

KY 30 PLANNING STUDY

From KY 11 in Booneville to KY 15 in Jackson
Owsley and Breathitt Counties, Kentucky
September 2014

Submitted To: Kentucky Transportation Cabinet, Division of Planning
Prepared By: CDM Smith

Final Report

KY 30 Planning Study

Executive Summary

From KY 11 in Booneville to KY 15 in Jackson Owsley and Breathitt Counties, Kentucky

This planning study examines the KY 30 corridor from KY 11 in Owsley County to KY 15 in Breathitt County, a total length of approximately 23.3 miles.

Existing Conditions

The study portion of KY 30 stretches from KY 11 in Booneville to KY 15 in Jackson. KY 30 is classified as a Rural Major Collector with a 55 mph posted speed limit in the majority of the study area. It is a two lane facility with the majority of the route having 9 to 10 foot wide travel lanes and narrow (2 to 4 foot wide) shoulders. The corridor passes through mountainous terrain, connecting a number of small rural communities and scattered homes. Two schools, the Kentucky Bend Medical Center in Jackson, and numerous churches also rely on the route for access.

At a systems level, KY 30 provides a connection between the Hal Rogers Parkway and I-75 in London and the Mountain Parkway near Salyersville.



Deficient geometric features are adjacent to Highland-Turner Elementary School.

Along the 23.3 mile study route, analysts identified 70 horizontal curves that do not meet current standards, 17 sag vertical curves that do not meet current standards for headlight stopping sight distance, and 18 crest vertical curves that do not meet current common geometric practices for stopping sight distance. This represents 58% of the horizontal curves along the study portion of the route, 29% of the sag vertical curves, and 45% of the crest vertical curves.

Based on 2013 traffic counts, traffic volumes along the corridor range from 800 to 5,400 vehicles per day – with the lower volumes in the section near the county line. Based on a traffic forecast conducted by KYTC, a 1.2% annual growth rate was applied to the corridor, with volumes growing as high as 7,000 vehicles per day by 2040. Volume-to-capacity ratio for each analysis segment varies from 0.23 to 0.32 in year 2013 and 0.27 to 0.38 in 2040. This indicates each segment operates well below its design capacity.

Over a four-year analysis period from June 2009 to June 2013, there were 119 reported crashes along the 23.3 mile corridor. Of these, two crashes resulted in fatalities and 48 resulted in injuries. Based on the most recent statewide crash data for rural major collectors¹ which looked at crashes between 2009-2011, injury crashes generally compose 29% of total crashes; along the study portion of the KY 30 corridor, injury crashes compose 40% of total reported crashes. The majority of crashes along KY 30 (64%) were single vehicle collisions. Along the study corridor, four spots were found to have a CRF greater than 1.00, with CRF values ranging from 1.15 to 1.28. Two of the high crash spots have deficient roadway geometrics along KY 30. A third is located at Fish Creek Loop Road which is skewed at the KY 30 intersection and has a steep grade. The fourth high crash spot is located in Booneville along a high volume stretch of KY 30 with a lot businesses and driveways.

Purpose & Need

The purpose of the proposed KY 30 improvement project is to improve roadway geometrics to enhance safety and local mobility between Jackson and Booneville and regional connectivity between the Hal Rogers Parkway and I-75 in London and KY 15 in Jackson. The need is expressed through the substandard geometric features and four high crash spots.

¹ Analysis of Traffic Crash Data in Kentucky (2007-2011); Kentucky Transportation Center

Beyond the primary project purpose, facilitating economic development is a secondary goal for the project.

Alternates Considered

To improve safety and traffic operations, the project team considered a selection of potential alternates:

- No Build Alternate.
- Short-term Spot Improvement options.
- Improve the corridor to 45 mph, following new alignment at times and widening shoulders.
- Improve the corridor to 55 mph, following new alignment at times and widening shoulders.

The project team (Kentucky Transportation Cabinet, Kentucky River Area Development District, CDM Smith & HMB) developed conceptual designs, planning-level cost estimates, and a high level comparison of impacts.

Throughout the study, the project team met with local officials, stakeholders, and the public to discuss alternates and understand local perspectives on improvement concepts. Generally, feedback received indicated strong public support for the proposed project:

- 76 of 78 surveys indicated the route should be improved.
- Respondents preferred the corridor be improved to 55 mph, following a new alignment at times

and widening the shoulders. This was preferred over spot improvements and the 45 mph improvement alternates.

- In addition 59 out of 74 respondents thought KY 30 should be rerouted to avoid the Booneville courthouse square.

Recommendations

The planning study recommends that the corridor be improved to 55 mph, widening the roadway to provide two 11 foot wide travel lanes with 10 foot shoulders (8 foot paved). In some locations, off-alignment improvement options are included to improve deficient curves to operate at higher design speeds.

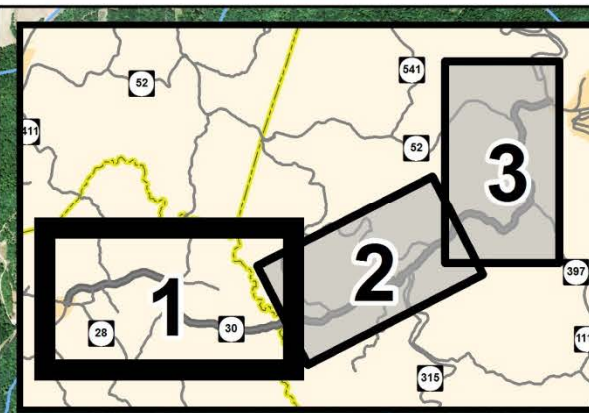
Planning-level cost estimates and the proposed corridor for each of the recommended construction sections are presented in **Figures ES-1, ES-2, and ES-3**.

In Segment 1, a potential rerouting through Booneville should be considered in future project phases to move traffic away from the courthouse square. In addition an optional new connection to KY 397 in Segment 3 should be considered in future project phases.

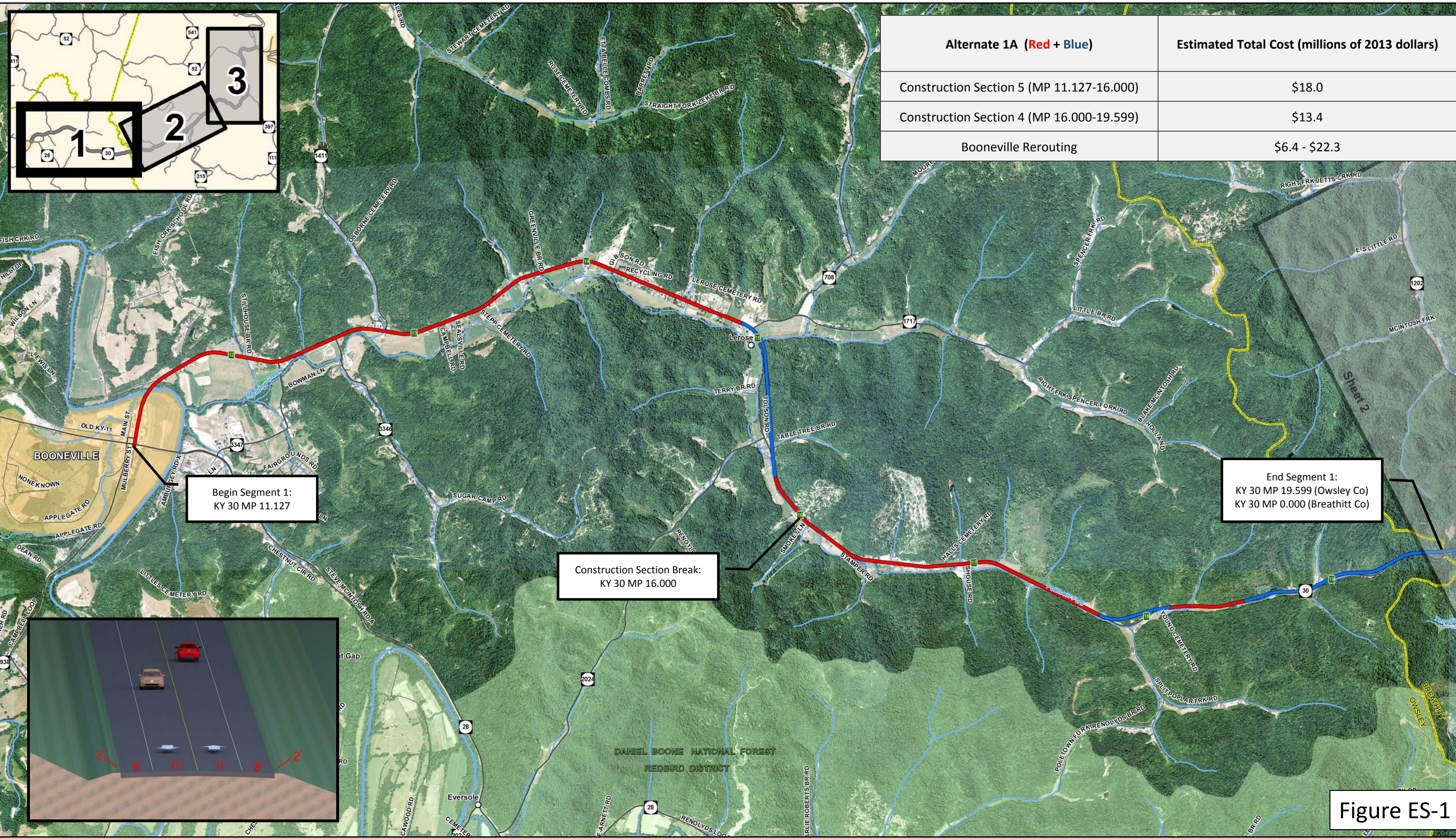
Where possible, segments are recommended to be split into \$25 to \$30 million construction sections to ease funding and maintenance of traffic concerns. Planning-level cost estimates and prioritized construction sections are presented in **Table ES-1**.

Table ES-1: Cost Estimates by Prioritized Construction Section (Millions of 2013 Dollars)

Prioritized Construction Section	Alternate	Design	ROW	Utilities	Construction	Total Cost
1	Alt 3C (Breathitt County MP 7.000 to 12.732)	\$3.6	\$2.2	\$1.4	\$40.8	\$48.0
2	Alt 2A (Breathitt County MP 5.000 to 7.000)	\$0.9	\$0.8	\$0.7	\$9.3	\$11.7
3	Alt 2A (Breathitt County MP 0.000 to 5.000)	\$2.1	\$1.9	\$1.7	\$23.2	\$28.9
4	Alt 1A (Owsley County MP 16.000 to 19.599)	\$0.9	\$0.8	\$1.3	\$10.4	\$13.4
5	Alt 1A (Owsley County MP 11.127 to 16.000)	\$1.3	\$1.0	\$1.7	\$14.0	\$18.0
Optional Improvements						
N/A	Booneville Rerouting	\$0.8	\$1.5	\$1.0	\$19.0	\$22.3
N/A	New KY 397 Connection	\$0.6	\$0.4	\$0.1	\$3.5	\$4.6



Alternate 1A (Red + Blue)	Estimated Total Cost (millions of 2013 dollars)
Construction Section 5 (MP 11.127-16.000)	\$18.0
Construction Section 4 (MP 16.000-19.599)	\$13.4
Booneville Rerouting	\$6.4 - \$22.3



Begin Segment 1:
KY 30 MP 11.127

Construction Section Break:
KY 30 MP 16.000

End Segment 1:
KY 30 MP 19.599 (Owsley Co)
KY 30 MP 0.000 (Breathitt Co)

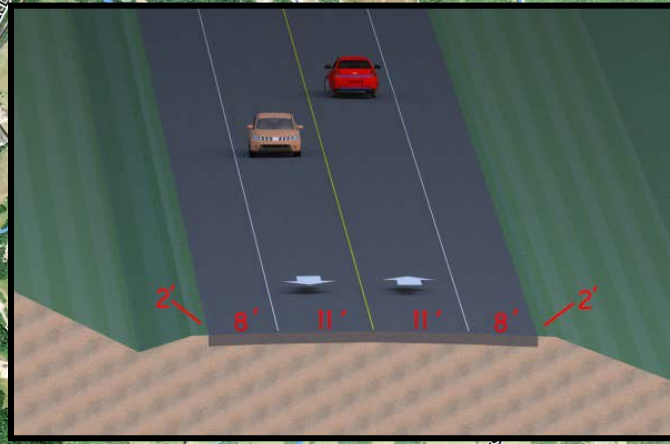


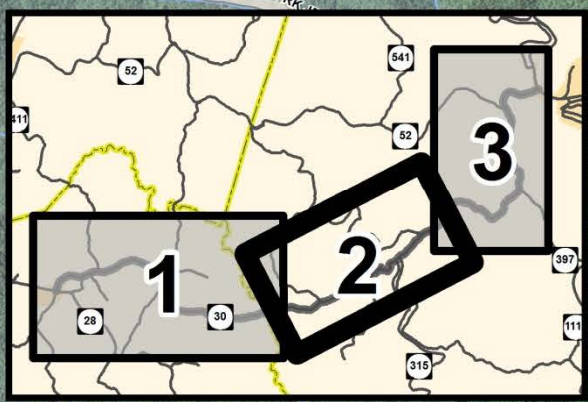
Figure ES-1



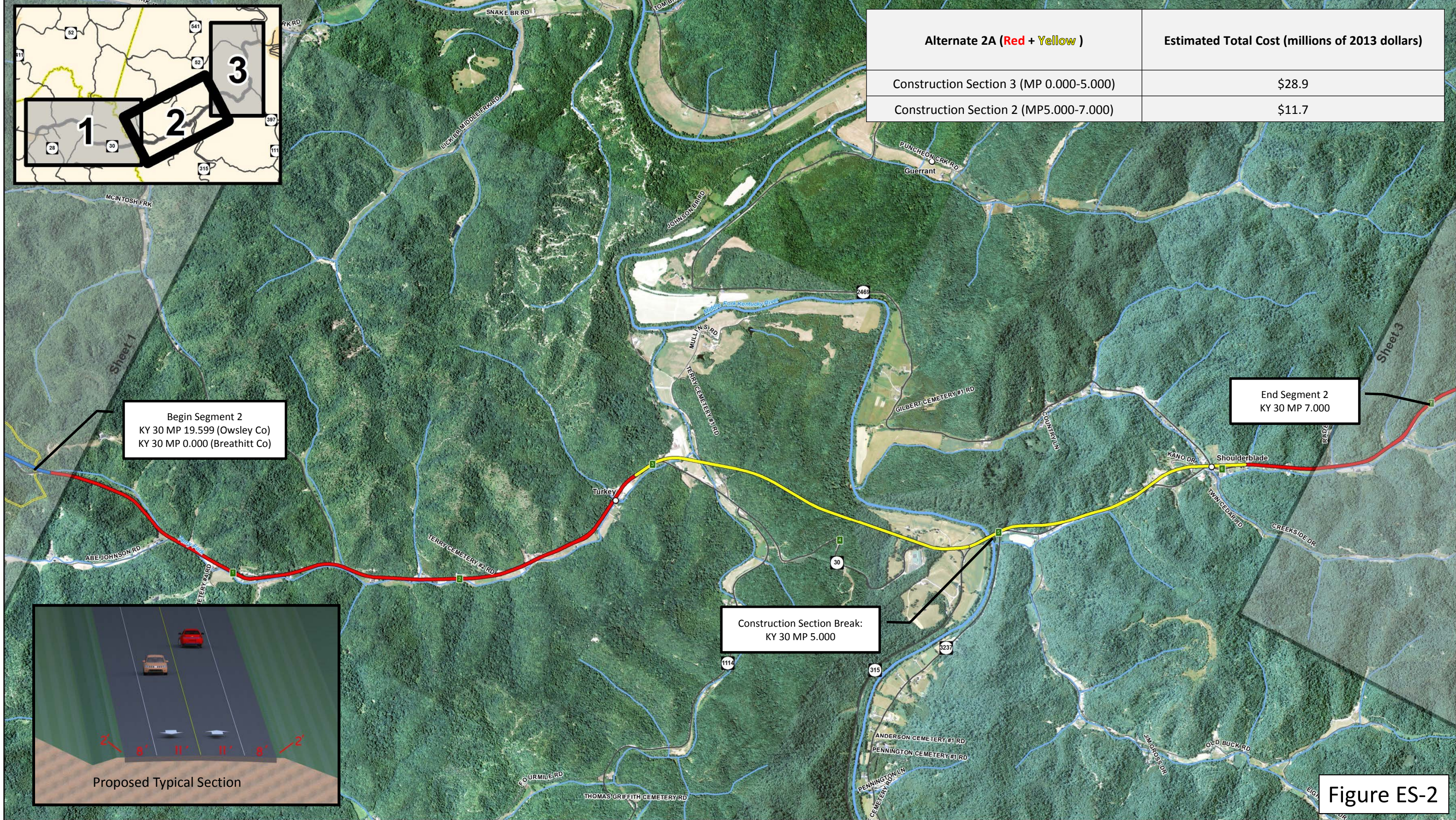
- Existing
- Widen Existing On Alignment (55 mph)
- New Alignment (55 mph)



KY 30 Planning Study
From KY 11 in Booneville to KY 15 in Jackson
Breathitt and Owsley Counties
**Long Term Improvement
Segment 1 Recommendation**



Alternate 2A (Red + Yellow)	Estimated Total Cost (millions of 2013 dollars)
Construction Section 3 (MP 0.000-5.000)	\$28.9
Construction Section 2 (MP 5.000-7.000)	\$11.7



Begin Segment 2
 KY 30 MP 19.599 (Owsley Co)
 KY 30 MP 0.000 (Breathitt Co)

End Segment 2
 KY 30 MP 7.000

Construction Section Break:
 KY 30 MP 5.000

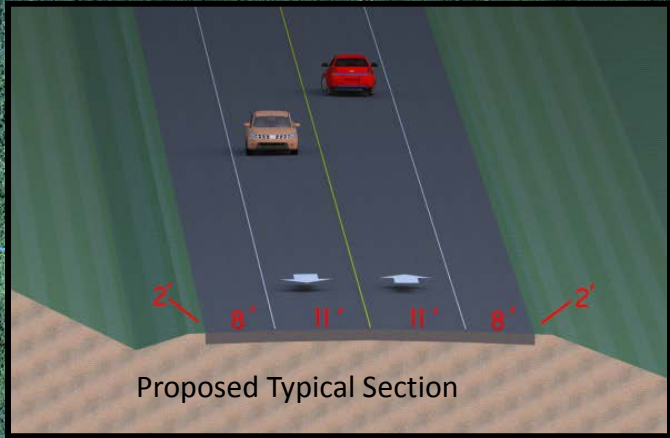


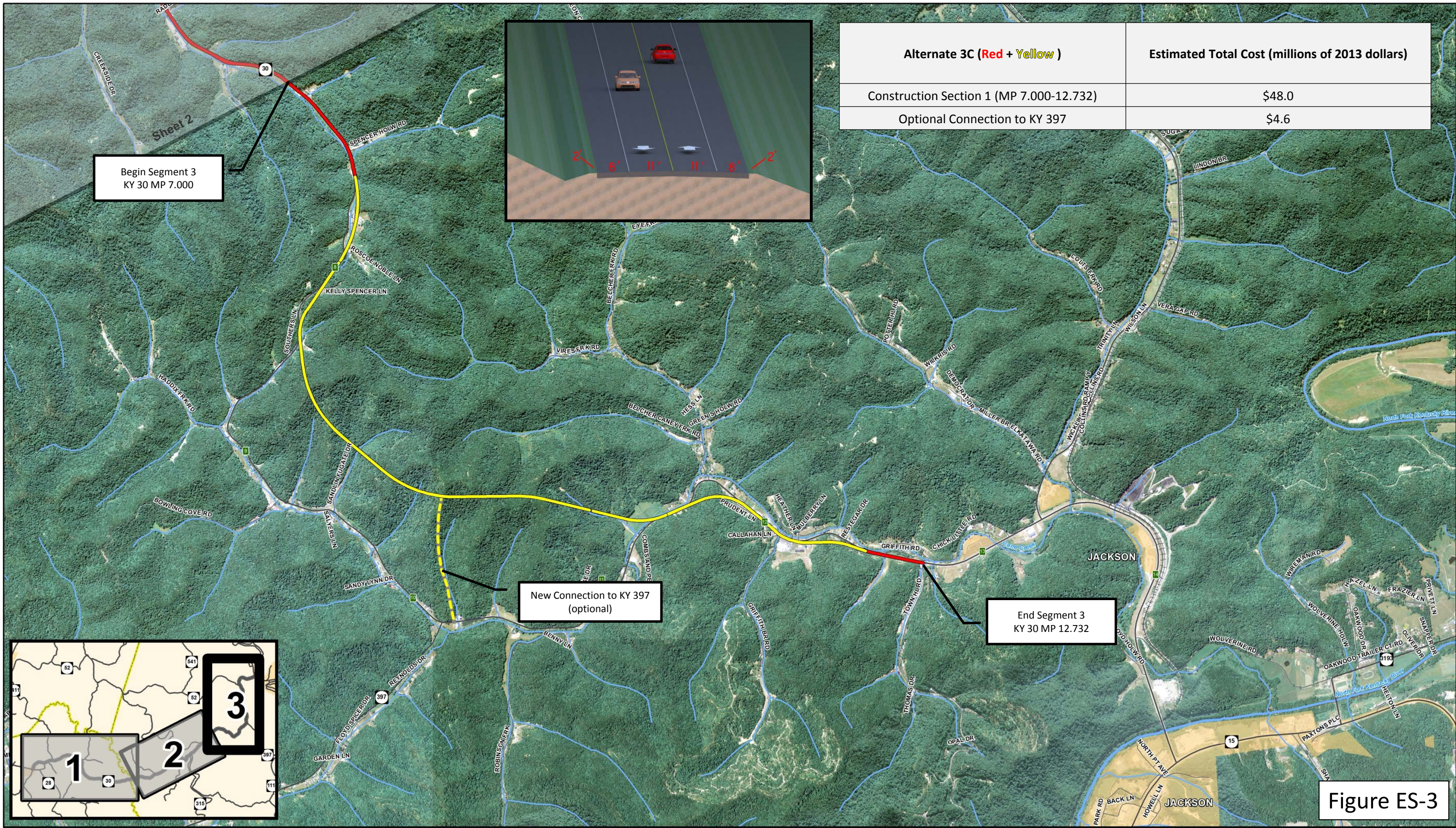
Figure ES-2



- Existing
- Widen Existing On Alignment (55 mph)
- New Alignment (55 mph)



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
**Long Term Improvement
 Segment 2 Recommendation**



- Existing
- Widen Existing On Alignment (55 mph)
- New Alignment (55 mph)
- - - Optional Connection to KY 397



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
**Long Term Improvement
 Segment 3 Recommendation**

KY 30 Planning Study

**Final Report
KY 30 from KY 11 in Booneville to KY 15 in Jackson
Owsley and Breathitt Counties, Kentucky
Kentucky Transportation Cabinet**

September 2014

**Submitted to:
Kentucky Transportation Cabinet
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Appendix C	Crash Records
Appendix D	Environmental Justice Review
Appendix E.....	Preliminary Geotechnical Assessment
Appendix F	Project Team Meetings
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Section 1

Introduction

The Kentucky Transportation Cabinet (KYTC), in partnership with consultant, CDM Smith, undertook a planning study to examine the KY 30 corridor from KY 11 in Owsley County to KY 15 in Breathitt County, a total length of approximately 23.3 miles.

