all other alternatives. Environmental impacts would be far less, and the Alternative 1 alignment would best serve the local residents.
- Kentucky State Nature Preserve Commission, Kentucky Environmental and Public Protection Cabinet - This agency recommends suitable measures to protect the integrity of the watersheds within the study area, as well as proper erosion and sediment control structures that will help maintain water quality in study area streams.

- Kentucky Heritage Council, State Historic Preservation Office - In the vicinity of the project, records show that there are many recorded archaeological resources, including as Early Archaic and historic farm site (15RO145) and two prehistoric rock shelters (15EL14 & 15EL15), as well as several cemeteries and other archaeological resources that have not been evaluated yet. In addition, there are many historic building sites within the study area. Full surveys of both architectural and archaeological resources should be conducted and submitted to the State Historic Preservation Office.
- Kentucky Department of Agriculture - No comments are offered on the proposed project at this time.
- Kentucky Department of Education - This project will not directly affect the Education Cabinet and its agencies. The Division of Facilities Management contacted Rowan and Elliott Counties Schools district offices and there are no negative environmental impacts from this project.
- Kentucky State Police Sergeant Jim Bowling - This portion of road is very hilly and curvy and the speed limit is too fast for the road since it is basically a series of sharp curves and steep grades, much of which is not protected by guardrails. There is a need for a new or improved roadway. It would improve access to Morehead State University, St. Claire Medical Center, I-64, and all the businesses in the Morehead area. A better roadway would make it easier, safer, and quicker for emergency vehicles to respond to calls for service in the area.
- Kentucky Representative Rocky Adkins, Kentucky House Majority Floor Leader - In favor of doing something similar to what was done on KY 7 in Elliott County, but not in favor of spot improvements. It is preferred to do a complete reconstruction of KY 32 even if it follows the existing alignment. Need to improve safety and keep scenic aspects of KY 32 in order to not lose the beauty of the scenic features as well as not change the characteristics or personality of the roadway.
- Kentucky Airport Zoning Commission - No adverse affects to air navigation are anticipated due to developments in the study area. If any structure or construction equipment exceeds 200 feet in height, a permit from this office will be required.
- Little Sandy Correctional Complex, Justice and Public Safety Cabinet - KY 32 is the major access route for the complex. This highway improvement would make KY 32 much safer, especially during inclement weather. The service the complex provides is critical to the safety of the local community. The road improvements could potentially save lives as the St. Claire Regional Medical Center is the primary health care center for the facility.
- Morehead State University - This is a major access road for hundreds of employees, students, parents and other visitors on a daily basis. A major concern is emergency response vehicles that travel the road. Shoulders are not wide enough for a vehicle to get out of the traffic flow if necessary. Strongly believe that an improvement of KY 32 will encourage more students from Elliott and Carter counties to commute to our Morehead campus to complete four-year college degrees.
- Department of The Army, Army Corps of Engineers - Alternative 1 and 1P are not anticipated to directly impact the property owned by the Huntington District. However, the karst geology of the Big Caney Creek watershed could result in long term impacts associated with the highway, so it is requested that KYTC consider these impacts as part of the analysis of the project.

Alternatives 2 and 3 have the potential to directly impact the Huntington district property along Laurel Creek watershed. The Laurel Gorge Trail is located within the study area which offers unique and valuable recreational opportunities. The trail area also contains cultural resources that are eligible for listing on the National Register of Historic Places. It is requested that KYTC avoid alternatives that could potentially impact this unique area of the Grayson Lake project.

KYTC is encouraged to continue to consult the Huntington District as the project develops.

- US Department of Homeland Security, United States Coast Guard – No bridges over navigable water of the United States are involved; therefore, a bridge permit is not required.
- University of Kentucky, Kentucky Geological Survey - Issues that may affect the improvement along KY 32 include slope stability of the weathered shales. None of the geologic features observed in the field (and summarized in the letter) would preclude improvements on or alternative routes along KY 32.

