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I. INTRODUCTION

The purpose of this Alternatives Study is to gather critical information necessary to develop and evaluate alternatives for the possible reconstruction of US 421 from KY 89 at the northern city limits of McKee in Jackson County to the recently improved section of US 421 near Bighill in Rockcastle County, just north of the Jackson-Rockcastle County line.

This project was identified in the Kentucky Transportation Cabinet's (KYTC) FY 2003-2008 Six Year Highway Plan as Item No. 11-113.00.

Through this Alternatives Study, the Kentucky Transportation Cabinet (KYTC) is able to ensure that future project improvements effectively address the identified transportation needs and that the project development effort meets the principles of the Federal requirements defined in the National Environmental Policy Act (NEPA).

This report provides a general introduction and description of the project; presents a traffic, environmental and geotechnical overview of the proposed project area; summarizes the public and agency input received to date on the project; and provides recommendations on future project development.

Report Contents

- General Information
- Study Area Characteristics
- Public and Agency Input
- Preliminary Environmental Overview
- Environmental Justice and Community Impact Report
- Preliminary Geotechnical Overview
- Future Traffic Considerations
- Draft Project Goals
- Recommendations and Conclusions

A. Project Location

This portion of US 421 runs from the northern city limits of McKee at Milepoint (MP) 14.808 in central Jackson County northwesterly to the recently improved section of US 421 near Bighill at MP 0.070 in Rockcastle County, just north of the Jackson-Rockcastle County line. The project study area is shown in **Figure 1**. A milepoint log of key points along the study route is provided in **Table 1**.

Jackson County is part of the federally designated Kentucky Highlands Empowerment Zone established in December of 1994 which has been extended through 2009. The Kentucky Highlands Empowerment Zone provides funding to participating counties to:

- Improve the workforce by offering job skills training, capital for new and expanding businesses and industries, and management consulting services; and
- Complete other improvement projects.

B. Study Objectives and Tasks

The primary objectives of this study are to:

- Better define improvement needs;
- Identify and evaluate potential improvement alternates; and
- Establish priority sections for scheduling future improvements.

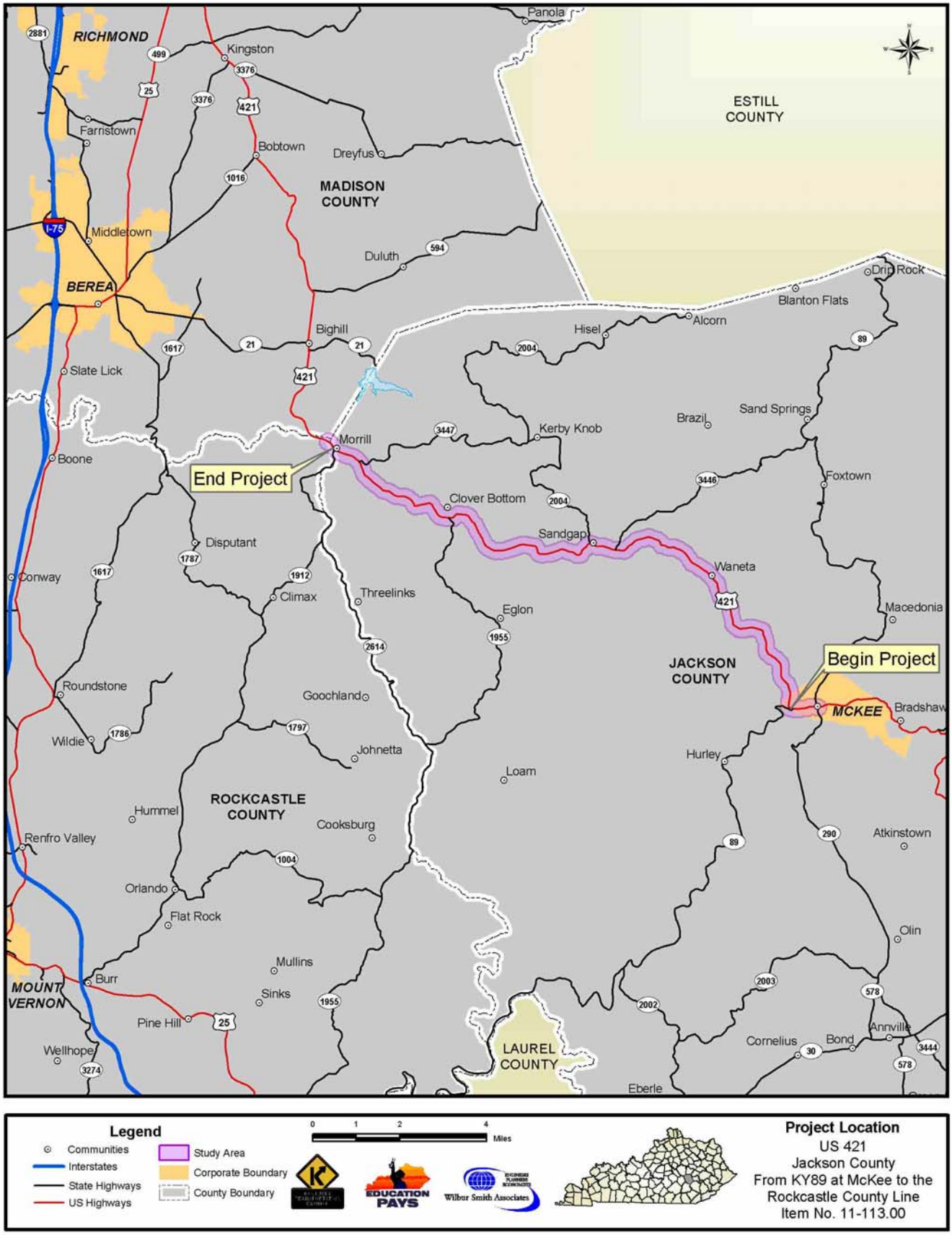

Figure 1. Project Location

Table 1. Route Log

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

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MILEPOINT	DESCRIPTION OF INTERSECTING ROAD OR FEATURE
Jackson County	
14.808	***BEGIN STUDY AREA***
14.808	KY 89
16.210	Elisha Branch Road
16.902	Sand Lick - Foxtown Road
16.923	Sand Lick Creek Bridge
18.144	Ball Road
18.292	Poplar Lick Branch Road
18.807	Waneta Hollow Road
18.851	Birch Lick School Road
18.925	Congleton Hollow Road
19.262	Congleton Hollow Road
20.193	Birch Lick School Road
20.361	Harrison Ridge Road
20.590	Isaacs Cemetery Road
21.445	South Tree Tower Road
21.563	KY 3446
21.959	John Street
22.138	KY 2004
22.176	Isaacs Grocery Road
22.344	Jack Thomas Road
23.525	Clover Bottom Creek Road
23.865	Durham Ridge School Road
24.873	Marcella Daughtery Road
24.942	Red Box Road
25.376	Asbill Road
26.210	KY 1955
26.762	Calloway Road
27.161	Rice Hill School Road
27.194	J.A. Farmer Road
27.470	T. Stanford Road
28.468	Amos Baker Road
28.929	KY 3447
29.222	Big Hill Baptist Church Road
29.227	Big Hill Church Road
29.520	KY 1912
29.558	Cox Cemetery Road
29.585	Rockcastle/Jackson County Line
Rockcastle County	
0.000	Rockcastle/Jackson County Line
0.070	***END STUDY AREA***

Source: KYTC's Highway Information System (HIS) database, April 2003

To accomplish these objectives, the study is also intended to:

- Afford an opportunity for public and agency input so that project needs, improvement alternatives, and potential issues and concerns can be clearly defined and addressed at the earliest stage of project development;
- Identify potential environmental issues; and
- Help expedite the project development process.

Specific tasks involved with this study include:

- Initiate contact with public officials and agencies;
- Listen to and share information with the public;
- Define project goals;
- Determine and analyze existing conditions and future needs;
- Identify preliminary environmental and other concerns;
- Develop and evaluate project alternatives; and
- Provide recommendations.

C. Programming and Schedule

Currently, the only funds programmed for this project are the $200,000 for the Planning phase of this proposed project. Subsequent phases of project development, including Design, Right-of-Way Acquisition, Utility Relocation, and Construction, are not scheduled in the most recent legislatively approved (FY 2003-FY2008) Six Year Highway Plan. Funding was also not included in KYTC's FY 2005-2010 (Recommended) Six Year Highway Plan, which was included in the state budget and was therefore not approved in the most recent session of the Kentucky General Assembly in 2004.

II. EXISTING CONDITIONS

Characteristics of US 421 and other major highways in the study area are identified in the following sections. Included are data and/or information on transportation systems, geometric characteristics, bridges, traffic conditions, crash history, and planned highway improvements. Features of the highways in the study area are summarized from the KYTC Highway Information System (HIS) database. Photographs of some features in the study area are contained in **Appendix A** and throughout this chapter.

Maps and table summaries located throughout this report may also include roadway segments that fall outside of the project study area.

A. Highway Systems

Major highway systems information is shown in **Table 2**, including, the State Primary Road System, Functional Classification System, National Highway System (NHS), National Truck Network (NN), and Designated Truck Weight Class. Other highway systems information is displayed in **Table 3**, including the Defense Highway Network, Forest Highway System, and others. Major highway systems information is summarized as follows:

- State-maintained roads in Kentucky are classified into one (1) of five (5) categories under the State System, ranging from the highest order classification to the lowest as follows: Interstates, Parkways, Other State Primary roads, Rural Secondary roads, and Supplemental roads. US 421 is currently classified as a State Primary route from MP 14.808 to MP 29.585 in Jackson County and as a State Primary route from MP 0.000 to MP 0.070 in Rockcastle County.
- One (1) 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 the highest to the lowest 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. In the study area, US 421 is classified as a Rural Minor Arterial.
- The National Highway System (NHS) was first established in 1991 by the Intermodal Surface Transportation Efficiency Act (ISTEA). It includes the Interstate Highway System and other significant Principal Arterial roads important to the nation's economy, defense, and mobility. In the study area, there are no NHS routes.
- The National Truck Network (NN) includes roads specifically designated for use by commercial trucks with increased dimensions (102 inches wide; 13 feet, six (6) inches high; semi-trailers up to 53 feet long; trailers up to 28 feet long – not to exceed two (2) trailers per truck). In the study area, there are no NN routes.
- Kentucky Revised Statutes require weight limits on the state-maintained highway system. There are three (3) weight classification limits: (1) AAA – 80,000 lbs. maximum gross vehicle weight; (2) AA – 62,000 lbs. maximum gross vehicle weight; and (3) A – 44,000 lbs. maximum gross vehicle weight. In the study area, US 421 has a weight classification limit of AAA. [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.]

Table 2. Major Highway Systems

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421,
just north of the Jackson-Rockcastle County line.

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Begin MP	Begin Route	End MP	End Route	State System	National Truck Network (NN)	National Highway System (NHS)	Functional Classification	Truck Weight Class
JACKSON COUNTY								
US 421 MP 14.211 to MP 29.585								
14.211	KY 89	29.585	Jackson - Rockcastle County Line	State Primary	No	No	Rural Minor Arterial	AAA
KY 89 MP 14.638 to MP 16.638								
14.638	Near Indian Springs Road	15.638	Intersection with US 421	State Secondary	No	No	Rural Major Collector	AA
15.638	Intersection with US 421	16.638	Near New School Road	State Secondary	No	No	Rural Major Collector	A
KY 290 MP 7.85 to MP 8.85								
7.850	Near Sahkey Road	8.850	Intersection with US 421	State Secondary	No	No	Rural Major Collector	A
KY 1912 MP 0.00 to MP 0.12								
0.000	Rockcastle - Jackson County Line	0.120	Intersection with US 421	Rural Secondary	No	No	Rural Local	A
KY 1955 MP 6.691 to MP 7.691								
6.691	Near Johnson Road	7.691	Intersection with US 421	State Secondary	No	No	Rural Minor Collector	A
KY 2004 MP 0.00 to 1.00								
0.000	Intersection with US 421	1.000	Near Clarke Road	Rural Secondary	No	No	Rural Minor Collector	A
KY 3446 MP 0.00 to MP 1.00								
0.000	Intersection with US 421	1.000	Near Happy Pappy Road	Rural Secondary	No	No	Rural Minor Collector	A
KY 3447 MP 0.00 to MP 1.00								
0.000	Intersection with US 421	1.000	Near Van Winkle Road	Rural Secondary	No	No	Rural Local	A
ROCKCASTLE COUNTY								
US 421 MP 0.000 to MP 0.483								
0.000	Jackson-Rockcastle County Line	0.483	Rockcastle-Madison County Line	State Primary	No	No	Rural Minor Arterial	AAA
MADISON COUNTY								
US 421 MP 0.000 to MP 2.442								
0.000	Rockcastle-Madison County Line	2.442	KY 21	State Primary	No	No	Rural Minor Arterial	AAA

Source: KYTC's *Highway Information System (HIS)* database, April 2003

Table 3. Other Highway Systems

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

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Begin MP	End MP	Appalachian Development Highway System	Bike Route System	Coal Haul (annual tons)	Defense Highway Network	Extended Weight System	Forest Highway System	Scenic Byway System
JACKSON COUNTY								
US 421 MP 14.211 to MP 29.585								
14.211	14.261	No	No	N/A	Yes	No	Yes	No
14.261	14.745	No	No	N/A	Yes	No	Yes	Yes
14.745	14.808	No	No	N/A	Yes	No	No	Yes
14.808	29.585	No	No	N/A	Yes	No	No	No
KY 89 MP 14.638 to MP 16.638								
14.638	16.638	No	No	N/A	No	No	Yes	Yes
KY 290 MP 7.850 to MP 8.850								
7.850	8.850	No	No	N/A	No	No	No	No
KY 1912 MP 0.000 to MP 0.120								
0.000	0.120	No	No	N/A	No	No	No	No
KY 1955 MP 6.691 to MP 7.691								
6.691	7.691	No	No	N/A	No	No	No	No
KY 2004 MP 0.000 to MP 1.000								
0.000	1.000	No	No	N/A	No	No	No	No
KY 3446 MP 0.000 to MP 1.000								
0.000	1.000	No	No	N/A	No	No	No	No
KY 3447 MP 0.000 to MP 1.000								
0.000	1.000	No	No	N/A	No	No	No	No

Source: KYTC's *Highway Information System (HIS)* database, April 2003

B. Geometric Characteristics

Geometric characteristics for major routes in the study area, listed in **Table 4**, including the number of lanes, lane widths, shoulder widths, roadway type, local terrain, route speed limits, and pavement type. The percent passing sight distance information was not available in KYTC's HIS database for most of the study area routes. In the study area, US 421 has the following characteristics:

- An undivided highway cross-section;
- Rolling terrain;
- A combination of two (2) nine-foot lanes in Jackson County (MP 14.808 to MP 29.585) and two (2) ten-foot lanes in Rockcastle County (MP 0.000 to MP 0.070);
- Shoulders from two feet in Jackson County (MP 14.808 to MP 29.585) to three feet in Rockcastle County (MP 0.000 to 0.070);
- High flexible pavement; and
- Posted speed limits varying from 35 to 55 mph.

US 421/KY 3447 Intersection in Jackson County

C. Bridges

Bridge data for the routes considered in this study are listed in **Table 5**. According to the KYTC, a bridge structure is eligible for Federal rehabilitation funds when it meets two criteria: (1) the bridge has a sufficiency rating below 50.0 and (2) the bridge is considered either structurally deficient or functionally obsolete. Structurally deficient bridges cannot carry the weight they were originally designed to carry. Bridges are considered functionally obsolete if they do not meet today's geometric design standards.

No bridges along US 421 in the study area meet both of these criteria, so none are eligible for Federal rehabilitation funds. One (1) bridge along US 421, located at MP 16.849 in Jackson County over Sand Lick Creek, is considered to be functionally obsolete.

Table 4. Geometric Characteristics

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

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Begin MP	End MP	Length (miles)	Number of Lanes	Lane Width (feet)	Shoulder Width (feet)	Speed Limit (mph)	Roadway Type	Terrain Type	Pavement Type
JACKSON COUNTY									
US 421 MP 14.211 to MP 29.585									
14.211	14.321	0.110	2	12	NA	25	Undivided	Rolling	High Flexible
14.321	14.349	0.028	2	9	2	25	Undivided	Rolling	High Flexible
14.349	14.77	0.421	2	9	2	35	Undivided	Rolling	High Flexible
14.77	21.649	6.879	2	9	2	55	Undivided	Rolling	High Flexible
21.649	22.32	0.671	2	9	2	35	Undivided	Rolling	High Flexible
22.32	29.145	6.825	2	9	2	55	Undivided	Rolling	High Flexible
29.145	29.585	0.440	2	9	2	45	Undivided	Rolling	High Flexible
KY 89 MP 14.638 to MP 16.638									
14.638	15.638	1.000	2	9	2	55	Undivided	Mountainous	High Flexible
15.638	15.667	0.029	2	11	1	35	Undivided	Mountainous	Bituminous Penetration
15.667	15.688	0.021	2	11	2	35	Undivided	Mountainous	Bituminous Penetration
15.688	15.883	0.195	2	9	2	35	Undivided	Mountainous	Bituminous Penetration
15.883	16.638	0.755	2	9	2	55	Undivided	Mountainous	Bituminous Penetration
KY 290 MP 7.850 to MP 8.850									
7.85	8.398	0.548	2	8	1	55	Undivided	Mountainous	Bituminous Penetration
8.398	8.632	0.234	2	8	1	35	Undivided	Mountainous	Bituminous Penetration
8.632	8.705	0.073	2	10	1	35	Undivided	Mountainous	Bituminous Penetration
8.705	8.85	0.145	2	10	NA	35	Undivided	Mountainous	Bituminous Penetration
KY 1912 MP 0.000 to MP 0.120									
0	0.12	0.120	2	10	4	55	Undivided	Rolling	Mixed Bituminous
KY 1955 MP 6.691 to MP 7.691									
6.691	7.691	1.000	2	9	1	55	Undivided	Rolling	Bituminous Penetration

Source: KYTC's *Highway Information System (HIS)* database, April 2003

Table 4. Geometric Characteristics (continued)

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

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Begin MP	End MP	Length (miles)	Number of Lanes	Lane Width (feet)	Shoulder Width (feet)	Speed Limit (mph)	Roadway Type	Terrain Type	Pavement Type
KY 2004 MP 0.000 to MP 1.000									
0.000	1.000	1.000	2	10	4	35	Undivided	Rolling	Mixed Bituminous
KY 3446 MP 0.000 to MP 1.000									
0.000	1.000	1.000	2	9	2	55	Undivided	Mountainous	Mixed Bituminous
KY 3447 MP 0.000 to MP 1.000									
0.000	1.000	1.000	2	9	3	55	Undivided	Mountainous	Mixed Bituminous
ROCKCASTLE COUNTY									
US 421 MP 0.000 to MP 0.483									
0.000	0.070	0.070	2	10	3	55	Undivided	Rolling	High Flexible
0.070	0.483	0.413	2	12	8	55	Undivided	Rolling	High Flexible
MADISON COUNTY									
US 421 MP 0.000 to MP 2.442									
0.000	1.590	1.590	2	12	8	55	Undivided	Rolling	High Flexible
1.590	2.422	0.832	2	10	2	55	Undivided	Rolling	High Flexible

Source: KYTC's *Highway Information System (HIS)* database, April 2003

Table 5. Bridge Data

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421,
just north of the Jackson-Rockcastle County line.

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Bridge No.	Bridge MP	Bridge Length (feet)	Bridge Width (feet)	Horizontal Clearance (feet)	Sufficiency Rating	Structural Function	Feature Intersected
US 421 MP 14.211 to MP 29.585							
B00001	14.321	54	26	25	51.4	Functionally Obsolete	Indian Creek
B00002	16.849	33	26	23	69.7	Functionally Obsolete	Sand Lick Creek
KY 89 MP 14.638 to MP 16.638							
B00042	15.601	47	37.3	34	84.5	Functionally Obsolete	Indian Creek
B00015	15.719	56	NA*	28	69.5	-	Pigeon Roost Creek

**B00015 is a culvert. KYTC Maintenance does not measure curb to curb width for culverts. The approach width is 24 feet.*

Source: *KYTC's Highway Information System (HIS)* database, April 2003

D. Traffic and Level of Service

Existing (Year 2003) and estimated future (Year 2025) traffic and operational conditions for each major route in the study area have been identified and are discussed in the following subsections.

1. Existing Traffic Volumes (Year 2003)

Existing traffic volumes (Year 2003) for segments of the study area routes were summarized based primarily on information provided in the HIS database. Existing truck percentages were determined for the study area routes using the HIS data and KYTC default values based on the functional classification of the segment. Traffic characteristics are shown in **Figure 2** and **Table 6**. The existing traffic volumes along US 421 in the study area range between 3,930 and 5,160 vehicles per day (vpd). Existing truck percentages are approximately 7.0% of the total traffic along the study route.