The purpose of this study is to:

- Identify known issues, concerns, and constraints, including safety, traffic, social, environmental, and geotechnical considerations;
- Develop preliminary purpose, needs, and goals for the proposed project;
- Listen and share information with local officials, other interested parties, and the public;
- Develop and evaluate improvement concepts for the corridor based on project purpose and need, including short-term spot improvements along the existing route; and
- Make project recommendations.

A. Background

This study is a component of a larger effort to improve KY 30 between London and Jackson. At this time, no funding has been committed for any future project development activities for the portion of KY 30 between Jackson and Booneville.

B. Project Location

The study corridor is located in two counties in south-central Kentucky: Breathitt and Owsley. The study portion of KY 30 stretches from KY 11 in Booneville to KY 15 in Jackson. The study portion of the route is approximately 23.3 miles in length. The corridor is a two lane highway that passes through mountainous terrain, connecting a number of small rural communities and scattered homes. Two schools, the Kentucky River Medical Center in Jackson, local businesses, and numerous churches also rely on the route for access. The study area is shown in **Figure 1-1**.

At a systems level, KY 30 provides a connection between the Hal Rogers Parkway and I-75 in London, and the Mountain Parkway near Salyersville.

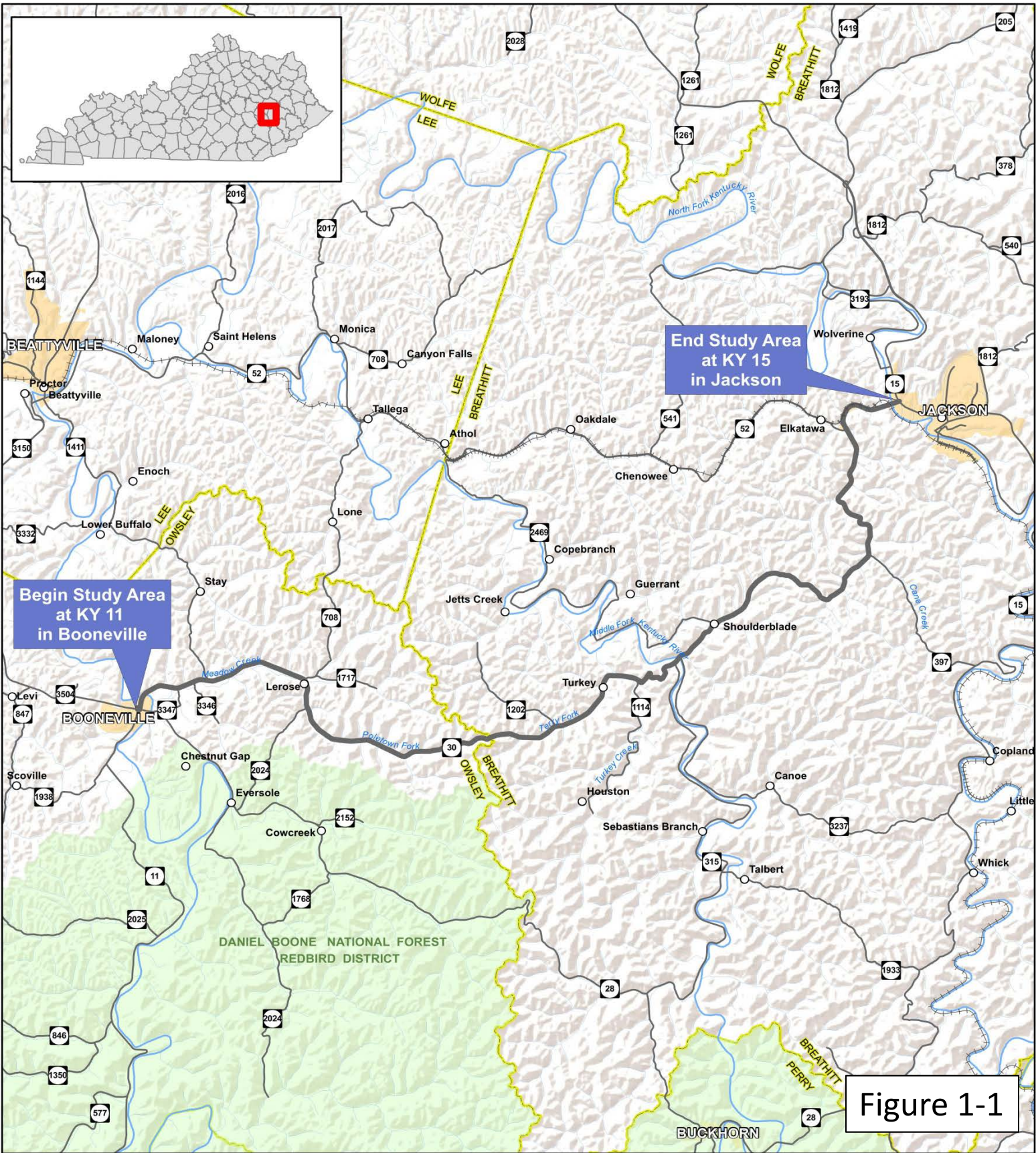


Figure 1-1



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
 Study Area

C. Previous Studies

One *2014 Enacted Six Year Highway Plan* project and five projects on KYTC's unscheduled needs list lie along KY 30 within the study area boundaries and are illustrated in **Figure 1-2**:

- Item #10-1096 includes a bridge replacement on KY 30 over the Middle Fork of the Kentucky River. Funding is allocated in the *2014 Enacted Highway Plan* for utilities (FY 2014, \$150,000) and construction (FY 2014, \$3.12 million). Current designs for the replacement bridge include two 11 foot wide lanes with 6 foot wide shoulders. Construction of the new bridge is currently scheduled to start in the summer of 2014.
- Project Identification Form (PIF) 10 095 D0030 82.00 includes reconstructing KY 30 from the south fork of the Kentucky River to KY 1202, a total distance of approximately 9.2 miles. The PIF notes issues with drainage concerns, pavement breaks/slides, deficient alignment, and high crash trends.
- PIF 10 013 D0030 7.10 includes correcting horizontal and vertical curves and steep grades along KY 30 from KY 1202 to Cane Creek culvert (12.1 total miles) in order to improve safety and mobility.
- PIF 10 013 D0030 5.00 includes reconstructing a 0.4 mile stretch of the highway just south of the KY 2469 intersection.
- PIF 10 013 D0030 7.15 includes reconstructing the highway across Shoulderblade Hill (MP 7.511 to 8.906 in Breathitt County).
- PIF 10 013 D0030 7.80 includes realigning the horizontal curve between MP 10.800 to 11.140 in Breathitt County.



Aging steel truss structure over Middle Fork of Kentucky River

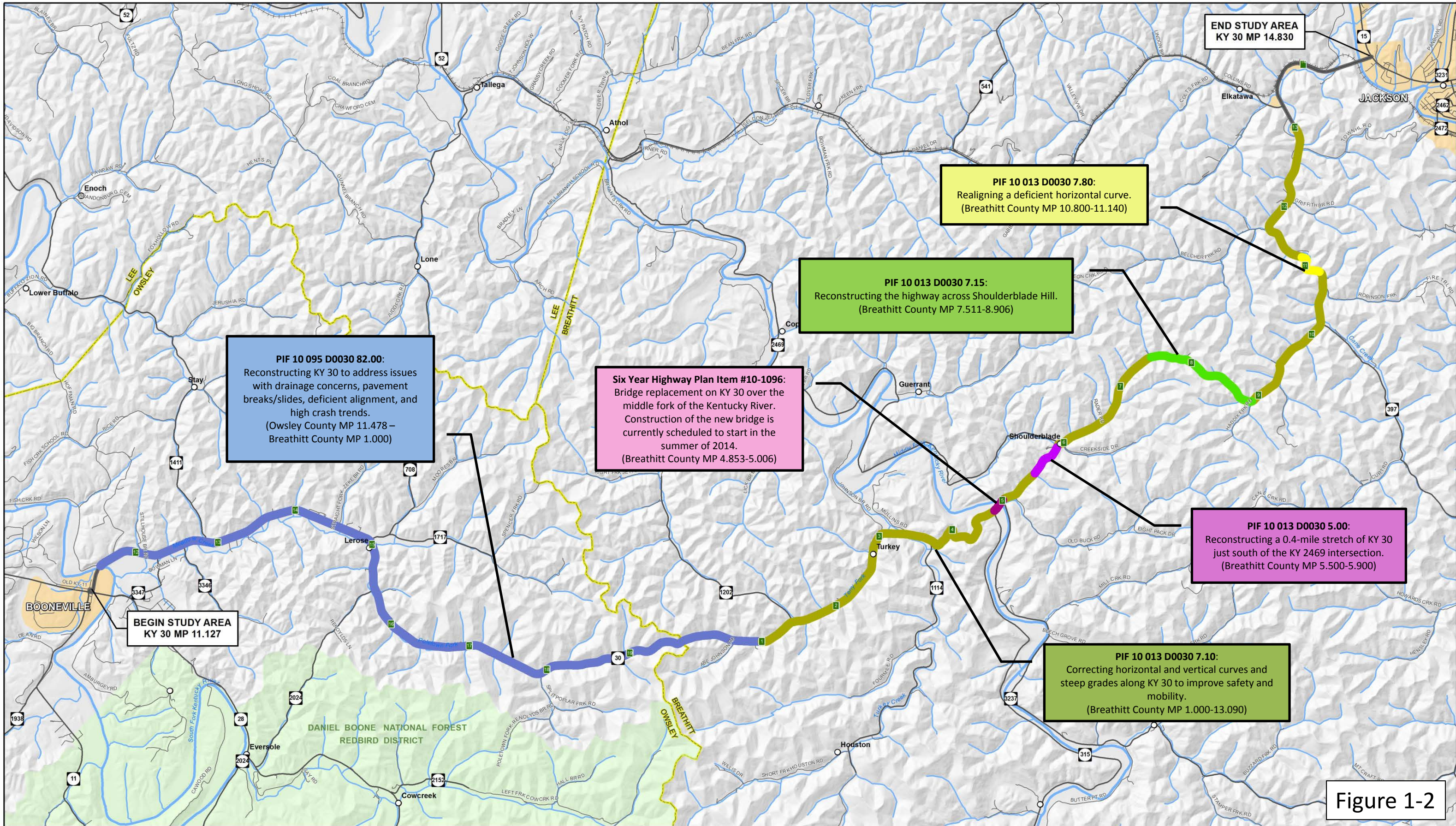


Figure 1-2



KY 30 Planning Study
From KY 11 in Booneville to KY 15 in Jackson
Breathitt and Owsley Counties
Identified Projects

Section 2

Existing Conditions

The following sections discuss the existing roadway conditions, traffic operations, and roadway safety.

A. Roadway Characteristics

KY 30 is classified as a Rural Major Collector with a 55 mph posted speed limit in the majority of the study area. It is a two lane facility with lane widths varying from 9 to 14 feet. The majority of the route has 9 to 10 foot wide travel lanes. Shoulder widths vary from 2 to 11 feet along the study portion of the route; the majority of the route (i.e., Owsley MP 11.645 through Breathitt MP 12.423 for a total length of 20.3 miles) has narrow (2 to 4 foot wide) shoulders. The key roadway characteristics are shown in **Figure 2-1**.



Representative views along KY 30

As part of the study effort, designers conducted a review of as-built highway plans to compare existing geometrics to the common geometric practices for Rural Collector Roads listed in Exhibit 700-02 of the *2006 KYTC Highway Design Manual*. While the cross-section at some points along the highway has been widened since its original construction, the alignment has not deviated from the as-built plans drawn in the 1930s. Along the 23.3 mile study route, analysts identified 70 horizontal curves that do not meet current standards, 17 sag vertical curves that do not meet current standards for headlight stopping sight distance, and 18 crest vertical curves that do not meet current standards for stopping sight distance based on design guidelines for the posted speed limits. This represents 58% of the horizontal curves along the study portion of the route, 29% of the sag vertical curves, and 45% of the crest vertical curves. The geometric analysis and standards are shown in **Figure 2-2**, and an individualized summary is located in **Appendix A**. KY 30 in Breathitt County was resurfaced in 2013, mitigating much of the pavement breaking and sliding which was previously occurring.

If the posted speed limits were reduced from 55 mph to 45 mph, there would be 41 horizontal curves that do not meet current standards, eight sag vertical curves that do not meet current standards for headlight stopping sight distance, and seven crest vertical curves that do not meet current standards for stopping sight distance based on design standards for a 45 mph design speed. Even though this would reduce the overall number of geometric deficiencies by 47%, there would still be 41 deficient horizontal curves along the study portion of the route which represents over a third (34%) of all the horizontal curves. The 45 mph geometric analysis is shown in more detail in **Appendix A**.

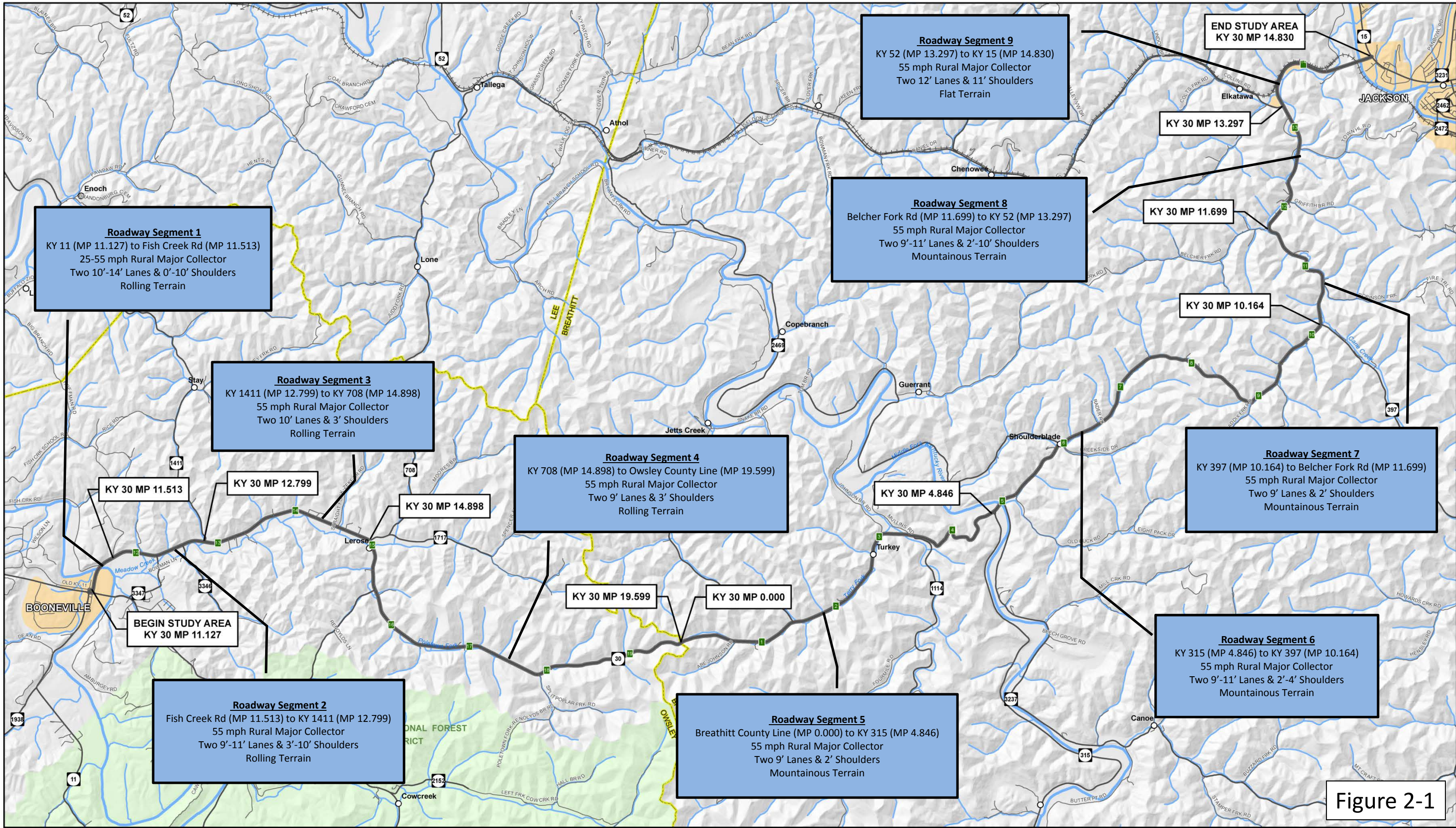


Figure 2-1



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
Key Roadway Characteristics

**Common Geometric Practices
(per 2006 KYTC Highway Design Manual Exhibit 700-02)**

Design Element	25 mph	35 mph	55 mph
Minimum Radius (assuming eMax 8%)	170 ft	350 ft	965 ft
Minimum Stopping Sight Distance	155 ft	250 ft	495 ft
Minimum Headlight Sight Distance	155 ft	250 ft	495 ft
Maximum Grade (Flat Terrain)*	7%	7%	6%
Maximum Grade (Rolling Terrain)*	10%	9%	7%
Maximum Grade (Mountainous Terrain)*	11%	10%	9%

* May use one percent steeper maximum grades on short lengths (less than 500 ft).

Note: Geometric features not meeting standards were identified by comparing horizontal and vertical alignment information from as-built plans to standards from the 2006 KYTC Highway Design Manual for Rural Collectors (Exhibit 700-02). No as-built plans were available on KY 30 in Breathitt County between MP 13.297 and MP 14.830.