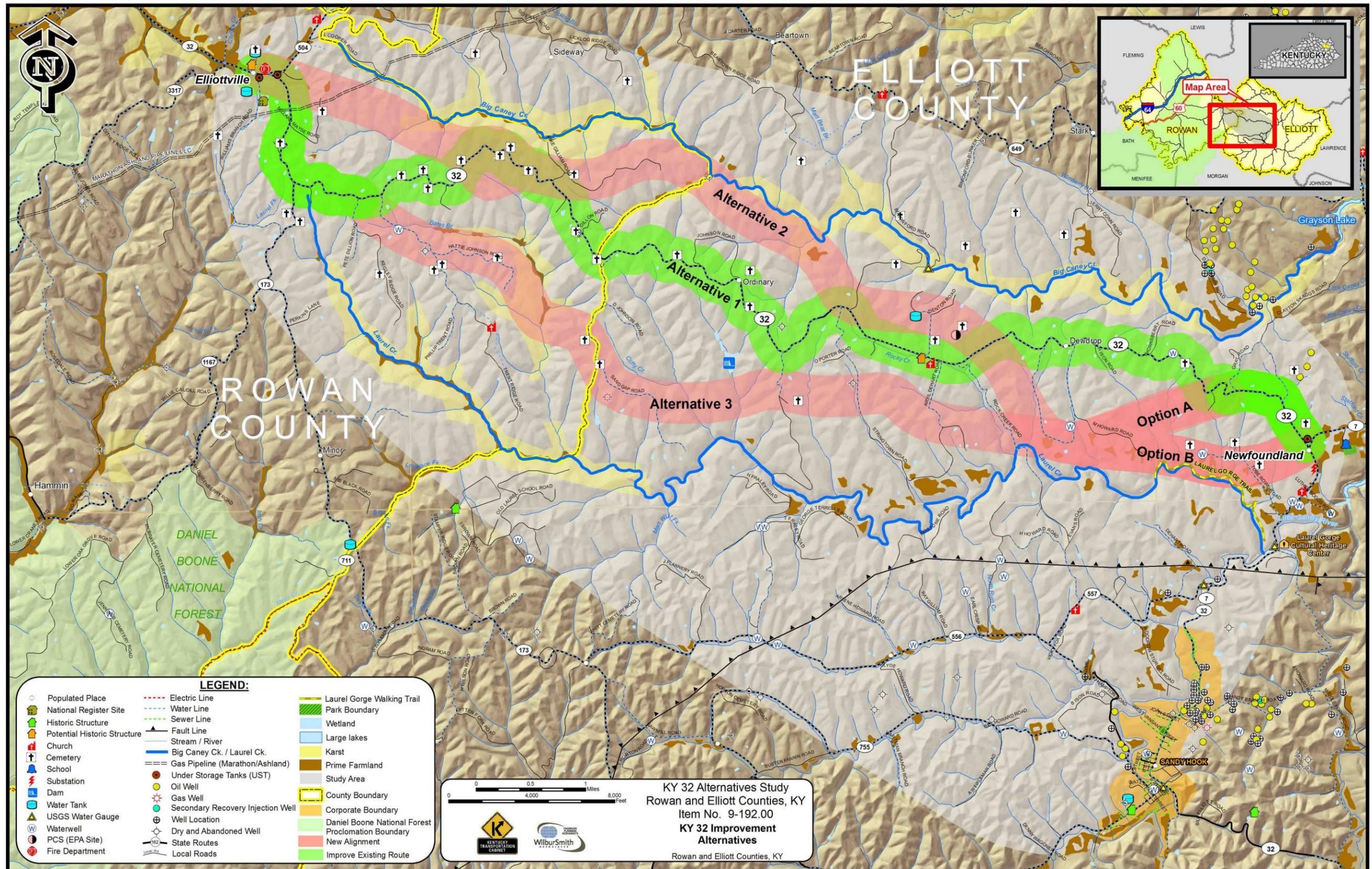


Figure 9.1 – Final Proposed Improvement Alternatives (1, 2, and 3)

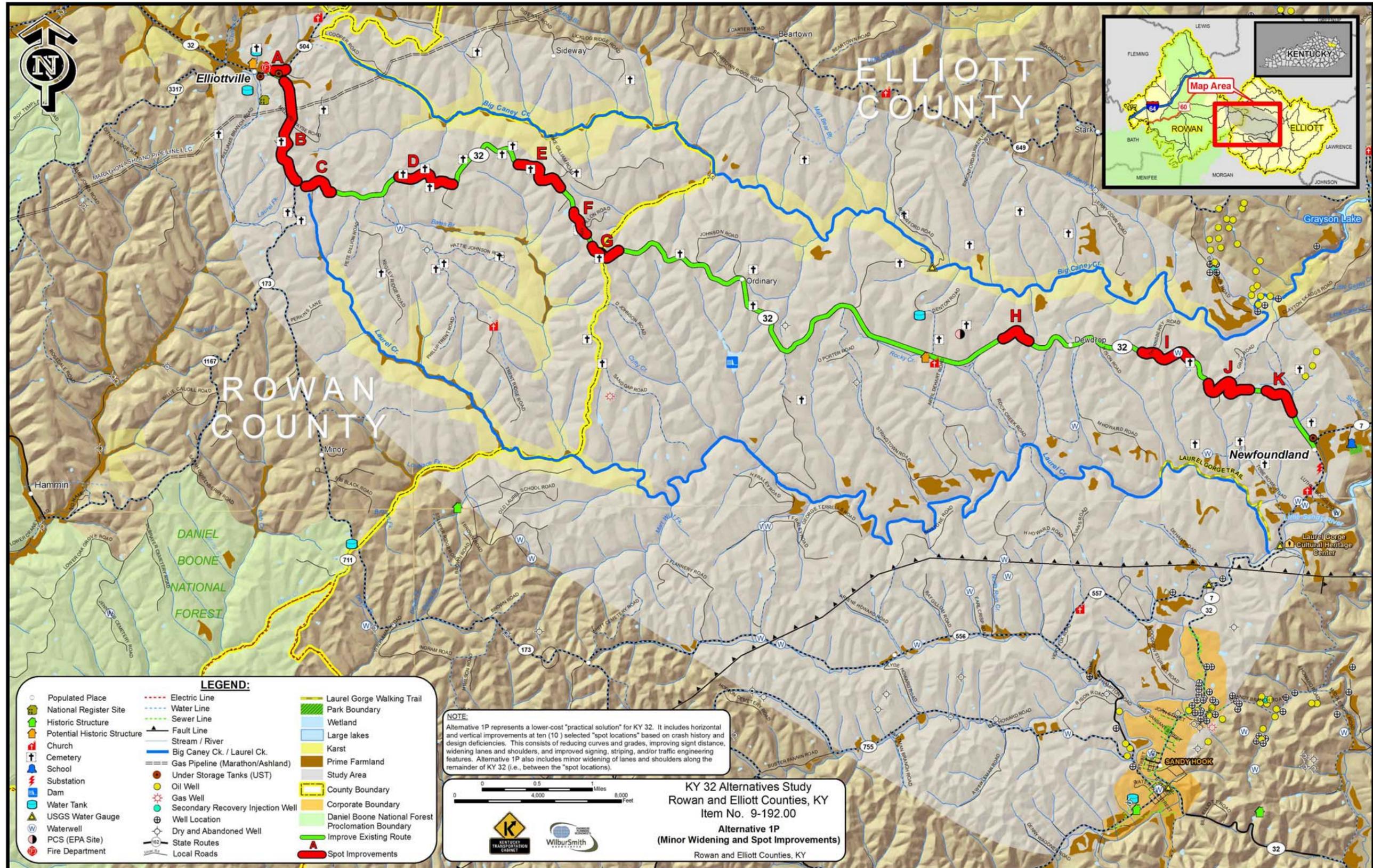


Figure 9.2 – Revised (Final Proposed) Alternative 1P

LEVEL 2 SCREENING SUMMARY

| Alternative | Distance (miles) | Purpose and Need/Project Goals | Traffic Operations | Potential Community Impacts | Potential Environmental Resource Impacts | Potential Cultural Resource Impacts | Potential Geotechnical Impacts | Constructability | Total Cost Estimate (\$ millions) |
|--------------------------|------------------|--------------------------------|--------------------|-----------------------------|--|-------------------------------------|--------------------------------|------------------|-----------------------------------|
| No Build | 13.7 | Least Desirable | Least Desirable | No Impact | No Impact | No Impact | Low | NA | \$0 |
| Alternative 1 | 12.1 | Satisfactory | Average | High | Low | Medium | Low | Average | \$8.1 |
| Alternative 1P | 13.7 | Satisfactory | Average | Medium | Low | Medium | Low | Average | \$3.8 |
| Alternative 2 (Option A) | 11.8 | Average | Average | Medium | Medium | Medium | Medium | Average | \$7.6 |
| Alternative 2 (Option B) | 11.4 | Average | Average | Medium | High | Medium | Medium | Average | \$8.0 |
| Alternative 3 (Option A) | 12.1 | Satisfactory | Satisfactory | Medium | Medium | High | Medium | Average | \$7.7 |
| Alternative 3 (Option B) | 11.8 | Average | Satisfactory | Medium | High | High | Medium | Least Desirable | \$8.1 |