2. Level of Service (Year 2003)

Level of Service (LOS) is a qualitative measure of highway traffic conditions, as defined in the *2000 Highway Capacity Manual*, published by the Transportation Research Board (TRB). Individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six (6) levels of service are defined and given letter designations from A to F, with LOS A as the best condition, representing free flow conditions, and ranging to LOS F, the worst condition, representing severe congestion and/or time delays. Typically, a minimum of LOS D is considered acceptable in urban areas and LOS C is considered acceptable in rural areas. **Figure 2** and **Table 6** show the existing LOS calculated for segments of each route in the study area. The study portion of US 421 in Rockcastle County (0.070 miles) currently operates at LOS B, while the Jackson County segment of US 421 (14.777 miles) operates between LOS D and E in the study area. All other study area routes operate at LOS C or better.

Level of Service

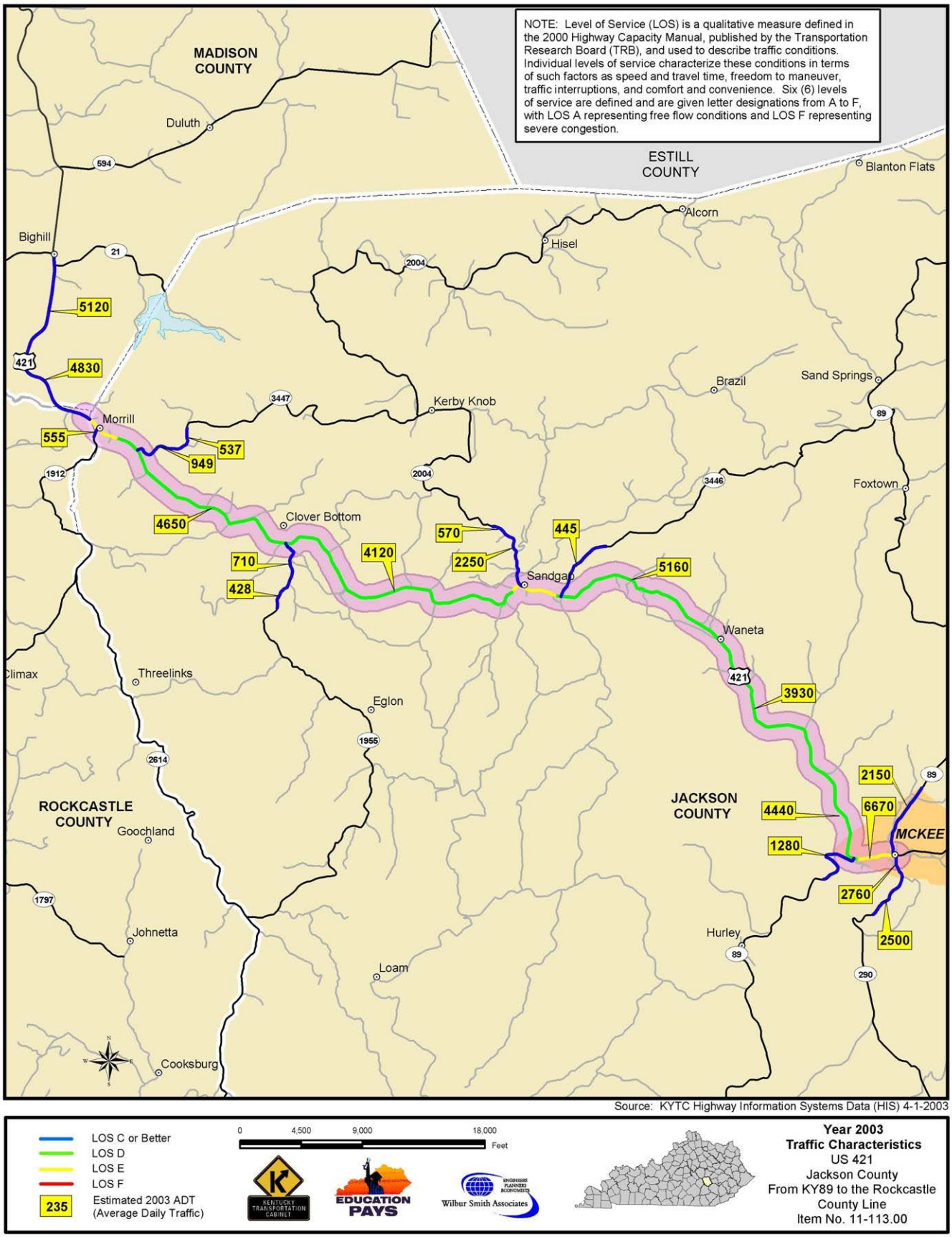
- LOS is used to describe traffic conditions, where LOS A is the best and LOS F is the worst.
- US 421 currently operates at LOS D and E in the study area.
- All other study area routes operate at LOS C or better.

3. Estimated Future Traffic (Year 2025) Based on Historic Growth

Year 2025 traffic was estimated using historic growth rates. Future transportation improvements were not taken into consideration. The historic growth rates used to forecast traffic on study area routes were based on 23 years of travel data for Jackson County. Traffic along US 421 was forecast with a compounded annual growth rate of 2.28 percent through Year 2025, resulting in an increase of over 60 percent from 2003 to 2025, or an ADT range from 6,500 to 8,500 vpd. Projected future year traffic volumes are shown in **Figure 3** and **Table 6**.

4. Estimated Future Level of Service (Year 2025) Based on Historic Growth

The study portion of US 421 in Rockcastle County (0.070 miles) is expected to operate at LOS C in the Year 2025, while the Jackson County segment of US 421 (14.777 miles) should continue to operate at LOS D and E. All other study area routes are expected to operate at LOS C or better in the Year 2025. The estimated future LOS is shown for the study area in **Figure 3** and **Table 6.**



Source: KYTC Highway Information Systems Data (HIS) 4-1-2003

Figure 2. Year 2003 Traffic Characteristics

Table 6. Traffic Characteristics

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

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County & Beginning Milepoint (MP)	End MP	Length (miles)	% Trucks	2003 ADT	2003 LOS	Estimated 2025 ADT[4]	2025 LOS
JACKSON COUNTY							
US 421 MP 14.211 to MP 29.585							
14.211	14.321	0.110	7.0 [1]	6670	E	11000	E
14.321	14.349	0.028	7.0 [1]	6670	E	11000	E
14.349	14.745	0.396	7.0 [1]	6670	E	11000	E
14.745	14.770	0.025	7.0 [1]	4440	E	7300	E
14.770	16.162	1.392	7.0 [1]	4440	D	7300	D
16.162	19.174	3.012	7.0 [1]	3930	D	6500	D
19.174	21.649	2.475	7.0 [1]	5160	D	8500	D
21.649	22.040	0.391	7.0 [1]	5160	E	8500	E
22.040	22.32	0.280	7.0 [1]	4120	E	6800	E
22.32	26.096	3.776	7.0 [1]	4120	D	6800	D
26.096	28.803	2.707	7.0 [1]	4650	D	7600	D
28.803	29.145	0.342	7.0 [1]	5070	D	8300	D
29.145	29.585	0.440	7.0 [1]	5070	E	8300	E
KY 89 MP 14.638 to MP 16.638							
14.638	15.638	1.000	5.5 [1]	1280	B	2100	B
15.638	15.667	0.029	5.5 [1]	3370	C	5400	C
15.667	15.680	0.013	5.5 [1]	3370	C	5400	C
15.680	15.688	0.008	5.5 [1]	2620	C	4200	C
15.688	15.883	0.195	5.5 [1]	2620	B	4200	C
15.883	16.080	0.197	5.5 [1]	2620	B	4200	C
16.080	16.548	0.468	5.5 [1]	2150	B	3400	C
16.548	16.638	0.090	5.5 [1]	993	A	1600	B
KY 290 MP 7.850 to MP 8.850							
7.850	8.398	0.548	7.9 [2]	2500	B	4000	C
8.398	8.632	0.234	7.9 [2]	2500	B	4000	C
8.632	8.660	0.028	7.9 [2]	2500	B	4000	C
8.660	8.705	0.045	7.9 [2]	2760	C	4500	C
8.705	8.850	0.145	7.9 [2]	2760	C	4500	C
KY 1912 MP 0.000 to 0.120							
0.000	0.120	0.120	5.0 [3]	555	A	800	A
KY 1955 MP 6.691 to MP 7.691							
6.691	7.039	0.348	9.7 [2]	428	A	600	A
7.039	7.691	0.652	9.7 [2]	710	A	1100	A
KY 2004 MP 0.000 to MP 1.000							
0.000	0.250	0.250	4.1 [1]	1990	B	2900	C
0.250	0.833	0.583	4.1 [1]	2250	B	3300	C
0.833	1.000	0.167	4.1 [1]	570	A	800	A
KY 3446 MP 0.000 to MP 1.000							
0.000	1.000	1.000	9.7 [2]	445	A	700	A
KY 3447 MP 0.000 to MP 1.000							
0.000	0.790	0.790	5.0 [3]	949	A	1500	B
0.790	1.000	0.210	5.0 [3]	537	A	800	A
ROCKCASTLE COUNTY							
US 421 MP 0.000 - 0.483							
0.000	0.483	0.483	6.9 [3]	4830	B	7900	C
MADISON COUNTY							
US 421 MP 0.000 - MP 2.442							
0.000	0.854	0.854	6.9 [1]	4830	B	8100	C
0.854	2.422	1.568	6.9 [1]	5120	B	8600	C

1) Truck Data Provided by KYTC, April 2003

2) Value Taken From 2002 Traffic Forecasting Report, KYTC Division of Multimodal Programs, Table 4F, pg. 20

3) Estimated based on other segments along route

4) Estimated based on 23 years (1980-2003) of historic growth in Jackson County

Sources: KYTC's Highway Information System (HIS) database, Transportation Research Board's 2000 Highway Capacity Manual, 2000 Highway Capacity Software

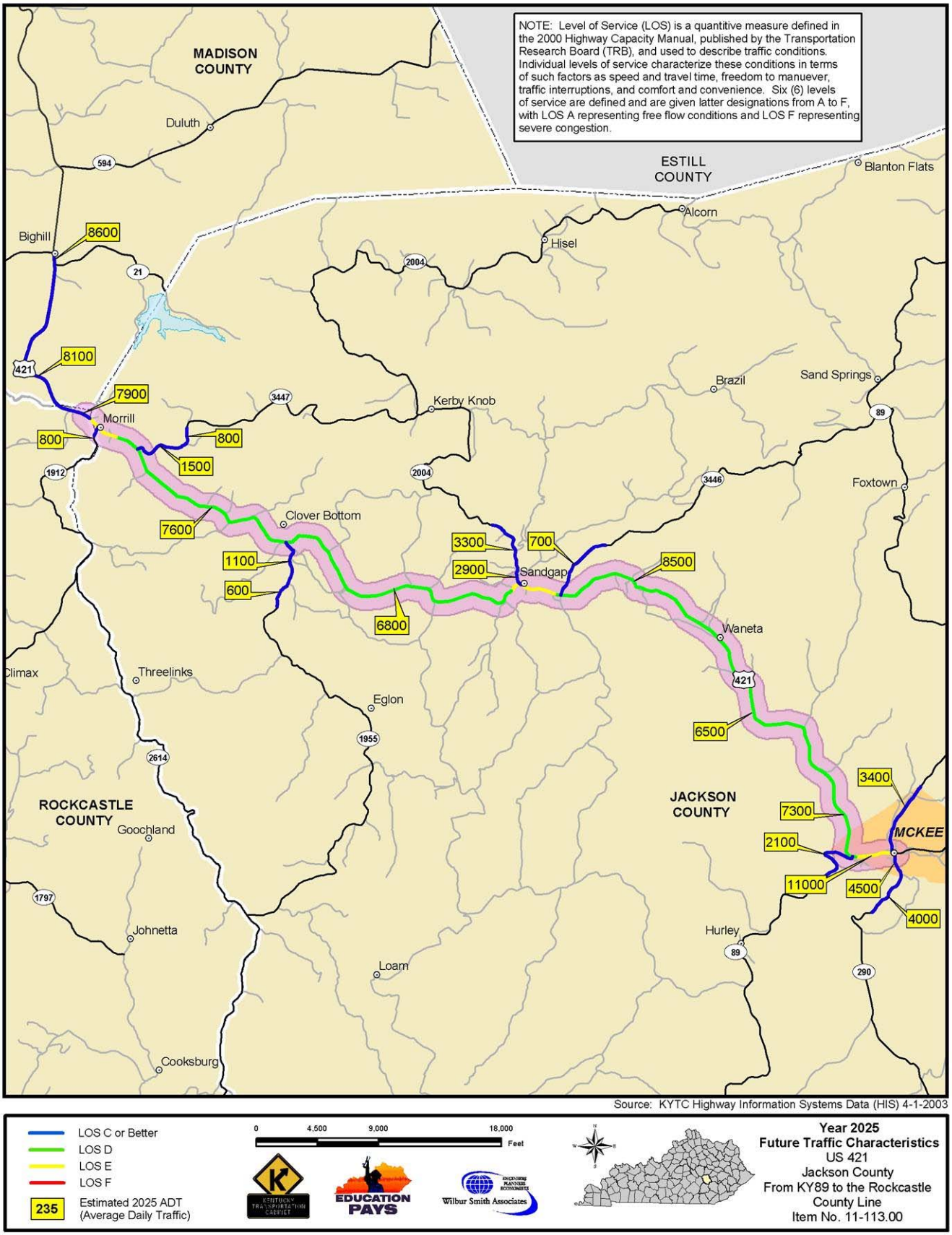


Figure 3. Year 2025 Traffic Characteristics

E. Crash Analysis

Crash data for major routes in the study area were considered for a four-year period (January 1, 1999 to December 31, 2002). The location of crashes with valid milepoint designations, recorded in the HIS database, are shown by corridor segment in **Table 7** and by spot locations (0.1 miles in length) in **Table 8**.

A spot location or a 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), i.e., the ratio of the crash rate for the spot or segment compared to the average crash rate for similar roads. When the critical rate factor is greater than 1.0, crashes may not be occurring randomly at a given location. The critical rate factors are calculated using the methodology presented in the Kentucky Transportation Center's Analysis of Traffic Accident Data in Kentucky (1997-2001)[1].

As part of this process, each crash was classified into one (1) of three (3) categories based on the degree of severity: fatal, injury, or property-damage-only. During the period studied, there were four (4) fatal, seventy-two (72) injury, and one-hundred-six (106) property-damage-only crashes along KY US 421 in the study area.

Figure 4 displays the crash data by severity and location, along with the identified high crash segments and spots (i.e., CRF > 1.0). As shown in **Tables 7** and **8** and in **Figure 4**, no high crash segments or spots were found in the study area, indicating that historical crash rates are not higher than those for similar highways in Kentucky.

F. Adequacy Ratings

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

If a road or road segment falls into the lowest percentile group, this indicates that a problem may exist that merits further investigation. As shown in this figure, the ratings for the entire study portion of US 421 in Jackson County (14.777 miles) is in the lowest percentile: between 0% and 25%. The study portion of US 421 in Rockcastle County (0.070 miles) falls in the highest percentile: between 75% and 100%.

G. Programmed Highway Improvements

In addition to the proposed improvement to US 421, there are other projects for Jackson County, as summarized in **Table 9**, that are in the KYTC's Approved 2002-2004 Biennial Highway Construction Program and Identified Preconstruction Program Plan for FY 2005 through 2008, often referred to as the Six Year Highway Plan. Major activities include:

- $2.65 million for utility and right-of-way activities for the relocation of KY 30 from the Rockcastle River to Welchburg Road in Jackson and Laurel Counties.
- $17.08 million for right-of-way, utility, and construction activities for the relocation of KY 30 from Welchburg Road to US 421 near Tyner in Jackson County.

[1] Agent and Pigman. *Analysis of Traffic Accident Data in Kentucky (1997-2001)*. Kentucky Transportation Center. August 2002.

Table 7. Vehicle Crash Segment Analysis

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

Item No. 11-113.00

January 1, 1999 - December 31, 2002 Crash Data

Route	Begin MP	End MP	Length (Miles)	ADT	Number of Lanes	Divided Undivided	Rural Urban	Avg. Veh. Crash Rate	Critical Veh. Crash Rate	Vehicle Crashes				HMVM	Rates per HMVM				Critical Rate Factor
										Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total	
JACKSON COUNTY																			
US 421	14.211	14.745	0.534	6670	2	Undivided	Rural	252	440.938	0	1	8	9	0.05	0.00	19.23	153.84	173.07	0.39
	14.745	16.162	1.417	4440	2	Undivided	Rural	252	392.369	0	7	11	18	0.09	0.00	76.21	119.75	195.96	0.50
	16.162	19.174	3.012	3930	2	Undivided	Rural	252	353.259	1	9	15	25	0.17	5.79	52.08	86.79	144.66	0.41
	19.174	22.040	2.866	5160	2	Undivided	Rural	252	342.321	1	22	26	49	0.22	4.63	101.89	120.42	226.94	0.66
	22.040	26.096	4.056	4120	2	Undivided	Rural	252	336.838	2	13	24	39	0.24	8.20	53.28	98.37	159.85	0.47
	26.096	28.803	2.707	4650	2	Undivided	Rural	252	350.110	0	14	13	27	0.18	0.00	76.18	70.74	146.92	0.42
	28.803	29.585	0.782	5070	2	Undivided	Rural	252	430.604	0	6	9	15	0.06	0.00	103.65	155.48	259.13	0.60
KY 89	14.638	15.638	1.000	1280	2	Undivided	Rural	252	577.888	0	1	5	6	0.02	0.00	53.51	267.55	321.06	0.56
	15.638	15.680	0.042	3370	2	Undivided	Rural	252	1393.517	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
	15.680	16.080	0.400	2620	2	Undivided	Rural	252	615.268	0	1	2	3	0.02	0.00	65.36	130.71	196.07	0.32
	16.080	16.548	0.468	2150	2	Undivided	Rural	252	623.422	0	0	2	2	0.01	0.00	0.00	136.14	136.14	0.22
	16.548	16.638	0.090	993	2	Undivided	Rural	252	1767.271	0	1	0	1	0.00	0.00	766.40	0.00	766.40	0.43
KY 290	7.850	8.660	0.810	2500	2	Undivided	Rural	252	506.737	0	3	6	9	0.03	0.00	101.47	202.94	304.41	0.60
	8.660	8.850	0.190	2760	2	Undivided	Rural	252	784.652	0	0	5	5	0.01	0.00	0.00	653.06	653.06	0.83
KY 1912	0.000	0.120	0.120	555	2	Undivided	Rural	252	2077.605	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
KY 1955	6.691	7.039	0.348	428	2	Undivided	Rural	252	1358.846	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
	7.039	7.691	0.652	710	2	Undivided	Rural	252	823.392	0	0	0	0	0.01	0.00	0.00	0.00	0.00	0.00
KY 2004	0.000	0.250	0.250	1990	2	Undivided	Rural	252	800.652	0	0	1	1	0.01	0.00	0.00	137.67	137.67	0.17
	0.250	0.833	0.583	2250	2	Undivided	Rural	252	573.598	0	1	0	1	0.02	0.00	52.22	0.00	52.22	0.09
	0.833	1.000	0.167	570	2	Undivided	Rural	252	1708.688	0	2	0	2	0.00	0.00	1439.08	0.00	1439.08	0.84
KY 3446	0.000	0.100	0.100	445	2	Undivided	Rural	252	2625.901	0	0	1	1	0.00	0.00	0.00	1539.17	1539.17	0.59
KY 3447	0.000	0.790	0.790	949	2	Undivided	Rural	252	688.541	0	0	0	0	0.01	0.00	0.00	0.00	0.00	0.00
	0.790	1.000	0.210	537	2	Undivided	Rural	252	1563.482	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00

Sources: KYTC Highway Information Systems Data (HIS) 99-02; Kentucky Transportations Center's *Analysis of Accident Data in Kentucky* (1997-2001)

Table 8. Vehicle Crash Spot Analysis

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421,
just north of the Jackson-Rockcastle County line.