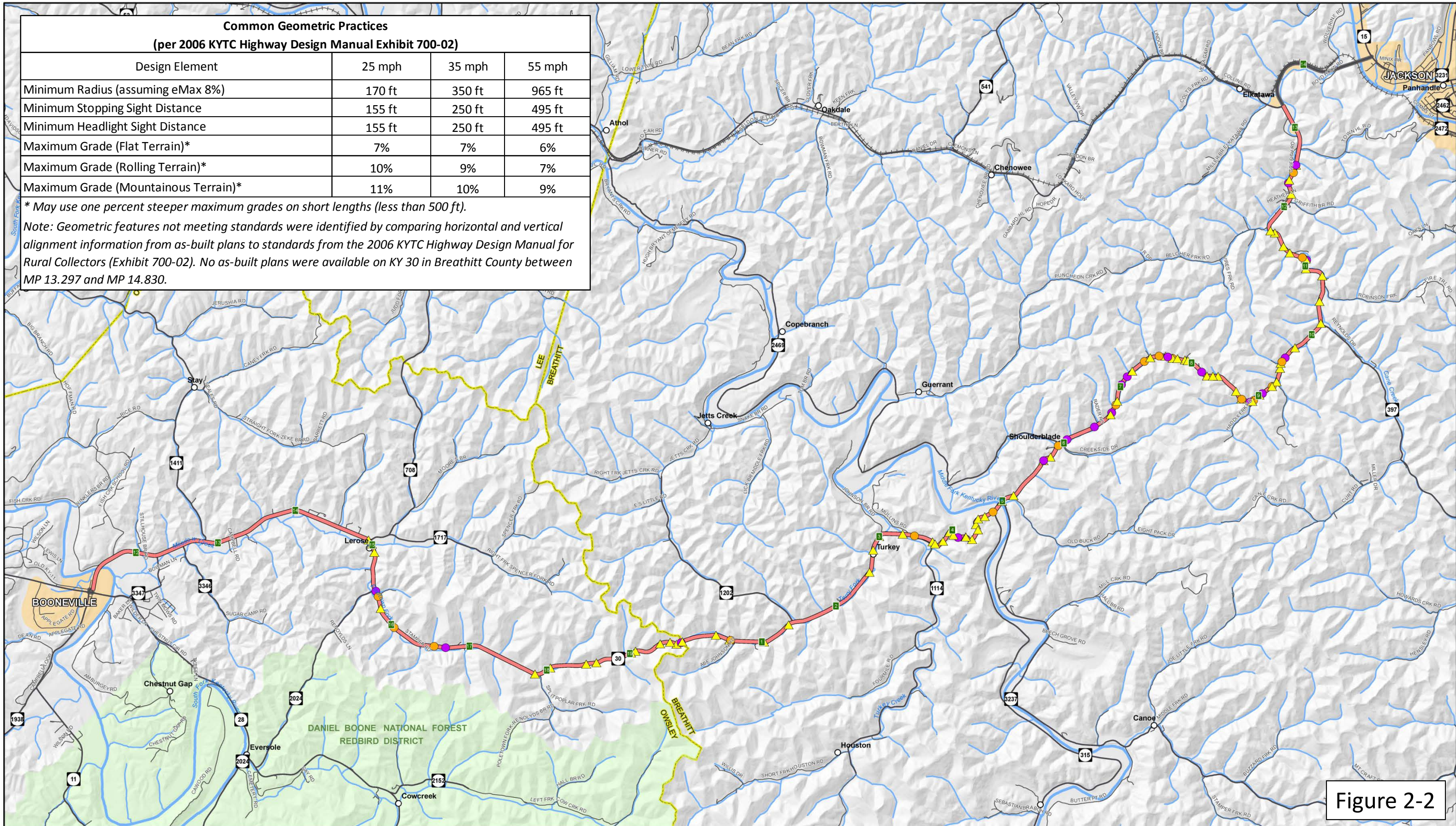


Figure 2-2

Geometric Characteristics not Meeting Current Standards

- ▲ Horizontal Curve: 70
- Headlight Stopping Sight Distance: 17
- Stopping Sight Distance: 18
- Grade: 0
- Cross Section (MP 11.187 in Owsley County to MP 13.297 in Breathitt County)



KY 30 Planning Study
From KY 11 in Booneville to KY 15 in Jackson
Breathitt and Owsley Counties
Geometric Analysis

B. Other Modal Users

Highland-Turner Elementary School, located along KY 30 near the Middle Fork of the Kentucky River in Breathitt County, relies on KY 30 for access, including access for school buses. Additional transit services in the region are coordinated by the LKLP Community Action Council, which provides non-emergency medical shuttles and a demand-response transit service, including service within both Breathitt and Owsley Counties. In addition, emergency medical services (ambulances) in Booneville and Owsley County rely heavily on KY 30 to access hospitals in Jackson.

C. Bridges

Numerous culverts and bridges are located along the study corridor, as summarized in **Table 2-1** and are shown on the Hydrology map (**Figure 3-2**) in **Section 3**, Environmental Overview. According to the KYTC, a bridge structure is eligible for federal rehabilitation funds when it meets two criteria: the bridge has a sufficiency rating below 50.0 and the bridge is considered either structurally deficient or functionally obsolete. Structurally deficient bridges cannot carry the weight they were originally designed to carry. Bridges are considered functionally obsolete if they do not meet geometric design standards of today. The sufficiency rating formula provides a method of evaluating the sufficiency of the bridge to remain in service on a 100-point scale; according to FHWA's Bridge Preservation Guide (August 2011), the formula incorporates the structural adequacy, functional obsolescence and level of service, and essentiality for public use.

As noted in **Section 1.C**, funds have been designated in the current Six Year Highway Plan to replace the bridge over the Middle Fork of the Kentucky River (013B00017N); construction letting is tentatively scheduled for summer 2014.

Table 2-1: Summary of Culverts & Bridges along KY 30

ID	MP	Feature	Description	Rating*
Owsley County				
095B00041N	11.449	KY River, south fork	4 span girder	98.6
095B00003N	14.980	Meadow Creek	2 span T-beam	61.0, FO
Breathitt County				
013B00019N	3.067	Terry Fork	culvert	67.4
013B00018N	3.294	Turkey Creek	1 span T-beam	71.0
013B00017N	4.934	KY River, middle fork	2 span steel truss	44.9, FO
013B00080N	5.923	Shoulderblade Creek	culvert	98.4
013B00015N	11.162	Cane Creek	3 span T-beam	75.3, FO
013B00059N	13.078	Cane Creek	culvert	94.8
013B00061N	13.444	Cane Creek, Lindon fork	culvert	91.9
013B00060N	14.372	Cane Creek	culvert	95.8
013B00058N	14.681	KY River, north fork CSX rail line	3 span girder	95.8

* sufficiency rating based on 100-point scale; FO = functionally obsolete

D. Existing & Future No Build Traffic Forecast

Within the study area, daily traffic volumes for KY 30 range from 800 to 5,400 vehicles per day (vpd) based on the nine traffic stations shown in **Figure 2-3**. As part of this study, new traffic counts were conducted by KYTC at traffic stations 095A04 (Owsley County MP 11.4), 013751 (Breathitt County MP 11.2), and 013799 (Breathitt County MP 14.6). Daily traffic volumes at these three locations range from 2,500 to 5,400 vpd; passenger cars, motorcycles, and pickup trucks account for approximately 96% of the daily traffic volume using the corridor. Buses and commercial trucks make up the remaining 4% of the daily traffic volume.

Based on population projections and historic traffic trends, a 1.2% annual growth rate was applied to the 2013 traffic volumes at traffic stations 095A04 (MP 11.4), 013751 (MP 11.2), and 013799 (MP 14.6) to forecast 2040 No Build volumes throughout the corridor. Thus, year 2040 ADT volumes range from 3,400 - 7,000 vpd along the corridor in those sections. This translates to a year 2040 design hourly volume between 400-800 vehicles per hour.

The *Traffic Forecast Report* prepared by KYTC provides additional information about the existing and future year volume forecasts and is included as **Appendix B**.

E. Operational Analysis

2013 and 2040 design hour volumes were also compared to the road's theoretical capacity. A volume-to-capacity ratio (V/C) represents the number of vehicles using the road in a specific time period (i.e. design hour volume) compared to the number of vehicles the road was designed to be able to handle during that period. The target V/C ratio is 0.9 for rural areas and 1.0 for urban areas. A V/C greater than this indicates the road is congested, i.e. operating above its design capacity. For urban areas, signal timing is factored into the theoretical capacity.

Along the corridor, 2013 and 2040 V/C for each analysis segment varies from 0.23 to 0.32 and 0.27 to 0.38, respectively. This indicates each segment operates well below its design capacity. **Table 2-2** presents 2013 and 2040 ADT, DHV, LOS and V/C.

Although V/C is KYTC's preferred operational analysis methodology, an alternative is Level of Service (LOS), which is a qualitative measure of highway traffic conditions, as identified in the 2010 Highway Capacity Manual (HCM). Individual levels of service characterize conditions in terms of speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined and given letter designations from A to F, with LOS A representing free flow conditions and LOS F representing severe congestion and/or time delays. Typically, a minimum LOS D is considered acceptable in urban areas and LOS C is considered acceptable in rural areas.

LOS was calculated for each of the three analysis segments along the corridor, based on the existing traffic volumes, 2013 and 2040 No Build forecasts and existing roadway geometry. All segments currently operate at LOS D and are projected to operate at LOS D in 2040. This LOS is not driven by congestion; rather the high percentage of time spent following due to the limited passing opportunities and poor geometrics discussed in **Section 2.A**.

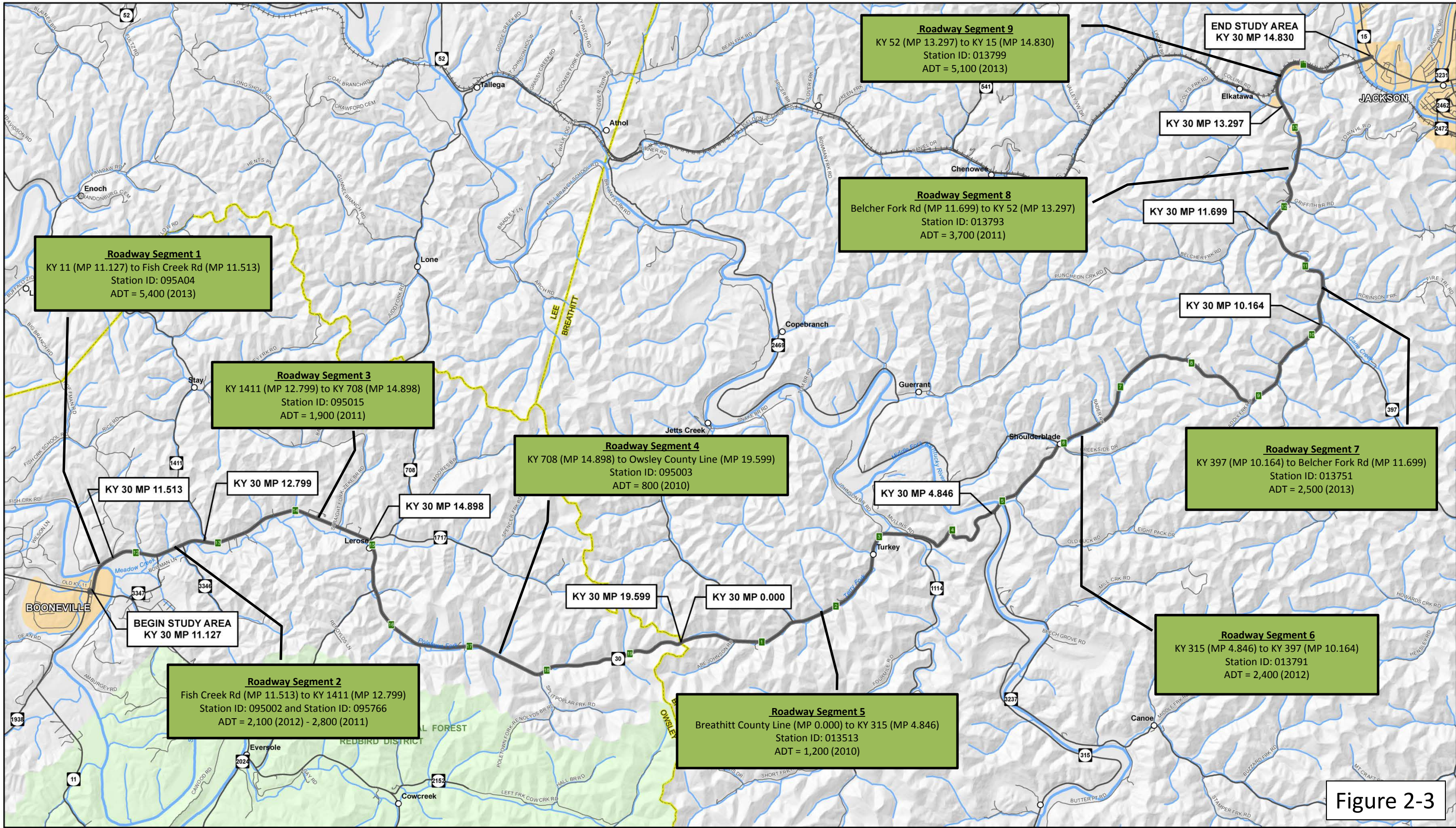


Figure 2-3



SID = Station Identifier

KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
Existing Traffic Counts

Table 2-2: 2013 and 2040 Operational Analysis

Segment	MP	ADT	DHV	LOS	V/C
Existing 2013					
Segment 1	Owsley 11.127-12.799	5,350	600	D	0.32
Segment 2	Owsley 12.799-19.599, Breathitt 0-11.699	2,500	300	D	0.23
Segment 3	Breathitt 11.699-14.830	5,100	600	D	0.25
Future 2040					
Segment 1	Owsley 11.127-12.799	7,000	800	D	0.38
Segment 2	Owsley 12.799-19.599, Breathitt 0-11.699	3,400	400	D	0.27
Segment 3	Breathitt 11.699-14.830	7,000	800	D	0.35

F. Roadway Safety

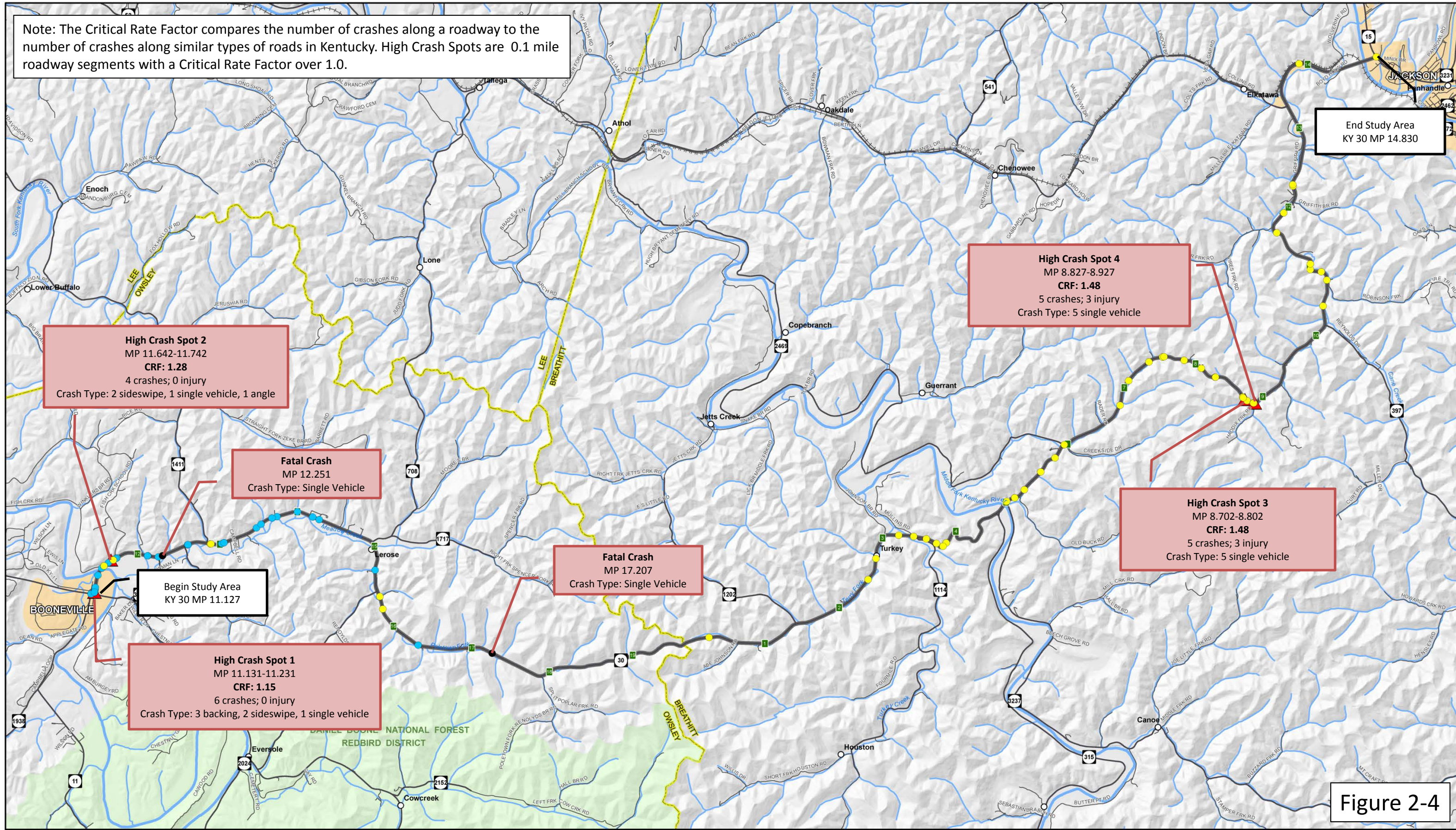
To quantify safety concerns, a crash analysis was performed for the study portion of KY 30. Crash records were collected from KYTC over a 49-month period (June 1, 2009 through June 30, 2013) as shown in **Appendix C**. Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above average crash rates. The methodology used is defined in the KYTC research report *Analysis of Traffic Crash Data in Kentucky (2007-2011)* (Kentucky Transportation Center, 2011).

Over the analysis period, there were 119 reported crashes along the 23.3 mile corridor. Of these, two crashes resulted in fatalities and 48 resulted in injuries. **Figure 2-4** presents the locations of crashes along the corridor, highlighting other crash statistics as well.

The percentage of injury collisions is considerably higher along this corridor than experienced statewide. Based on the most recent statewide crash data for rural major collectors¹ which looked at crashes between 2009-2011, injury crashes generally compose 29% of total crashes; along the study portion of the KY 30 corridor, injury crashes compose 40% of total reported crashes. The majority of crashes (64%) were single vehicle collisions. **Figure 2-5** demonstrates the distribution of crashes by collision type.

¹ Analysis of Traffic Crash Data in Kentucky (2007-2011); <http://www.ktc.uky.edu/projects/analysis-of-traffic-crash-data-in-kentucky-2007-2011/>

Note: The Critical Rate Factor compares the number of crashes along a roadway to the number of crashes along similar types of roads in Kentucky. High Crash Spots are 0.1 mile roadway segments with a Critical Rate Factor over 1.0.



End Study Area
KY 30 MP 14.830

High Crash Spot 2
MP 11.642-11.742
CRF: 1.28
4 crashes; 0 injury
Crash Type: 2 sideswipe, 1 single vehicle, 1 angle

High Crash Spot 4
MP 8.827-8.927
CRF: 1.48
5 crashes; 3 injury
Crash Type: 5 single vehicle

Fatal Crash
MP 12.251
Crash Type: Single Vehicle

High Crash Spot 3
MP 8.702-8.802
CRF: 1.48
5 crashes; 3 injury
Crash Type: 5 single vehicle

Fatal Crash
MP 17.207
Crash Type: Single Vehicle

Begin Study Area
KY 30 MP 11.127

High Crash Spot 1
MP 11.131-11.231
CRF: 1.15
6 crashes; 0 injury
Crash Type: 3 backing, 2 sideswipe, 1 single vehicle

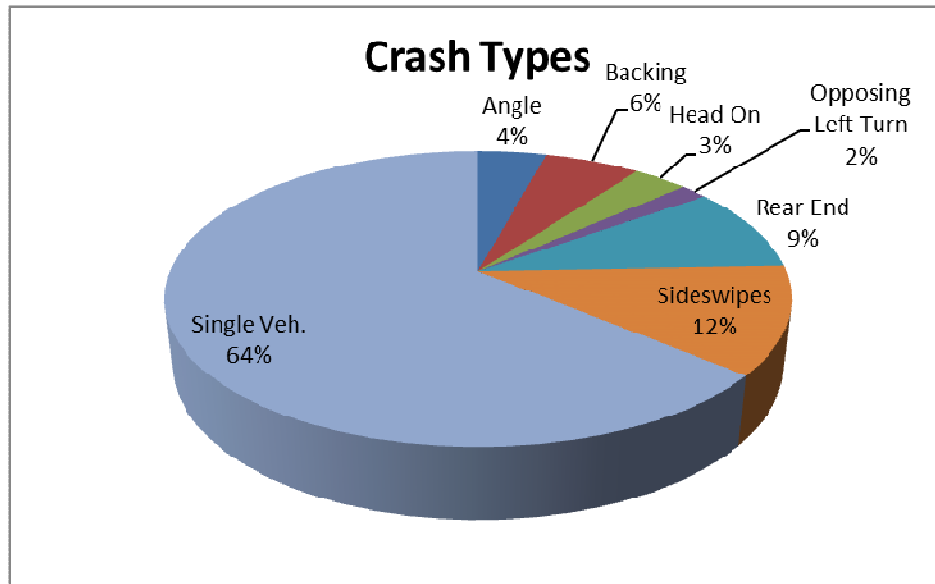
Figure 2-4



- Fatality Crash: 2
- Injury Crash: 48
- Property Damage Only (PDO) Crash: 69
- ▲ High Crash Spots: 4
- High Crash Segment: 0
- KY 30 Milepoints



KY 30 Planning Study
From KY 11 in Booneville to KY 15 in Jackson
Breathitt and Owsley Counties
Crash Analysis
June 1, 2009 - June 30, 2013

Figure 2-5: Distribution of Crashes by Type

1. Segment Analysis

As defined in the methodology report, segments vary in length and are divided along roadways where geometry or traffic volumes change. For each section, analysts looked at the number of crashes to determine the critical rate factor (CRF). The CRF is one measure of the safety of a road, expressed as a ratio of the crash rate at the location compared to the average crash rate for roadways of the same functional classification throughout the state. CRF also takes into account traffic volume, area type (rural/urban), and the number of lanes. If the CRF is 1.00 or greater, it may indicate that crashes are occurring due to circumstances that cannot be attributed to random occurrence.

Analysis of segments along KY 30 did not yield any locations with a CRF over the threshold. CRF values ranged from 0.24-0.72.

2. Spot Analysis

Analysts also conducted a spot crash analysis along the study route. Spots were defined by observing crash data to identify 0.10 mile sections where crashes were concentrated. Crashes were again geospatially referenced and compared to statewide data to identify spot locations experiencing above average crash rates. The methodology is also defined in the KYTC research report *Analysis of Traffic Crash Data in Kentucky* (Kentucky Transportation Center, 2011).