Table 9.1 - Revised Level 2 Screening

KEY:

| | |
|----------------------|---|
| Low/Satisfactory | Lowest likely impacts; Satisfactory for this measure. |
| Medium/Average | Mid-range of impacts; Somewhat unsatisfactory for this measure. |
| High/Least Desirable | High likely impacts; Least Desirable for this measure. |

| Alternative | Distance (miles) | Addressing Purpose and Need | | | Addressing Other Project Goals | Traffic Operations | | Potential Community Impacts | | | | | Potential Environmental Impacts | | | | Potential Cultural Resource Impacts | | | | Potential Geotechnical Impacts |
|--------------------------|------------------|---|-----------------|-----------------|--------------------------------|--|---|--|------------------------------|--------------------------------------|--|-----------------------------------|---|---|---|---|---------------------------------------|---|----------------------------|---|---|
| | | Improve Access and Safety through Improved: | | | | Estimated 2030 Traffic Volume on Existing KY 32 (KY 7 - KY 173 / KY 173 - KY 504) | Estimated 2030 Traffic Volume on Proposed Alternative | Possible Relocations Homes/ Businesses | Possible Impacts to Churches | Possible Impacts to Known Cemeteries | Potential Impact to Laurel Gorge Walking Trail | Environmental Justice Communities | Streams | Threatened and Endangered Species - Mammals | Threatened and Endangered Species - Mollusks | Hazardous Materials/Underground Storage Tanks | National Register Historic Properties | Likelihood of additional National Register of Historic Properties | Known Archaeological Sites | Likelihood of Additional Archaeological Sites | |
| No Build | 13.7 | 18.3 | Least Desirable | Least Desirable | Least Desirable | 730 to 3750 | NA | 0/0 | 0 | 0 | No Impact | None | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| Alternative 1 | 12.1 | 13.2 | Satisfactory | Satisfactory | Satisfactory | 1400 to 4100 (approximately 300 vpd diverted from KY 173) & approximately 350 new trips) | | 13/2 | 1 | 4 | No Impact | None | Avoids Caney Creek and Laurel Creek, 41 named and unnamed streams are located within this corridor. Most are the headwaters of streams that feed Laurel and Caney Creeks. Not all of the streams would be impacted within the corridor. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana, gray and Virginia big eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that between 8 to 9 sites should be present. | None were reported in the USFWS database for the area along the existing roadway. | A total of two sites exist – a gas station in Elliottville along existing KY 32 at the western terminus; the second site is located in Newfoundland just north of the eastern terminus where KY 32 junctions with KY 7. | 0 | Medium | 1 | High | 1 water well, 1 dry and abandoned well |
| Alternative 1P | 13.7 | 16.4 | Satisfactory | Satisfactory | Satisfactory | 1100 to 4000 (approximately 150 vpd diverted from KY 173) & approximately 250 new trips) | | 6/0 | 0 | 2 | No Impact | None | Same as 1 | Fewer impacts than Alternative 1 | Same as 1 | Same as 1 | 0 | Low | 1 | High | 1 water well, 1 dry and abandoned well |
| Alternative 2 (Option A) | 11.8 | 12.9 | Average | Average | Satisfactory | 200 to 2700 (2400 on Option A segment) | | 5/1 | 0 | 2 | No Impact | None | Two areas of Caney Creek are situated along the northernmost edges of the project corridor – the first area (app. 0.8 miles) is located within Rowan County app. 1.8 miles east of Elliottville. The second area (app. 1.7 miles) is located on either side of the Rowan/Elliott County line. In addition, 28 named and unnamed streams are located within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana, gray and Virginia big eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be present. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. | A total of two sites exist – a gas station in Elliottville along existing KY 32 at the western terminus; the second site is located in Newfoundland just north of the eastern terminus where KY 32 junctions with KY 7. | 0 | Medium | 0 | Medium | 1 water well, potential for mines |
| Alternative 2 (Option B) | 11.4 | 12.5 | Least Desirable | Least Desirable | Satisfactory | 200 to 2700 (2100 on Option B segment) | | 7/0 | 0 | 2 | Medium | None | Two areas of Caney Creek and Laurel Creek would likely be impacted. The portion of Laurel Creek that could be impacted is located in the area where Option B separates from Option A in the eastern most portion of the corridor. A total of 27 named and unnamed streams are located within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana, gray and Virginia big eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be present. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. Laurel Creek and its tributaries in the eastern area of the corridor are very likely to be impacted. | A total of two sites exist – a gas station in Elliottville along existing KY 32 at the western terminus; the second site is located in Newfoundland just north of the eastern terminus where KY 32 junctions with KY 7. | 0 | Medium | 1 | Medium | 2 water wells, potential for mines |
| Alternative 3 (Option A) | 12.1 | 13.2 | Satisfactory | Satisfactory | Satisfactory | 200 (2400 on Option A segment) | | 5/1 | 0 | 1 | No Impact | None | Although a portion of Laurel Creek, including the headwater, exists within the first section of this corridor in Rowan County, it is not likely to be impacted by this option. A total of 37 named and unnamed streams, including Laurel Creek, exist within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana, gray and Virginia big eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be present. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. | There are 3 Hazardous Materials sites in this Alternative Corridor. A gas station in Elliottville along existing KY 32, the second site is located in Newfoundland where KY 32 junctions with KY 7, and a gas station in North of KY 32 and | 0 | Medium | 3 | High | 2 water wells, 1 gas well, 1 dry abandoned well |
| Alternative 3 (Option B) | 11.8 | 12.8 | Least Desirable | Least Desirable | Satisfactory | 200 (2400 on Option B segment) | | 7/0 | 0 | 1 | Medium | None | Laurel Creek would likely be impacted if Option B of this alternative is selected. The portion of Laurel Creek that could be impacted is located in the area where Option B separates from Option A in the eastern most portion of the corridor. Caney Creek is avoided. A total of 37 named and unnamed streams are located within this corridor, but not all would be crossed. | Wooded areas in this corridor are suitable for bat habitats. Three bat species, the Indiana, gray and Virginia big eared bat, are known to occur within both Elliott and Rowan Counties. It is estimated that approximately 10 sites should be present. | Northern Riffleshell and Pink Mucket mussels have been known to exist in Elliott County, but not Rowan County. Laurel Creek and its tributaries in the eastern area of the corridor are very likely to be impacted. | There are 2 Hazardous Materials sites in this Alternative Corridor. A gas station in Elliottville along existing KY 32 and an oil spill that was reported by the EPA within their database website located North of KY 32 and | 0 | Medium | 4 | High | 3 water wells, 1 gas well, 1 dry and abandoned well |

| Alternative | Distance (miles) | Constructability | | Cost Estimates | | | | | |
|--------------------------|------------------|------------------------|--------------------|----------------------|-------------------|-----------------------|----------------------------|--------------------------|-------------------------|
| | | Maintenance of Traffic | Phasing/Scheduling | Design (\$ millions) | ROW (\$ millions) | Utility (\$ millions) | Construction (\$ millions) | Total Cost (\$ millions) | Cost/Mile (\$ millions) |
| No Build | 13.7 | NA | NA | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |
| Alternative 1 | 12.1 | Least Desirable | Satisfactory | \$6.4 | \$16.5 | \$10.9 | \$63.7 | \$97.5 | \$8.1 |
| Alternative 1P | 13.7 | Least Desirable | Satisfactory | \$2.7 | \$11.4 | \$10.9 | \$26.5 | \$51.5 | \$3.8 |
| Alternative 2 (Option A) | 11.8 | Average | Satisfactory | \$6.1 | \$12.3 | \$9.4 | \$61.3 | \$89.1 | \$7.6 |
| Alternative 2 (Option B) | 11.4 | Average | Satisfactory | \$6.4 | \$11.9 | \$9.1 | \$63.9 | \$91.3 | \$8.0 |
| Alternative 3 (Option A) | 12.1 | Average | Average | \$6.5 | \$12.6 | \$9.7 | \$64.6 | \$93.4 | \$7.7 |
| Alternative 3 (Option B) | 11.8 | Average | Least Desirable | \$6.7 | \$12.2 | \$9.4 | \$67.2 | \$95.5 | \$8.1 |