Item No. 11-113.00

January 1, 1999 - December 31, 2002 Crash Data

Route	Begin MP	End MP	Length (Miles)	ADT	Number of Lanes	Divided/ Undivided	Rural/ Urban	Avg. Veh. Crash Rate	Critical Veh. Crash Rate	Vehicle Crashes				MV	Rates per MV				Critical Rate Factor
										Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total	
JACKSON COUNTY																			
KY 290	8.700	8.800	0.100	2760	2	Divided	Rural	0.76	2.003	0	0	5	5	4.03	0.00	0.00	1.24	1.24	0.62
US 421	14.300	14.400	0.100	6670	2	Divided	Rural	0.76	1.531	0	1	4	5	9.74	0.00	0.10	0.41	0.51	0.34
	14.900	15.000	0.100	4440	2	Divided	Rural	0.76	1.719	0	2	5	7	6.48	0.00	0.31	0.77	1.08	0.63
	21.000	21.100	0.100	5160	2	Divided	Rural	0.76	1.645	0	0	4	4	7.53	0.00	0.00	0.53	0.53	0.32
	21.400	21.500	0.100	5160	2	Divided	Rural	0.76	1.645	1	3	2	6	7.53	0.13	0.40	0.27	0.80	0.48
	21.500	21.600	0.100	5160	2	Divided	Rural	0.76	1.645	0	3	2	5	7.53	0.00	0.40	0.27	0.66	0.40
	22.000	22.100	0.100	4120	2	Divided	Rural	0.76	1.759	0	3	5	8	6.02	0.00	0.50	0.83	1.33	0.76
	22.200	22.300	0.100	4120	2	Divided	Rural	0.76	1.759	1	1	2	4	6.02	0.17	0.17	0.33	0.66	0.38
	23.525	23.625	0.100	4120	2	Divided	Rural	0.76	1.759	0	2	3	5	6.02	0.00	0.33	0.50	0.83	0.47
	23.900	24.000	0.100	4120	2	Divided	Rural	0.76	1.759	0	1	3	4	6.02	0.00	0.17	0.50	0.66	0.38
	26.000	26.100	0.100	4120	2	Divided	Rural	0.76	1.759	1	2	3	6	6.02	0.17	0.33	0.50	1.00	0.57
	27.000	27.100	0.100	4650	2	Divided	Rural	0.76	1.696	0	1	5	6	6.79	0.00	0.15	0.74	0.88	0.52
	27.400	27.500	0.100	4650	2	Divided	Rural	0.76	1.696	0	1	3	4	6.79	0.00	0.15	0.44	0.59	0.35
	28.000	28.100	0.100	4650	2	Divided	Rural	0.76	1.696	0	2	3	5	6.79	0.00	0.29	0.44	0.74	0.43
	28.800	28.900	0.100	5070	2	Divided	Rural	0.76	1.653	0	2	2	4	7.40	0.00	0.27	0.27	0.54	0.33
	28.925	29.025	0.100	5070	2	Divided	Rural	0.76	1.653	0	2	2	4	7.40	0.00	0.27	0.27	0.54	0.33

Sources: KYTC Highway Information Systems Data (HIS) 99-02; Kentucky Transportations Center's *Analysis of Accident Data in Kentucky* (1997-2001)

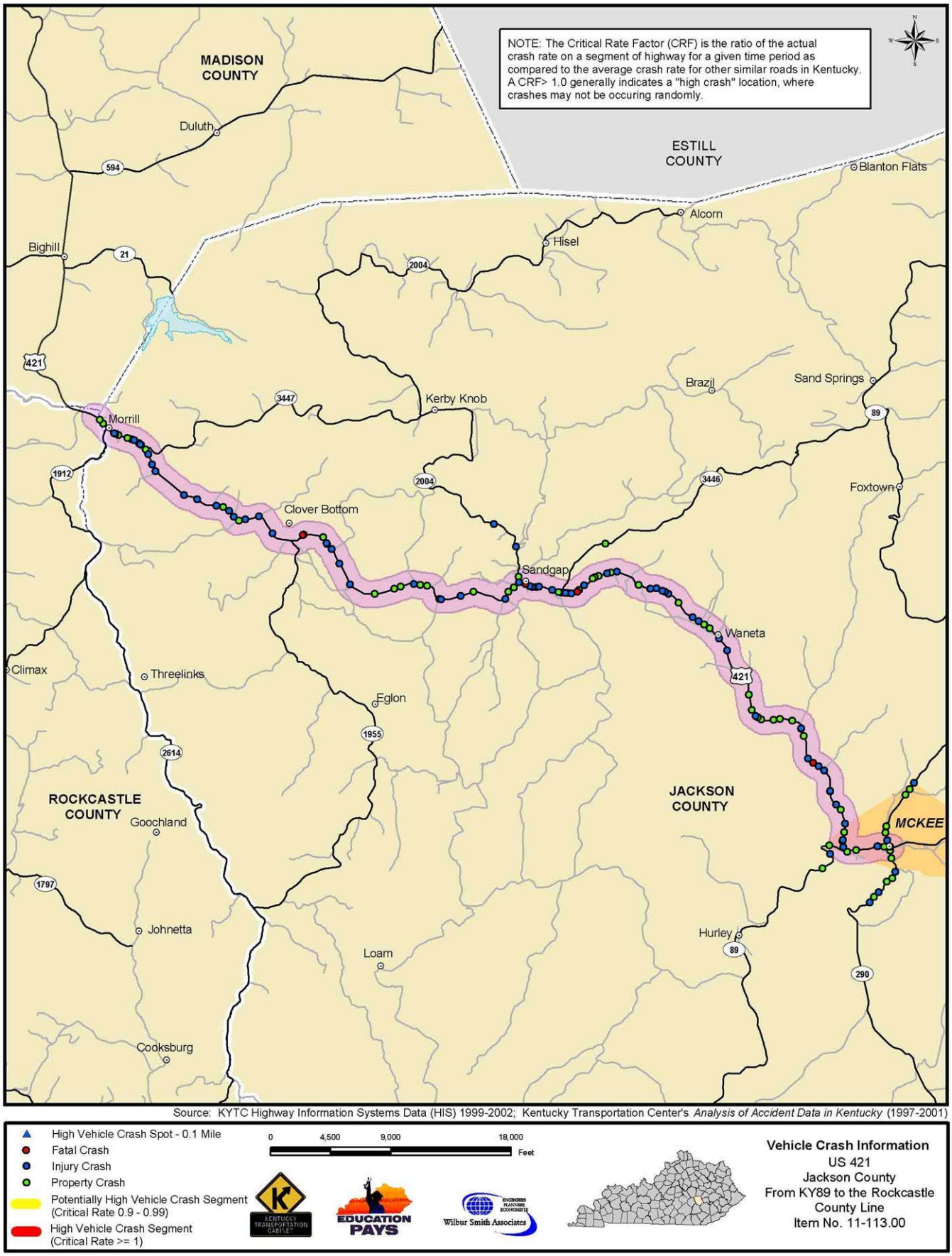


Figure 4. Vehicle Crash Information

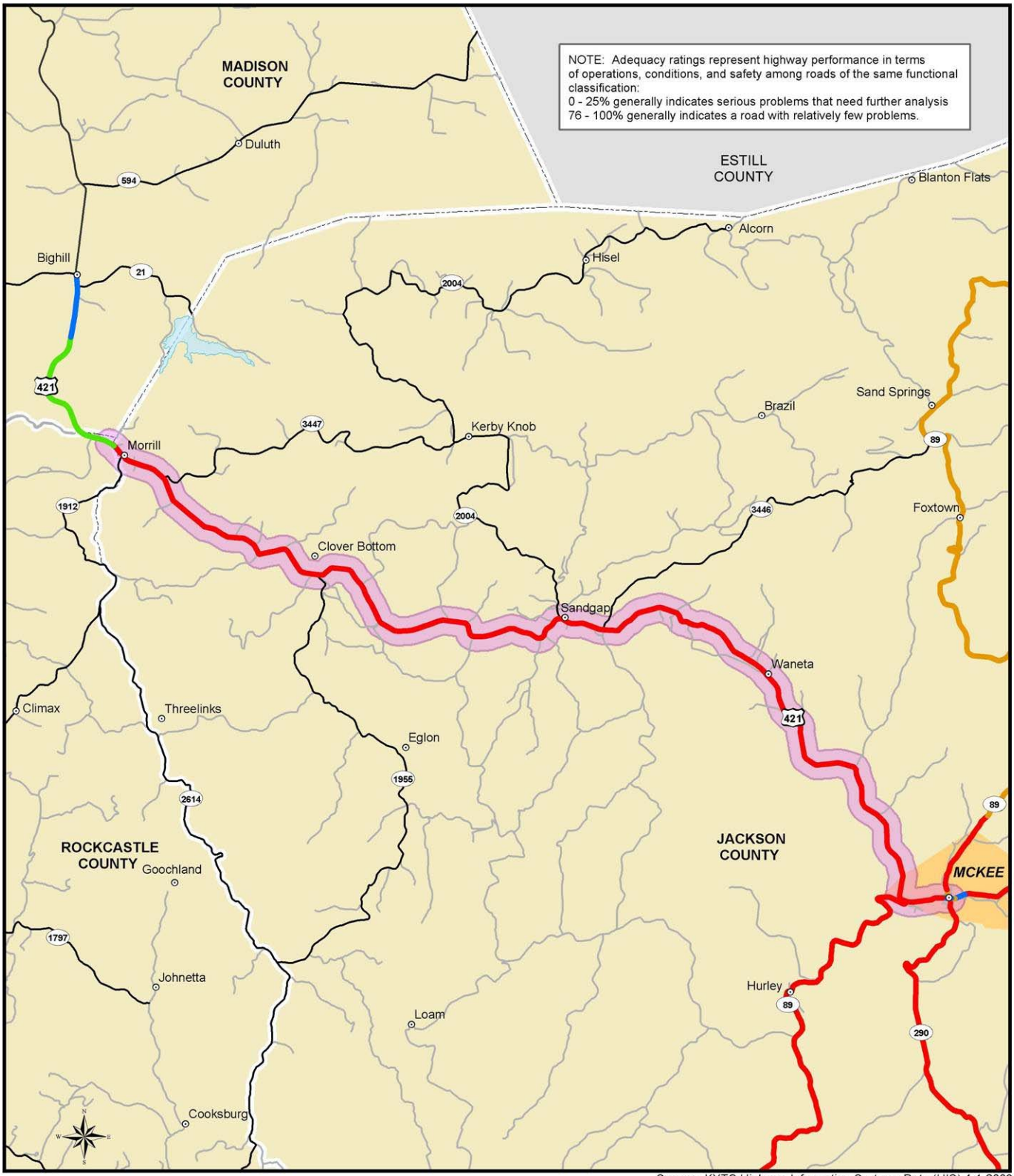


Figure 5. Adequacy Rating Percentiles

Table 9. Six Year Highway Plan Improvements

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

Item No. 11-113.00

County	Route	Item Number	Begin MP	End MP	Length (miles)	Project Description	Scope of Work	Stage of Project Development	Fiscal Year Scheduled	Estimated Phase Cost
Jackson/ Laurel	KY 30	11-278.24	N / A	N / A	6.800	I-75 to Mountain Parkway; Relocate KY-30 from 0.1 mile E of the Rockcastle River E to 0.3 mile west of Welchburg Road.	Relocation	Utility Relocation	2005	$550,000
								Right of Way	2005	$2,100,000
								Total:		**$2,650,000**
Jackson	KY 30	11-278.27	N / A	N / A	2.900	I-75 to Mountain Parkway; Relocate KY-30 from 0.3 mile W of Welchburg Road E to US 421 near Tyner.	Relocation	Right of Way	2003	$575,000
								Utility Relocation	2005	$900,000
								Construction	2006	$15,600,000
								Total:		**$17,075,000**
Jackson	KY 30	11-989.00	14.765	14.865	0.100	Realign intersection of KY 30 and KY 1431	Safety - Hazard Elimination	Right of Way	2006	$35,000
								Utility Relocation	2006	$4,000
								Construction	2007	$125,000
								Total:		**$164,000**
Jackson	KY 578	11-1055.00	5.471	5.571	0.100	Replace Bridge and Approaches at Pond Creek 0.1 mile south of KY-30 (B18).	Bridge Replacement	Right of Way	2004	$65,000
								Utility Relocation	2004	$45,000
								Construction	2005	$360,000
								Total:		**$470,000**
Jackson	CR 1304	11-1057.00	N / A	N / A	0.100	Replace Bridge and approaches at Pond Creek 0.2 mile S KY-30 @ Annville (C14).	Bridge Replacement	Right of Way	2003	$25,000
								Utility Relocation	2003	$6,000
								Construction	2004	$330,000
								Total:		**$361,000**
Jackson	US 421	11-1059.00	8.821	8.921	0.100	Replace Bridge Over McCammon Creek (B04) 1.4 mile NW of JCT. KY-1071 (SR=25.5).	Bridge Replacement	Right of Way	2005	$30,000
								Utility Relocation	2005	$10,000
								Construction	2006	$300,000
								Total:		**$340,000**

Source: KYTC's *Approved 2002-2004 Biennial Highway Construction Program and Identified Preconstruction Program Plan for FY 2005 through FY 2008 (Six Year Highway Plan)*

- $0.16 million for right-of-way, utility, and construction activities for the realignment of the intersection of KY 30 with KY 1431.
- $0.47 million for right-of-way, utility and construction activities for the replacement of the bridge and approaches at Pond Creek along KY 578, just south of KY 30.
- $0.36 million for right-of-way, utility and construction activities for the replacement of the bridge and approaches at Pond Creek along CR 1304 at Annville.
- $0.34 million for right-of-way, utility and construction activities for the replacement of the bridge and approaches at McCammon Creek along US 421(MP 8.821).

However, the status of these projects was uncertain at the time of this report since the KYTC FY 2005-2010 (Recommended) Six Year Highway Plan was not approved in the 2004 session of the Kentucky General Assembly.

III. INITIAL CABINET, PUBLIC AND AGENCY INPUT

Public and Agency Involvement
- Project Team Meetings
- Local Officials/Stakeholders Meetings
- Public Involvement Meetings
- Public Comment Surveys
- Resource Agency Coordination

Local citizens, public officials and representatives of government resource agencies were given the opportunity to provide input throughout the course of this Alternatives Study for US 421. This chapter describes the first round of public and agency involvement that occurred throughout the study process and describes the comments and input received as a result of those efforts. Activities undertaken as part of the second round of cabinet, public and agency involvement are summarized in **Chapter VII**, as they relate to the development of improvement alternatives. In addition to the information presented in this chapter and **Chapter VII**, material related to the public involvement process is included in the October 21, 2003 US 421 Public Meeting Notebook and the March 18, 2004 Public Meeting Notebook, which are separate documents containing a summary of public meeting events.

A. Project Team Meeting I (August 11, 2003)

A project team meeting was conducted on Monday, August 11, 2003, at the KYTC District 11 Office in Manchester, Kentucky. The purpose of the meeting was to discuss the project history and purpose, scope of work and related activities, preliminary data/exhibits, project issues, and public involvement needs and ideas. A copy of the meeting minutes is included in **Appendix B**. Items discussed by those present at the meeting included:

- This project has been identified as a Top 10 Priority of the Cumberland Valley ADD Regional Transportation Committee for the last two years, as part of the KYTC statewide transportation planning process. Jackson County's designation as a Federal Empowerment Zone may have helped to get this project selected.
- The study area was discussed, and the termini were decided as follows: The southern terminus will be the northernmost junction of KY 89 near the northern city limits of McKee. The northern terminus will be the southern end of the improved section at Bighill, just north of the Rockcastle County line.
- The project team recommended that the study area buffer be widened from 1000 feet to 2000 feet on each side of the existing alignment to provide adequate area for possible new alignment alternatives. [NOTE: Afterwards, the Division of Planning decided that the study would continue with a 2,000-feet wide corridor instead of the 4,000-feet wide corridor proposed in the project team meeting due to the funding limits for the study. It was felt that expanding the study boundaries would be contrary to the defined scope of the project, which was described as a reconstruction project in the Six Year Highway Plan.]
- The importance of coordinating with the U.S. Forest Service was discussed since part of the proposed project lies within the boundaries of the Daniel Boone National Forest. It was mentioned that there may also be a need for coordinating with Berea College, since they own a lot of land in the area and were heavily involved in the nearby Bighill project. It may also be beneficial to coordinate with the Kentucky Speleological Society due to caves that are located near the Rockcastle County Line.
- It was the consensus of the project team that there were probably no Environmental Justice population clusters in the study area. It was mentioned, however, that

Jackson County had a large low-income population, and this should be considered. It was suggested that contacts be made with Jackson County Transit and the Christian Appalachian Project, two groups that represent low-income populations. [NOTE: Two other groups that represent low-income populations were identified after the project team meeting: Daniel Boone Development Council and St. Paul's. These four (4) groups were invited to attend the Local Officials Meetings on September 2, 2003, and March 2, 2004.]

Several issues were mentioned by the project team for consideration throughout the project development process, including:

- The potential existence of family clusters along US 421;
- Relocations, especially if the improvement is along the existing route;
- The Daniel Boone National Forest;
- A rock quarry at Clover Bottom, along with other mines in the study area;
- An industrial park located at Clover Bottom;
- Maintenance of traffic during construction, particularly for an improvement along or near the existing road;
- The stream running alongside US 421 and other streams in the area;
- Residential development in Sandgap;
- Observed pedestrian traffic at various points along the route, especially in the Sandgap area and near other built-up areas along the route, so the study will follow Cabinet policy for accommodating pedestrian/bicycle access;
- Existence of caves and karst topography near the Rockcastle County Line;
- Acidic soils found near the Rockcastle County Line as part of the Bighill project;
- The historic Cox Simpson House, located near the Rockcastle County Line which is currently receiving Transportation Enhancement Funds for improvements; and
- Grade issues near Sandgap, which may need to be bypassed.

B. Local Officials and Agencies Meeting I (September 2, 2003)

As part of the public involvement portion of this study, a meeting was held with local officials, potential stakeholders, and the media at the Jackson County Empowerment Zone office in McKee on Tuesday, September 2, 2003. The purposes of this meeting were to inform these groups about the project and to gain input about the issues and concerns of the community. Copies of the meeting minutes are included in **Appendix B**.

A total of 21 persons attended the local officials meeting to discuss the alternatives study. Topics discussed during the meeting included:

- Project Origination and History;
- Study Area;
- Project Purpose and Need;
- Scope of Work and Project Schedule;
- Environmentally and socially sensitive areas, including a watershed that drains into the Owsley Fork Reservoir, the historic Cox-Simpson House, the Daniel Boone National Forest, a divide near the Jackson-Rockcastle County Line, and possible family clusters;
- New development in the study area;
- Preservation of rural character;

- Objectives of the Jackson County Empowerment Zone Strategic Plan;
- Measures of effectiveness that might be used to compare alternatives, such as level of service;
- Potential environmental justice issues and approach; and
- Public involvement approach.

C. Public Information Meeting I (October 21, 2003)

On Tuesday, October 21, 2003, a Public Involvement Open House was held at the Sandgap Elementary School in Sandgap, Kentucky, from 5:00 p.m. to 7:00 p.m. The purpose of the open house was to seek input from the community and present information to the general public on the overall project development process, project purpose, existing conditions information, identified issues, and potential improvements.

A total of 144 persons registered their attendance at this two-hour public session, including ten (10) KYTC, ADD, and consultant staff. Minutes for this meeting are included in **Appendix B**.

Attendees of this open house were given a survey questionnaire, project brochure, and information regarding KYTC roadway projects. The meeting room was set up with a semi-circular arrangement of the following project exhibits:

- Study Area
- Project Goals
- Existing Traffic and Level of Service (LOS)
- Future Traffic, Based on Historical Growth
- Adequacy Rating Percentiles
- Crash Location and Severity
- Environmental Footprint

US 421 Public Meeting
October 21, 2003

A PowerPoint slide presentation was presented to provide information on the US 421 Alternatives Study. The presentation included information on: the study area; preliminary project goals; project schedule; traffic, design and environmental considerations; public involvement opportunities; and contact information. Consultant staff made a formal presentation to attendees once, and then the slides were displayed continuously throughout the remainder of the public involvement session.

Attendees were invited to view the project exhibits and discuss any questions or concerns with KYTC, ADD, and consultant staff.

Two (2) exhibit stations were set up with environmental footprint maps of the entire study area to solicit public opinion about potential improvements. The first station gave attendees the opportunity to circle areas that should be improved by the reconstruction of US 421. Many areas were identified for improvement along the entire route. More than twelve (12) curves were identified for improvement for a variety of reasons, including poor sight distance, steep grades, water problems, narrow lanes, and narrow bridges. The next exhibit station gave attendees the opportunity to identify areas that should be avoided or preserved by any improvements. Areas identified for avoidance included:

- Development in Sandgap;
- Daniel Boone National Forest; and

- Caves throughout the study area (one attendee identified on the map a route north and south of US 421 between Morrill and Sandgap that would not impact caves).

Comments made at the public meeting by attendees, either verbally or recorded on available writing tablets, included the following:

- Negative impacts of existing US 421 in Jackson County include:
  - Significantly higher automobile insurance rates than in surrounding counties, and
  - Jackson County Schools miss more snow days than schools in surrounding counties.
- Twenty-nine (29) people have been killed in a curve located in Clover Bottom over the last several years.
- Improve access for future development and improved job opportunities.
- Construct road along coal seam and recover costs through the sale of the coal.
- Unsafe conditions exist at various locations. Anecdotal information was provided on accidents and accident history along the route.
- A dangerous curve/intersection exists at KY 3446.
- A farm on both sides of US 421 near Morrill has been in the family since 1803; it is not on the historical register, and it is not being worked currently. The owner is a retired policeman who lives in Berea.
- During rain, heavy water flows through a gap at Morrill, causing unsafe conditions.
- There may be a need to bypass the quarry near Clover Bottom, which operates on both sides of US 421.