Along the study corridor, four spots were found to have a CRF greater than 1.00, as shown in **Figure 2-4**. One additional spot is approaching the 1.00 threshold. **Table 2-3** presents summary information about each of the five spots along the corridor. Spot 1 is located in Booneville along a high volume stretch of KY 30 with a lot businesses and driveways. Spot 2 located at Fish Creek Loop Road which is skewed at the KY 30 intersection and has a steep grade. Spots 3 and 4 have deficient roadway geometrics along KY 30.

Table 2-3: High Crash Spot Statistics

Spot	MP	# Crashes	# Fatality	# Injury	# PDO ¹	CRF
1	Owsley 11.131-11.231	6	0	0	6	1.15
2	Owsley 11.642-11.742	4	0	0	4	1.28
3	Breathitt 8.702-8.802	5	0	3	2	1.48
4	Breathitt 8.827-8.927	5	0	3	2	1.48
5	Breathitt 12.278-12.378	4	0	2	2	0.92

¹PDO = Property Damage Only

Section 3

Environmental Overview

The following sections provide an overview of the existing human and natural environment, based on planning-level information from readily available sources. Alternates should be developed to minimize impacts to the environment, particularly sensitive resources such as schools, wetlands, cemeteries, and homes adjacent to the corridor. The following sections describe population trends, community resources, aquatic and terrestrial resources, air quality, noise, hazardous materials, and geotechnical concerns.

A. Socioeconomic and Community Resources

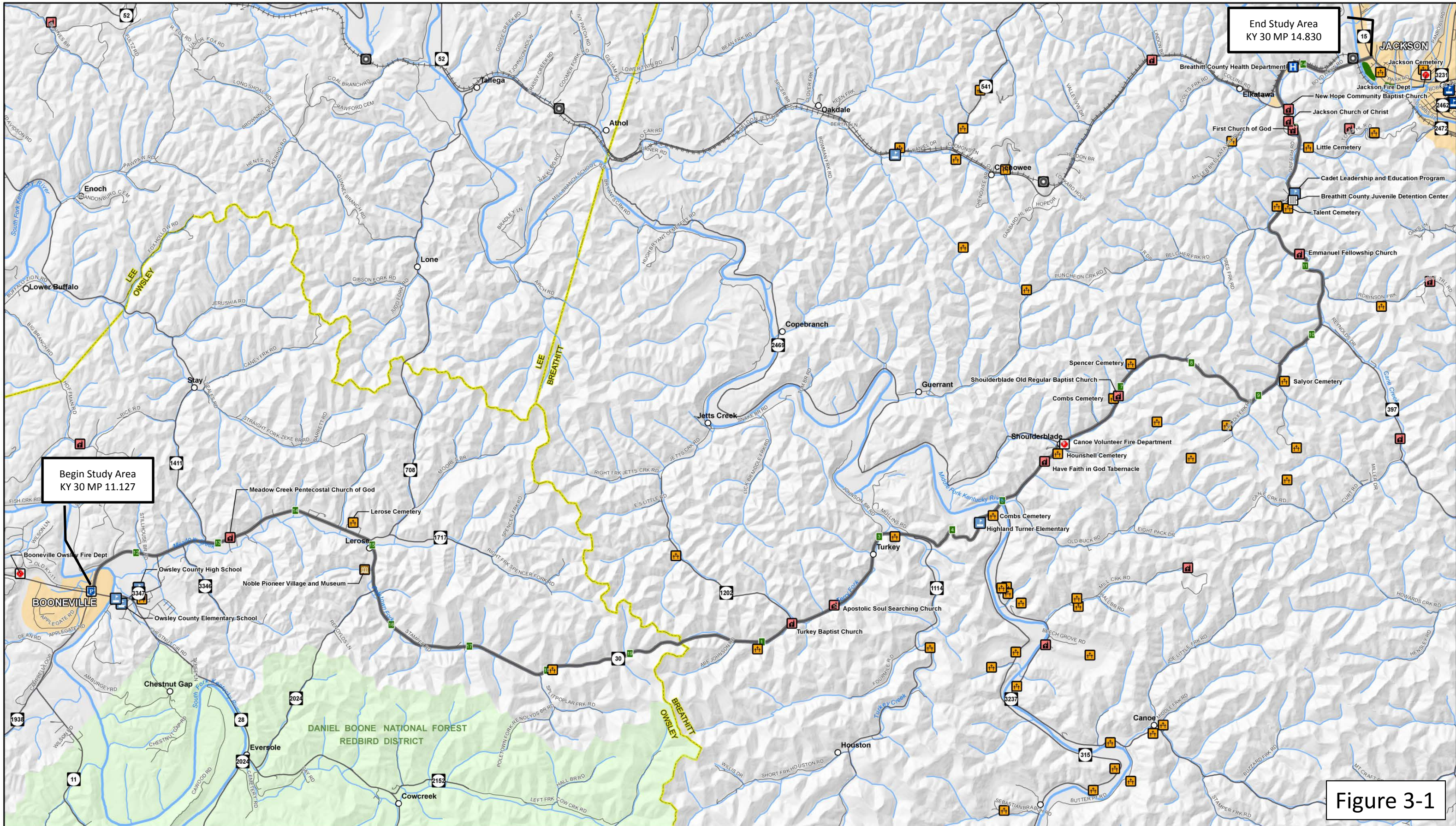
A number of community resources lie along the corridor, shown in **Figure 3-1**. Traveling from west to east, notable features include:

- In Booneville, the Owsley County Court House is located at the western terminus of the study corridor.
- South of Lerosé, the Owsley County Historical Society operates the Noble Pioneer Village and Museum, a collection of structures dating to the 19th century.
- The corridor provides direct access to Highland-Turner Elementary School; students and faculty use the study corridor to get to the school.
- A volunteer fire department is located in the Shoulderblade community, at the intersection of KY 30 with KY 2469.
- Approaching Jackson, the Breathitt County Detention Center and Cadet Leadership and Education Program are located along KY 30 at Griffith Branch Road.



Highland-Turner Elementary

Several local businesses line KY 30 (Mulberry Street) in Booneville, transitioning to scattered homes and undeveloped lands heading northeast from the city. Along the rural portion of the route, there are several homes, farms, churches, and cemeteries along the route. In Jackson, the corridor is primarily undeveloped with a few commercial buildings. A rail line runs along the northern side of the route approaching Jackson.



1. Demographics

The Kentucky River Area Development District (KRADD) assembled an overview of select socioeconomic characteristics to determine the potential for the project to impact environmental justice populations; the report is presented as **Appendix D** and summarized in this section. Census data was assembled for five Census tracts containing the project, Owsley and Breathitt Counties, the 8-county KRADD region, the state of Kentucky, and the US. It should be noted that the tracts cover a much larger area than the study corridor so they were broken down into 8 Block Groups which are more representative of the study area.

The demographic data collected, summarized in **Table 3-1**, shows that minority populations are below national and state averages; four tracts show minority concentrations greater than the reference community (i.e., the KRADD region). The KRADD region has a concentration of persons age 60 and over greater than state or national averages; two tracts have aging population concentrations exceeding that of the KRADD region. Low-income populations and the concentration of persons with disabilities in the KRADD region exceed concentrations in the nation or state; all study area tracts exceed the low-income population and persons with disabilities concentration of the KRADD region with two exceptions for each metric.

Table 3-1: Demographic Summary Data for Selected Geographies

Geography	Minority Population ¹	Population Age 60 and over ¹	Population Below Poverty Level ¹	Disabled Population ¹
United States	37.28%	18.60%	14.88%	10.08%
Kentucky	13.68%	19.20%	18.56%	15.37%
KRADD Area	2.36%	20.54%	27.90%	27.14%
Breathitt Co.	2.21%	19.85%	31.42%	30.31%
Tract 9202 BG 2	5.94%	18.37%	27.34%	24.48%
Tract 9203 BG 1	2.33%	17.32%	39.20%	36.48%
Tract 9203 BG 3	4.83%	17.24%	44.75%	36.19%
Tract 9205 BG 1	1.48%	22.69%	27.56%	27.30%
Tract 9206 BG 1	2.46%	8.10%	31.84%	23.64%
Owsley Co.	3.84%	29.16%	36.38%	29.37%
Tract 9301 BG 1	18.69%	22.56%	55.27%	24.93%
Tract 9301 BG 2	0.00%	26.71%	23.71%	15.49%
Tract 9301 BG 3	1.65%	22.14%	38.52%	40.05%

¹ Kentucky State Data Center from 2008-2012 ACS Estimates

Based on the data obtained from the U.S. Census Bureau for race, age, income, and disability there does not appear to be a defined environmental justice community within the study area. Analysis of Tracts 9203 BG1, 9203 BG3, 9301 BG1, and 9301 BG3 show elevated percentages of persons below poverty level. The percentages of persons below poverty level is higher than that of the KRADD region and considerably higher than that of Kentucky and the U.S. This should be noted and taken into consideration in the recommended short-term improvements and long-term solutions of the planning study.

The percentages of minority populations in Tract 9202 BG 2 and 9203 BG 3 are significantly higher than that of the KRADD region. Although there may be a high percentage, there is not necessarily a concentrated population. These areas should be noted in the future project planning and design

phases and if necessary field visits, discussions with local officials, and/or other sources of information should be consulted.

B. Aquatic & Terrestrial Resources

The corridor is located in a rural setting, with open farmlands, wooded areas, streams, and wetlands in the vicinity supporting diverse wildlife habitats.

The US Fish & Wildlife Service website indicates two known threatened, endangered, or candidate species may occur within the project area: Gray bat (*Myotis grisescens*, Endangered) and Indiana bat (*Myotis sodalist*, Endangered). There are no known critical habitats or wildlife refuges in the vicinity.

Figure 3-2 shows water resources within the study area. A number of streams and wetlands drain the area, flowing into one of three regional branches of the Kentucky River. Due to the steep topography, floodplains in the area are generally narrow. Numerous water wells are located in close proximity to the study corridor.

C. Air Quality

Pursuant to the Clean Air Act, the US Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards for six principal pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), inhalable particulate matter (PM₁₀), fine particulate matter (PM_{2.5}), ozone (O₃), sulfur dioxide (SO₂), and lead. The study area is located within unincorporated areas of Owsley and Breathitt Counties. There are no existing violations of CO in the project area; no hotspot analysis will be required because of the low traffic volumes. The area is in attainment for NO₂, O₃, SO₂, particulate matter, and lead. The proposed project is expected to have a low potential Mobile Source Air Toxics (MSAT) effect as it serves to improve operations of highway and freight without adding substantial new capacity.

D. Noise

To determine if road noise levels are compatible with various land uses, the Federal Highway Administration (FHWA) has developed noise abatement criteria (NAC) and procedures to be used in the planning and design of highways. These abatement criteria and procedures are in accordance with Title 23 Code of Federal Regulations, Part 772, FHWA Procedures for Noise Abatement of Highway Traffic Noise and Construction Noise. A summary of the FHWA NAC for various land uses is presented in **Table 3-2**.

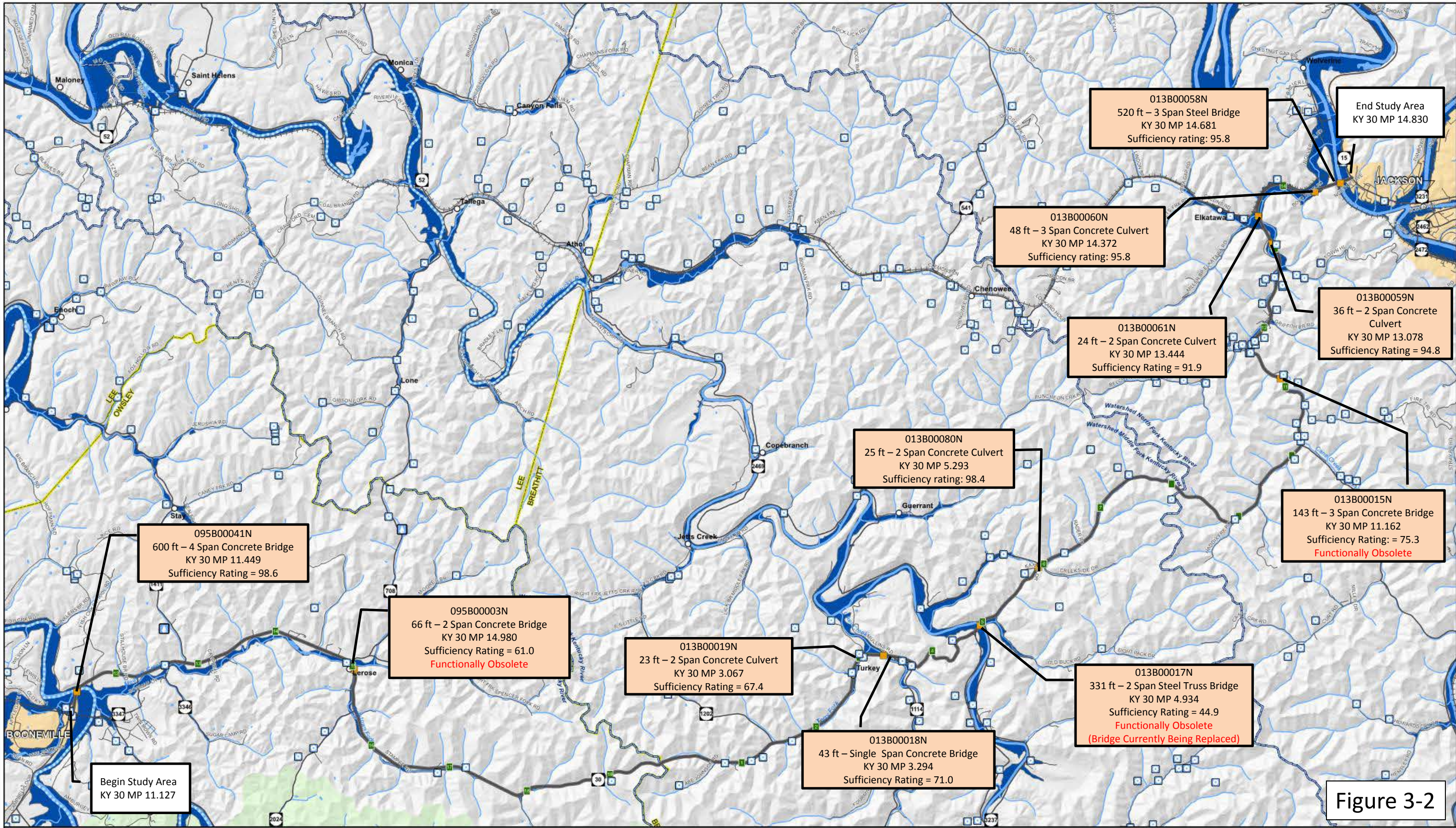


Figure 3-2

Table 3-2: Noise Abatement Criteria, Hourly A Weighted Sound Level in Decibels

Activity Category	Activity Leq(h) (dBA)	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B¹	67	Exterior	Residential
C¹	67	Exterior	Active sport areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E¹	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	NA	NA	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), and warehousing.
G	NA	NA	Undeveloped lands that are not permitted for development.

Source: 23 CFR Part 772

Note: ¹ Includes undeveloped lands permitted for this activity category

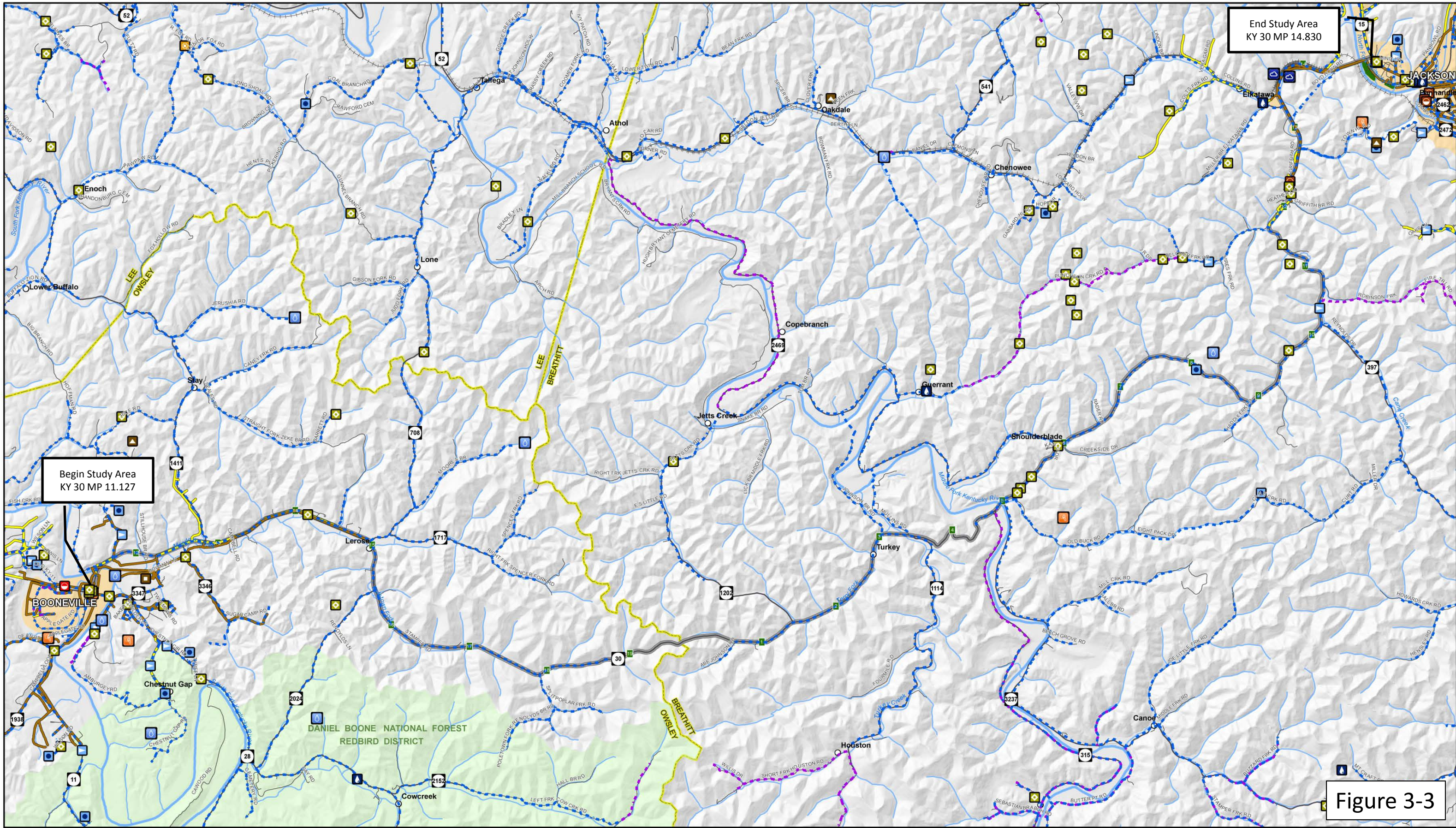
A receptor is defined as a discrete or representative location of a noise sensitive area(s), for any of the land uses listed in Table 3.2. Receptors are impacted if noise levels increase over the NAC as defined by FHWA and KYTC. The study area is located in a mostly rural residential area with some businesses, religious institutions, cemeteries, and a school. These receptors are classified as categories B or C by FHWA with a NAC of 67 dBA.

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area. For the areas where impacts are identified, methods of noise abatement will be evaluated to determine the feasibility and reasonableness of their implementation. The evaluation is based on many factors, some of which include constructability, cost, height of wall, amount of land use, and whether changes in existing land use are expected.

This project is a Type I project as designated in FHWA Regulation 23 CFR Part 772 and, in any future project development phases, a detailed noise analysis should follow the FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise and the KYTC Noise Analysis and Abatement Policy (July 13, 2011).

E. Hazardous Materials

GIS data from the US Environmental Protection Agency include a number of permitted facilities/monitored sites along the corridor, particularly east of the Middle Fork of the Kentucky River. These are shown in **Figure 3-3**.



End Study Area
KY 30 MP 14.830

Begin Study Area
KY 30 MP 11.127

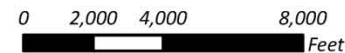
Figure 3-3

Monitored Sites

-  AIRS
-  PCS
-  RCRA
-  KY-TEMPO
-  CWNS
-  EIS
-  NPDES
-  Landfill
-  Underground Storage Tank
-  Leaking Underground Storage Tank

Utilities

-  Water Treatment Plant
-  Water Tank
-  Pump Station
-  Water Line
-  Water Line Proposed
-  Sewer Treatment Plant
-  Sewer Line
-  Sewer Line Proposed



KY 30 Planning Study
From KY 15 in Jackson to KY 11 in Booneville
Breathitt and Owsley Counties

**Monitored Sites
& Utilities**

F. Geotechnical Overview

The KYTC Geotechnical Branch completed a preliminary geotechnical assessment of the study area which is provided as **Appendix E** and summarized herein. Site specific Geotechnical investigations are critical for design projects in the region, particularly in areas where mining is suspected. **Figure 3-4** shows the known mining/drilling sites near the study area.

The study area is located in the Eastern Kentucky Coal Field Physiographic Region, which is dominated by forested hills and highly dissected by V-shaped valleys. Mapping indicates that the project is underlain by bedrock from the Breathitt and Lee Formations (i.e., shale, limestone, siltstone, sandstone, coal, and clay) and alluvial deposits.

Mapping shows some geological faults in the area but these are not likely to be a concern.