Figure 9.3 – Revised (Final Proposed) Spot Improvements

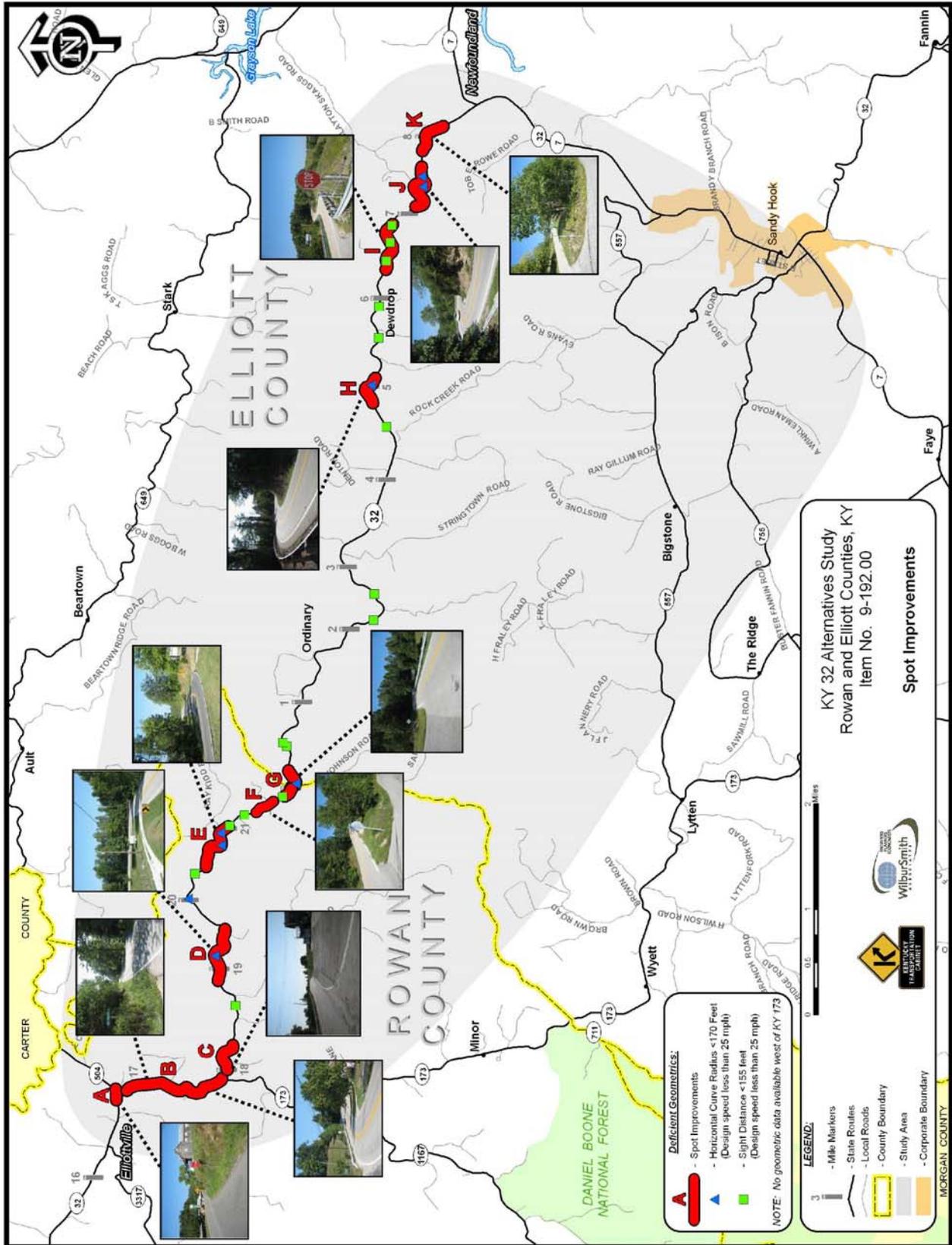


Table 9.2 – Revised (Final Proposed) Spot Improvements Table

| Spot Improvement ID | County | Begin Milepoint | End Milepoint | Description | Construction Cost | ROW Cost | | Utility Cost | Design Cost | Total Cost |
|---------------------|-------------------|------------------|----------------|---|---------------------|---------------------------------|--------------------|--------------------|--------------------|---------------------|
| | | | | | | Number of Property Acquisitions | Cost | | | |
| A | Rowan | 16.62 | 16.62 | Realign KY 504 at the KY 32 intersection. | \$600,000 | 0 | \$120,000 | \$80,000 | \$60,000 | \$860,000 |
| B | Rowan | 16.60 | 17.80 | Reconstruct or realign KY 32 between KY 504 and KY 173, add eastbound and westbound passing lanes just east of KY 504 (includes intersection with Cox Cemetery Road). | \$3,700,000 | 3 | \$1,890,000 | \$960,000 | \$370,000 | \$6,920,000 |
| C | Rowan | 17.80 | 18.15 | Realign KY 32 just east of KY 173. | \$1,000,000 | 1 | \$630,000 | \$320,000 | \$100,000 | \$2,050,000 |
| D | Rowan | 18.80 | 19.55 | Realign KY 32 (includes intersections with Fraley Cemetery Road and Adkins Road). | \$2,900,000 | 1 | \$750,000 | \$400,000 | \$290,000 | \$4,340,000 |
| E | Rowan | 20.35 | 20.85 | Realign KY 32 (includes intersection with Lower Caney Creek Road). | \$1,000,000 | 1 | \$510,000 | \$240,000 | \$100,000 | \$1,850,000 |
| F | Rowan | 21.15 | 21.35 | Realign KY 32 (includes intersection with Alexandria Drive). | \$1,000,000 | 0 | \$240,000 | \$160,000 | \$100,000 | \$1,500,000 |
| G | Rowan/ Elliott | 21.50 (Rowan) | 0.20 (Elliott) | Realign KY 32 (includes intersection between George Johnson Road and The Simmons Loop). | \$1,500,000 | 0 | \$480,000 | \$320,000 | \$150,000 | \$2,450,000 |
| H | Elliott | 4.85 | 5.05 | Realign KY 32 in/near Dewdrop. | \$600,000 | 0 | \$120,000 | \$80,000 | \$60,000 | \$860,000 |
| I | Elliott | 6.30 | 6.80 | Realign KY 32 (includes western end of Simmons Loop). | \$2,600,000 | 1 | \$750,000 | \$400,000 | \$260,000 | \$4,010,000 |
| J | Elliott | 7.05 | 7.65 | Realign KY 32 (includes eastern end of Simmons Loop). | \$1,400,000 | 0 | \$480,000 | \$320,000 | \$140,000 | \$2,340,000 |
| K | Elliott | 7.80 | 8.20 | Realign KY 32 (includes eastern end of Simmons Loop). | \$2,700,000 | 2 | \$660,000 | \$240,000 | \$270,000 | \$3,870,000 |
| TOTAL | - | - | - | - | \$19,000,000 | 9 | \$6,630,000 | \$3,520,000 | \$1,900,000 | \$31,050,000 |