Before leaving, a total of 61 individuals completed the public comment survey provided, while an additional 36 surveys were submitted to the KYTC after the meeting. Responses to the public comment survey are tabulated in **Table 10** and summarized below:

- The majority (98%) of survey respondents indicated that the reconstruction of US 421 is needed from KY 89 at the northern limits of McKee in Jackson County to the recently improved section of US 421 near Bighill in Rockcastle County, just north of the Jackson-Rockcastle County line.
- Over 80% of respondents believed that the following problems should be addressed by the proposed project: Few Passing Opportunities, Sharp Curves, Steep Grades, Poor Visibility, Narrow Shoulders, and Large Trucks.
- The majority of respondents (81 of 97, or 83.5%) indicated that they use US 421 on a daily basis.
- Work or Business was selected by 98% of respondents as a primary purpose of travel along US 421.
- “Personal property or homes” and “businesses or commercial property” were chosen most by respondents as areas that should be considered sensitive if the proposed project proceeds.

One (1) letter of input was received after the public meeting expressing favor for the proposed reconstruction of US 421. The letter cited the need for better access for this low-income area to jobs, services, shopping, hospitals, recreation, and schools in nearby cities and counties.

Table 10. Project Survey I Results

Alternatives Study
Reconstruction of US 421
From KY 89 at the northern city limits of McKee to the recently improved section of US 421,
just north of the Jackson-Rockcastle County line.
Item No. 11-113.00

Public Meeting Responses

Do you think reconstruction of US 421 from KY 89 at the northern limits of McKee in Jackson County to the recently improved section of US 421 near Bighill in Rockcastle County, just north of the Jackson-Rockcastle line is needed? (95 Respondents)

Yes	*No*
93	2
98%	2%

What problems currently exist on US 421 that the proposed project should address? (97 Respondents)
(Multiple problems were selected by several respondents)

Low Travel Speed	*High Speeds*	*Few Passing Opportunities*	*Sharp Curves*	*Steep Grades*	*Poor Visibility*	*Narrow Lanes*	*Narrow Shoulders*	*Large Trucks*	*Stopped or Broken Down Vehicles*	*Congestion*	*Other*
53	36	83	97	81	79	73	85	83	37	44	5
55%	37%	86%	100%	84%	81%	75%	88%	86%	38%	45%	5%

How often do you use US 421 now? (97 Respondents)

Daily	*Once a week*	*Once a month*	*Never*	*Other*
81	14	1	0	1
84%	14%	1%	0%	1%

If you use this route now, what is the primary purpose of your trips? (96 Respondents)
(Multiple purposes were selected by several respondents)

Work or Business	*Personal Business*	*Visit Friends or Family*	*School*	*Doctor*	*Shopping*	*Trips or Vacations*	*Other*
94	33	38	19	44	39	18	7
98%	34%	40%	20%	46%	40%	19%	7%

Are there sensitive areas that should be considered if this new route is constructed? (46 Respondents)
(Multiple areas were selected by several respondents)

Personal Properties or Homes	*Businesses/ Commercial Property*	*Natural Areas or Habitats*	*Recreational Areas*	*Historic or Cultural Sites*	*Hazardous or Monitored Sites*	*Scenic Areas or Viewsheds*	*Prime Farmland*	*Other*
27	18	8	3	6	7	1	9	2
59%	39%	17%	7%	13%	15%	3%	20%	3%

D. Resource Agency Coordination Round I (November 2003)

Resource Agencies
- City/County Agencies
- Local Interest Groups
- KYTC Division Offices
- Other State Agencies
- Federal Agencies

Many local, state and federal resource agencies, with diverse areas of public responsibility, were involved in this planning process. Input was solicited through written requests on two occasions. This section describes the input received from the first round of resource agency coordination. Input from the second round of resource agency coordination is summarized in **Chapter VII**. In the first round of coordination, agencies were sent a preliminary statement of study purpose and project goals, a map showing project location and environmental features, year 2003 traffic characteristics, and vehicle crash information. Letters of input from the responding resource agencies are located in **Appendix C** and are summarized below.

The following 28 agencies responded by offering comments or concerns regarding the project:

- Berea College – The proposed project should consider avoiding negative impacts on the watershed that serves Owsley Fork Reservoir, which provides drinking water to the City of Berea and residents of southern Madison County.
- Jackson County Development Association – US 421 is the major artery in and out of Jackson County. Improvements are needed to improve access to medical facilities, jobs, and businesses outside of Jackson County, and to stimulate commercial and economic activity within the county. Their specific comment and concern is that a roadway sufficient to handle the traffic is safely constructed by removing bad curves, adding turn-lanes, and adding shoulders where possible.
- Jackson County Empowerment Zone Community, Inc. – Infrastructure Goal #2 of the Jackson County Empowerment Zone Community, Inc. Strategic Plan is: To develop a safe, reliable and efficient transportation system that will accommodate travel for residents, visitors, businesses, and industries in order to stimulate growth. Action items under this goal include: (a) advocate safety improvements to US 421 and (b) advocate reconstruction of US 421. The Jackson County Empowerment Zone Community, Inc. is in full support of reconstruction/improvements to US 421 from McKee to the Jackson/Rockcastle line.
- Jackson County Transportation Committee – The proposed project will greatly improve the quality of life for Jackson County citizens by providing better access to the Interstate Highway System and markets at Manchester, London, Berea, Richmond, and beyond. The committee believes there is no more important project to the future of Jackson County than the proposed improvement to US 421. Consideration should be given to: (1) the well-being of communities built up along the existing route, (2) prioritizing construction scheduling based on safety concerns, and (3) constructing the proposed route “five miles at a time” to complete the reconstruction at the earliest possible date consistent with budgetary limitations and construction convenience.
- Rockcastle County, Office of County Judge-Executive – The Office supports the proposed project and recommends that any improvements from Bighill to McKee consider enhancing the area’s natural beauty, preserving historic sites such as the Bighill Civil War activities, and providing more information about such sites to travelers.

- Kentucky Department of Agriculture – Special consideration should be given to land that is considered prime and/or statewide unique farmland. Alternatives that disrupt the least amount of farmland should be seriously considered since agriculture is vital to the overall well-being of Jackson County and its citizens.
- Kentucky Department of Fish and Wildlife Resources (KDFWR) – The Kentucky Fish and Wildlife Information System indicates that the federally endangered Indiana bat, federally endangered Virginia big-eared bat, and the state-listed Rafinesque's big-eared bat are known to occur in the Johnetta 7.5 minute USGS quadrangle. Known to exist in the Sandgap 7.5 minute quadrangle is the federally endangered little-winged pearly mussel. In quadrangles in which Virginia big-eared bats are known to occur, cave entrances should be surveyed for potential use. In quadrangles in which Indiana bats are known to occur, any wooded areas that may be impacted by the proposed project should be examined for potential Indiana bat habitat. The KDFWR made several recommendations for portions of the project that might cross intermittent or perennial streams.
- Kentucky Department of Military Affairs – No impacts from the proposed project are anticipated on any properties utilized by the Department of Military Affairs.
- Kentucky Department for Surface Mining Reclamation and Enforcement, Environmental and Public Protection Cabinet – The London Regional Office currently has no permit in the study area. There are reserves in the study area that could be permitted in the future, depending on coal market conditions; however, the proposed project would not likely affect them.
- Kentucky Department for Surface Mining Reclamation and Enforcement, Natural Resources and Environmental Protection Cabinet – Two active rock quarries, both permitted as M.A. Walker Company, Inc., have been identified in the study area, both of which generate a substantial amount of truck traffic. The quarry located along US 421 is at Clover Bottom. The quarry located along KY 89 is approximately 5.2 miles south of the junction of US 421 and KY 89 on Indian Creek.
- Kentucky Transportation Cabinet, Division of Materials, Geotechnical Branch – The Branch would prefer an alignment that avoids any quarries and/or coal mined areas (surface or underground), if possible. The Pennington Formation may contain shales with poor engineering properties such as highly weathered rock, deep Rock Disintegration Zones, and existing slides which may require more right-of-way than normal. Also, shales from this formation used in embankments may result in flatter than normal fill slopes.
- Kentucky Division of Air Quality, Natural Resources and Environmental Protection Cabinet – Kentucky Division for Air Quality Regulations 401 KAR 63:010 and 401 KAR 63:005 apply to the proposed project. The project must also meet the conformity requirements of the Clean Air Act, as amended, and the transportation planning provisions of Title 23 and Title 49 of the United State Code. Every effort should be made to maintain compliance with these regulations and requirements. The Division also suggests an investigation into compliance with applicable regulations of the local governments.
- Kentucky Transportation Cabinet, Division of Environmental Analysis – No known significant archaeological sites are located within the study area. Floodplains have a greater potential to contain undisturbed archaeological sites. Staying close to the existing alignment, where possible, should reduce the number of sites impacted. A large number of family cemeteries exist on toe-slopes and may require archaeological investigation. Rockshelters, which were often utilized by Native

Americans and have a greater chance of having intact archaeological deposits, may be impacted by alternates running cross-country, possibly requiring a significant amount of archaeological investigation.

- Kentucky Division of Forestry, Environmental and Public Protection Cabinet – No concerns or issues with the proposed project were discovered that would affect the Division of Forestry.
- Kentucky Transportation Cabinet, Division of Traffic, Permits Branch – This project should provide for a partially controlled access facility, with access control fencing and all possible access points set on the plans in accordance with 603 KAR 5:120. The design speed should be the same as the anticipated posted speed when the project is completed. The Permits Branch should be notified if the proposed route is to be placed on the National Highway System.
- Kentucky Department of Environmental Protection, Division of Waste Management, Natural Resources and Environmental Protection Cabinet – The Division requests the use of Pulverized Glass Aggregate (PGA) in roadbed construction, where feasible. No landfills exist along US 421 in the study area. The Division provided a list of superfund sites, underground storage tank sites, and underground storage tank sites in enforcement.
- Kentucky Geologic Survey, University of Kentucky – The proposed project is in the Eastern Kentucky Coal Field and Mississippian Plateau (Pennyroyal or Pennyrile) Physiographic Regions, which are underlain by sandstone, conglomerates, shale silty shale, siltstone, coal, underclay, and limestone. The project could encounter karst features in the limestone, such as sinkholes and caves. The project would likely encounter pre- or post-landslide hazards. This project would encounter unconsolidated sediments at or near stream drainage, such as gravel, sand, and silt. Resource conflicts could be encountered such as prior ownership of property for coal and limestone mining. The project would probably encounter limestone suitable for construction stone. The project area would not likely encounter any faults. There is very low potential for liquefaction or slope failure in the unconsolidated sediments at or near streams caused by earthquake motion.
- Kentucky Secretary for Health Services – The proposed project will have no adverse effect on the Cabinet for Health Services.
- Kentucky State Nature Preserves Commission – A review of the Natural Heritage database revealed the presence of no KSNPC-listed species or unique natural areas that would be directly impacted by implementation of the project. However, there are several concerns that should be addressed during planning stages: (1) minimizing impact to the Horse Lick Creek drainage area (including provisions for precluding hazardous spills into tributary drainages of Horse Lick Creek, including underground passageways), (2) assuring that no caves are impacted by the project, (3) minimizing stream impacts (including runoff of sediment from soils disturbed and exposed during construction), and (4) minimizing forest fragmentation.
- Kentucky State Police, Post 11, London – Improvements to US 421 would improve access to medical facilities and businesses in Richmond and Manchester and improve tourism and economic conditions in Jackson County. Issues to consider include: (1) delay to the substantial work force commuting out of county via US 421, (2) potential flooding in Clover Bottom, and (3) terrain in Sandgap.
- Kentucky State Police, Post 7, Richmond – They are unaware of any specific problems in the study area for which they could offer suggestions.

- Appalachian Regional Commission – The proposed project will not have any adverse effect on the Appalachian Development Highway System.
- United States Coast Guard – A Coast Guard bridge permit is not required for this project, as it does not cross waterways over which the Coast Guard exercises jurisdiction for bridge administration purposes.
- United States Department of Agriculture, Forest Service – Federally listed endangered and sensitive species habitat areas exist near the study corridor. Threatened and endangered (T & E) mussel habitat downstream from Birch Lick Creek in the Rockcastle River may be subject to sedimentation. Twenty-three monumented USA property corners are within the study corridor. The corner monumentation should be protected from or replaced after disturbance. The "Entering National Forest" portal sign located on trail right-of-way near the western intersection of US 421 with the Sheltowee Trace National Recreational Trail should be protected from disturbance, if possible, or replaced at an appropriate location for sight distance and aesthetics. Consideration should be given to the 1.6 miles of National Recreation Trail passing through the study area that is used by pedestrians, equestrians, mountain bikers, and properly licensed motorcyclists. There may be an opportunity to use TEA-21 grant funding to plan a multi-use trail lane alongside US 421 to accommodate the current mix of motorized and other trail users.
- United States Department of Agriculture, Natural Resources Conservation Service (NRCS) – NRCS is concerned with potential impacts that the proposed highway project might have upon prime farmland soils and additional farmlands of statewide importance. Form NRCS-CPA-106 must be submitted to NRCS if federal dollars are to be used to convert important farmlands from agricultural uses to non-agricultural uses.
- United States Department of the Army, Nashville District, Corps of Engineers – Based on a review of the Wildie, Sandgap, and Johnetta U.S. Geological Survey Quadrangle maps, the proposed corridor's alternative alignments would involve potential stream construction activities in or over Birch Lick Creek and tributaries, Clover Bottom Creek and tributaries, and several streams near Morrill. Certain areas near Morrill are part of the Kentucky River watershed. It is estimated that most of the streams crossed would be considered waters of the U.S. and would, thus, be subject to Section 404 of the Clean Water Act. The design of the proposed project must avoid impacts or adverse modification to the waters of the U.S. to the extent practicable.
- United States Department of Health and Human Services – The NEPA process for this project should consider: (1) air quality, (2) water quality and quantity, (3) wetlands and floodplains, (4) hazardous materials and wastes, (5) non-hazardous solid waste and other materials, (6) noise, (7) occupational health and safety, (8) land use and housing, and (9) environmental justice.
- United States Department of the Interior, Fish and Wildlife Service – Excessive sedimentation during construction can be prevented through Best Management Practices (BMPs). Three federally listed threatened and endangered species may occur within the proposed project area, including: the running buffalo clover, the Indiana bat, and the Virginia big-eared bat. The project area should be surveyed for caves, rock shelters, and underground mines to identify and avoid impacts to potential habitats for the Virginia big-eared bat. Tree removal should be completed at the appropriate time to avoid impacts to summer roosting Indiana bats.

IV. ENVIRONMENTAL OVERVIEW

This chapter provides a summary of the environmental issues identified in the project area based on a separate Environmental Overview Report completed March 2004. This report is included in **Appendix D**. Many environmental features identified within the project area are shown in **Figure 6**.

Construction of the proposed project is not expected to change current land use trends along the corridor. Residential, small business, and institutional uses would be expected to continue to dominate the study area.

Air quality is not expected to be adversely impacted with the proposed project, nor is highway noise expected to influence project feasibility or alternative location designations.

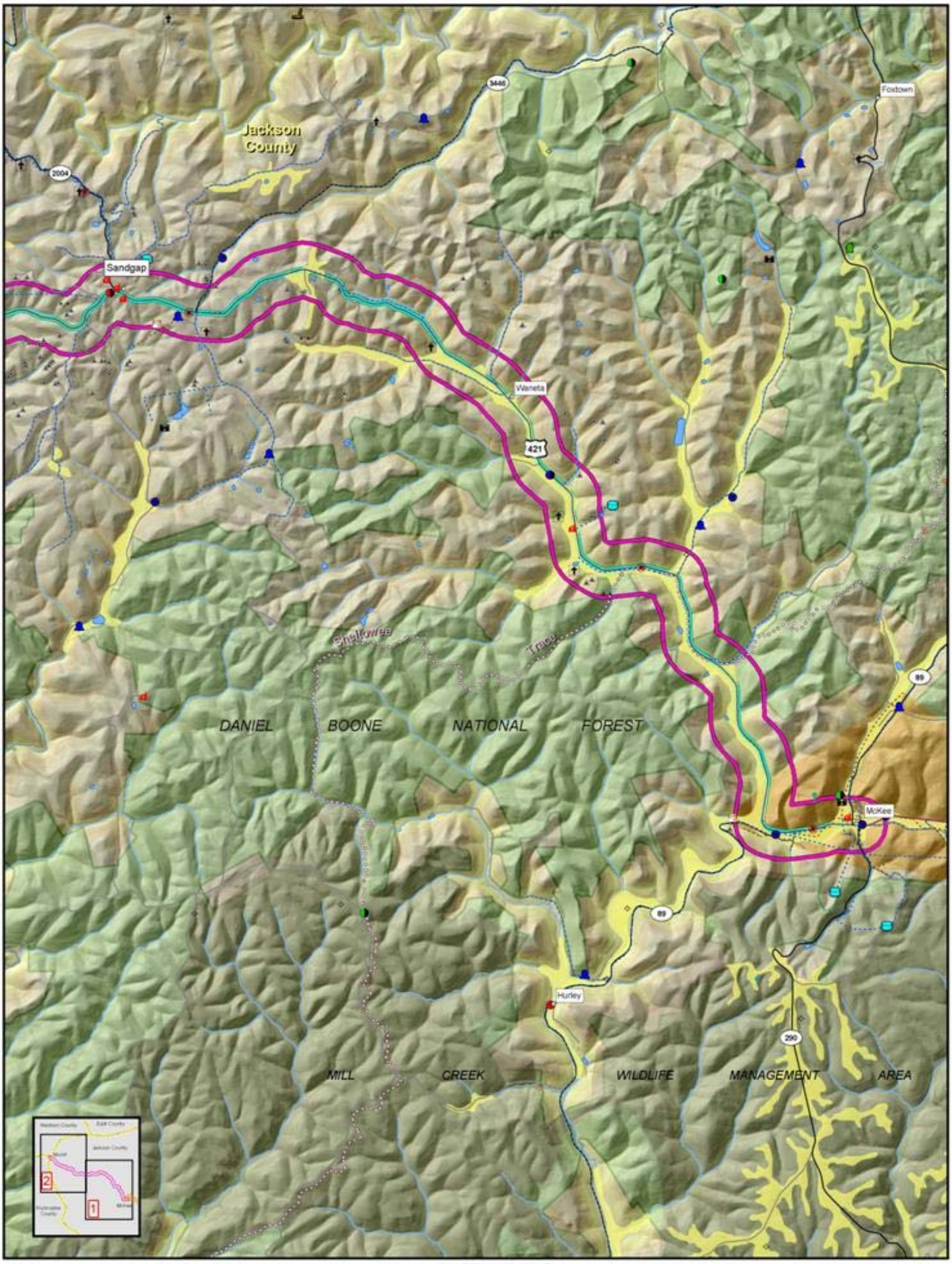
Aquatic and terrestrial ecosystems could experience adverse impacts from construction activities associated with stream channelization, culvert and bridge structures, and nonpoint source discharges. Best Management Practices (BMPs) and erosion and sediment control plans should be employed to prevent adverse impacts to sensitive resources. Potential wetland areas exist within the project study area. Additional investigations should be conducted to confirm the presence of jurisdictional wetlands and establish practicable avoidance measures as necessary. Potential floodplain impacts should be addressed in accordance with current KYTC standard procedures.

Tracts of the Daniel Boone National Forest (DBNF) are located adjacent to US 421 within the project corridor. Any acquisition of land within DBNF boundaries would require prior approval of the U.S. Forest Service (USFS). An important element of the Forest is the Sheltowee Trace National Recreational Trail. The trail crosses existing US 421 south of Waneta and north of McKee. Project related impacts to the Trail may constitute a Section 4(f) use. This possibility should be thoroughly investigated in future project phases.

The U.S. Fish and Wildlife Service (USFWS) listed three (3) threatened and endangered species as possibly occurring in the project area. They are the running buffalo clover, the Indiana bat, and the Virginia big-eared bat. Additional site-specific investigations and preparation of Biological Assessments will be necessary during Preliminary Engineering and Environmental (PE/E) phases of the project.

More than 200 structures within the project study area meet the 50 years of age or older criteria requiring evaluation for historic significance. This evaluation and determination of historic significance should be conducted as soon as possible in subsequent project phases. The presence of structures or sites that prove to be eligible for listing on the National Register of Historic Places could materially affect project location decisions. Initial project area research also indicates that there is a strong potential for prehistoric and historic archaeological sites to be present within the study area. Therefore, project specific archaeological investigations should be conducted during the PE/E phase in accordance with current KYTC procedures.