Numerous mines are located throughout the area, including strip mines, auger mines, and deep mines. It is also likely that there are numerous locations where small scale “house coal” mining has occurred. Available mine maps are included as part of **Appendix E**. Additional unmapped mines are likely to be encountered during any future design and construction efforts. It is also likely that areas of uncompacted or loosely compacted mine spoil exist in the area. Mitigation efforts may be required.

Regionally, bridge foundations are typically founded on shallow foundations (e.g., spread footings on bedrock) or deep foundations (e.g., steel H-piles driven to bedrock or drilled shafts socketed into bedrock). Culverts and walls are typically supported on shallow foundations on soil or bedrock. Mined areas can be problematic for structure foundations.

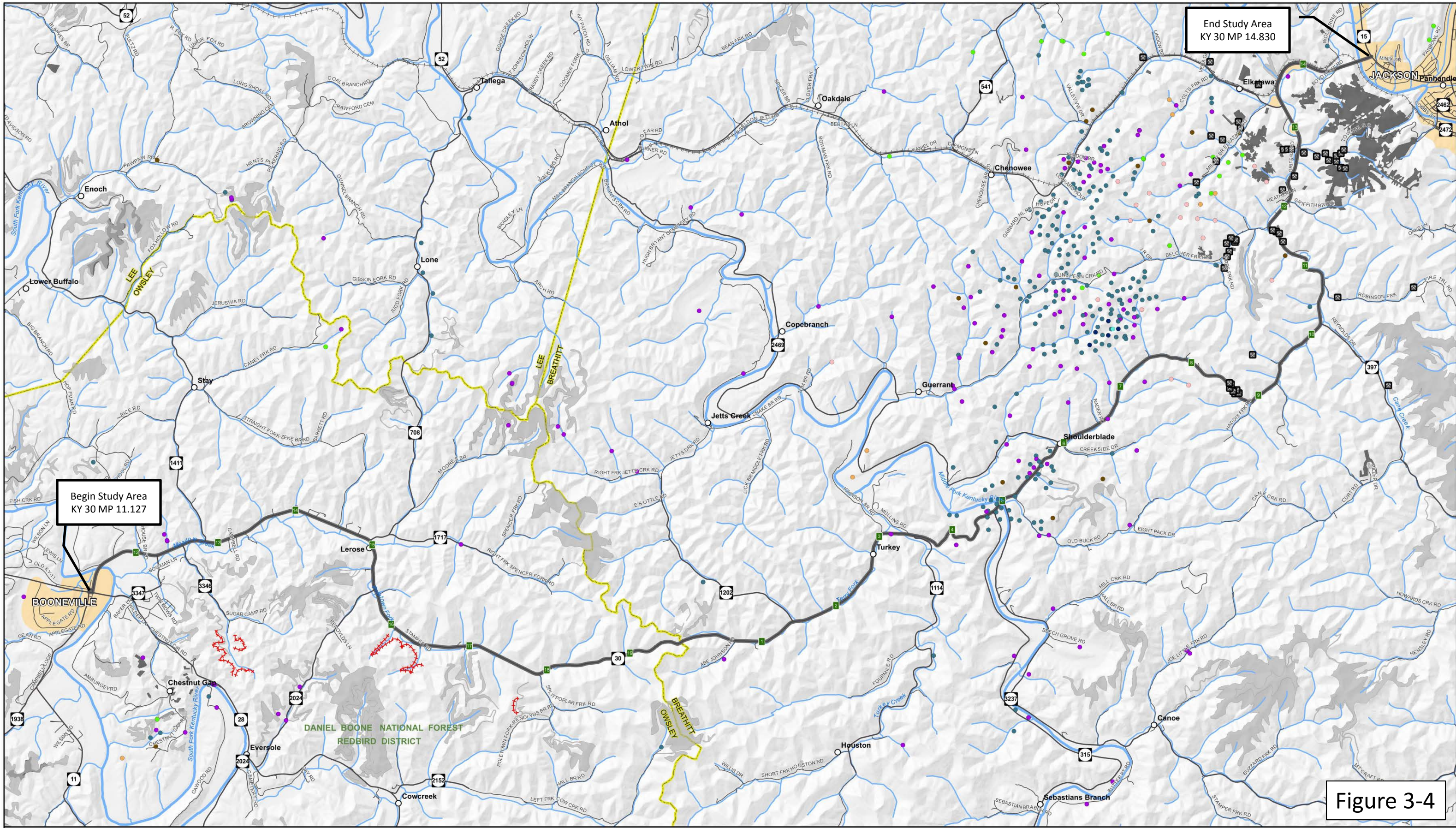
Rock cuts in the area are typically 1 Vertical: 1 Horizontal to 1.5 Vertical: 1 Horizontal.

Soil strata in the area tend to be relatively thin but are generally suitable for embankment construction. Soils in the area are considered erodible. Generally, native soil embankments can be constructed to a height of 60 feet with 2 Horizontal: 1 Vertical side slopes if the foundation is suitable and proper compaction methods are used. Building embankments with non-durable shales may require special methods to obtain acceptable long term results. Soil cuts over approximately 10 feet often require analyses to design proper side slopes. In no case should soil cuts be steeper than 2 Horizontal: 1 Vertical. Suitable rock for embankment construction and rock roadbed is often readily available in this area of the state.

There are likely numerous potentially unstable talus areas in the study area. Existing KY 30 has numerous places where railroad rails are in use as a landslide abatement measure (i.e., holding up the downhill side of the road). Some of the existing slopes have shown movement in the past and it is likely that many of the existing soil slopes range from marginally stable to unstable.

California Bearing Ratio (CBR) values used in pavement design generally range from 2 to 4 for soils subgrades in the area and 9 to 11 for a 2-foot durable rock road bed. Chemical modification of soil subgrades are sometimes used in this area. Wet areas could require undercutting and replacement of soils.

Numerous other geotechnical investigation reports have been completed in the region and are available from the KYTC Geotechnical Branch.



End Study Area
KY 30 MP 14.830

Begin Study Area
KY 30 MP 11.127

Figure 3-4

<p>Coal</p> <ul style="list-style-type: none"> Permitted Mine Boundaries (July 2013) Mined Out Areas Mine Shaft (USGS) Contour Strip 		<p>Wells</p> <ul style="list-style-type: none"> Domestic gas Dry and Abandoned Gas producer Oil producer Combined oil and gas producer Secondary recovery injection (Class II) Unknown Water supply 	
		<p>0 2,000 4,000 8,000 Feet</p>	
<p>KY 30 Planning Study From KY 15 in Jackson to KY 11 in Booneville Breathitt and Owsley Counties</p> <p>Mining and Drilling</p>			

Section 4

Purpose & Need Statement

The purpose and need statement establishes why KYTC is proposing to advance a transportation improvement and drives the process for improvements, alternate consideration, analysis, and selection.

A. Purpose and Need

The purpose of the proposed KY 30 improvement project is to improve roadway geometrics to enhance safety and local mobility between Jackson and Booneville and regional connectivity between the Hal Rogers Parkway and I-75 in London and KY 15 in Jackson.

The following needs have been identified:

1. Address Substandard Geometry

As discussed in **Section 2**, the route has numerous substandard geometric features:

- 9 to 10 foot wide driving lanes along 20.3 miles of the 23.3 mile corridor;
- Narrow or no shoulders in most locations;
- 70 horizontal curves that do not meet current KYTC guidelines for turning radius;
- 35 vertical curves do not meet current KYTC requirements for stopping sight or headlight sight distance; and
- Flood prone areas and issues with breaks and slides in the pavement.

2. Enhance Safety

Crash records show four spots where crashes occur more frequently than for similar type roadways throughout the state. Based on reported crashes from June 1, 2009 through June 30, 2013, there were 119 crashes along the 23.3 mile study corridor. This includes 2 fatalities and 48 injury collisions. Four 1/10-mile long spots show above average crash concentrations, resulting in a critical rate factor (CRF) greater than 1.0. CRF greater than 1.0 indicates crashes are happening more often than can be attributed to random chance. The four spots with a CRF greater than 1.0 are:

- Owsley County MP 11.131 to 11.231 located in Booneville along a high volume stretch of KY 30 with a lot businesses and driveways (6 crashes, CRF = 1.15). Owsley County MP 11.642 to 11.742 located at the intersection with Fish Creek Loop Road which is skewed and has a steep grade. (4 crashes, CRF = 1.28).
- Breathitt County MP 8.702 to 8.802 has substandard geometrics and is located just west of Haddix Fork Road (5 crashes including 3 injury collisions, CRF = 1.48).
- Breathitt County MP 8.827 to 8.927 has substandard geometrics and is located at the Haddix Fork Road intersection (5 crashes including 3 injury collisions, CRF=1.48).

B. Additional Goals

Beyond the primary project purpose, facilitating economic development is a secondary goal for the project, which could create jobs and positively impact the above-average number of persons below the poverty level.

Section 5

Initial Team & Stakeholder Coordination

Over the course of the study, the project team held three in-person project team meetings to coordinate on key issues; project team meeting summaries are presented in **Appendix F**. The project team consisted of representatives of the Kentucky Transportation Cabinet Central and District 10 offices, representatives of the Kentucky River Area Development District, and the consultant team of CDM Smith and HMB. The project team also reached out to stakeholders/local officials and the public. Detailed summaries of each are presented in **Appendix G**. Coordination efforts are described in the following subsections.

A. Project Team Meeting #1

Staff from the KYTC Central Office, KYTC District Office, KRADD, and consultant firm met at the KYTC District Ten office in Jackson on August 13, 2013. The purpose of the meeting was to discuss the project purpose and history, the scope of work, the preliminary data collected, relevant project issues, and public input strategies. Key discussion items included the following:

- A section of KY 30 in Breathitt County has been resurfaced within the last two years, which is likely why no pavement breaks or slide issues were noted in this area.
- Section 9 (approaching KY 15) has already been improved. The team discussed whether this section needed further study; the team decided to continue to study this segment, as a new off-alignment connection to KY 15 may be considered.
- Alternates should be developed to tie into the ongoing bridge replacement project over the Middle Fork of the Kentucky River. Once constructed, the bridge will provide two 11 foot lanes with six foot shoulders.
- Funds have been made available to add 4' wide shoulders to KY 30 in Owsley County as a short-term improvement.

B. Project Team Meeting #2

A second project team meeting was held in Jackson on October 3, 2013 to discuss the purpose and need of the project, existing and future traffic conditions, preliminary alternate development activities, the alternate screening methodology, and to prepare for the upcoming meetings with local stakeholders. Generally, the corridor serves low traffic volumes. The low LOS is related to substandard geometrics; the V/C calculations indicate that the route provides adequate capacity to handle existing and future forecast traffic volumes.

At project team meeting #2, the consultant team presented a range of initial alternates for KYTC consideration. Alternates are presented in detail in **Section 6**.

C. Local Officials/Stakeholders Meeting #1

The project team reached out to a number of local government representatives and other community groups early in the planning process. The following organizations were invited to participate as key stakeholders in the KY 30 Planning Study:

- State Legislators
- Judge Executives in Owsley and Breathitt Counties
- Mayors of Booneville and Jackson
- Breathitt and Owsley County School Boards
- Highland-Turner Elementary School Principal
- Breathitt Regional Juvenile Detention Center Director

The project team met with key stakeholders and local officials on October 3, 2013. In addition to the project team, the Judge Executive of Owsley County attended along with representatives from both school systems and the State Representative for the 91st District. During the meeting, the project team shared existing conditions information collected to date and solicited feedback. Among other comments, attendees discussed whether future traffic forecasts adequately accounted for anticipated growth. Key comments related to the alternates include:

- The Breathitt County section of the corridor is worse than the Owsley County section.
- An alignment passing in front of Highland-Turner Elementary School is preferable.
- The section of roadway at Shoulderblade Hill is very difficult for school buses to navigate during the winter.
- The current routing of KY 30 through Booneville around the courthouse square creates a choke point, particularly for truck traffic.
- Improved connectivity to London would be a huge benefit.

*Shoulderblade Hill
at Haddix Fork Road
Intersection*



Section 6

Alternate Development

The following subsections outline the process by which potential improvement alternates were developed. Alternates were developed based on the existing conditions analysis (i.e., traffic, crash, and environmental analyses), previous studies, and input received from the project team and stakeholders/local officials. Initially, three types of alternates were considered: No Build, Spot Improvements, and 2 Lane Widening, which includes several alignment options at different curves.

The American Association of State Highway and Transportation Officials (AASHTO) 2010 Highway Safety Manual provides guidance on quantitative safety analyses to estimate the impacts of proposed safety improvements. This guidance was considered as improvements were proposed and evaluated.

According to the manual:

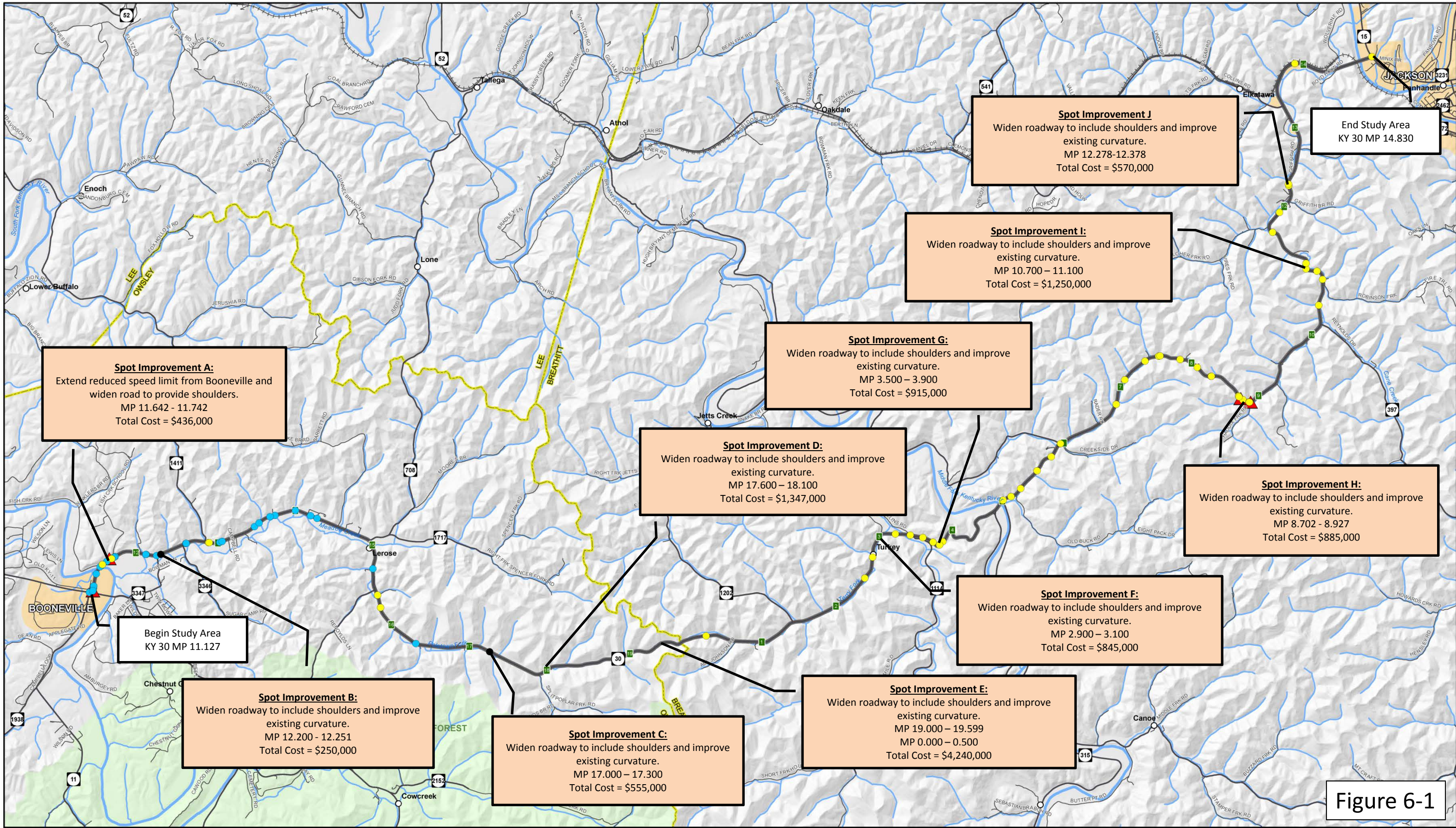
- Widening lanes from 9 foot to 11 foot results in an estimated 30% reduction in run-off-road, head-on, and sideswipe crashes for two lane rural highways. Widening from 10 foot to 11 foot results in an estimated 13% reduction in the same crash types.
- Widening shoulders from 2 foot to 8 foot results in an estimated 33% reduction in run-off-road, head-on, and sideswipe crashes for two lane rural highways. Widening shoulders from 2 foot to 6 foot and 2 foot to 4 foot results in an estimated 23% reduction and 12% reduction in run-off-road, head-on, and sideswipe crashes for two lane rural highways, respectively.
- Improving the horizontal alignment also results in safety improvements, proportional to the curve length and radius.
- Installing new signage warning motorists of upcoming horizontal curves and advisory speed limits results in an estimated 13% reduction in injury collisions.

Although the No Build Alternate does not meet the project purpose, it was carried forward as a baseline for comparison between other alternates.

A. Spot Improvements

The Spot Improvement Alternate generally includes relatively lower cost improvements that could be implemented individually as short-term solutions to address existing safety issues and geometric concerns. A number of locations were identified for potential spot improvement projects, as shown in **Figure 6-1**.

- Spot A: Extend reduced speed limit eastward from Booneville to east of Fish Creek School Road and widen road to provide shoulders. Stretching between milepoints 11.642 to 11.742, the total length of the spot improvement is 0.100 miles.
- Spot B: Widen roadway to include shoulders and improve existing curves at Shepherd Road (KY 3347) intersection. Stretching between milepoints 12.200 to 12.251, the total length of the spot improvement is 0.051 miles.



Spot Improvement A:
 Extend reduced speed limit from Booneville and widen road to provide shoulders.
 MP 11.642 - 11.742
 Total Cost = \$436,000

Spot Improvement B:
 Widen roadway to include shoulders and improve existing curvature.
 MP 12.200 - 12.251
 Total Cost = \$250,000

Spot Improvement C:
 Widen roadway to include shoulders and improve existing curvature.
 MP 17.000 - 17.300
 Total Cost = \$555,000

Spot Improvement D:
 Widen roadway to include shoulders and improve existing curvature.
 MP 17.600 - 18.100
 Total Cost = \$1,347,000

Spot Improvement G:
 Widen roadway to include shoulders and improve existing curvature.
 MP 3.500 - 3.900
 Total Cost = \$915,000

Spot Improvement I:
 Widen roadway to include shoulders and improve existing curvature.
 MP 10.700 - 11.100
 Total Cost = \$1,250,000

Spot Improvement J
 Widen roadway to include shoulders and improve existing curvature.
 MP 12.278-12.378
 Total Cost = \$570,000

Spot Improvement H:
 Widen roadway to include shoulders and improve existing curvature.
 MP 8.702 - 8.927
 Total Cost = \$885,000

Spot Improvement F:
 Widen roadway to include shoulders and improve existing curvature.
 MP 2.900 - 3.100
 Total Cost = \$845,000

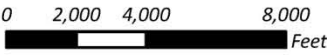
Spot Improvement E:
 Widen roadway to include shoulders and improve existing curvature.
 MP 19.000 - 19.599
 MP 0.000 - 0.500
 Total Cost = \$4,240,000

Figure 6-1



- Fatality Crash: 2
- Injury Crash: 48
- Property Damage Only (PDO) Crash: 69
- ▲ High Crash Spots: 4
- High Crash Segment: 0
- KY 30 Milepoints

Crash Data from:
 June 1, 2009 to
 June 30, 2013

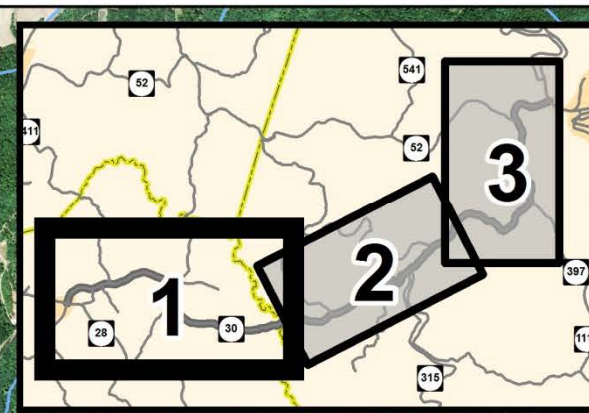


KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
Potential Spot Improvements

- Spot C: Widen roadway to include shoulders and improve existing curves between Stamper Road and Split Poplar Fork Road. Stretching between milepoints 17.000 to 17.300, the total length of the spot improvement is 0.300 miles.
- Spot D: Widen roadway to include shoulders and improve existing curves at Split Poplar Fork Road. Stretching between milepoints 17.600 to 18.100, the total length of the spot improvement is 0.500 miles.
- Spot E: Widen roadway to include shoulders and improve existing curves approaching county line. Stretching between milepoints 19.000 (Owsley County) and 0.500 (Breathitt County), the total length of the spot improvement is 1.099 miles.
- Spot F: Widen roadway to include shoulders and improve existing curves at Johnson Branch Road. Stretching between milepoints 2.900 to 3.100, the total length of the spot improvement is 0.200 miles.
- Spot G: Widen roadway to include shoulders and improve existing curves just east of KY 1114. Stretching between milepoints 3.500 to 3.900, the total length of the spot improvement is 0.400 miles.
- Spot H: Widen roadway to include shoulders and improve existing curves just west of Haddix Fork Road. Stretching between milepoints 8.702 to 8.927, the total length of the spot improvement is 0.225 miles.
- Spot I: Widen roadway to include shoulders and improve existing curves between Robinson Fork Road/Bethany Lane and the Cane Creek Bridge at Combs and Perry Bridge. Stretching between milepoints 10.700 to 11.100, the total length of the spot improvement is 0.400 miles.
- Spot J: Widen roadway to include shoulders and improve existing curve north of Mulberry Lane. Stretching between milepoints 12.278 to 12.378, the total length of the spot improvement is 0.100 miles.