Note: Spot B would require one cemetery relocation. Cost for cemetery not included at this time. Cutting down the hill east of KY 173 to improve sight distance would have a \$700,000 construction cost. Improving alignment, as shown above (Spot C), is recommended.

10. RECOMMENDATIONS

This chapter provides recommendations for improvements to KY 32 between KY 504 at Elliottville in Rowan County and KY 7 at Newfoundland in Elliott County. The recommendations made in this chapter are the result of the Alternatives Study process for the KY 32 corridor.

A. Project Purpose and Need

To summarize, the primary purpose of the proposed KY 32 project is to improve highway access and safety from Sandy Hook, Elliott County, and southeastern Kentucky to businesses, medical facilities, post-secondary education facilities, other services or attractions, and I-64 at Morehead through improved travel time, improved travel conditions at high crash locations, and improved travel conditions for emergency medical services and school buses.

Project Purpose and Need

- Improve Highway Access
- Improve Safety

Detailed discussion of the purpose and need can be found in **Chapter 7**.

B. Final Project Team Meeting (May 26, 2009)

The project team met for the final time on May 26, 2009 at the KYTC Highway District 9 Office in Flemingsburg, Kentucky. The purposes of the meeting were to discuss the input from the second round of resource agency coordination, the second local officials and stakeholders meeting, and the second public meeting and to review the Level 2 Screening Matrix and the public and resource agency input to decide on recommendations for the KY 32 study corridor. Meeting minutes can be found in **Appendix D**.

Recommendations

The following summary of decisions made at the final project team meeting outlines the project team's discussion and resulting recommendations for the KY 32 corridor.

Decision 1 - Alternative 3 should be dismissed based on the following:

- **Connectivity to Existing KY 32:** This alternative provides no opportunities for a connection to existing KY 32 between KY 7 and the proposed tie-down on KY 32 just east of KY 173. Therefore, there would be no improvement for highway users with origins and destinations along KY 32 for approximately 12 miles (85% of the total project length). Some local roads could be improved or new roads built to provide this connection; however, this would expand the scope of the project, increase the cost, and pose other potential impacts that have not yet been assessed.
- **Purpose and Need:** Alternative 3 is on new alignment and has no connectivity to existing KY 32 for most of its length. While it would meet the purpose and need of improved access and safety for through traffic, the geometric conditions of existing KY 32 would not be improved so it would be of little benefit to those who live along the existing roadway.
- **Constructability:** Because of the lack of connectivity, there are no opportunities in this 12-mile section to build constructible sections that would have independent utility during the time it would take to complete phased construction.
- **Stream Impacts:** Laurel Creek would likely be impacted if Option B of Alternative 3 is selected. The portion of Laurel Creek that could be impacted is located in the area where Option B separates from Option A in the easternmost portion of the corridor. Up

to 35 named and unnamed streams are located within this corridor, but not all would be crossed.

- **Known and Potential Archaeological Sites:** There are up to four known archeological sites that could potentially be impacted by Alternative 3. Because known sites exist, there is also increased potential for additional sites.
- **Resource Agency Input:** Concerns were expressed by the Division of Water in the Kentucky Environmental and Public Protection Cabinet, Kentuckians for the Commonwealth, and U.S. Army Corps of Engineers-Huntington Division about potential impacts of both Alternatives 2 and 3 to Big Caney Creek and/or Laurel Creek.
- **Public Sentiment:** At the final public meeting, public input was provided in two ways: a voting station and written surveys. At the voting station, Alternative 3A was the least preferred alternative. After combining the written survey results for the two options developed for each numbered corridor, Alternative 3 was the least favored alternative. These combined results showed 47% in favor of Alternative 1 or 1P, 29% for Alternatives 2A or 2B, and 17% for Alternative 3A or 3B. The voting station yielded similar results when totals were combined for 3A and 3B.

Decision 2 - The western section of Alternative 2 between KY 504 (MP 16.619) and near MP 19.9 (just east of Atlee Lowe Road) should be dismissed based on the following:

- **Access:** This alternative would not provide a direct connection to KY 173, which is an important route in the area. At present, the section of existing KY 32 between KY 504 and KY 173 carries an Average Daily Traffic volume of 2,400 vehicles per day (vpd). There is a major traffic split at KY 173, with approximately 40% of the traffic continuing along KY 32 and 60% along KY 173. Although an improvement would result in a slight estimated diversion of about 300 vehicles per day from KY 173 to KY 32, more than half of the traffic would continue to use KY 173 and, therefore, this existing portion of KY 32. Therefore, the first section of Alternative 2 would not improve access for those who continue to use KY 32.
- **Safety:** The construction of the first section of Alternative 2 would not improve safety along existing KY 32 at Hogtown Hill between KY 504 and KY 173. Although the Critical Rate Factor does not indicate a major safety problem in this segment, there was one fatality reported in this section in the study data. More significantly, there was considerable anecdotal data from local officials and the public that there were perceived safety problems by highway users, particularly during snow and ice conditions. From local input, an improvement to this section was considered a major need, especially given that a significant percentage of the traffic would continue to access both KY 173 and, for local residents, this portion of existing KY 32.
- **Purpose and Need:** Because this section of Alternative 2 would not improve access and safety for a significant portion of highway users, it does not meet the purpose and need for the project as compared to an improvement along the existing route (Alternatives 1 and 1P).
- **Geotechnical Issues:** This section of Alternative 2 would pass through the Lee Formation. According to the Geotech Branch of KYTC, the Lee Formation is made up of mostly conglomeritic sandstone and minor amounts of shale that range from 0 to 200 feet in thickness in the study area. Within the Lee Formation is the Olive Hill Clay Bed of Crider, a semiflint clay and flint clay bed that has been extensively stripped and underground mined along Big Caney Creek. The Geotech Branch recommends that areas directly on top of and around this bed should be avoided. Since an alignment

could probably be developed that would avoid the areas of concern, this issue is not a reason by itself to dismiss this section of Alternative 2, but it adds additional weight when combined with other factors.