Three (3) former underground storage tank (UST) sites and six (6) businesses which utilize hazardous materials in their normal operations have been designated for investigation as sites of potential environmental concern. If any of these sites would be affected by the proposed project, they should be evaluated for petroleum and toxic substances contamination. The three (3) former UST sites include two (2) former Ashland Stations: one at the junction of US 421 and KY 3446 and the other in the community of Sandgap. The third former UST site is the Hill Top Gas and Grocery at the northern project terminus at Morrill. The six (6) auto repair and auto salvage businesses that could be impacted by the proposed project are located adjacent to the route sporadically throughout the study area.



Note: Archaeological Sites are not shown due to the sensitive nature of the data.

Figure 6. Environmental Footprint

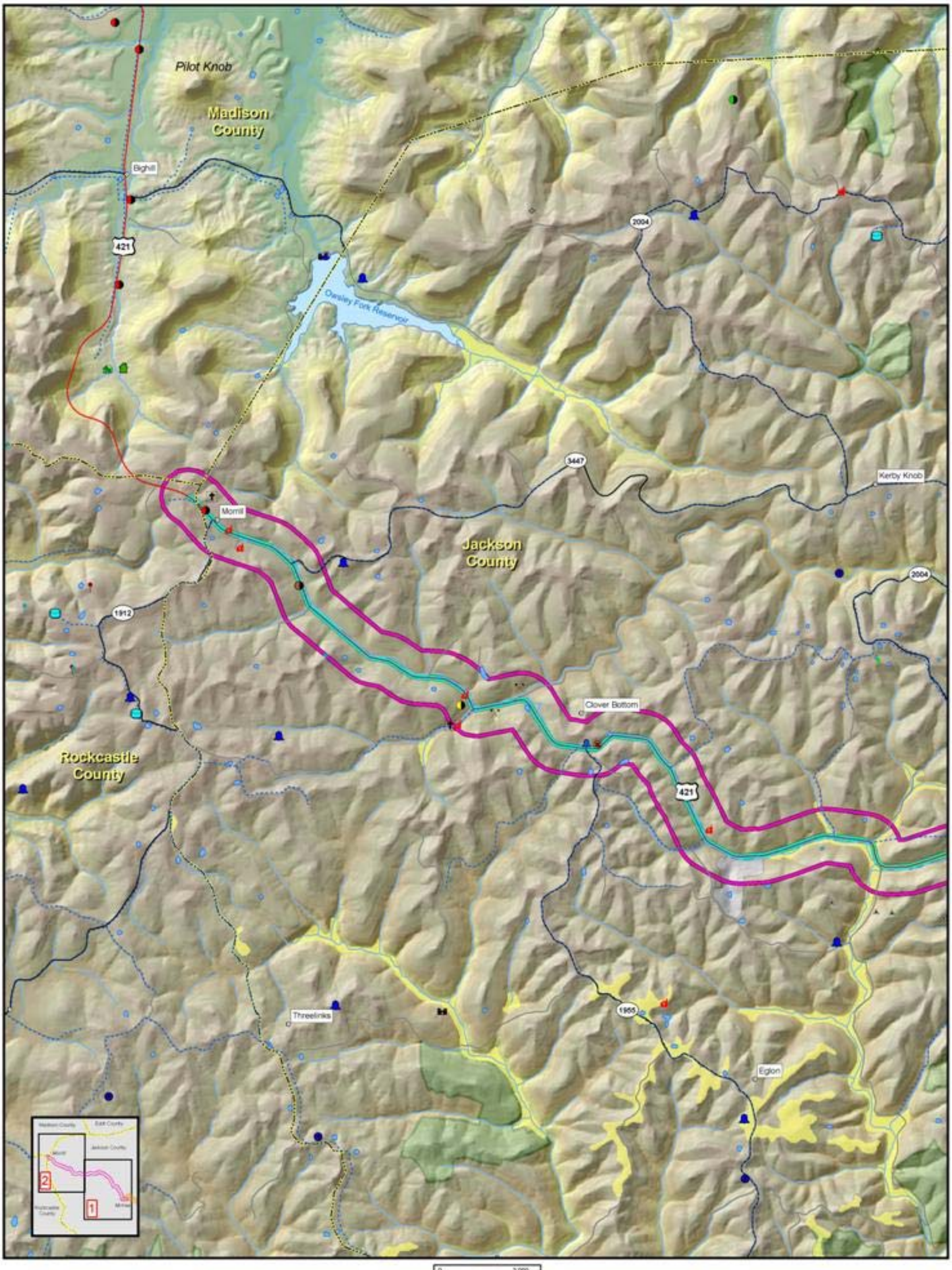


Figure 6. Environmental Footprint (continued)

Note: Archaeological Sites are not shown due to the sensitive nature of the data.

V. ENVIRONMENTAL JUSTICE

This chapter provides a summary of the Environmental Justice and Community Impact Report completed February 2004 by the Cumberland Valley Area Development District (CVADD) as part of this planning study. This report assesses potential environmental justice concerns related to the proposed project. The entire document is included in **Appendix E**.

According to the 2000 Census, there are five (5) Census Tracts and ten (10) Block Groups that encompass the US 421 study area in Jackson and Rockcastle County.

Study area Census Tracts and Block Groups in Jackson and Rockcastle Counties have homogeneous minority populations of 0.6% to 1.8% and 0.2% to 3.0%, respectively. These populations are considerably lower than the Kentucky average of 10% and United States average of 25%. While environmental justice concerns related to minority populations are not likely within the project area, KYTC and CVADD should monitor such populations during future phases of this project.

The percentage of population below poverty level for all study area Census Tracts and Block Groups in Jackson and Rockcastle Counties significantly exceed averages for Kentucky and the United States. Study Area Census Tracts and Block Groups contain percentages of persons below poverty level from 22.4% to 32.5% and 19.6% to 40.6%, respectively. The percentage of these populations is drastically more than the 15.3% in Kentucky and the 12.0% in the United States. The proposed reconstruction of US 421 is viewed by many local officials and community members as a project that would be beneficial for further economic growth and development in the area, thereby improving conditions for the residents of Jackson and Rockcastle Counties that are currently classified as being below poverty level. CVADD staff recommends that a subsequent review of poverty data within affected Census divisions be undertaken in future phases of this project to ensure that concentrations of populations below the poverty level do not receive disproportionate negative impacts resulting from the proposed project.

The percentage of persons over the age of 65 throughout study area Census Tracts and Block Groups in Jackson and Rockcastle Counties range from 11.0% to 12.7% and 9.3% to 15.4%, respectively. These populations are in line with the state and national average of 12.5% each. Discussions with local officials and community members indicate that the 15.4% of persons over the age of 65 in Tract 9602, Block Group 2 is evenly dispersed throughout the Block Group. The uniform dispersion of this population, together with the corridor's location being along the southern boundary of this block group, indicates that impacts to persons age 65 and over should not be an issue.

A comprehensive review of race, age, and poverty data from the U.S. Census Bureau, discussions with local officials, and field observations indicates that a defined Environmental Justice community does not exist within the study area for the proposed project.

VI. GEOTECHNICAL OVERVIEW

This chapter provides a summary of the environmental issues identified in the project area based on a separate Geotechnical Overview Report completed February 2004. This report is included in **Appendix F**.

A. Potential Issues Identified

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

- Several slope areas have rock blankets, or rock fill, which are indicative of slope instability problems along the new section of US 421 between the improvement at Bighill and the Jackson County line. It is understood that these areas were remediated during construction for the new section of roadway. According to the geologic mapping, this section occurred in the Borden Formation and on the down-dip side. The Borden Formation is not mapped on the section of indexes for the project.
- There is evidence of karst activity from Morrill and extending to near Sandgap. Sinkholes and rock outcrops are common from Morrill to Clover Bottom (KY 1955).
- Two rock quarries exist along the edge of US 421, less than one quarter mile apart, near Clover Bottom. One of the quarries hosts underground mining activity, while the other is a surface, open-pit mine. Nearby blasting during construction of the proposed project will be of concern to the operation of the underground quarry due to the potential for rock falls.
- Previous surface mined areas (strip mining) are a concern near Sandgap. If a bypass is proposed for Sandgap, there is a possibility that some surface mined areas may be encountered. Strip-mined areas have inherent problems (poor backfilling practices, random fill particle size, inadequate fill placement/compaction procedures, and acid mine drainage).
- Deep-mined areas were noted near Sandgap. Underground mine works could be encountered if a bypass is proposed for Sandgap. These areas carry a risk of subsidence, or for encountering the old mine works associated with shallow underground mines.
- There is an oil or gas well located between Waneta and McKee which presents constructability and monetary issues.

B. Conclusions

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

The recommended corridor should avoid strip-mined or deep-mined areas, avoid the oil or gas well previously discussed, and be located along the up-dip side of side hill cut areas to lessen the possibility of groundwater and slope instability problems.

If a bypass around Sandgap is considered, a north bypass is recommended to avoid the considerable amounts of coal mining that have occurred south of Sandgap. If a bypass is recommended south of Sandgap, the grades may need to be adjusted so that the road cuts will extend to the depth of the bottom of the mined out coal seams in this area.

C. Recommendations

From a geotechnical perspective, the following general conclusions and recommendations are applicable to the proposed corridor:

- Fill for embankments will likely consist primarily of shot rock from the Newman Limestone, the Pennington Formation, and the Breathitt and Lee Formations since soil overburden will be thin in most areas. Shot rock fill can be placed according to requirements as specified in the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction (latest edition).
- Shrink/swell of newly placed fill should not be of significant concern in most areas. However, consolidation of soft, alluvial soils near the valley bottoms may present some settlement concerns for embankments or for box culverts or other drainage structures.
- A mixture of soil and shot rock fill will likely be used for the majority of the roadway subgrade. The roadway subgrade could be constructed with durable rock if a more stable road base is desired. The local geology suggests that there may be some durable limestone or sandstone available within certain portions of the proposed corridor; however, it is doubtful that there will be sufficient volume to provide a durable rock roadbed without importing additional material.
- The selected corridor should avoid contour strip-mined or deep-mined areas, if possible. Acid mine drainage is of concern for these areas and could be encountered – either from new cuts or from old mined areas. Special construction considerations such as limestone-lined ditches may be required to mitigate the acid mine drainage. In addition, cuts extending across deep-mined areas may need to be over-excavated to the base of the coal seam elevation and backfilled to eliminate the possibility of future subsidence.
- Groundwater seeps or springs should be expected in down-dip cut areas, especially those cuts that intersect a coal seam. As such, special construction considerations will likely be required to collect and pipe groundwater in these areas.
- Steep cut slopes in massive, durable sandstone or limestone are typically stable with proper engineering of the cut slopes. Cut slopes in durable shale, poor limestone, or fractured sandstone are typically less stable than more durable rock and, thus, require less aggressive cut slopes. Cut slopes in non-durable shale will be even less stable, thus, requiring even flatter cut slopes. Pre-splitting will likely be required once the rock disintegration zone (RDZ) has been encountered. An overburden bench and flattened cut slopes will be required above the RDZ. Obviously, no geotechnical work has been performed for this project. Rock coring and a geologic evaluation will be required before specific cut slope recommendations can be presented.
- A mixture of soil and shot rock fill will likely be used for fill slopes, thus, the fill slopes will need to be engineered based upon the shear strength parameters of the applicable fill material. Rock toe buttresses may be required at the toe of fill slopes in deep alluvium soil areas.

VII. ALTERNATIVES DEVELOPMENT

Following the existing conditions review and first round of public involvement, potential improvement alternatives were developed for the possible reconstruction of US 421, based on an analysis of existing conditions and on input received from early public involvement.

Local citizens, public officials and representatives of government resource agencies were then given the opportunity to react to the proposed improvement alternatives through a second round of public involvement activities. This chapter outlines the development and evaluation of the proposed improvement alternatives, including the second round of Cabinet, Public, and Agency involvement.

A. Proposed Improvement Alternatives

The following four (4) alternatives were developed for the possible reconstruction of US 421:

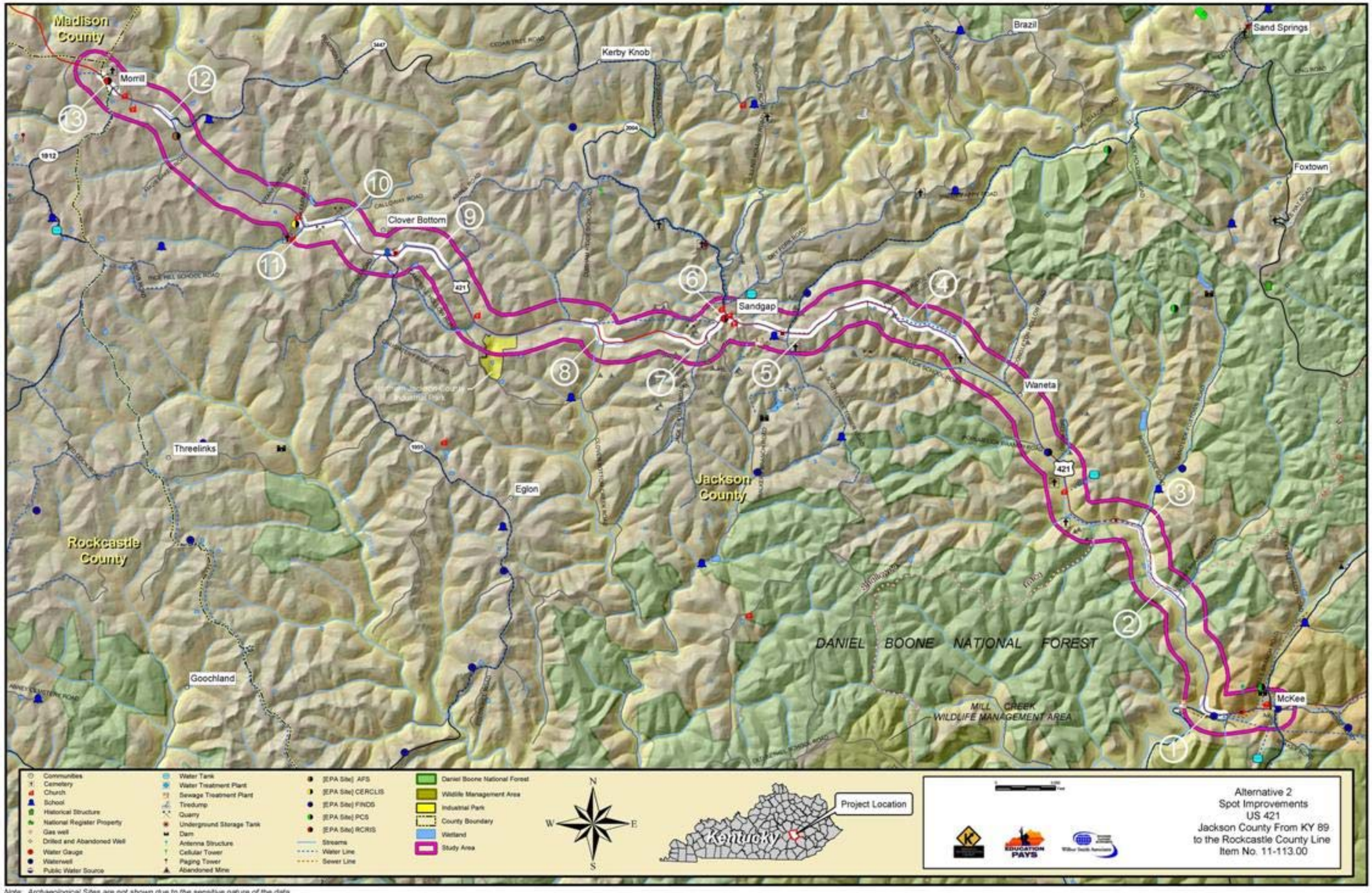
- Alternative 1 is the No-Build option, which recommends no changes to existing US 421.
- Alternative 2, as shown in **Figure 7** and summarized in **Table 11** is a combination of 13 spot improvements along the route. Locations in need of improvement were selected based on safety concerns (crash history), horizontal alignment, vertical alignment, other geometric characteristics, and public input.
- Alternative 3, as shown in **Figure 8**, is a reconstruction of the entire study length of US 421, along the existing alignment to the maximum extent possible.
- Alternative 4, as shown in **Figure 9**, is a total reconstruction on and off the existing alignment with options to bypass Morrill, the rock quarries at Clover Bottom, and Sandgap.

B. Project Team Meeting II (February 12, 2004)

A second project team meeting was conducted on Thursday, February 12, 2004 at the KYTC District 11 Office in Manchester, Kentucky. The primary purpose of the meeting was to get approval for the proposed alternatives for the US 421 Alternatives Study. The agenda included discussions of early public and resource agency input, environmental justice issues, findings from the geotechnical and environmental overviews, proposed improvement alternatives, and the approach for the upcoming public involvement meetings. A copy of the meeting minutes is included in **Appendix B**.

Items discussed by those present at the meeting included the following:

- The project team reviewed the input received from the local officials/stakeholders meeting and the public information meeting.
- Palmer Engineering presented preliminary results from the Environmental Overview Report. The text of the final Environmental Overview Report can be found in **Appendix D** and is summarized in **Chapter IV**. Exhibits and maps can be found in the Environmental Overview report, a separate document prepared by Palmer Engineering, Inc.
- Cumberland Valley Area Development District (CVADD) revealed preliminary findings from the Environmental Justice review of the study area. The final version of this document can be found in **Appendix E** and is summarized in **Chapter V**.
- Preliminary findings from the Geotechnical Overview Report were summarized by Qore, Inc. The final Geotechnical Overview Report can be found in **Appendix F** and is summarized in **Chapter VI**.



Note: Archaeological Sites are not shown due to the sensitive nature of the data.

Figure 7. Proposed Improvement Alternative 2

Table 11. Proposed Improvement Alternative 2 (Spot Improvements)

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

Item No. 11-113.00

Improvement	Begin MP	End MP	Length	Safety*	Horizontal Curvature	Grade	Public Concern	Description
1	14.700	15.000	0.300	3 Injury, 7 Property Damage	8.5-10.9 Degrees(MP 14.667-14.706), 0.0-0.4 Degrees(MP 14.706-14.813), 28 Degrees or Greater(MP 14.813-14.868), 0.0-0.4 Degrees(MP 14.868-15.123)	0-0.4% (MP 14.7- MP 14.993), 0.5-2.4% (MP 14.993-15.069)	-	Reduce Horizontal Curve
2	16.000	16.500	0.500	1 Fatal (MP 16.200), 4 Injury, 1 Property Damage	0.0-0.4 Degrees (MP 15.929-16.059), 8.5-10.9 Degrees (MP 16.059-16.093), 0-0.4 Degrees (MP 16.093-16.246), 7.0-8.4 Degrees (MP 16.246-16.405), 0.0-0.4 Degrees(MP 16.405-16.537)	0.0-0.4% (MP 15.818-16.045), 0.5-2.4% (MP 16.045-16.376), 0.0-0.4% (MP 16.376-16.594)	Yes	Reduce Horizontal Curves
3	16.700	17.000	0.300	1 Injury, 3 Property Damage	4.5-5.4 Degrees(MP 16.699-16.772), 0.0-0.4 Degrees(MP 16.772-16.806), 19.5-27.9 Degrees (MP 16.806-16.869)	0.5-2.4% (MP 16.698-16.774), 0.5-2.4% (MP 16.84-16.982), 0.0-0.4% (MP 16.982-17.058)	-	Reduce Horizontal Curve
4	19.500	20.500	1.000	5 Injury, 7 Property Damage	0.0-0.4 Degrees(MP 19.416-19.633), 8.5-10.9 Degrees (MP 19.633-19.681), 0-0.4 Degrees(MP 19.681-19.771), 5.5-6.9 Degrees(MP 19.771-19.809), 0-0.4 Degrees(MP 19.809-19.874), 8.5-10.9 Degrees(MP 19.874-19.896), 0-0.4 Degrees(MP 19.896-19.944), 28+ Degrees(MP 19.944-19.975), 0-0.4 Degrees(MP 19.975-20.002), 19.5-27.9 Degrees(MP 20.002-20.034), 0-0.4 Degrees(MP 20.034-20.108), 19.5-27.9 Degrees(MP 20.108-20.128), 0-0.4 Degrees(MP 20.128-20.166), 28+ Degrees(MP 20.166-20.191), 0-0.4 Degrees(MP 20.191-20.219), 28+ Degrees(MP 20.219-20.264), 0-0.4 Degrees(MP 20.264-20.332), 19.5-27.9 Degrees(MP 20.332-20.376), 0.0-0.4 Degrees(MP 20.376-20.578)	0.5-2.4% (MP 19.26-19.647), 6.5-8.4% (MP 19.647-20.093), 4.5-6.4% (MP 20.093-20.548)	Yes	Reduce Horizontal Curve, Reduce Grade
5	21.100	21.800	0.700	1 Fatal (MP 21.3), 7 Injury, 13 Property Damage	0.0-0.4 Degrees(MP 21.082-21.133), 8.5-10.9 Degrees(MP 21.133-21.166),0.0-0.4 Degrees(MP 21.166-21.261), 19.5-27.9 Degrees(MP 21.261-21.307), 0-0.4 Degrees(MP 21.307-21.498), 5.5-6.9 Degrees(MP 21.498-21.548), 0.0-0.4 Degrees(MP 21.548-21.758), 8.5-10.9 Degrees(MP 21.758-21.806)	0.0-0.4% (MP 20.945-21.116), 2.5-4.4% (MP 21.116-21.277), 2.5-4.4% (MP 21.277-21.438), 0.5-2.4% (MP 21.438-21.817)	Yes	Realign KY 3446/SandGap Rd. Intersection (MP 21.563), Reduce Horizontal Curve near intersection and at MP 21.261-21.307, Add left turn lane at Sandgap Elementary School Entrance
6	22.088	22.188	0.100	1 Fatal (MP 22.1), 1 Injury, 1 Property Damage	0-0.4 Degrees(MP 22.074-22.1), 19.5-27.9 Degrees(MP 22.1-22.156), 0-0.4 Degrees(MP 22.156-22.201)	2.5-4.4% (MP 21.968-22.139), 2.5-4.4% (MP 22.139-22.385)	Yes	Add Left Turn Lane at KY 2004 (MP 22.138)
7	22.200	22.800	0.600	4 Injury, 3 Property Damage	0.0-0.4 Degrees(MP 22.156-22.201), 19.5-27.9 Degrees(MP 22.519-22.561), 0-0.4 Degrees(MP 22.561-22.635), 19.5-27.9 Degrees(MP 22.635-22.662), 0.0-0.4 Degrees(MP 22.662-22.735), 8.5-10.9 Degrees(MP 22.735-22.767), 0.0-0.4 Degrees(MP 22.767-22.837)	2.5-4.4% (MP 22.139-22.385), 6.5-8.4% (MP 22.385-22.934)	Yes	Reduce Horizontal Curve