B. Long Term Build Improvements along Corridor

The Two Lane Widening Alternates would result in the reconstruction of KY 30 as a two lane rural highway, providing two 11 foot wide travel lanes with 10 foot shoulders (8 foot paved). In some locations, off-alignment improvement options are included to improve deficient curves to operate at higher design speeds. The Two Lane Widening Alternates are shown in **Figure 6-2** through **Figure 6-4**, moving west to east along the corridor.



Segment 1 Alternates	Estimated Total Cost (millions of 2013 dollars)
No Build	\$0.0
<i>Two Lane Widening Alternate</i>	
<i>Improve corridor to 55 mph, following new alignment at times and widening shoulders.</i>	
Alternate 1A (Red + Blue Alternate)	\$31.4



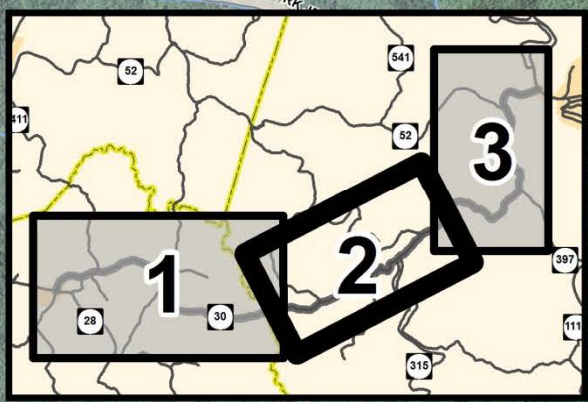
Figure 6-2



— Existing
 — Widen Existing On Alignment (55 mph)



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
**Long Term Improvement Options
 Segment 1**



Segment 2 Alternates	Estimated Total Cost (millions of 2013 dollars)
No Build	\$0.0
<i>Two Lane Widening Alternates</i>	
<i>Improve corridor to 55 mph, following new alignment at times and widening shoulders.</i>	
Alternate 2A (Red + Yellow Alternate)	\$40.6
Alternate 2B (Red + Green Alternate)	\$60.7
<i>Follow existing alignment, bringing all sections to at least 45 mph and widen shoulders.</i>	
Alternate 2C (Red + Pink Alternate)	\$29.3

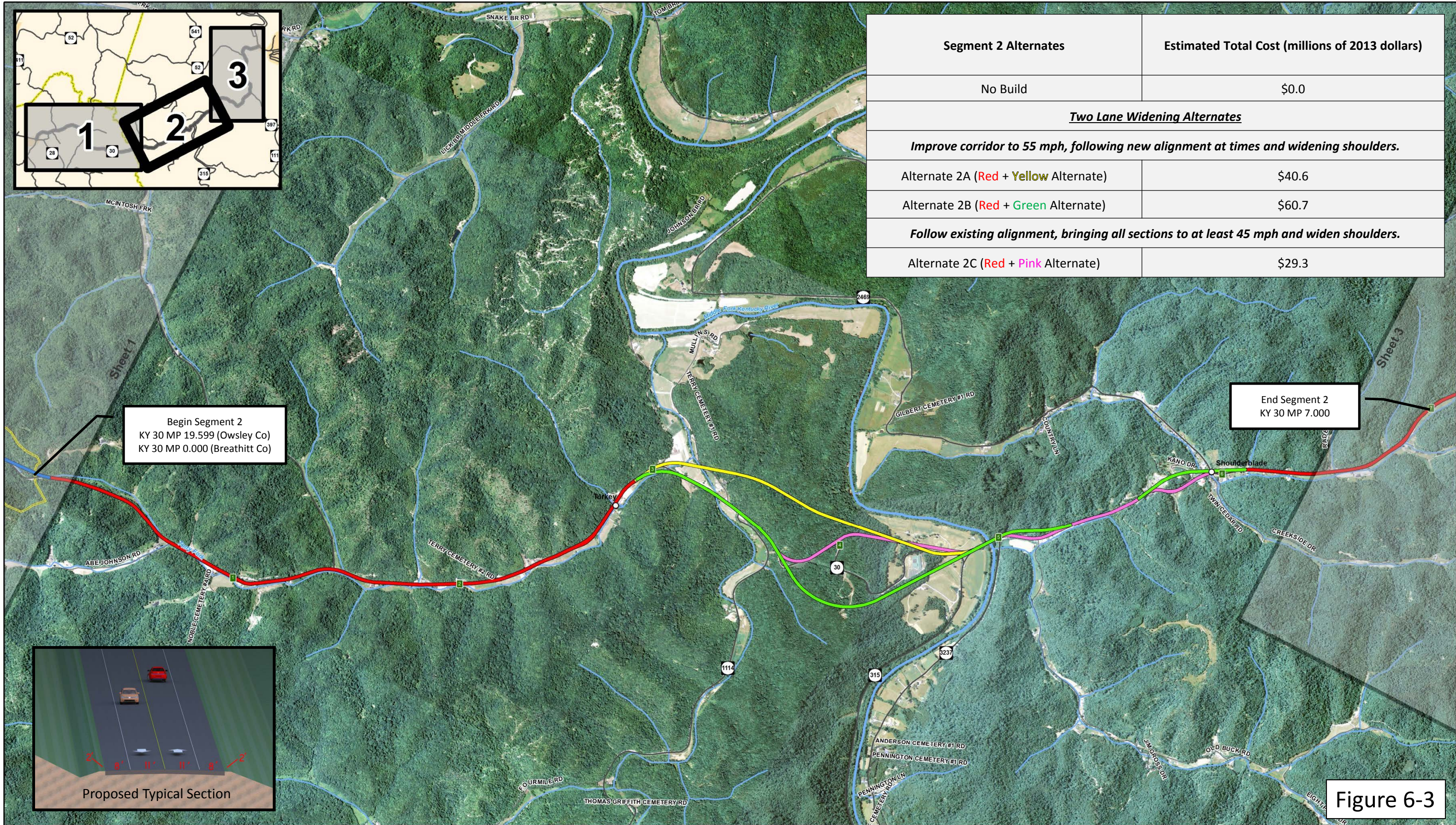


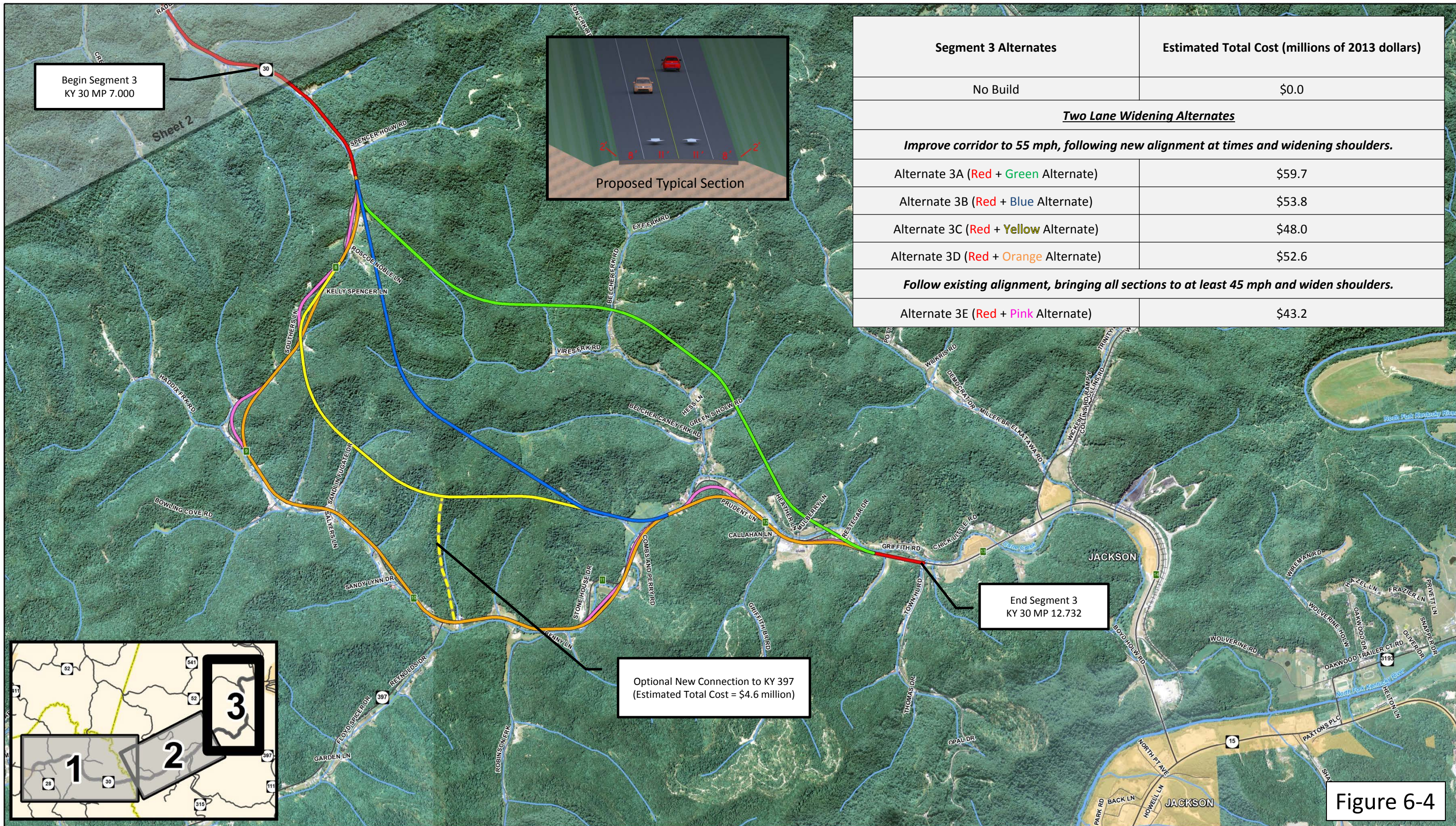
Figure 6-3



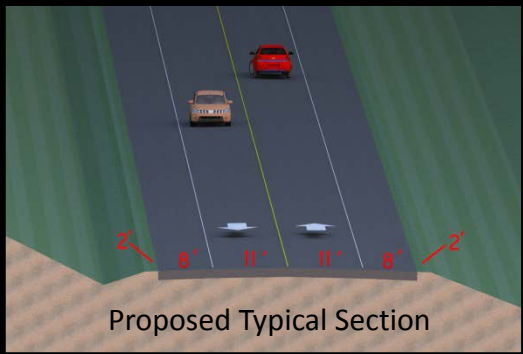
— Existing
 — Widen Existing On Alignment (55 mph)



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
**Long Term Improvement Options
 Segment 2**



Begin Segment 3
KY 30 MP 7.000



Segment 3 Alternates	Estimated Total Cost (millions of 2013 dollars)
No Build	\$0.0
Two Lane Widening Alternates	
<i>Improve corridor to 55 mph, following new alignment at times and widening shoulders.</i>	
Alternate 3A (Red + Green Alternate)	\$59.7
Alternate 3B (Red + Blue Alternate)	\$53.8
Alternate 3C (Red + Yellow Alternate)	\$48.0
Alternate 3D (Red + Orange Alternate)	\$52.6
<i>Follow existing alignment, bringing all sections to at least 45 mph and widen shoulders.</i>	
Alternate 3E (Red + Pink Alternate)	\$43.2

End Segment 3
KY 30 MP 12.732

Optional New Connection to KY 397
(Estimated Total Cost = \$4.6 million)

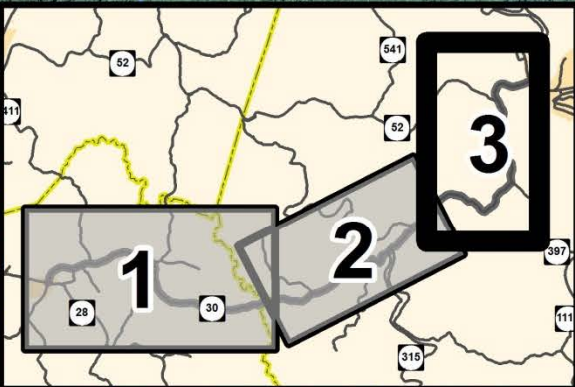


Figure 6-4



— Existing
— Widen Existing On Alignment (55 mph)



One long term build option is proposed in Segment 1, which stretches from Booneville to the Owsley/Breathitt County line. As shown in **Figure 6-2**, the majority of the route would be widened along the existing alignment to provide two 11 foot lanes and full 10 foot shoulders (8 foot paved). Spot Improvements A and B, which fall within the red portion of the Two Lane Widening Alternate, would be included in the long term improvement scenario as well. The three sections shown in blue in **Figure 6-2** would include off-alignment improvements to provide the full cross-section at a 55 mph design speed.

Three long term build options are proposed in Segment 2, which stretches from the county line to MP 7.000 (east of Shoulderblade). As shown in red in **Figure 6-3**, the majority of the route would be widened along the existing alignment to provide two 11 foot lanes and 10 foot shoulders (8 foot paved). For the portion of the route between Turkey and Shoulderblade, three off-alignment are proposed:

- Alternate 2A (Red + Yellow) would create a new 55 mph link north of the existing route from MP 3.0 at Johnson Branch Road to MP 4.8 at KY 315. Curves at Old Buck Road and Kano Drive would also be improved off-alignment to a 55 mph design speed.
- Alternate 2B (Red + Green) would create a new 55 mph link that generally follows the existing route from MP 3 at Johnson Branch Road to MP 3.7; between MP 3.7 and the intersection with KY 315, Alternate 2B travels south of the existing route. Curves at Old Buck Road and Kano Drive would also be improved off-alignment to a 55 mph design speed.
- Alternate 2C (Red + Pink) would create a new 45 mph link that generally follows the existing route from MP 3 at Johnson Branch Road to MP 3.7; between MP 3.7 and the intersection with KY 315, Alternate 2C travels north of the existing route. Curves at Old Buck Road and Kano Drive would also be improved to a 45 mph design speed.

Five long term build options are proposed in Segment 3, which stretches from MP 7.000 (east of Shoulderblade) to MP 12.732 (Town Hill Road) outside of Jackson. As shown in red in **Figure 6-4**, either end of the route in Segment 3 would be widened along the existing alignment to provide two 11 foot lanes and 10 foot shoulders (8 foot paved). For the portion of the route between MP 7.5 at Spencer Hollow Road and MP 12.6 at Griffith Road, five off-alignment options are proposed:

- Alternate 3A (Red + Green) would create a new 55 mph link west of the existing alignment between MP 7.5 and MP 12.6.
- Alternate 3B (Red + Blue) would create a new 55 mph link west of the existing alignment between MP 7.5 and MP 11.5 (just north of Combs and Perry Road). From MP 11.5 to MP 12.6, Alternate 3B creates a new 55 mph link east of the existing corridor.
- Alternate 3C (Red + Yellow) would create a new 55 mph link west of the existing alignment between MP 8 (Roscoe Nobel Lane) and MP 11.5 (just north of Combs and Perry Road). From MP 11.5 to MP 12.6, Alternate 3C creates a new 55 mph link east of the existing corridor.
- Alternate 3D (Red + Orange) would more closely follow the existing alignment, shifting slightly east or west to improve existing curves to a 55 mph design speed.
- Alternate 3E (Red + Pink) would more closely follow the existing alignment, shifting slightly east or west to improve existing curves to a 45 mph design speed.

C. Comparison of Costs & Impacts

Based on the conceptual alignments described above, **Table 6-1** presents a comparison of relocations and potential environmental impacts for each alternate. Overall, the No Build Alternate does not satisfy the project purpose, which is to improve roadway geometrics to enhance safety, local mobility, and regional connectivity. The Spot Improvements somewhat meet the purpose. Each of the options under the Two Lane Widening Alternate meets the purpose. As shown in the matrix, shorter alternates generally result in fewer impacts; alternates near the existing route tend to result in more relocations and stream impacts (e.g., Alternate 3D) whereas alternates further from the existing route tend to result in higher impacts to forested habitats (e.g. Alternate 3A). Further field study will be needed to determine the location and extent of mining operations; however there is a potential to encounter mine shaft entrances in Segment 3.

Table 6-1: Comparison of Alternate Impacts

Alternate	Potential Relocations	Stream Crossings	New Alignment through Forest	Known Mining Impacts
No Build	0	0	0 miles	None
Segment 1				
Spot Improvements	0	Widen 1	0 miles	None
Alt 1A (Red + Blue)	22	Widen 11 + 3 New	0.6 miles	None
Segment 2				
Spot Improvements	0	Widen 1	0 miles	None
Alt 2A (Red + Yellow)	35	Widen 7 + 2 New	1.1 miles	Potential for Wells
Alt 2B (Red + Green)	23	Widen 7 + 3 New	0.9 miles	Potential for Wells
Alt 2C (Red + Pink)	18	Widen 7 + 3 New	0.4 miles	Potential for Wells
Segment 3				
Spot Improvements	2	Widen 1	0 miles	None
Alt 3A (Red + Green)	22	Widen 9 + 6 New	2.6 miles	Potential Shafts
Alt 3B (Red + Blue)	20	Widen 9 + 5 New	2.3 miles	Potential Shafts
Alt 3C (Red + Yellow)	24	Widen 9 + 6 New	2.2 miles	Potential Shafts
Alt 3D (Red + Orange)	41	Widen 9 + 11 New	0.9 miles	Shafts
Alt 3E (Red + Pink)	18	Widen 9 + 10 New	0.3 miles	Shafts

Cost estimates were developed and include Design, Right-of-Way, Utilities, and Construction. Costs for the Two Lane Widening Alternates are summarized by phase in **Table 6-2**. Depending on the final alternate recommended for implementation, costs to improve the entire corridor range from \$103.7 million to \$151.7 million.

Table 6-2: Planning-Level Cost Estimates for Two Lane Widening Alternates presented in Millions of 2013 Dollars

Alternate	Length	Design	ROW	Utilities	Construction	Total Cost
Segment 1						
Alt 1A (Red + Blue)*	4.873 mi	\$1.3	\$1.0	\$1.7	\$14.0	\$18.0
	3.599 mi	\$0.9	\$0.8	\$1.3	\$10.4	\$13.4
Segment 2						
Alt 2A (Red + Yellow)**	5 mi	\$2.1	\$1.9	\$1.7	\$23.2	\$28.9
	2 mi	\$0.9	\$0.8	\$0.7	\$9.3	\$11.7
Alt 2B (Red + Green)**	5 mi	\$3.3	\$1.3	\$1.6	\$37.2	\$43.4
	2 mi	\$1.3	\$0.5	\$0.6	\$14.9	\$17.3
Alt 2C (Red + Pink)**	5 mi	\$1.5	\$1.1	\$1.7	\$16.6	\$20.9
	2 mi	\$0.6	\$0.4	\$0.7	\$6.7	\$8.4
Segment 3						
Alt 3A (Red + Green)	3.60 mi	\$4.6	\$2.1	\$1.2	\$51.8	\$59.7
Alt 3B (Red + Blue)	3.93 mi	\$4.2	\$2.0	\$1.3	\$46.3	\$53.8
Alt 3C (Red + Yellow)	4.22 mi	\$3.6	\$2.2	\$1.4	\$40.8	\$48.0
Alt 3D (Red + Orange)	5.20 mi	\$3.9	\$3.2	\$1.8	\$43.7	\$52.6
Alt 3E (Red + Pink)	5.44 mi	\$3.3	\$1.5	\$1.9	\$36.5	\$43.2
* Segment 1 divided into two construction segments: MP 11.127 to 16.000 and MP 16.000 to 19.599						
** Segment 2 divided into two construction segments MP 0.000 to 5.000 and MP 5.000 to 7.000						

Table 6-3 presents planning-level cost estimates by phase for each of the identified spot improvements. Costs for individual spots range from \$250,000 to \$4.3 million. To construct all ten spot improvements, the total cost would be \$11.3 million.

Table 6-3: Planning-Level Cost Estimates for Spot Improvements Costs presented in 2013 Dollars

Spot	MP	Design	ROW	Utilities	Construction	Total
A	11.642 to 11.742	\$30,000	\$21,000	\$35,000	\$350,000	\$436,000
B	12.200 to 12.251	\$15,000	\$15,000	\$20,000	\$200,000	\$250,000
C	17.000 to 17.300	\$30,000	\$20,000	\$105,000	\$400,000	\$555,000
D	17.600 to 18.100	\$152,000	\$20,000	\$175,000	\$1,000,000	\$1,347,000
E	19.000 to 19.599 0.000 to 0.500	\$315,000	\$75,000	\$350,000	\$3,500,000	\$4,240,000
F	2.900 to 3.100	\$60,000	\$35,000	\$70,000	\$680,000	\$845,000
G	3.500 to 3.900	\$60,000	\$35,000	\$140,000	\$680,000	\$915,000
H	8.702 to 8.927	\$65,000	\$40,000	\$80,000	\$700,000	\$885,000
I	10.700 to 11.100	\$85,000	\$75,000	\$140,000	\$950,000	\$1,250,000
J	12.278 to 12.378	\$35,000	\$100,000	\$35,000	\$400,000	\$570,000

Other potential impacts of widening the road are listed below.