- Pipeline: This alternative would cross the Marathon Ashland Pipeline in a new location. This is a major gas pipeline that crosses beneath existing KY 32 just east of KY 504. While any improvement would affect the pipeline, a road on new alignment could possibly result in more additional issues and costs. While this issue is not a reason by itself to dismiss this section of Alternative 2, it adds additional weight for dismissing this section for a combination of factors.

Decision 3 - Alternative 1 should be recommended for further consideration in the next phase based on the following:

- Stream Impacts: Alternative 1 (Improve Existing KY 32) follows the ridge and may have significantly fewer stream impacts than 2 or 3. Stream impacts to Big Caney Creek, Laurel Creek, and their tributaries appear to be the most important environmental issues of concern within the study area.
- Purpose and Need: Alternative 1 improves access and safety for all highway users, including through traffic and those whose origins and destinations are within the study area. Therefore, Alternative 1 best meets the purpose and need for the proposed KY 32 project.
- Constructability: The opportunity for phased construction of Alternative 1 is much better since connectivity is not an issue. The project could be built in affordable, logical sections, each of which would have independent utility since the improvement would primarily be along or in close proximity to the existing roadway.
- Resource Agency Input: A primary concern from several key resource agencies were the potential impacts to Big Caney Creek and Laurel Creek. Generally, these agencies opposed Alternatives 2 and 3 and preferred Alternative 1 because it would probably have fewer impacts on these important streams.
- Public Input: At the voting station, Alternatives 1P and 2B tied for the most preferred alternative. Based on the written survey, Alternative 1P was the most preferred alternative and Alternative 2B was second. Combining the written survey results for the two options for each of the numbered alternatives, the written public survey results indicate that Corridor Alternative 1 was the most favored alternative (47% for Alternative 1; 29% for Alternative 2; 17% for Alternative 3; 7% for Spot Improvements Only; and 5% for the No Build Alternative).
- Relocations: Alternative 1 would have the greatest potential number of relocations since many homes and/or other structures are located close to the existing road, so this could be an issue of concern; however, the number of relocations could be minimized in the selection of alignments and design parameters in the next phase of project development.
- Maintenance of Traffic: Maintenance of traffic is an issue of concern; however, this potential problem could be minimized because of the following:
 - The relatively low ADT along existing KY 32;
 - The availability of detour routes via KY 173 and/or KY 504/KY 649; and
 - The likely nature of the reconstruction along this curvy roadway (i.e., much of the improvement will be to reduce curves by building sections on new alignment; so the

- maintenance of traffic in many cases would only be at the crossing points where the new alignment merges and diverges from the existing KY 32 alignment).
- Stream Impacts: Although Alternative 1 would have fewer potential impacts than Alternatives 2 and 3, there are still potential impacts just east of KY 173 at the headwaters of Laurel Creek. If Alternative 1 moves forward, care is needed to stay as close to the existing alignment as possible at that location and/or to widen or reconstruct to the north side of the existing roadway.
 - Cemeteries: There are numerous cemeteries located along or in close proximity to the existing route. If Alternative 1 moves forward, care should be taken in the next phase to avoid or minimize the impacts to these important community resources.
 - Historic Sites: Hogtown Voting House, located near the western end of the study area, just south of KY 32, on Williams Branch Road near Elliottville is listed on the National Register of Historic Places (NRHP). The Concord School, located on the south side of KY 32 in Elliott County near Arvil Dehart Road (just over 4 miles from the Rowan-Elliott County Line), could potentially be eligible. Additionally, there are many cemeteries that may have historic importance. Historic sites are likely along existing KY 32 due to the number of older structures that are illustrated on early maps and are no longer extant. If Alternative 1 moves forward, care should be taken in the next phase to identify and to avoid or minimize impacts to these important community resources.
 - Archaeological Sites: It is possible that archaeological sites will be encountered along KY 32 since this is the area where much of the settlement has taken place over time. The numerous drainages and ridgetops signal a high likelihood for additional unrecorded prehistoric sites within the project area. If Alternative 1 moves forward, care should be taken in the next phase to identify and to avoid or minimize impacts to these important resources, if possible.
 - Utility Relocation: Several major utilities are located along the existing route. These are likely to be identified for relocation in the next phase.
 - Pipeline: Existing KY 32 currently crosses the Marathon Ashland Pipeline, and any improvement will need to address this issue.

Decision 4 - Alternative 1 should be modified to provide an opportunity for sections to be constructed off existing KY 32 within a widened Alternative 1 corridor. Following are the reasons for this decision:

- Because potential issues may arise related to Alternative 1, the group discussed whether the remaining portion of Alternative 2B (i.e., Alternative 2B excluding the western section of Alternative 2 from KY 504 to MP 19.9, which had been dismissed previously) should move forward in the next phase to allow for more flexibility. Following are key items discussed for this portion of Alternative 2B:
 - Connectivity and Constructability: Unlike Alternative 3, Alternative 2B would cross the existing roadway in two or three locations, making phased construction possible, since this alternative would provide connectivity and independent utility.
 - Reduction of Some Impacts: The widening of the corridor would likely provide opportunities to reduce some of the potential impacts associated with Alternative 1, including relocations, maintenance of traffic, cemeteries, historic sites, archaeological sites, and utilities.
 - Stream and Trail Impacts: There are major concerns from the public and some resource agencies about potential impacts to Big Caney Creek to the north (in the

- middle of the corridor) and to Laurel Creek and the Laurel Gorge Trail to the south (near the eastern end of the corridor). Flexibility would be needed in the next phase to allow the development of an alignment to the outer limits of or possibly just outside the planning study corridor boundary to provide an opportunity to avoid or minimize impacts to these resources.
- Alternative 2 was too close to Big Caney Creek; however, it is desirable to have flexibility for a new alignment in the general area, but closer to existing KY 32.
 - Modifying Alternative 1 was preferred over carrying the remainder of Alternative 2 forward because of the potential impacts that Alternatives 2A and 2B pose to Big Caney Creek, Laurel Creek, and the Laurel Gorge Trail. Widening the Alternative 1 corridor offers the same opportunity to go off alignment, if needed, with less potential impact to these sensitive resources.

A map of the recommended alternative (Revised Alternative 1) is shown as **Figure 10.1**.