Table 11. Proposed Improvement Alternative 2 (Spot Improvements) (continued)

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

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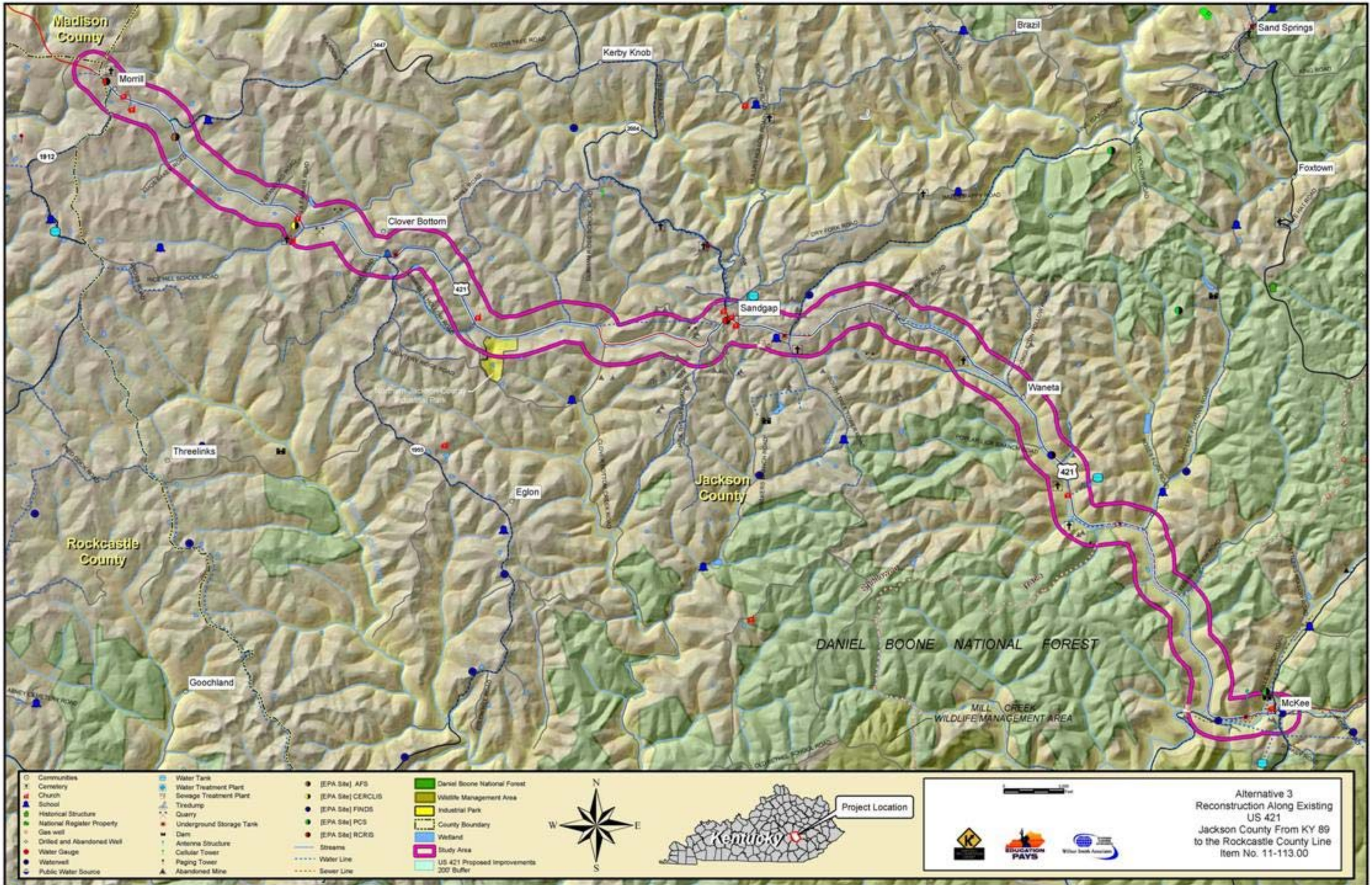
Improvement	Begin MP	End MP		Safety	Horizontal Curvature	Grade	Public Concern	Description
8	23.300	24.000	0.700	5 Injury, 8 Property Damage	11.0-13.9 Degrees(MP 23.403-23.53), 0.0-0.4 Degrees(MP 23.53-23.601), 19.5-27.9 Degrees(MP 23.601-23.669), 0-0.4 Degrees(MP 23.669-23.959), 19.5-27.9 Degrees(MP 23.959-23.983), 0.0-0.4 Degrees(MP 23.983-24.385)	0.0-0.4% (MP 23.483-23.938), 0.5-2.4% (MP 23.938-24.032), 0.5-2.4% (MP 24.032-24.184)	Yes	Reduce Two Horizontal Curves to Remove Steep "S" Curve
9	25.500	26.300	0.800	1 Fatal (MP 26.010), 3 Injury, 6 Property Damage	0.0-0.4 Degrees(MP 25.414-25.51), 3.5-4.4 Degrees(MP 25.51-25.554) 0-0.4 Degrees(MP 25.554-25.636), 19.5-27.9 Degrees(MP 25.636-25.684), 0-0.4 Degrees(MP 25.684-25.884), 14-19.4 Degrees(MP 25.884-25.954), 0-0.4 Degrees(MP 25.954-26.023), 14.0-19.4 Degrees(MP 26.023-26.092), 0.0-0.4 Degrees(MP 26.092-26.323)	0.5-2.4% (MP 25.453-25.548), 2.5-4.4% (MP 25.548-25.718), 4.5-6.4%(MP 25.718-26.135)	Yes	Reduce Grade and Horizontal Curve, Add Left Turn Lane at KY 1955 (MP 26.210), Left Turn Lane at Cave Spring Road (MP 26.260)
10**	26.500	26.999	0.499	3 Injury	0.0-0.4 Degrees(MP 26.402-26.599), 4.5-5.4 Degrees(MP 26.599-26.625), 0.0-0.4 Degrees(MP 26.625-26.667), 11-13.9 Degrees(MP 26.667-26.789), 0.0-0.4 Degrees(MP 26.789-27.07)	4.5-6.4% (MP 26.39-26.542), 2.5-4.4% (MP 26.542-26.608), 6.5-8.4% (MP 26.608-26.911), 0.0-0.4% (MP 26.911-27.157)	Yes	Reduce Grade and Horizontal Curve
11**	27.000	27.220	0.220	2 Injury, 5 Property Damage	0.0-0.4 Degrees(MP 26.789-27.07), 28+ Degrees(MP 27.07-27.12), 0.0-0.4 Degrees(MP 27.12-27.178), 8.5-10.9 Degrees(MP 27.178-27.206), 0.0-0.4 Degrees(MP 27.206-27.244)	0-0.4% (MP 26.911-27.157), 0.5-2.4% (MP 27.157-27.547)	Yes	Reduce Horizontal Curve, Add Left Turn Lane at Rice Hill School Road (MP 27.161)
12	28.720	29.029	0.309	4 Injury, 3 Property Damage	8.5-10.9 Degrees(MP 28.794-28.84), 0-0.4 Degrees(MP 28.84-29), 8.5-10.9 Degrees(MP 29-29.048)	6.5-8.4% (MP 28.748-28.9), 4.5-6.4% (MP 28.9-29.014), 0.5-2.4% (MP 29.014-29.089)	-	Reduce Grade, Add Left Turn Lane at KY 3447 (MP 28.929)
13	29.466	29.585	0.119	-	0-0.4 Degrees(MP 29.412-29.585)	0.5-2.4% (MP 29.373-29.573), 4.5-6.4%(MP 29.563-29.585)	Yes	Reduce Grade, Add Left Turn Lane at KY 1912 (MP29.520)

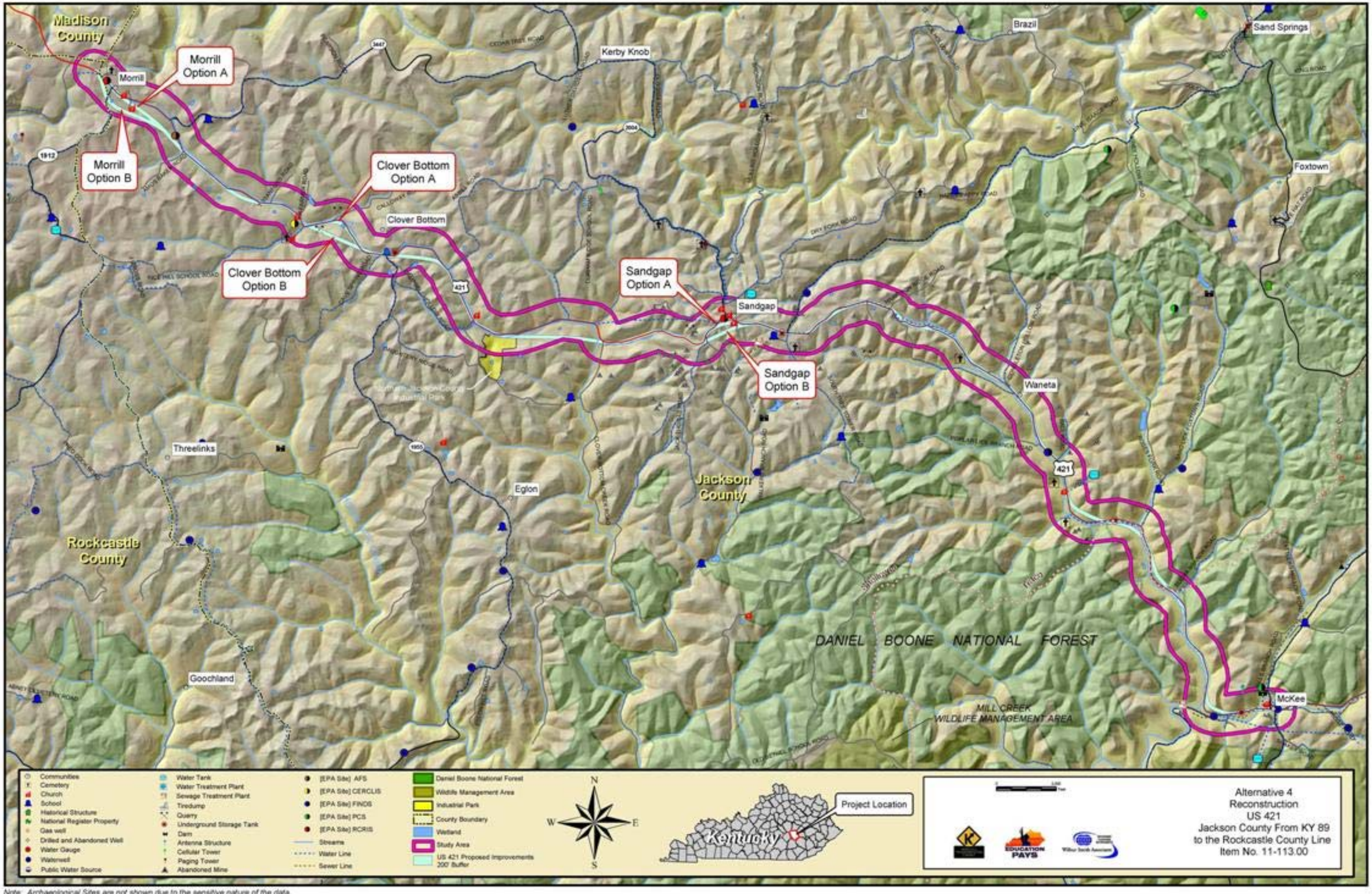
* Notes crash history between January 1, 1999 and December 31, 2002

** In order to correct an overlap in locations, Spot Improvements 10 and 11 have been revised from their original begin and end milepoint designations of 26.500 - 27.011 and 26.970 - 27.220, respectively .



Note: Archaeological Sites are not shown due to the sensitive nature of the data.

Figure 8. Proposed Improvement Alternative 3



Note: Archaeological Sites are not shown due to the sensitive nature of the data.

Figure 9. Proposed Improvement Alternative 4

- Attendees reviewed and discussed the four (4) proposed improvement alternatives and decided to move forward with further analysis and solicit additional public and agency input on all four of the proposed alternatives. No new alternatives were identified.
- The project team discussed traffic maintenance issues with construction of the proposed project, particularly concerns about locations with grade improvements.
- The project team agreed that the typical section of the proposed project would likely be a two-lane section with truck passing lanes and turning lanes where possible. Curb-and-gutter sections should be considered for any project along the existing alignment in Morrill, at the quarries near Clover Bottom, and in Sandgap.
- The project team discussed the location, time and agenda for the upcoming local officials/stakeholders meeting and the next project steps including traffic forecasts, level of service analysis, evaluation of potential impacts, and cost analysis of the proposed alternatives.

C. Proposed Improvement Alternative Evaluation

Once the project team agreed to move forward with the four (4) proposed improvement alternatives, each was further evaluated based on expected traffic impacts, environmental issues, and construction cost estimates as shown in **Table 12** and summarized below:

- Alternative 1, the No-Build Option, with no changes to the route proposed, would have no adverse impacts on the environment, and no design, right-of-way, utility, or construction costs. As estimated using the Kentucky Statewide Traffic Model (KYSTM), it is expected that an average of 6,190 vehicles per day (vpd) would use this portion of US 421 in the year 2030 with no improvements made. This alternative will not improve access, increase capacity, or enhance safety.
- Alternative 2, the Spot Improvement Option, could impact the following environmental features: three (3) churches, one (1) underground storage tank, two (2) EPA RCRIS Sites, 5.9 miles of water lines, 2.7 miles of streams, 0.8 miles of Sheltowee Trace, and 2.7 acres of Daniel Boone National Forest. The preliminary construction cost estimate for this alternative was $24.7 million (approximately $4 million per mile). With this improvement, this portion of US 421 is expected to carry 6,190 vpd by the year 2030.
- Alternative 3, the Reconstruction Along the Existing Alignment Option, could impact the following environmental features: three (3) churches, six (6) underground storage tanks, one (1) EPA AFS Site, two (2) EPA FINDS Sites, two (2) EPA RCRIS Sites, 15.8 miles of water lines, 0.2 miles of sewer lines, 5.2 miles of streams, 1.2 miles of Sheltowee Trace, and 5.3 acres of Daniel Boone National Forest. The preliminary construction cost estimate for this alternative was $74.6 million (approximately $5 million per mile). With this improvement, traffic is expected to reach 6,250 vpd for this portion of US 421 by the year 2030.
- Alternative 4, the Reconstruction On and Off the Existing Alignment Option, could impact the following environmental sites: two to three (2 to 3) churches; three (3) underground storage tanks; one (1) EPA FINDS Site; one (1) EPA RCRIS Site; 10.7 to 11.8 miles of water lines; 0.2 miles of sewer lines; 3.6 to 3.8 miles of streams; 0.4 miles of Sheltowee Trace; and 6.3 acres of Daniel Boone National Forest. The preliminary construction cost estimate for this alternative was between $75.2 and $78.7 million (approximately $5.2 to 5.4 million per mile). With this improvement, it is expected that 6,250 vpd would use this portion of US 421 by the year 2030.

Table 12. Alternatives Evaluation Matrix

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

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	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4[1]**
	No-Build	Spot Improvements	Reconstruction along existing alignment	Reconstruction on and off existing alignment
LENGTH				
Estimated length of reconstructed or new roadway (miles)	0 miles	6.1 miles	14.8 miles	14.4 - 14.6 miles
TRAFFIC				
Year 2030 Estimated Average Daily Traffic Volume (vpd)	6190	6190	6250	6250
COST				
Estimated Total Cost	$0	24.7 Million	74.6 Million	75.2 - 78.7 Million
Estimated Per Mile Cost	$0	4 Million Per Mile	5 Million Per Mile	5.2 - 5.4 Million Per Mile
POSSIBLE ENVIRONMENTAL IMPACTS				
Churches	-	3	3	2 - 3
Underground Storage Tanks	-	1	6	3
EPA Sites (AFS)2	-	-	1	-
EPA Sites (FINDS)3	-	-	2	1
EPA Sites (RCRIS)4	-	2	2	1
Water Line	-	5.9 miles	15.8 miles	10.7 - 11.8 miles
Sewer Line	-	-	0.2 miles	0.2 miles
Streams	-	2.7 miles	5.2 miles	3.6 - 3.8 miles
Sheltowee Trace	-	0.8 miles	1.2 miles	0.4 miles
Daniel Boone National Forest	-	2.7 acres	5.3 acres	6.3 acres

[1] *Length, cost and possible environmental impacts vary with the options proposed for this alternative in Morrill, Clover Bottom, and Sandgap.*

[2] *AFS - Air Facility System Sites - The Air Facility System contains compliance and permit data for stationary sources regulated by the U.S. EPA and state and local air pollution agencies.*

[3] *FINDS - Facility Identification Initiative System Sites - The goal of this system is to simplify the reporting of all government sites by using an extensive database relative to all environmental sites monitored by the EPA which are subject to environmental regulation or of environmental interest.*

[4] *RCRIS - Resource Conservation and Recovery Information System Sites - RCRIS is a national information system which supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities which generate, transport, treat, store or dispose of hazardous waste.*

D. Local Officials and Agencies Meeting II (March 2, 2004)

A second meeting with local officials, potential stakeholders, and the media was held at the Jackson County Empowerment Zone office in McKee on Tuesday, March 2, 2004. The purpose of this meeting was to discuss public and resource agency input, environmental justice concerns, findings from the geotechnical and environmental overviews, proposed improvement alternatives, approach for the upcoming public meeting, and any issues and concerns of the community. Copies of the meeting minutes are included in **Appendix B**.

A total of 18 persons attended the local officials meeting to discuss the alternatives study. Topics discussed during the meeting included the following:

- The study team reviewed the input received from the first round of involvement activities, including a local officials meeting, public meeting, and correspondence with resource agencies.
- Cumberland Valley Area Development District (CVADD) revealed preliminary findings from the Environmental Justice review of the study area (the final version of this document can be found in **Appendix E** and is summarized in Chapter V).
- Preliminary findings from the Geotechnical Overview Report were summarized by the study team (the final Geotechnical Overview report can be found in Appendix F and is summarized in **Chapter VI**).
- The study team presented results of the Environmental Overview report (the final Environmental Overview report can be found in **Appendix D** and is summarized in **Chapter IV**).
- The project team introduced the four (4) proposed improvement alternatives (discussed in Section A of this chapter, Chapter VII).
- Attendees inquired if the KYTC is currently studying a connection from the northern end of the Bighill project to the Berea Bypass. Project staff indicated that there appeared to be no plans to study or improve that section of roadway at present.
- KY 1955, Rice Hill School Road, Congleton Hollow, and Lower Clover Road were identified by attendees as dangerous locations, especially for school buses. Project staff explained that Alternatives 3 and 4 would address all these concerns. The project team indicated that each site would be further analyzed and compared with improvements proposed in Alternative 2. The spot improvements in Alternative 2 would be revised if deemed necessary to include problem areas at these locations.
- Summer 2004 construction plans for the entrance to the historic Cox Simpson House were discussed. Project staff said that the Cox Simpson House should proceed with construction of the entrance without consideration of future improvements to US 421. It was agreed that a turning lane should be provided at this location if this section of US 421 is improved.
- The U.S. Forest Service informed the project team that any alignment that required the purchase of Daniel Boone Forest property would need to be closely coordinated with the Forest Service, including possible mitigation.
- The U.S. Forest Service emphasized the need for possible improvements for the connection of the Sheltowee Trace from the west side to the east side of US 421. Currently, this portion of the trail permits use of off-highway vehicles (OHVs); however, a portion of the trail goes north and south along the shoulder before crossing US 421, which creates potential safety problems. Two alternates were proposed: (1) providing a shoulder width that is suitable for OHV use or (2) work with

the Forest Service to relocate the trail south of its existing location to provide a 90-degree crossing at or near the southernmost crossing location on US 421.