- **Utilities** – Most of the corridor has above ground power, cable, and telephone lines that lie just off the existing road; the majority of the Owsley County section also has a water line. Avoiding and/or relocating these utilities will be a major factor during the design process and in future phases of project development.

- **Bridges and Culverts** – Numerous bridges and culverts lie along the route, which would likely need to be widened or replaced depending on the alternate selected. Except for the Middle Fork bridge that is scheduled for replacement, all structures have a sufficiency rating of 60 or better.
- **Cemeteries and Churches** – Numerous cemeteries and several churches lie in the vicinity of KY 30. As with rural areas, there is potential to encounter unmarked burial sites and small family plots that are not identified in statewide GIS databases.
- **Floodplain Encroachment** - Portions of the study route fall within floodplains of various creeks and the river. Coordination with resource agencies will be needed as part of any future project development phases.
- **Educational/Civic Institutions** - The corridor provides direct access to Highland-Turner Elementary School, as well as the Breathitt County Detention Center and Cadet Leadership and Education Program. Although no alternates directly impact these institutions, special consideration should be given to minimizing impacts and preserving safe access during construction. Stakeholders reported that the existing entrance to the school can be hazardous for buses during winter weather.
- **Hazardous Materials/Underground Storage Tank Sites** – GIS data from the US Environmental Protection Agency include a few permitted facilities/monitored sites along the corridor. Solid wastes generated by any future construction activities must be disposed of at a permitted facility.
- **Historic/Archaeological Resources** – Although it falls beyond the scope of this planning study, investigations to identify potential historic structures and/or archaeological deposits should be conducted as part of any future project development phases.
- **Geotechnical Considerations** – Site specific geotechnical investigations are critical in this region prior to design, particularly as mining operations are likely to be encountered. There are likely numerous potentially unstable talus areas in the study area. Soils in the area are generally suitable for embankment construction; suitable rock for embankment construction and rock roadbed is also readily available in this area of the state. Soils in the area are considered erodible.

Section 7

Final Coordination

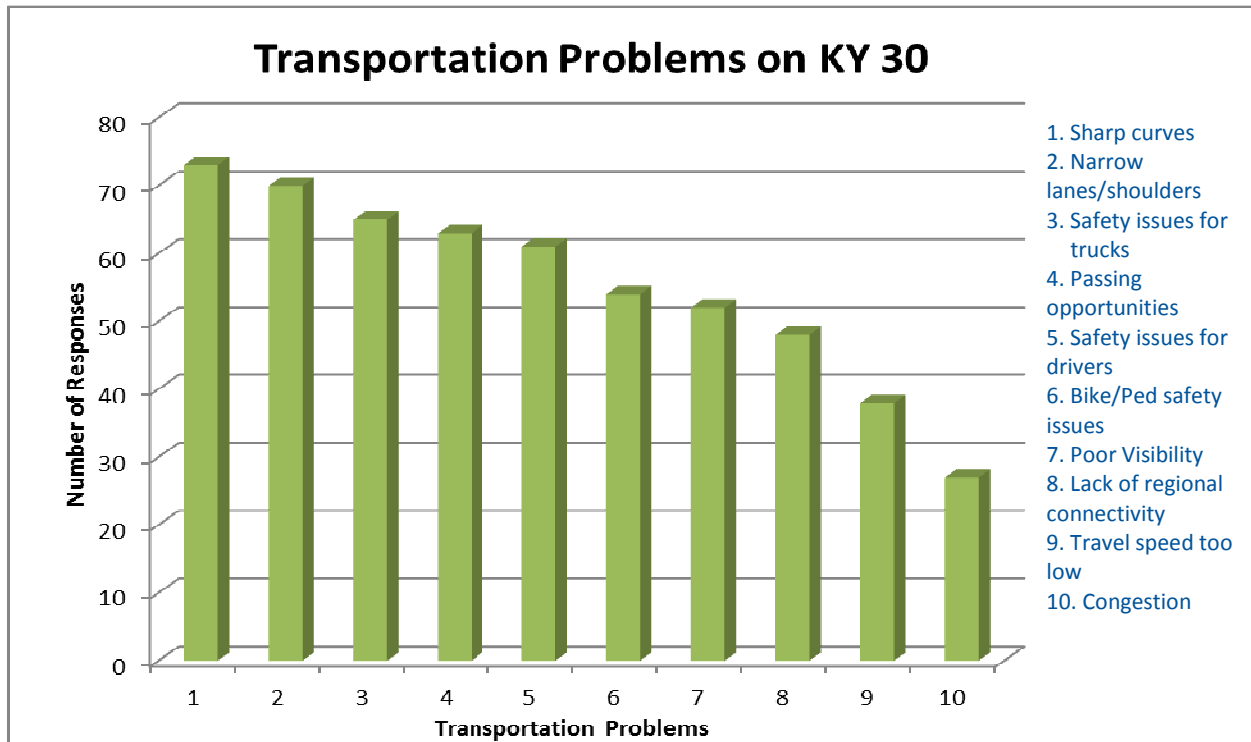
Following the development of alternates, the project team met with stakeholders and interested members of the public. At these coordination points, alternates were presented and each group was asked to provide feedback regarding their concerns and preferences.

A. Public Meeting

An open house public meeting was held on November 7, 2013 at Highland-Turner Elementary School. The meeting summary is included in **Appendix G**. The purpose of the meeting was to present project findings, solicit input, and give the public an opportunity to ask questions of the project team. Display boards provided information about key roadway characteristics, existing traffic conditions and crashes, environmental features, and proposed alternates. Excluding the project team, 67 individuals attended the meeting. Several attendees requested additional surveys for persons who could not attend the meeting.

Attendees were asked to complete a survey to indicate their concerns with the existing route and preferences regarding proposed alternates. Of the 78 completed surveys returned, all but two respondents indicated the corridor should be improved. When asked to identify existing transportation problems, respondents indicated that sharp curves and narrow lanes/shoulders were their top concerns. **Figure 7-1** presents other responses to this question.

Figure 7-1: What are the Existing Transportation Problems on KY 30?



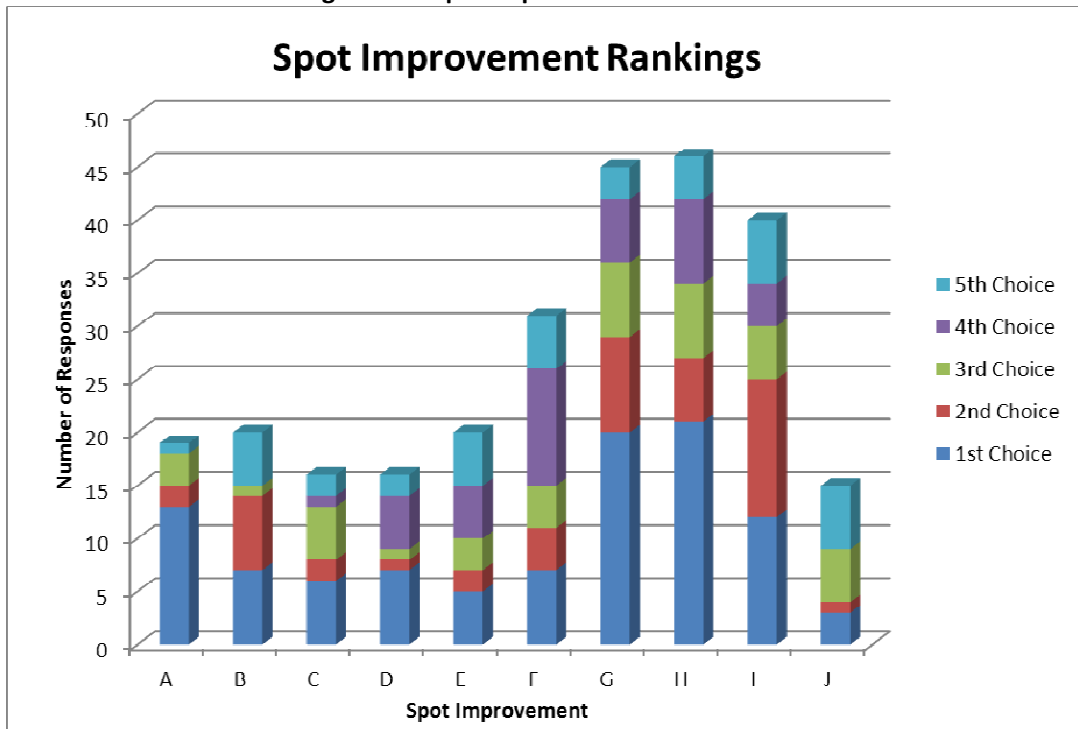
Overall, respondents preferred the corridor be improved to 55 mph, following a new alignment at times and widening the shoulders. **Table 7-1** summarizes respondent preferences for each segment, highlighting overall preferences for each segment.

Table 7-1: Alternate Preferences by Segment

	Description	Responses
Segment 1	Which Improvement Option do you prefer?	
	No Improvements in Segment 1	3 out of 69
	Spot Improvement but no long term improvements	18 out of 69
	Alternate 1A (Red + Blue) with 55 mph design	48 out of 69
	Should KY 30 be routed to avoid the Booneville courthouse square?	Yes = 59 out of 74
Segment 2	Which Improvement Option do you prefer?	
	No Improvements in Segment 2	1 out of 70
	Spot Improvement but no long term improvements	8 out of 70
	Alternate 2A (Red + Yellow) with 55 mph design	52 out of 70
	Alternate 2B (Red + Green) with 55 mph design	7 out of 70
Alternate 2C (Red + Pink) with 45 mph design	2 out of 70	
Segment 3	Which Improvement Option do you prefer?	
	No Improvements in Segment 3	1 out of 76
	Spot Improvement but no long term improvements	8 out of 76
	Alternate 3A (Red + Green) with 55 mph design	29 out of 76
	Alternate 3B (Red + Blue) with 55 mph design	18 out of 76
	Alternate 3C (Red + Yellow) with 55 mph design	13 out of 76
	Alternate 3D (Red + Orange) with 55 mph design	4 out of 76
Alternate 3E (Red + Pink) with 45 mph design	3 out of 76	

Respondents were shown a map of potential spot improvements and asked to rank their top five preferences. **Figure 7-2** shows the ranking of potential spot improvements. Overall, Spots H, G, I, and F received the most votes to fall within the top five priorities. Considering only respondent's top priority selections, Spots H, G, A, and I were most often selected.

Figure 7-2: Spot Improvement Preferences



In addition to the survey responses, attendees provided general comments during the meeting:

- Emergency response vehicles in Owsley County have to traverse KY 30 to reach the hospital in Jackson. An improved corridor would aid in quicker response times.
- Fixing KY 30 near Shoulderblade Hill and near Highland-Turner Elementary School are the two most critical areas.
- There are a lot of sharp curves. Trucks driving around the sharp curves have to use the opposing driving lane to navigate turns. This is really dangerous for opposing traffic. Widening driving lanes and shoulders could help this.
- School buses have a hard time using the Highland-Turner Elementary School entrance, especially during wintery weather.

B. Local Officials/Stakeholders Meeting #2

On December 20, 2013, a second meeting was conducted to solicit feedback from local officials and other stakeholders. At this meeting, attendees reviewed input from the November public meeting and discussed their recommendations for potential priorities to advance for future project development activities. At the meeting, discussion focused on a potential alternate KY 30 routing through Booneville that was identified at the public meeting. Overall, 80% of public survey respondents favored an alternate KY 30 route through Booneville to avoid the courthouse square. In response to this feedback, project team members developed a selection of potential conceptual rerouting options through Booneville, shown in **Figure 7-3**.

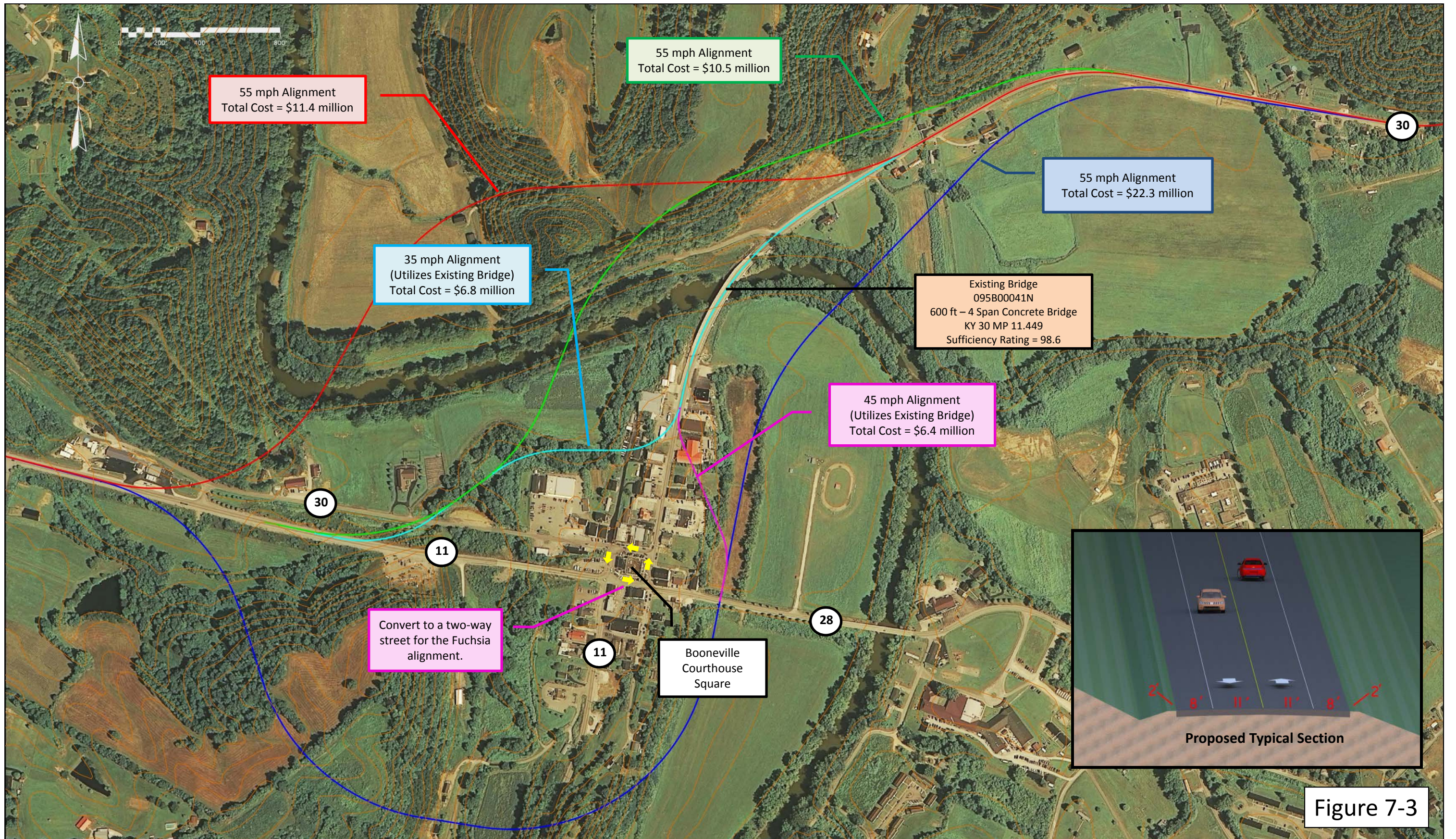


Figure 7-3



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
**Conceptual KY 30 Rerouting
 Options through Booneville**

As shown, five conceptual options were developed to illustrate potential rerouting alternates at Booneville. It should be noted that the existing courthouse is aging; a new courthouse could be constructed in a different location in the future, which could possibly negate the need for the potential rerouted KY 30 through Booneville.

- The Blue Alternate would swing south of the existing KY 30 alignment at Stillhouse Branch Road, cross the river east of the existing KY 30 bridge, and travel along the east and south sides of Booneville. The new route would connect to KY 11 west of town just east of Apple Gate Road. This connection would be designed at 55 mph.
- The Fuchsia Alternate would follow the existing KY 30 alignment across the river into Booneville then shift east near the Senior Citizens Center. It would tie into KY 28 (Court Street) east of downtown. Court Street at the courthouse would be converted to operate as a two-way street in this alternate. This connection would be designed at 45 mph.
- The Light Blue Alternate would follow the existing KY 30 alignment across the river into Booneville then shift west near the Senior Citizens Center. It would travel around the west side of Booneville and connect to KY 11 west of town near the Dollar General store. This connection would be designed at 35 mph.
- The Green Alternate would swing north of the existing KY 30 alignment at Stillhouse Branch Road, cross the river west of the existing KY 30 bridge, and travel along the west side of Booneville. The new route would connect to KY 11 west of town near the Dollar General store. This connection would be designed at 55 mph.
- The Red Alternate would swing west of the existing KY 30 alignment just north of the river and cross the river at a new location west of town. The new route would connect to KY 11 west of town near Apple Gate Road; it would be designed at 55 mph.

Overall, the Fuchsia and Light Blue Alternates have the lowest costs as they require the least roadway construction and reuse the existing Kentucky River Bridge. The Blue Alternate has the highest cost as it requires the most roadway construction. Planning-level cost estimates are presented in **Table 7-2** below.

Table 7-2: Planning-Level Costs Estimates for Booneville Rerouting Options presented in 2013 Dollars

Alternate	Length	Estimated Total Cost
Blue	1.9 mi	\$22.3 million
Fuchsia	0.7 mi	\$6.4 million
Light Blue	0.8 mi	\$6.8 million
Green	1.2 mi	\$10.5 million
Red	1.2 mi	\$11.4 million

During the meeting, local officials indicated a preference for the Blue Alternate, which was extended south of Court Street to connect west of town at their request. Other discussions included funding and prioritization of segments; a meeting summary is included in **Appendix G**.

Section 8

Conclusions & Recommendations

This chapter provides the project team’s recommendations for improvements to KY 30 between Booneville and Jackson. The project team met a final time on December 20, 2013 to review input and recommendations. A detailed summary of the final project team meeting is included in **Appendix F**.

The **Purpose** of the proposed KY 30 Project is to **Improve Roadway Geometrics** to enhance Safety, Local Mobility and Regional Connectivity.

Input from local officials, stakeholders, and public surveys showed a strong correlation regarding local preferences for improving KY 30 between Booneville and Jackson. Considering these preferences alongside technical data and engineering considerations, the project team developed the recommendations described below.

A. Implementation Recommendations

The planning study recommends that the corridor be improved to 55 mph and widening the roadway to provide two 11 foot wide travel lanes with 10 foot shoulders (8 foot paved). In some locations, off-alignment improvement options are included to improve deficient curves to operate at higher design speeds. **Table 8-1** summarizes the prioritized recommendations from the study staff.

Table 8-1: Prioritized Recommendations

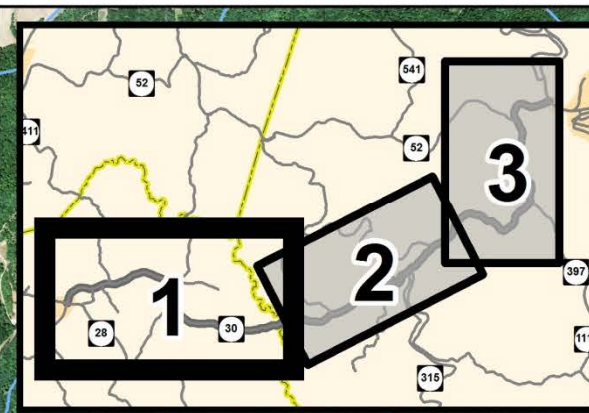
Priority	Description
1	Alternate 3C: improve corridor to 55 mph, following new alignment at times and widening shoulders.
2	Alternate 2A: improve corridor to 55 mph, following new alignment at times and widening shoulders.
3	Alternate 1A: improve corridor to 55 mph, following new alignment at times and widening shoulders.