Cost Estimates

As shown in **Table 10.1** and the Level 2 Screening Matrix in **Chapter 9**, Alternative 1 (using full design guidelines) was estimated to cost \$97.5 million (current dollars), including \$6.4 million for design, \$16.5 million for right-of-way, \$10.9 million for utility relocation, and \$63.7 million for construction. This is approximately \$8.1 million per mile of new road to be constructed or \$7.1 million per mile of existing road to be improved, because an improved KY 32 would have fewer curves and, therefore, less mileage than existing KY 32. This is a planning level cost estimate.

Costs for the recommended alternative could vary greatly depending on decisions made in future project phases. For example, the planning-level cost estimate for the practical solution alternative (Alternative 1P) was \$51,500,000, as shown in the Level 2 Screening Matrix in **Chapter 9**, including \$2.7 million for design, \$11.4 million for right-of-way, \$10.9 million for utility relocation, and \$26.5 million for construction.

Table 10.1 – KY 32 Cost Estimates by Phase (Current \$)

| Phase of Project Development | Cost Estimate: Full Design | Cost Estimate: Practical Solution |
|-------------------------------------|-----------------------------------|--|
| Design | \$6,400,000 | \$2,700,000 |
| Right-of-Way | \$16,500,000 | \$11,400,000 |
| Utility Relocation | \$10,900,000 | \$10,900,000 |
| Construction | \$63,700,000 | \$26,500,000 |
| Total | \$97,500,000 | \$51,500,000 |

Construction Sections

Because spot improvements identified on each end are perhaps the most needed to address safety issues, the project team agreed that constructing KY 32 from each end toward the middle is recommended to address the highest priority sections first. Spot improvement priorities are discussed later in this chapter.

Construction sections were developed for the recommended alternative considering approximate costs of \$7.1 million per mile of existing road, which is the per mile cost estimate for Alternative 1. This resulted in seven recommended construction sections ranging in cost from approximately \$9 million to \$17 million, as shown in **Figure 10.2**.

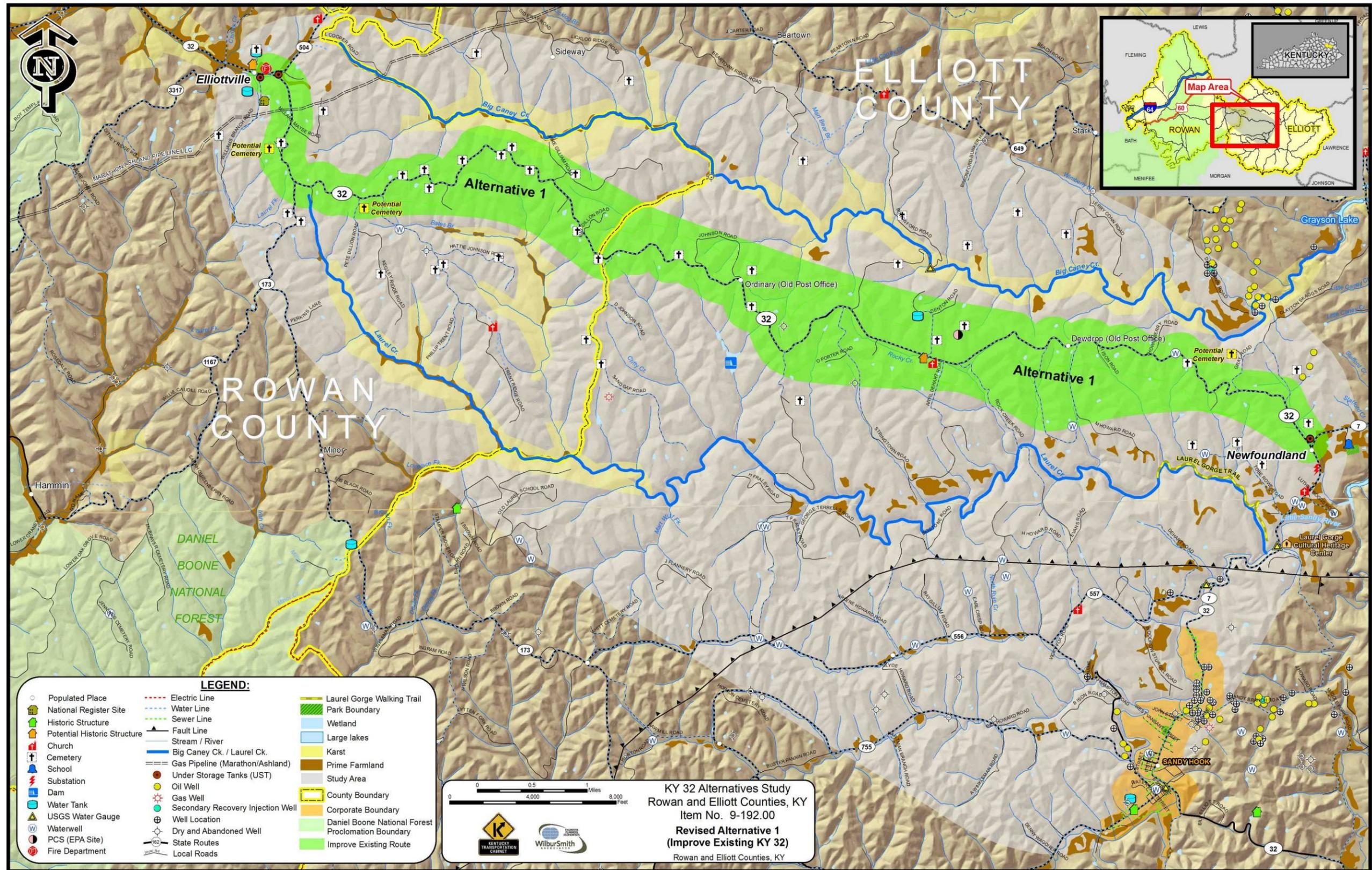


Figure 10.1 – Recommended Alternative (Revised Alternative 1)

Typical Section

The project team discussed the typical section for an improved KY 32, given that:

- Existing KY 32 has 9-foot driving lanes and 2-foot combination shoulders.
- For planning level cost estimates, two potential cross-sections were used, one using full design guidelines and one using a “practical solution” option.
 - Applying full design guidelines for a Rural Major Collector and a 55 mile per hour design speed, a typical section was assumed for planning-level cost estimating purposes only. This included 12-foot driving lanes, 8-foot graded shoulders, and 12-foot 6:1 cut-and-fill slopes, resulting in a 20-foot clear zone. The improvement to KY 32 was assumed to be a two-lane section with turning lanes at major intersections.
 - For planning purposes only, a “practical solution” option was developed for improvement of the existing roadway, which included a typical section with 11-foot driving lanes and 8-foot graded (6-foot paved) shoulders.
 - While 98% of KY 32 is geometrically deficient for a 55 mph design speed, assumptions made for Alternative 1P included improvements only to horizontal curves with 25 mph geometrics and below.
 - Alternative 1P also included widening the remaining corridor between those horizontal curves.
 - As stated previously, assumptions made for Alternative 1P were primarily for cost estimation purposes as one example of a practical solution.