- The study team explained that the typical section of the proposed project would likely be a two-lane section with truck passing lanes and turning lanes where possible. Curb and gutter sections may best meet the needs in Morrill, at the quarries near Clover Bottom, and in Sandgap if improvements are made along the existing alignment.
- Attendees discussed the location, time and agenda of the upcoming March 18, 2004 public meeting.

E. Public Information Meeting II (March 18, 2004)

On Thursday, March 18, 2004, the second Public Involvement Open House was held from 5:00 p.m. to 7:00 p.m. at the Sandgap Elementary School in Sandgap, Kentucky. The purposes of the meeting were to present the four proposed project alternatives, provide further new information to the public on the proposed project, and solicit public input on possible issues, impacts, and the proposed alternatives.

A total of 78 persons registered their attendance at the two-hour public session, including ten (10) KYTC, ADD, and consultant staff. Minutes for this meeting are included in **Appendix B**.

Attendees of this open house were given a survey questionnaire, proposed alternatives brochure, and information regarding other KYTC roadway projects. The meeting room was set up with a semi-circular arrangement of the following project exhibits:

- Study Area
- Project Goals
- Existing Traffic and Level of Service (LOS)
- Adequacy Rating Percentiles
- Crash Location and Severity
- Proposed Alternative 2 on Environmental Footprint Map
- Proposed Alternative 2 List of Spot Improvements
- Proposed Alternative 3 on Environmental Footprint Map
- Proposed Alternative 4 on Environmental Footprint Map
- Alternatives Evaluation Matrix

US 421 Public Meeting
March 18, 2004

Attendees were invited to view the project exhibits and discuss any questions or concerns with KYTC, ADD, and consultant staff. A large display was provided in this area of the room for attendees to record comments. Only one comment was recorded which advised the project team to check the locations of the rock quarries, Cave Spring Road, and Amos Baker Road as presented on the exhibits. [NOTE: The study team later verified the mapping of these locations.]

A PowerPoint slide presentation was prepared for the public involvement meeting to provide information on the US 421 Alternatives Study. The presentation included the following information: the study area; preliminary project goals; project schedule; traffic, design and environmental considerations; public involvement opportunities; proposed alternatives; and contact information. Consultant staff made a formal presentation to attendees once, and then the slides were displayed continuously throughout the remainder of the public involvement session.

Following the formal presentation, the following questions (underlined) were asked by attendees with the following responses given by project staff:

- How long will it be before this road is completed? The road building process takes about 8-10 years following the planning phase; however, this project does not currently have any funding set aside for implementation following the completion of this planning study.
- Would it be beneficial to talk with representatives about getting more funding for the project in the Six Year Highway Plan? The current session of the Kentucky legislature will review the Plan submitted by the Transportation Cabinet, which does not include any additional funding for this project. If you want the project, it would be a good idea to contact legislative representatives about supporting the project before the Six Year Highway Plan is updated again in two years.
- What is the current traffic along the corridor? Traffic volumes along US 421 range between 4,000 and 5,000 vehicles per day.
- When will the report for this study be finished? The report will be finished late in the summer – probably August.

Before leaving, a total of 44 individuals completed the public comment survey provided, while an additional 123 surveys were submitted to the KYTC after the meeting. Responses to the public comment survey are tabulated in **Table 13** and summarized below:

- Almost all (95%) of the survey respondents preferred Improvement Alternative 4 for US 421.
- Listed in order by the number of responses, Spot Improvements 1, 4, 5, 7, 8, 9, 10, and 11 were chosen by the majority of respondents as the most important spot improvements along US 421.
- The following locations were identified where additional spot improvements should be considered:
    - The hill below the KY 1955 intersection;
    - The curve just past the rock quarries in Clover Bottom;
    - Sidewalks in Waneta, Sandgap, and Morrill community; and
    - Hills, mainly near Jackson County High School.

  Table 13 *lists additional comments in the space provided on the survey form to identify additional spot improvement locations.*
- As part of Improvement Alternative 4, the largest number of respondents preferred Option B in Clover Bottom, Option A in Sandgap and Option B in Morrill.

One (1) letter of input was received after the public meeting expressing support for improvement Alternative 2. The letter cited the quick time in which the improvements could be implemented to save lives as the primary reason for favoring it over Alternative 3 and Alternative 4. The letter stated that Alternative 1, the no build alternative, was unacceptable.

Table 13. Project Survey II Results

Alternatives Study
Reconstruction of US 421
From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.
Item No. 11-113.00

Which improvement alternative do you prefer for US 421? (166 Respondents)

Alternative 1 No Build	*Alternative 2 Spot Improvements*	*Alternative 3 On Existing*	*Alternative 4 On and Off Existing*
0	1	6	159
0%	1%	4%	95%

If Alternative 2 were selected, which five (5) spot improvements do you feel are the most needed? (Check 5 boxes) (97 Respondents)

1	*2*	*3*	*4*	*5*	*6*	*7*
9	1	2	8	9	5	8
5%	1%	1%	5%	5%	3%	5%

8	*9*	*10*	*11*	*12*	*13*
11	11	13	12	5	3
7%	7%	8%	7%	3%	2%

Are there any other locations where spot improvements should be considered as part of Alternative 2? (List locations or identify on the map on the back of the survey.)
The hill below the 1955 intersection.
The curve just past the Rock Quarries in Clover Bottom.
Hills, mainly the hill toward the high school, HWY should go to 30 b/c there are plants there.
Hills, mainly the hill toward the high school
Hills, mainly the hill toward the high school
Sidewalks in Waneta, Sand Gap, and Morrill community.
4-7 should be considered one spot. Straighten road completely.
Spot improvements will improve the highway, but will not solve the problem. This highway should be a state priority!
Jackson Co. roads are being neglected relative to those in other parts of Eastern KY. I want answers!
Lay a straight road from Big Hill to McKee; forget 421.
Widen the shoulder 20 ft. on the curves. The whole county is not worth 24 million.
Any improvement would help, but US421 connecting w/ HWY30 would be best.
Go to HWY30.
Go to 30, plant sites there.
Need to 4-lane road from Clay Co to Richmond.

Alternative 4 offers different improvement location options in three locations along US 421: (a) Sandgap, (b) near the quarries just north of Clover Bottom, and (c) Morrill. For each location, choose a preferred improvement option (Check one box for each location) (167 Respondents)**:**

Sandgap			**Clover Bottom**		
A	**B**	**No Response**	**A**	**B**	**No Response**
79	66	22	65	82	20
47%	40%	13%	39%	49%	12%

Morrill		
A	***B***	***No Response***
68	76	23
41%	46%	14%

F. Resource Agency Coordination Round II (May 2004)

Input was solicited from many local, state, and federal resource agencies a second time through written requests. Each agency was sent a proposed improvement alternative brochure to review. Response letters from the 27 responding resource agencies are located in **Appendix G** and are summarized below:

- Gabbard Sign Company, Jackson County – Alternative 4, Option B, is the appropriate way to improve US 421. If anything is done to this road, it should be done the right way.
- Jackson County Judge/Executive – The Office is not aware of any additional concerns or problems with the proposed project. Proposed improvement alternative 4 is preferred.
- Kentucky Airport Zoning Commission – No conflicts with air navigation are expected from the proposed project; however, if the proposed construction requires equipment that exceeds 200 feet, a permit will have to be obtained from the Airport Zoning Commission.
- Kentucky Cabinet for Health and Family Services – The Cabinet does have an office in the area of the proposed project, but expects no positive or negative impacts for staff or clients.
- Kentucky Department of Agriculture – The agency has no specific concerns or issues about the proposed project.
- Kentucky Department for Natural Resources, Environmental and Public Protection Cabinet – The Department could not identify any specific issues or agency concerns with any of the proposed alternatives.
- Kentucky Department of Parks – The proposed project will not directly impact any of the Department's facilities.
- Kentucky Transportation Cabinet, Division of Materials, Geotechnical Branch – The Geotechnical Overview completed by QORE Property Sciences has outlined the critical issues on the project such as mining, quarries, etc. However, embankment failure has since occurred on a portion of the existing US 421 in the vicinity of Clover Bottom and Cave Spring Church. The failure at this time seems to be due to sinkholes. Personnel from the branch visited the site recently and stated that the area contained numerous sinkholes, including some that are very large. The sinkholes are found in the Newman Limestone which outcrops along the South Fork of Station Camp Creek between Morrill and Clover Bottom. The Branch recommends performing a geophysical investigation of any new route in the study area during the design phase as part of the geotechnical investigation. An additional $50,000 would be needed in the design phase to include this investigation.
- Kentucky Department of Travel, Commerce Cabinet – The proposed improvement alternatives are not expected to adversely impact tourism-related activities in the area. Providing safe and pleasant driving experiences will assist in the Department's efforts to grow the tourism industry within the Commonwealth. The Kentucky Historical Society, Kentucky Heritage Council, and Kentucky Department of Fish and Wildlife Services should be contacted, if they have not yet been, to ensure properties of interest to these agencies are not adversely impacted.
- Kentucky Department of Vehicle Enforcement, Transportation Cabinet – From the perspective of commercial vehicles, the only concern would be an increase in commercial traffic when the roadway is built, especially to the Jackson County

Industrial Park. The road should accommodate 53' trailers that are 102'' wide. Increased truck traffic should also be considered and accommodated.

- Kentucky Department of Fish and Wildlife Resources (KDFWR) – The Kentucky Fish and Wildlife Information System indicates that a number of federally endangered or threatened species are known to occur within a 10-mile radius of the project area, and a number of state-listed species are known to occur within a one-mile radius of the project area; both lists are shown as an attachment to the KDFWR letter in **Appendix G**. In addition to earlier concerns, the Department feels the proposed project may include wetland areas. A mitigation of at least 2:1 is recommended for any permanent loss or degradation of wetland acreage.
- Kentucky Division of Conservation, Environmental and Public Protection Cabinet – There are no agricultural districts in the project area; therefore, land enrolled in the Agricultural District Program will not have to be mitigated by the Department of Transportation. Both prime farmland and farmland of statewide importance could be impacted by this project. The Division would like to see the issue of the loss of farmland addressed. The Division is also concerned with the control of erosion and sedimentation during and after earth-disturbing activities once the proposed project begins. It is recommended that Best Management Practices (BMPs) be utilized to prevent non-point source water pollution. This would protect the water quality and aquatic habitat of several perennial and intermittent streams that this project could impact.
- Kentucky Division of Forestry, Environmental and Public Protection Cabinet – Alternative 4 best serves the Southeastern District of the Kentucky Division of Forestry. This route is used every spring and fall to reach many wild land fires in the northern end of the district. The Division often drives the route in a heavy transport vehicle carrying a 400 series dozer to be used for fire suppression. Alternative 4 would help reduce the severity of many of the curves along US 421, therefore, making this section safer for travel and decreasing the time it takes to respond to fires. Alternative 4 (Option B) would also make getting through Sandgap easier. This improvement would also improve the intersections of KY 2004 and US 421 as well as Morill-Kerby Knob Road and KY 1912. These improvements would also make the transport of forest products easier and safer along a main travel route for these materials.
- Kentucky Transportation Cabinet, Division of Traffic, Permits Branch – The Permits Branch makes the same recommendations as previously mentioned, these include: 1) This project should provide for a partially controlled access facility, with access control fencing and all possible access points set on the plans in accordance with 603 KAR 5:120; 2) The design speed should be the same as the anticipated posted speed when the project is completed; and 3) The Permits Branch should be notified if the proposed route is to be placed on the National Highway System.
- Kentucky Division of Air Quality, Environmental and Public Protection Cabinet – The Kentucky Division has no additional comments regarding the proposed project at this time.
- Kentucky Division of Water, Environmental and Public Protection Cabinet – There are no Wild Rivers in the proposed corridor. However, some of the streams in the area are designated as Outstanding Resource Waters (ORW's), Reference Reach (RR), or Exceptional Waters (EW). This designation provides extra protection under Kentucky Surface Water Standards. These streams, including their headwaters should be avoided. Placement of fill in headwater tributaries of Station Camp Creek

or Horse Lick Creek is not advisable. In addition, some headwater tributaries not designated as special use waters could be of exceptional quality and require enhanced mitigation for loss of those streams.

- Kentucky Education Cabinet – The Cabinet does not have any comments at this time.
- Kentucky State Nature Preserves Commission – The Commission has no additional concerns and believes that most of the concerns previously mentioned would be addressed by carefully constructing US 421 within the current corridor, assuming contractors adhere to the strictest of erosion and sediment control measures.
- Kentucky State Police, Post 7, Richmond – The Post is concerned with the ability of emergency vehicles to have unobstructed travel during emergency situations through the construction area of the proposed projects.
- Kentucky State Police, Post 11, London – There are no adverse impacts expected from the proposed US 421 project in Jackson County.
- Kentucky State Representative, 89th District – It appears that careful consideration must be given to improvement Alternatives 3 and 4 to help alleviate safety concerns and travel time, accomplish area objectives of supporting economic development initiatives, and provide access to necessary services in surrounding cities. While the project should have as little environmental impact as possible, reconstruction does seem a potential necessity to reach stated goals.
- United States Department of Agriculture, Forest Service – The items previously identified by the Department of Agriculture still accurately represent the concerns and issues related to this project. There was discussion in the March 2, 2004 Local Officials Meeting related to the possible solutions to the Off Highway Vehicle (OHV) trail issue crossing and running with US 421. The possible problems associated with designing a safe, maintainable traffic surface for ATVs adjacent to the existing or reconstructed highway indicated that the better solution might be to acquire an easement or right-of-way (ROW) across private land south of the US 421/ FS 370 (Elisha Branch Road) intersection, to allow reconstruction of the Sheltowee Trace trail on a new National Forest location away from the highway. A safely engineered crossing for OHV trail traffic would still be required.
- United States Department of Agriculture, Natural Resources Conservation Service (NRCS), District Office – The Service is concerned with soil erosion, water quality, sedimentation, and conversion of prime farmland to nonagricultural uses during the reconstruction of US 421. Re-vegetating the rights-of-way, spoil areas and borrow pits immediately after construction will be of utmost importance to minimize the rate of erosion and sedimentation. The existing right-of-way passes through prime farmland soils and karst areas, creating additional areas of concern with the proposed project.
- United State Department of Agriculture, Natural Resources Conservation Service (NRCS), State Office – The Department has no additional comments regarding the proposed project at this time. The Department reiterated its concern about prime farmland soils and additional farmlands of statewide importance with the proposed project and provided the KYTC with ArcView GIS shapefiles of basic soils information for the study area, which were incorporated into **Figure 6** and discussed in **Chapter IV**.
- United States Department of the Army, Nashville District, Corps of Engineers – It appears that Alternative 2 would result in less impact on the aquatic environment (streams, wetlands, etc) and, therefore, is the Department's preferred alternative.

- United States Department of Health & Human Services – The Department has no additional comments related to the proposed project at this time.
- United States Department of Transportation, Federal Aviation Administration – The Madison County Airport in Berea is in the vicinity of the study area, but it is not expected to be impacted by the proposed project. Provided that construction activities do not exceed 200 feet in height above ground level, no impacts are expected on Federal Aviation Administration programs and no Notice of Proposed Construction will be required.

VIII. PROJECT PURPOSE AND NEED

As a result of the planning process and public involvement efforts, project goals were identified for the proposed reconstruction of US 421, based on a compilation of input from highway officials, local government agencies, interest groups, members of the general public, and the project team. These goals address accessibility, economic benefit, travel times, and geometric conditions of US 421. These goals have been used in preparing the Purpose and Need for the proposed project during future project development efforts, including design and environmental activities.

Following is a brief discussion of the Purpose and Need for the proposed US 421 project:

- **The proposed project is needed to provide improved regional access along an improved US 421 route that will:**
  - **Support economic development initiatives in Jackson County by opening up this low-income area.**

    The 2000 Census indicates that the percentage of population below poverty level for all five (5) study area Census Tracts and ten (10) Block Groups in Jackson and Rockcastle Counties significantly exceed averages for Kentucky and the United States. Study Area Census Tracts and Block Groups contain percentages of persons below poverty level from 22.4% to 32.5% and 19.6% to 40.6%, respectively. The percentage of these populations is drastically more than the 15.3% in Kentucky and the 12.0% in the United States. Because of the low income levels, Jackson County was federally designated as an Empowerment Zone.

    Limited truck access to the Northern Jackson County Industrial Park and other prospective industrial sites is an issue for site development and the potential for an increase in new local jobs, especially those with higher income levels. The potential to improve the economic vitality of Jackson County and surrounding counties would be greater with improved truck access to and from the area. Many local officials and community members indicate that reconstruction of US 421 has the potential to increase the number of local job opportunities by improving access for new industries or expansion of existing ones.
  - **Improve access to jobs, hospitals, services, shopping, and schools in Berea, Richmond, and Lexington.**

    Access to and from key highway facilities is an issue for many areas in the Appalachian region. The average travel distance to an Interstate or Parkway facility from the McKee area is about 25 miles. Most residents of McKee, Sandgap, Morrill, and the surrounding communities commute to Berea (24 miles), Richmond (34 miles), and Lexington (62 miles) for work, medical treatment, services, shopping, and post-secondary education. An improved US 421 would improve safety and reduce travel time for local residents traveling to and from their homes in Jackson County.
- **An improved highway is needed to help alleviate public concerns about safety and travel time along the existing US 421 corridor by providing improved roadway geometrics.**

  Local residents have expressed concerns about safety and travel times along US 421 between McKee and Morrill. Over 99% of existing US 421 in the study area has two (2) nine-foot lanes, shoulders from two (2) feet to three (3) feet, and very

limited passing sight distance. Many horizontal and vertical curves along the route do not meet current design standards.

Through the public involvement portion of this project, local leaders and agencies have also expressed concern about emergency service response times in the project area. One local official said that the typical travel time delays along the route could become a life-and-death matter whenever an EMS vehicle is trying to transport a critically ill patient to a hospital in Berea, Richmond, or Lexington for emergency treatment. Local officials and stakeholders agreed that a reconstructed US 421 has the potential to improve travel times for police, fire and ambulance services by providing a better roadway for safe and efficient travel.

IX. CONCLUSIONS AND RECOMMENDATIONS

This chapter provides conclusions and recommendations for improvements to US 421 from KY 89 at the northern city limits of McKee in Jackson County to the recently improved section of US 421 south of Bighill and just north of the Jackson-Rockcastle County line. The recommendations made in this chapter are the result of the Alternatives Study process for the US 421 corridor.

A. Project Purpose and Need

The purpose and need, discussed in detail in the previous chapter, for the proposed US 421 improvement is as follows:

- The proposed project is needed to provide improved regional access along an improved US 421 route that will:
  - Support economic development initiatives in Jackson County by opening up this low-income area.
  - Improve access to jobs, hospitals, services, shopping, and schools in Berea, Richmond, and Lexington.
- An improved highway is needed to help alleviate public concerns about safety and travel time along the existing US 421 corridor by providing improved roadway geometrics.

B. Final Project Team Meeting (July 13, 2004)

1. Project Team Discussion

A final project team meeting was held on July 13, 2004 at the KYTC District 11 Conference Room in Manchester, Kentucky. Attendees at the meeting included staff from KYTC District 11, KYTC Division of Planning, and the project consultant. The purpose of the meeting was to discuss the project information identified through the course of the US 421 Alternatives Study and to finalize the recommendations for improvements along the route. The meeting minutes are included in **Appendix B**.

Project information provided for discussion at the meeting included: project survey results from both rounds of public involvement; a summary of input from the second round of coordination with resource agencies; an alternatives brochure displaying project goals, maps showing each improvement alternative on an environmental footprint, and a matrix showing a comparison of the proposed alternates.