1. Segment 1

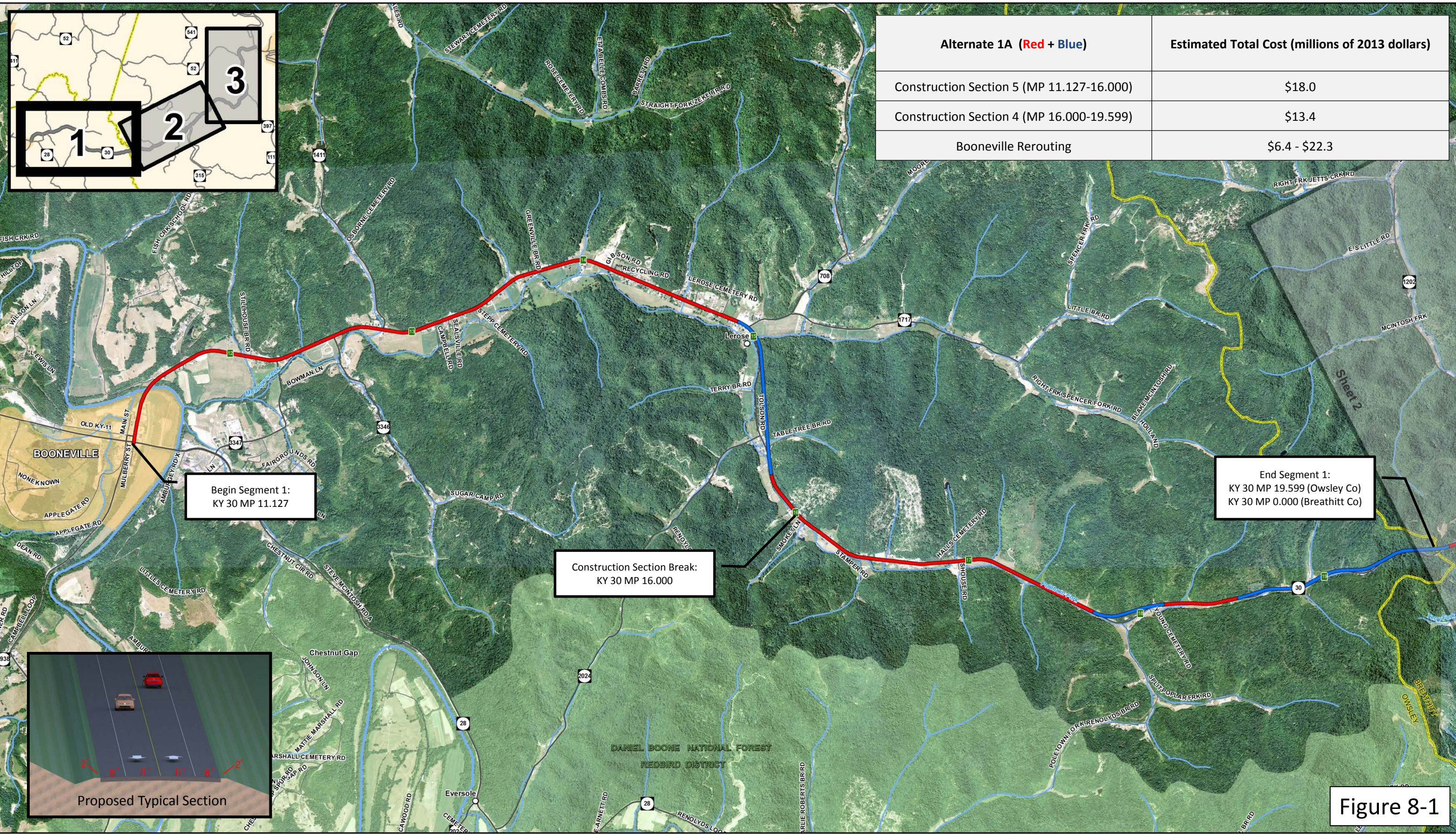
In Segment 1, Alternate 1A (Red + Blue) is recommended to advance for additional project development phases (shown in **Figure 8-1**). This is the third priority recommendation of the study as the crash trends and geometric deficiencies were less severe than in other sections.

Alternate 1A meets the purpose and would result in minor impacts to the natural environment, including streams, floodplains, and wetlands. Because it is located near the existing highway, Alternate 1A would result in an estimated 22 residential relocations, although this amount could be reduced during future design efforts. Alternate 1A was preferred by 70% of public survey respondents.

With Alternate 1A, a potential rerouting through Booneville should be considered to move traffic away from the courthouse square. A new route was preferred by 80% of public survey respondents.



Alternate 1A (Red + Blue)	Estimated Total Cost (millions of 2013 dollars)
Construction Section 5 (MP 11.127-16.000)	\$18.0
Construction Section 4 (MP 16.000-19.599)	\$13.4
Booneville Rerouting	\$6.4 - \$22.3



Begin Segment 1:
KY 30 MP 11.127

Construction Section Break:
KY 30 MP 16.000

End Segment 1:
KY 30 MP 19.599 (Owsley Co)
KY 30 MP 0.000 (Breathitt Co)

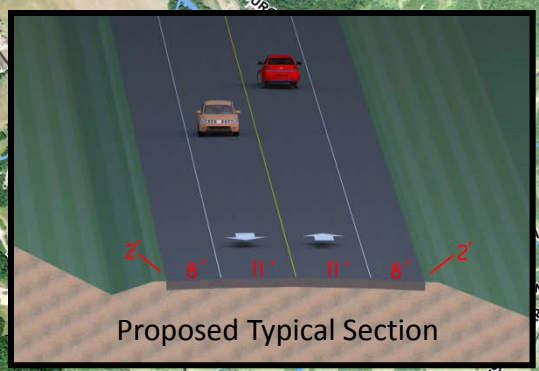


Figure 8-1



- Existing
- Widen Existing On Alignment (55 mph)
- New Alignment (55 mph)



KY 30 Planning Study
From KY 11 in Booneville to KY 15 in Jackson
Breathitt and Owsley Counties
**Long Term Improvement
Segment 1 Recommendation**

Of the conceptual options developed (presented in **Figure 7-3**), local officials indicated a preference for the Blue Alternate, which would cross the river east of the existing KY 30 bridge, and travel along the east and south sides of Booneville to connect to KY 11 west of town. It should be noted that if a new courthouse is constructed at some time in the future, the need for this portion of the project could be nullified. The study recommendation is that each of the conceptual rerouting options shown in **Figure 7-3** as well as eliminating on-street parking and reconfiguring the existing streets should all be considered further in future project development phases.

2. Segment 2

In Segment 2, Alternate 2A (Red + Yellow) is recommended to advance for additional project development phases (shown in **Figure 8-2**). This is the second priority recommendation of the study based on the crash history and geometric deficiencies.

Alternate 2A meets the project purpose and would result in moderate impacts to the natural environment, including streams, floodplains, wetlands, forested habitat (including likely habitat for endangered bat species), and potentially wells. Alternate 2A is the least expensive of the 55 mph options considered in Segment 2. It is the locally preferred option: 74% of public survey respondents indicated Alternate 2A was their preferred route in Segment 2. The number of residential relocations is the highest of all the alternates considered in Segment 2; however, this impact could be reduced during future design efforts by potentially lowering the design speed in some locations. Minimizing stream impacts (e.g., in lieu fees) should also be considered further during future design efforts.

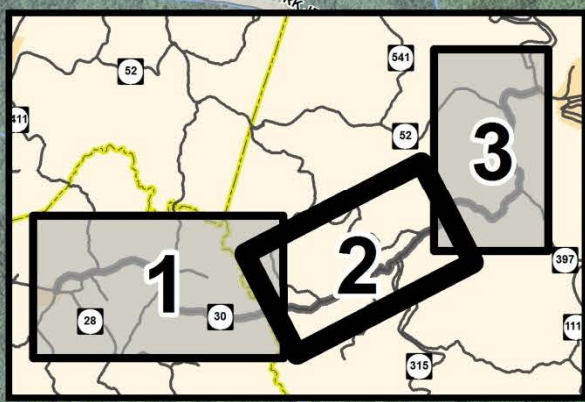
3. Segment 3

In Segment 3, Alternate 3C (Red + Yellow) is recommended to advance for additional project development phases (shown in **Figure 8-3**). This is the highest priority recommendation of this study based on the crash history and the concentration of substandard geometric features.

Alternate 3C meets the project purpose and would result in moderate impacts to the natural environment, including streams, floodplains, wetlands, forested habitat (including likely habitat for endangered bat species), and potentially mine shafts near the KY 30 intersection with Combs and Perry Road. It is the least expensive alternate in Segment 3 that provides a 55 mph design speed. Although Alternate 3C was not the favorite based on public input, 79% of survey respondents preferred off-alignment alternates to pass around the deficient geometric features from Shoulderblade Hill to Combs and Perry Road.

Alongside Alternate 3C, an optional new connection to KY 397 should be considered in future project phases (shown in **Figure 8-3**) due to the amount of traffic traveling between KY 30 and KY 397. To meet grade requirements the new link shown ties to existing KY 30 north of the existing KY 397 intersection. Other potential options include improving the deficient 3.5 mile section of the existing KY 30 alignment between KY 397 and the new off-alignment section or leaving the existing section as is. All options should be considered in the next phase of the project.

Project team members noted one particular concern with Alternate 3C during the final Project Team meeting: while the off-alignment section would create a safe, new route for through traffic, the deficient 3.5 mile section of the existing alignment would have to be preserved for local access. District staff was concerned about the county absorbing the additional maintenance costs. Alternate 3D, which has a 55 mph design speed and more closely follows the existing alignment, would



Alternate 2A (Red + Yellow)	Estimated Total Cost (millions of 2013 dollars)
Construction Section 3 (MP 0.000-5.000)	\$28.9
Construction Section 2 (MP 5.000-7.000)	\$11.7



Begin Segment 2
 KY 30 MP 19.599 (Owsley Co)
 KY 30 MP 0.000 (Breathitt Co)

End Segment 2
 KY 30 MP 7.000

Construction Section Break:
 KY 30 MP 5.000

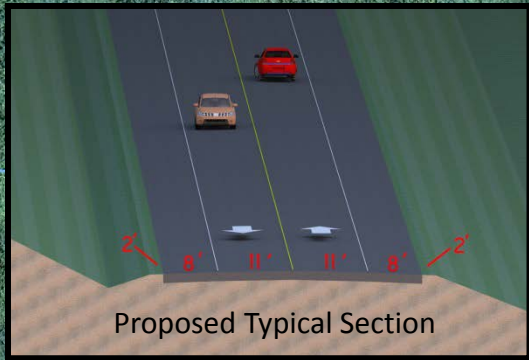


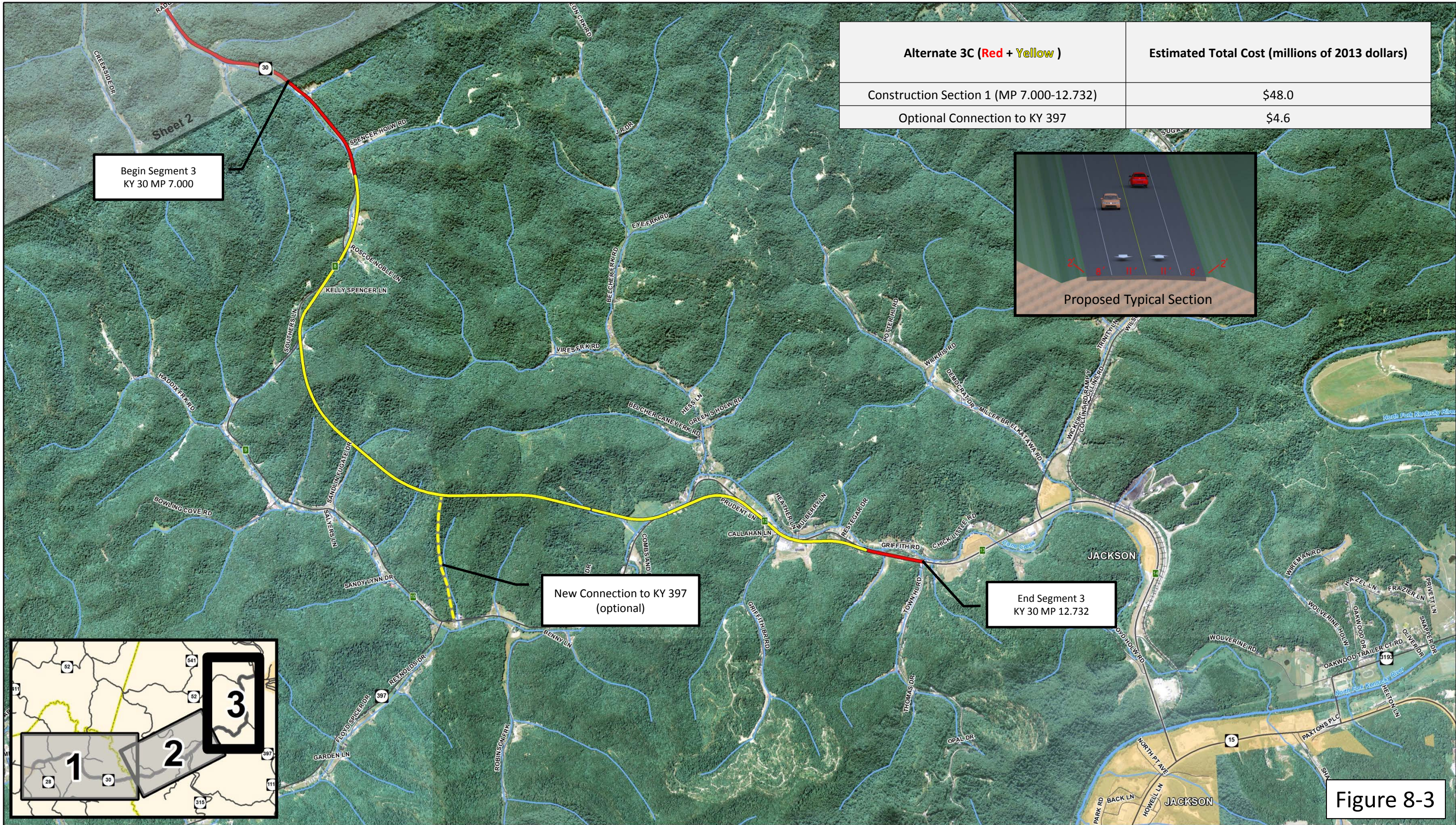
Figure 8-2



- Existing
- Widen Existing On Alignment (55 mph)
- New Alignment (55 mph)



KY 30 Planning Study
 From KY 11 in Booneville to KY 15 in Jackson
 Breathitt and Owsley Counties
**Long Term Improvement
 Segment 2 Recommendation**



New Connection to KY 397 (optional)

End Segment 3
KY 30 MP 12.732

Begin Segment 3
KY 30 MP 7.000

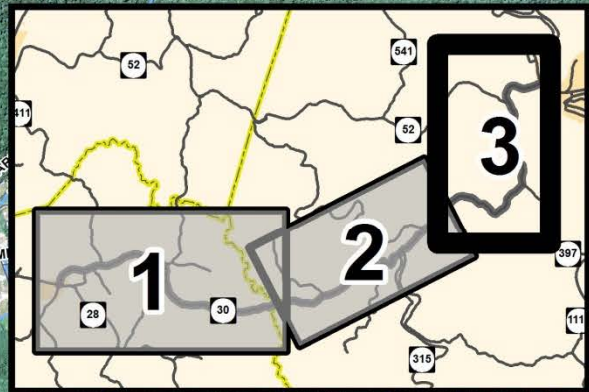
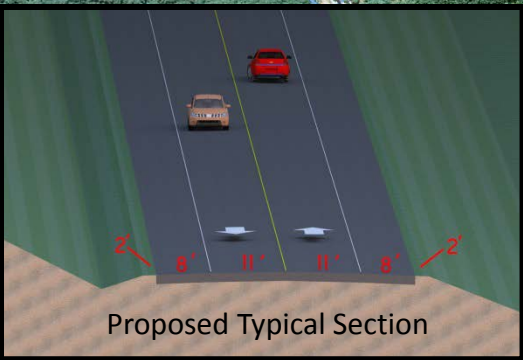


Figure 8-3



- Existing
- Widen Existing On Alignment (55 mph)
- New Alignment (55 mph)
- Optional Connection to KY 397



KY 30 Planning Study
From KY 11 in Booneville to KY 15 in Jackson
Breathitt and Owsley Counties
**Long Term Improvement
Segment 3 Recommendation**

minimize these costs but would result in higher residential relocations and additional impacts to streams.

4. Spot Improvements

Construction of spot improvements alone does not completely meet the purpose of the project. These short term improvements would address primary geometric deficiencies and safety concerns at select locations. If adequate funding is not available to implement the priorities in Segments 1, 2, or 3 above, implementing some or all of the spot improvements discussed in **Section 6** and shown in **Figure 6-1** would still be beneficial. Cost estimates for each spot improvement are shown in **Table 6-3**. The top five spot improvements are as follows:

- Spot H, a sharp curve near Shoulderblade Hill, was the top priority choice of 27% of public survey respondents. Overall, 59% of respondents indicated it was one of their top 5 priorities. Two of the five high crash spots along the route are located in the vicinity of Spot H. KY 30 would bypass Spot H upon completion of the re-alignment of Segment 3; however, local traffic will still utilize the existing roadway geometry.
- Spot G, a sharp curve near the intersection of KY 1114, was the top priority choice of 26% of respondents and was selected by 58% of respondents as one of their top 5 priorities. KY 30 would bypass Spot G upon completion of the re-alignment of Segment 2; however, limited local traffic may still utilize the existing roadway.
- Spot A, where KY 30 narrows east of the South Fork of the Kentucky River, was the top priority choice of 17% of respondents and was selected by 24% of respondents as one of their top 5 priorities. One of the five high crash spots along the route is located at Spot A. Spot A would be improved as part of Segment 1.
- Spot I, an S-curve near Robinson Fork, was the top priority choice of 15% of respondents and was selected by 51% of respondents as one of their top 5 priorities. Spot I would be improved as part of Segment 3.
- Spot F, a sharp curve in Turkey, was the top priority choice of 9% of respondents and was selected by 40% of respondents as one of their top 5 priorities. Spot F would be improved as part of Segment 2.

5. Construction Sections

Where possible, segments are recommended to be split into \$25 to \$30 million construction sections to ease funding and maintenance of traffic concerns (as shown in **Figure 8-1** through **Figure 8-3**).

- Segment 1 should be split into two construction sections. This split should occur at approximately MP. 16.0 to achieve the desired \$25 to \$30 million dollar construction sections.
- Segment 2 should be split into two construction sections. This split should occur at MP 5.0 where the proposed alternate goes off-alignment.
- The majority of Segment 3 is off-alignment. It may not be prudent to subdivide this segment into multiple construction sections, even though the construction costs exceed the desired \$25 to \$30 million construction section.

B. Cost Estimates by Construction Section for Recommended Improvement Segments

Planning-level cost estimates and prioritized construction sections are presented in **Table 8-2**.

Table 8-2: Cost Estimates by Prioritized Construction Section – Millions of 2013 Dollars

Prioritized Construction Section	Alternate	Design	ROW	Utilities	Construction	Total Cost
1	Alt 3C (MP 7.000 to 12.732)	\$3.6	\$2.2	\$1.4	\$40.8	\$48.0
2	Alt 2A (MP 5.000 to 7.000)	\$0.9	\$0.8	\$0.7	\$9.3	\$11.7
3	Alt 2A (MP 0.000 to 5.000)	\$2.1	\$1.9	\$1.7	\$23.2	\$28.9
4	Alt 1A (MP 16.000 to 19.599)	\$0.9	\$0.8	\$1.3	\$10.4	\$13.4
5	Alt 1A (MP 11.127 to 16.000)	\$1.3	\$1.0	\$1.7	\$14.0	\$18.0
Optional Improvements						
N/A	Booneville Rerouting	\$0.8	\$1.5	\$1.0	\$19.0	\$22.3
N/A	New KY 397 Connection	\$0.6	\$0.4	\$0.1	\$3.5	\$4.6

C. Construction and Environmental Considerations for Future Phases

Construction and environmental considerations identified throughout the study process are summarized here for further consideration in future project development phases:

- **Noise** – In any future project development phases, a detailed noise analysis should follow the FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise and the KYTC Noise Analysis and Abatement Policy (July 13, 2011) for a Type I project.
- **Waste Management** – Solid wastes occurring as part of the construction process must be disposed of at a permitted facility. Underground storage tanks and other contaminants should be properly addressed as they are encountered.
- **Geotechnical Considerations** – Site specific geotechnical investigations are critical in this region prior to design, particularly as mining operations are likely to be encountered. There are likely numerous potentially unstable talus areas in the study area. Soils in the area are generally suitable for embankment construction; suitable rock for embankment construction and rock roadbed is also readily available in this area of the state. Soils in the area are considered erodible.
- **Utilities** – Underground waterlines as well as above ground power, cable, and telephone lines lie just off the existing road for portions of the corridor. Avoiding and/or relocating these utilities will be a concern during the design process and in future phases of project development.
- **Traffic Operations** – Maintenance of traffic and residential access should be preserved throughout the construction process.

- **Erosion and Sediment Control** – Measures should be utilized to control erosion and sedimentation during and after the commencement of earth-disturbing activities. Consideration should be given to erosion control methods; a Best Management Practices for Construction Activities guide is available from the Kentucky Division of Conservation.
- **Cemeteries and Churches** – There are numerous churches and cemeteries along the existing route. Further, there is a potential to uncover previously unidentified burial sites during construction.
- **Schools** – The corridor provides direct access to Highland-Turner Elementary School. Bus access and mobility should be addressed in future project phases.
- **Threatened and Endangered Species** – The federally endangered Indiana bat and Gray bat are likely to occur in the project area. Coordination with the US Fish & Wildlife Service and the KY Department of Fish & Wildlife Resources will be required during future project development phases.
- **Floodplains & Wetlands** - Portions of the study route fall within the floodplains of various creeks and branches of the Kentucky River; coordination with the responsible agencies will be required. There are likely scattered wetlands along the corridor. Any affected wetlands should be delineated; impacts may require permits from the US Army Corps of Engineers and/or the Kentucky Division of Water.
- **Cultural & Historic Resources** - An archaeological and cultural historic survey of the project area should be conducted as part of future phases of the project development process to identify project-related impacts and to ensure compliance with Section 106 of the National Historic Preservation Act.
- **Hazardous Materials** – GIS data from the US Environmental Protection Agency include a few permitted facilities/monitored sites along the corridor, particularly in Breathitt County. Solid wastes generated by any future construction activities must be disposed of at a permitted facility.