The project team decided that, while the typical sections developed for the planning study can provide some guidance, flexibility may be needed in the next phase to (1) decide whether full design guidelines should be used or (2) find the best way of applying practical solutions, including variations from the design parameters assumed in the planning phase. Therefore, it was agreed that the typical section should be decided during the next phase of project development.

Short-Term Improvements

The project team then discussed the proposed short-term “spot” improvements. These improvements are intended to improve access and safety to the maximum extent possible based on the most critical needs. The group agreed that short-term improvement priorities should be established because transportation funds are limited and unpredictable.

Based on highway geometrics, crash history, and public input, the project team decided that the “spot improvements” identified in the study be constructed as funds are available in the following order of priority:

1. B - Reconstruct or realign KY 32 between KY 504 and KY 173, add eastbound and westbound passing lanes just east of KY 504 (Cox Cemetery Road intersection).
2. A - Realign KY 504 at the KY 32 intersection.
3. J - Realign KY 32 (includes western end of Simmons Loop).
4. K - Realign KY 32 (includes eastern end of Simmons Loop).
5. C - Realign KY 32 just east of KY 173.
6. E - Realign KY 32 (includes intersection with Lower Caney Creek Road).
7. F - Realign KY 32 (includes intersection with Alexandra Drive).
8. G - Realign KY 32 (includes intersection with Sand Gap Road).
9. H - Realign KY 32 in/near Dewdrop.
10. I - Realign KY 32 between George Johnson Road and Thornberry Road.
11. D - Realign KY 32 (includes intersections with Fraley Cemetery Road and Adkins Road).

Project information sheets, including a detailed project description and cost estimate, for each proposed spot improvement project are included in **Appendix G**.

However, the project team also decided that the KYTC should continue to review these spot improvement locations and should have the flexibility to revise the proposed project description and/or rearrange these priorities in the future, as needed, based on the level of available funds and changing conditions over time. Further, the project team agreed that the design and construction of each spot improvement should be consistent with its incorporation into the KY 32 long-term vision for improvement of the entire segment under study.

C. Summary of Environmental Issues for Future Phases

A number of issues related to environmental factors and sensitive land uses identified through this study should be considered as this project moves into future phases. These issues have been discussed in greater detail in previous chapters. Important issues include:

- Stream Crossings - Several ephemeral and intermittent streams exist in the proposed improvement area.
- Floodplain Encroachment - Impacts would be associated with area streams, including the Laurel Creek and Big Caney Creek, but maps were not available on the FEMA website. Coordination with FEMA will be required to determine the extent of area floodplains.
- Wells - A review of Kentucky Geological Survey maps estimated sixty to seventy oil wells located within the project corridor.
- Caves - No caves were evident during field trips, but the area does features caves. As alternatives are developed, caves will be identified.
- Ponds - Several ponds exist within the proposed corridor.
- Jurisdictional Wetlands - No wetlands were identified within the project corridor.
- Threatened and Endangered Species - The federally endangered Indiana bat, gray bat, Virginia big-eared bat, northern riffleshell mussel and pink mucket mussel could occur in the project area. The Bald Eagle is delisted, but still protected by the Migratory Bird Act. Surveys at stream crossings and mist netting for bats could be required. If species are identified, a biological assessment will be required.
- Water Quality/Aquatic Habitats - Laurel Creek and Big Caney Creek are Cold Water Habitats, Exceptional Waters and Reference Reach Streams. Consideration should be given to potential water quality issues. Any affected wetlands should be delineated; impacts may require permits from the US Army Corps of Engineers and/or the Kentucky Division of Water.
- Hazardous Materials/Underground Storage Tank Sites - Sites containing hazardous materials or USTs are evident and located within communities along existing roadways. Most of these sites are gasoline/convenience stores and auto repair shops. The KYTC Elliott County maintenance garage is located along KY 32 approximately four miles west of Sandy Hook. This site has been included on resource reference maps. A former gas station is located near the junction of KY 32 and KY 504 in the Haldeman quadrangle near the western limits of the project corridor. A former gasoline station is located on KY 32 near the middle of the Ault quadrangle. An oil spill was recorded on the Whitley lease in the northeast corner of the project corridor in the Newfoundland quadrangle. No illegal land fills and no dump sites were identified during field trips. If federal funding

becomes available, a Phase I Hazardous Materials investigation including field trips and data records searches will be required for the build alternatives.

- Cemeteries and Unmarked Graves - More than 35 cemeteries are located within the project area, ranging from small family plots with only a few graves to larger community cemeteries. Many are located on small ridgetops in the study area. Other cemeteries may be unmarked and are likely to be encountered during construction in this area.
- Historic - Hogtown Voting House, located near the western end of the study area, just south of KY 32 on Williams Branch Road near Elliottville is listed on the National Register of Historic Places (NRHP). The Concord School, located on the south side of KY 32 in Elliott County near Arvil Dehart Road (just over 4 miles from the Rowan-Elliott County Line) could potentially be eligible since small, rural school houses not dramatically altered are becoming rare. Some historic sites are likely along existing KY 32 due to the number of older structures shown on early maps that are no longer extant.
- Archaeology - There are several previously recorded sites within the study area. These include known sites ranging from the Early Archaic Period to historic farmsteads and at least two documented prehistoric rock shelters. It is highly likely that additional archaeological sites will also be encountered. The numerous drainages and ridgetops also signal a high likelihood for additional unrecorded prehistoric sites.

D. Construction Considerations

Construction-related issues were also identified within this study, as discussed in previous chapters. Potential major construction issues include:

- Erosion and Sediment Control - Measures should be utilized to control erosion and sedimentation during and after the commencement of earth-disturbing activities. The *Best Management Practices for Construction Activities* guide is available from the Kentucky Division of Conservation.
- Air Quality - 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 local government regulations should also be considered.
- Waste Management - Solid wastes occurring as part of the construction process should be disposed of at a permitted facility. Underground storage tanks and other contaminants should be properly addressed as they are encountered.
- Traffic Operations - Maintenance of traffic and residential access should be preserved throughout the construction process.
- Geotechnical Considerations - The primary geotechnical challenges appear to be:
 - Stability of major cuts into hillsides would require close scrutiny before and during construction to minimize risk of failure due to groundwater seepage, unfavorably jointed bedrock, and layers of weak materials. As recommended by the KYTC Geotechnical Branch, any new roadway(s) should cross perpendicular to the Little Sandy Hook Fault to minimize slope design and maintenance issues.
 - Since unidentified mines for coal and the Olive Hill Clay Bed of Crider exist in the study area, impacts to design and construction costs could be significant.
 - Numerous oil, gas and water wells are located in the recommended corridor.