As discussed in **Chapter VII**, the final proposed alternates presented for consideration by the project team include:

- Alternative 1, the No-Build option, which recommends no changes to existing US 421;
- Alternative 2, a combination of 13 spot improvements along the route;
- Alternative 3, a total reconstruction of the entire study length of US 421, along the existing alignment; and
- Alternative 4, a total reconstruction on and off the existing alignment with two options:
  - Option A – Reconstruct along the existing alignment, including at Sandgap, the rock quarries at Clover Bottom, and Morrill; but provide some deviations on new alignment to improve highway curvature.

- Option B – Provide the same alternate as Option A, except provide a bypass option (Option B) at Sandgap, the rock quarries at Clover Bottom, and/or Morrill.

A review of the public involvement input from the second round of survey questionnaires indicated that Alternative 4 was preferred by 95% of respondents. If Alternative 4 were to be constructed, the percentages of responses for each of the bypass options were as follows:

- 47% of respondents preferred that existing US 421 be improved on the existing alignment through Sandgap, while 40% preferred a bypass for Sandgap;
- 49% preferred new alignment to bypass Clover Bottom, while 39% preferred an improvement along the existing alignment; and
- 46% preferred new alignment to bypass Morrill, while 41% preferred an improvement along the existing alignment.

Of the 27 agencies asked to provide input on the improvement alternatives through a second round of resource agency coordination, only the following four (4) agencies made specific comments as to their preferred alternative:

- Gabbard Sign Company, Jackson County expressed that Alternative 4, with Option B (i.e., the bypass options at Sandgap, Clover Bottom, and Morrill), is the appropriate way to improve US 421;
- Tommy Slone, Jackson County Judge/Executive, expressed support for proposed improvement Alternative 4;
- The 89th District Kentucky State Representative, Marie Rader, expressed that careful consideration must be given to improvement Alternatives 3 and 4 to help alleviate safety concerns and travel time, accomplish the objectives of supporting economic development initiatives, and provide access to necessary services of surrounding cities. Representative Rader stated that, while this project should minimize environmental impacts, reconstruction does seem to be a potential necessity to reach stated goals; and
- United States Department of the Army, Nashville District, Corps of Engineers said that Alternative 2 would result in lesser impacts on the aquatic environment (streams, wetlands, etc.) and, therefore, is the Department's preferred alternative.

2. Project Team Recommendations

Based upon consideration of project purpose and need, transportation issues, access needs, potential environmental and community impacts, and public/agency input, the project team agreed on the following recommendations:

Preferred Alternate

Improvement Alternative 4 via Option B, the bypass option, at Sandgap, Clover Bottom, and Morrill is the preferred improvement alternative, as shown in **Chapter VII**, **Figure 9**. Based on the evaluation of the alternates, it was felt that none were as effective as the preferred in meeting the overall purpose and need of the project. Alternate 4, Option B, provides better opportunities to not only improve roadway curvature, but also to relocate the route outside the communities of Sandgap and Morrill and the quarry area near Clover Bottom. This alternate would be more effective in maintaining continuity and travel flow, improving horizontal and vertical curvature, reducing travel delays, and improving safety, especially travel delays and safety issues associated with lower speeds and turning movements within the two existing communities and in the Clover Bottom area.

Although a larger percentage of the public survey responses indicated more support for Option A in the Sandgap area, it was felt that (1) Option B better meets the purpose and need for the project and (2) the difference in support of Options A and B did not appear to be significant, given the relatively small number of respondents.

Spot Improvements

While the project team agreed on a recommendation for a long-term improvement, there were concerns that budget limitations might delay this improvement for many years. Therefore, the project team felt that some low-cost, short-term improvements were needed to address some of the more immediate needs, since funding might be more readily available for low-cost improvements. It was also recommended that these spot improvements should be compatible with or in locations that would not be addressed by the proposed highway improvement.

The project team agreed that four (4) of the 13 spot improvements proposed as part of Improvement Alternative 2 be recommended for implementation, including three (3) improvements in the areas bypassed by Alternative 4 Option B, as follows:

- Spot Improvement 1: Straighten the curve north of KY 89 (MP 14.808) near McKee at the southern terminus of the project. Spot Improvement 1 would address substandard curvature and sight distance problems to improve safety. Since this project is located immediately at the beginning of the project, the project team felt that the improvement could be designed and constructed to be compatible with any future improvement of the entire study corridor.
- Spot Improvement 6: Provide a left turn lane at KY 2004 (MP 22.138) in Sandgap to improve travel time and safety by separating through and turning traffic. Spot Improvement 6 was recommended to address potential travel delays and safety problems due to left-turning vehicles on the existing roadway. Since this project is located on a segment bypassed under the recommended alternate, the improvement would solve an existing problem and would not conflict with any future improvements.
- Spot Improvement 10: Reduce the grade and horizontal curve between MP 26.5 and MP 27.0. Spot Improvement 10 was recommended to address substandard horizontal and vertical alignment in the Clover Bottom area. These cause travel delays as well as potential safety problems, particularly for truck traffic. Since this project is located on a segment bypassed under the recommended alternate, the improvement would solve an existing problem and would not conflict with any future improvements.
- Spot Improvement 13: Reduce the grade and add a left turn lane at KY 1912 (MP 29.520) in Morrill to improve sight distance and safety. Spot Improvement 13 was recommended to address potential travel delays and safety problems due to left-turning vehicles on the existing roadway. Since this project is located on a segment bypassed under the recommended alternate, the improvement would solve an existing problem and would not conflict with any future improvements.

Alternates for Phase 1 Design

As part of the preliminary design and environmental assessment in the next phase of project development (Phase 1 Design), it was recommended that a minimum of three alternates, including the No-Build, be evaluated. Therefore, the project team agreed to recommend that Alternates 1, 3, and 4 be carried forward for further consideration in the next phase of project development.

C. Potential Design Criteria and Considerations

Potential design criteria and considerations for the proposed US 421 route are noted here for planning purposes only. Construction sections, typical section, access control, and Off-Highway Vehicle (OHV) considerations are addressed. These criteria are general recommendations based upon the information gathered through this planning phase of study. Specific geometric parameters should be defined during future design phase(s) of the project, after more detailed information is available.

1. Construction Sections

It is recommended that US 421 be constructed in seven (7) sections varying in length from 1.818 miles to 2.461 miles, as shown in **Table 14**. Construction should begin at the northern end of the project area to (1) provide geometric continuity from the recently reconstructed section of US 421 north of the Jackson County-Rockcastle County line, (2) improve level of service in the Morrill area, (3) address potential safety problems in the Morrill area, (4) improve access to the Cox Simpson historic home which is proposed for use as a tourist information center, and (5) improve access to the North Jackson County Industrial Park just south of Clover Bottom, thus, a high priority for the Jackson County Empowerment Zone to enhance economic development opportunities for the area.

2. Typical Section

Based on design criteria for a rural arterial road in rolling terrain and current traffic volumes, the typical section for the proposed route will likely include:

- Two 12-foot lanes with usable shoulder widths of 10 feet;
- Either a truck lane or passing lane in certain areas;
- A design speed of 60 miles per hour;
- Minimum passing sight distance of about 2,100 feet; and
- Minimum stopping sight distance of about 525 feet.

Curb and gutter sections, including sidewalks, may best meet needs for any project along the existing alignment in Morrill, at the rock quarries near Clover Bottom, and in Sandgap. **Figure 10** displays an artistic rendering of the existing and recommended typical sections.

3. Access Control Recommendations

If feasible, it is recommended that this project be constructed as a partially controlled access facility, particularly those portions of the route on new alignment, with access control fencing and all possible access points set in accordance with 603 KAR 5:120.

4. OHV Recommendations

The project team agreed that future phases should give consideration to the 1.6 miles of Sheltowee Trace through the Daniel Boone National Forest, a national recreational trail passing through the study area that is available for pedestrians, equestrians, mountain bikers, and properly licensed motorcyclists. If feasible, easement or right-of-way (ROW) should be acquired across private land south of the US 421/ FS 370 (Elisha Branch Road) intersection, as requested by U.S. Forest Service officials. A safely engineered crossing for OHV trail traffic should also be provided in such as way as to (1) provide a 90-degree intersection with US 421 and/or (2) eliminate OHV travel along the shoulder. If deemed prudent and feasible in the next phase of project development, consideration should be given to providing a grade-separated highway-trail crossing to preclude potentially unsafe travel by OHVs along the shoulders of US 421.

Table 14. Recommended Construction Sections

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee in Jackson County to the recently improved section of US 421 near Bighill in Rockcastle County, just north of the Jackson-Rockcastle County line

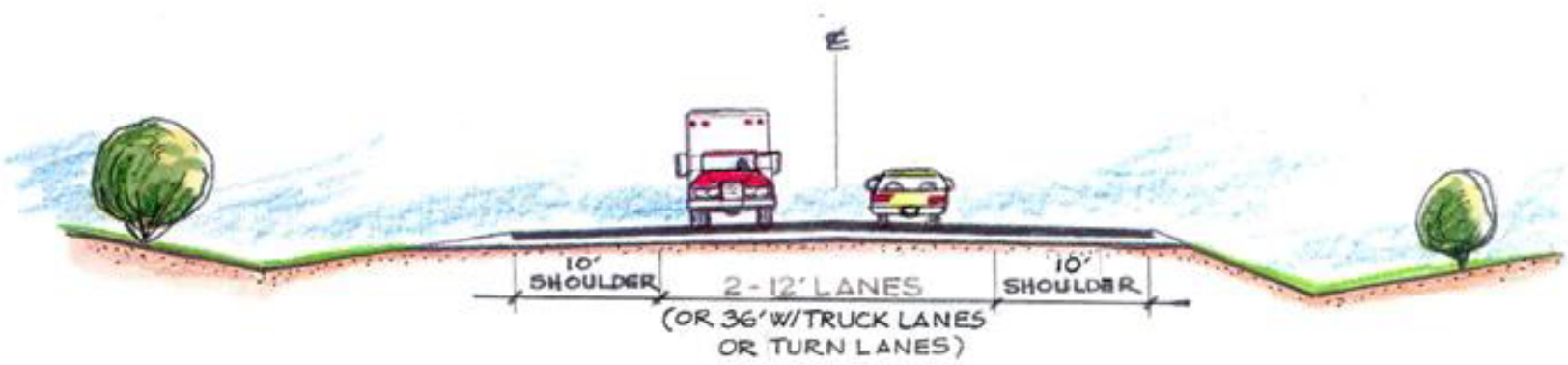
Item No. 11-113.00

Begin MP	Begin Description	End MP	End Description	Length
14.808	KY 89	16.902	Sand Lick - Foxtown Road	2.094
16.902	Sand Lick - Foxtown Road	19.262	Congleton Hollow Road	2.360
19.262	Congleton Hollow Road	21.445	Southtree Tower Road	2.183
21.445	Southtree Tower Road	23.525	Clover Bottom Creek Road	2.080
23.525	Clover Bottom Creek Road	25.376	Asbill Road	1.851
25.376	Asbill Road	27.194	J.A. Farmer Road	1.818
27.194	J.A. Farmer Road	0.070	Just North of Jackson-Rockcastle County Line	2.461

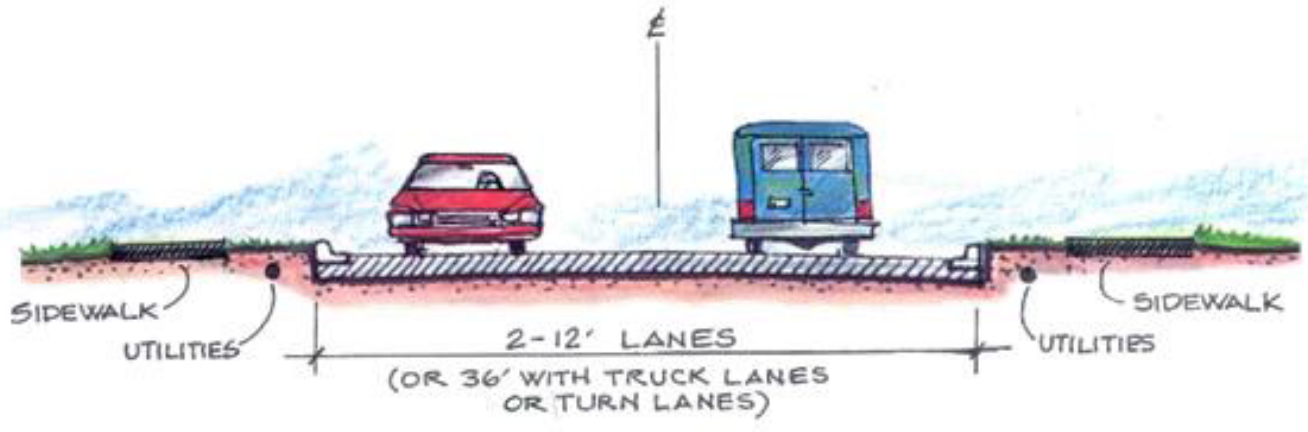
Figure 10. Recommended Typical Sections
Alternatives Study
Reconstruction of US 421
From KY 89 at the northern city limits of McKee to the recently improved section of US 421, just north of the Jackson-Rockcastle County line.

Item No. 11-113.00

EXISTING SECTION



PROPOSED RURAL SECTION



PROPOSED URBAN SECTION

5. Future Study

A planning study is recommended for the segment of US 421 from the improved section at Bighill in Madison County to Berea and/or I-75 via KY 21. To maximize the potential to be derived from this proposed project, the project team agreed that this portion of US 421 should also be considered for future upgrades. The proposed US 421 improvement addressed in this study from McKee to the Jackson-Rockcastle county line will be of benefit to the Jackson County area; however, more economic opportunities could be realized with improved access along all portions of US 421 to connect with the north-south I-75 interstate highway and, thus, to other areas throughout the region, the state, and the nation.

While a segment of US 421 has been improved from MP 0.070 in Rockcastle County to MP 1.590 in Madison County, north of the terminus of this project, there are problems between the end of that improved segment of US 421 and other major arterials to the north. At present, this is the primary route from Jackson County to jobs, higher education and services, and it is the primary truck route into and out of the area. The existing roadway is narrow with numerous horizontal and vertical curvature deficiencies. Therefore, an alternatives planning study is needed to identify and evaluate the issues, impacts, alternates, and costs of an improvement north of the road section addressed in this study.

D. Phase Costs

With the recommended alternative, **Alternative 4 via Option B in Sandgap, Clover Bottom and Morrill**, the estimated total cost is $99,550,000. Cost estimates for each of the seven (7) construction sections previously identified is summarized below and shown by phase in **Table 15**:

- Section 1 – $14,950,000
- Section 2 – $15,580,000
- Section 3 – $14,490,000
- Section 4 – $13,830,000
- Section 5 – $12,340,000
- Section 6 – $12,150,000
- Section 7 – $16,210,000

Another $4,990,000 is estimated to be necessary to complete spot improvements 1, 6, 10, and 13, as recommended in addition to Alternative 4. Total cost estimates for each spot improvement are summarized below and shown by phase in **Table 16**:

- Spot Improvement 1 – $1,205,000
- Spot Improvement 6 – $440,000
- Spot Improvement 10 – $3,045,000
- Spot Improvement 13 – $300,000

The total cost estimate for Alternative 4, Option B and the four (4) spot improvements is $104,540,000.

Table 15. Alternative 4 Phase Costs by Construction Section

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee in Jackson County to the recently improved section of US 421 near Bighill in Rockcastle County, just north of the Jackson-Rockcastle County line

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Construction Section	Begin MP	End MP	Length	Design	Right-of-Way	Utility	Construction	Total
Section 1	14.808	16.902	2.094	$970,000	$1,200,000	$520,000	$12,260,000	$14,950,000
Section 2	16.902	19.262	2.360	$990,000	$1,360,000	$590,000	$12,640,000	$15,580,000
Section 3	19.262	21.445	2.183	$980,000	$1,260,000	$550,000	$11,700,000	$14,490,000
Section 4	21.445	23.525	2.080	$970,000	$1,200,000	$520,000	$11,140,000	$13,830,000
Section 5	23.525	25.376	1.851	$910,000	$1,060,000	$460,000	$9,910,000	$12,340,000
Section 6	25.376	27.194	1.818	$910,000	$1,050,000	$450,000	$9,740,000	$12,150,000
Section 7	27.194	0.070	2.461	$990,000	$1,420,000	$620,000	$13,180,000	$16,210,000
		Total	**14.847**	$6,720,000	$8,550,000	$3,710,000	$80,570,000	**$99,550,000**

Table 16. Phase Cost for Recommended Spot Improvements

Alternatives Study

Reconstruction of US 421

From KY 89 at the northern city limits of McKee in Jackson County to the recently improved section of US 421 near Bighill in Rockcastle County, just north of the Jackson-Rockcastle County line

Item No. 11-113.00

Spot Improvement	Begin MP	End MP	Design	Right-of-Way	Utility	Construction	Total
Spot Improvement 1	14.700	15.000	$110,000	$130,000	$120,000	$845,000	$1,205,000
Spot Improvement 6	22.088	22.188	$40,000	$50,000	$40,000	$310,000	$440,000
Spot Improvement 10	26.500	26.999	$275,000	$335,000	$305,000	$2,130,000	$3,045,000
Spot Improvement 13	29.466	29.585	$30,000	$30,000	$30,000	$210,000	$300,000
		Total	$455,000	$545,000	$495,000	$3,495,000	**$4,990,000**

E. Summary of Environmental Issues for Future Phases

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

- Threatened and Endangered Species: Threatened and endangered species should be carefully monitored. The U.S. Fish and Wildlife Service (USFWS) lists three (3) threatened and endangered species as possibly occurring in the project area. They are the running buffalo clover, the Indiana bat, and the Virginia big-eared bat.
- Water Quality and Aquatic Habitats: Consideration should be given to potential water quality issues related to Owsley Fork Reservoir and the Horse Lick Creek watershed and its tributaries.
- Environmental Justice: Environmental justice issues related to low-income populations should be closely monitored throughout further phases of this project due to higher percentages of these populations within close proximity to the project area compared with the percentages for Kentucky and the United States.
- Family Clusters: Local officials and citizens expressed concern over potential relocations impacting family clusters residing along the corridor. With limited relocation possibilities in the study area, every effort should be made to ensure that suitable arrangements are made to maintain family integrity.
- Cemeteries and Unmarked Graves: There are a number of cemeteries documented or observed within the project area. Other cemeteries may be unmarked and are likely to be encountered during construction in this area.
- Agriculture and Farmlands: Agriculture is not the main land use in Jackson or Rockcastle County, but prime farmlands are identified within the project area. Conversion of farmland to other uses as a result of improvements to US 421 could result in a net loss of farmland along the project corridor. Design of the project should minimize impacts to farmsteads in the project area.
- Cultural Resources: Special consideration should be given to the Cox-Simpson House historic property, located at the northern terminus of the proposed project. The project area may also contain unrecorded historic structures or archaeological sites that are eligible or potentially eligible for listing on the National Register of Historic Places (NRHP).

F. Construction Considerations

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

- Erosion and Sedimentation Control: Measures should be utilized to control erosion and sedimentation during, and after, the commencement of earth-disturbing activities. The construction of this project may initially increase the amount of erosion. There may also be an increase in non-point source pollution after the construction of this project. Careful consideration should be given to erosion control methods and to decreasing the amount of non-point source pollution that reaches surface and ground water.
- Floodplains: The construction of this project may impact floodplains in the project area. Care must be taken to maintain current flood stages without increasing them

by more than one (1) foot in uninhabited areas. The construction of this project must not increase the flood hazard for any property within the project's corridor.

- Air Quality Impacts during Construction: Construction period air quality impacts will need to be evaluated to (1) expose the potential short-term effects of site preparation, demolition, materials storage and construction and (2) determine if any appropriate mitigation commitments are to be incorporated into the project plans.
- Geologic Conditions: If deemed necessary, a more detailed study of karst topography within the study area should be considered as the project develops.
- Geologic Impacts on Cut Slopes: Steep cut slopes in massive, durable sandstone or limestone are typically stable with proper engineering of the cut slopes. Rock coring and a geologic evaluation will be required before specific cut slope recommendations can be presented.
- Abandoned Mine Areas: Special consideration may be required to mitigate problems associated with contour strip-mined or deep-mined areas, such as acid mine drainage and subsidence, if these areas can not be avoided.
- Other Geotechnical Issues: Groundwater seeps or springs should be expected in down dip cut areas, particularly those intersecting a coal seam. Special construction consideration will be required to collect and pipe groundwater in these areas.

X. ACKNOWLEDGEMENTS AND CONTACTS

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

- For contributions to this project, thanks go to Greene Keith, Joel Holcomb, Dean Croft and the other KYTC District 11 staff members who assisted with this effort.
- Thanks also to Clay McKnight with the Cumberland Valley Area Development District for assistance throughout the project.
- Thanks, too, to the KYTC Division of Planning staff, including Project Manager Steve Ross, Strategic Corridor Planning Team Leader Jimmy Wilson, and the data management staff.

Additional information regarding the US 421 Alternatives Study can be obtained from the following KYTC Division of Planning staff members:

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