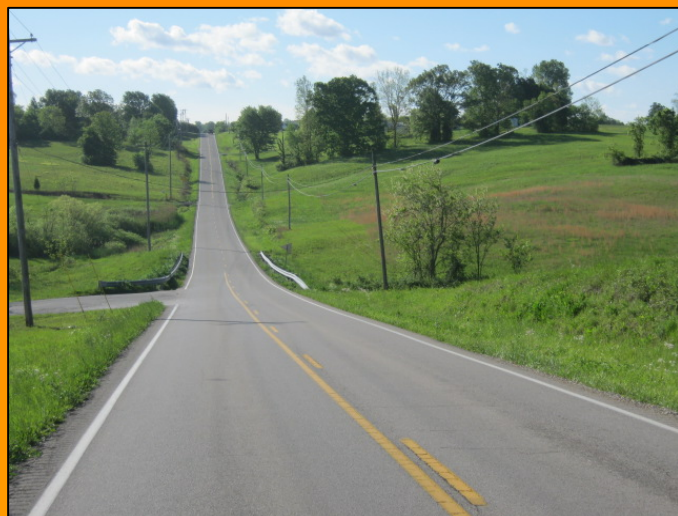


# EXECUTIVE SUMMARY

December 2017



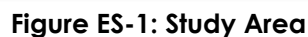
**KY 86 Scoping Study**  
**Breckinridge and Hardin Counties**  
**KYTC Item No. 4-8901.00**



## EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) initiated the KY 86 Scoping Study in Breckinridge and Hardin Counties to examine the need for and types of improvements necessary along KY 86 between the US 60 intersection in Breckinridge County and the US 62 intersection in Hardin County. The study area is shown in **Figure ES-1**. This study serves as the first step in establishing goals, completing an existing conditions analysis, identifying potential concerns, developing cost estimates, and evaluating preliminary alternatives along the 26.325-mile-long corridor.

The purpose of the KY 86 Scoping Study is to enhance regional mobility and to provide a safer east/west corridor across Breckinridge and Hardin Counties. KY 86 provides the most direct regional connection between Hardinsburg, Cecilia, Elizabethtown, the Western Kentucky Parkway, and I-65. I-65 is a major north-south interstate highway that travels through Western Kentucky from Nashville, Tennessee in the south to Louisville, Kentucky in the north.



Within the study corridor, KY 86 is functionally classified as a Rural Minor Arterial from US 60 in Breckinridge County to Cecilia in Hardin County and an Urban Minor Arterial from Cecilia to US 62. The posted speed limit throughout most of the corridor is 55 mph, except in Cecilia and several unincorporated communities, where the posted speed limit drops to 35 mph. The majority of KY 86 has nine-foot-wide lanes and eighteen-inch shoulders, which does not meet the minimum recommendations. The road widens to include 12-foot lanes in Cecilia, which is desirable. A review of the as-built plans found 18 horizontal curves (25 percent) and 160 vertical curves (66 percent) along KY 86 do not satisfy current “Green Book”<sup>1</sup> design guidelines for the existing functional classification and posted speed limits.

The current traffic volumes on KY 86 range between 1,700 and 4,200 vehicles per day (vpd) with 2.5 to 11 percent trucks. Of that, 59 percent of the trucks are single unit trucks and school buses rather than long-haul freight. It should also be noted that the majority of large trucks are traveling the entire corridor length and the truck percentage varies due to the range in vehicles per day. By 2040, traffic volumes are expected to grow to between 1,900 to 4,700 vpd with a truck percentage between 2.7 and 11.7 percent. A volume to capacity (V/C) and level of service (LOS) analysis indicates the two-lane road can accommodate the existing and future traffic demand.

#### Purpose and Need

- A two-lane road can adequately accommodate the existing and future traffic demand.
- Safety is the primary concern along KY 86.
- Given the location and types of crashes (primarily single vehicle collisions), it appears roadway geometrics could be a contributing factor.

Over the ten-year period between July 1, 2006, and June 30, 2016, 398 crashes were reported along the study area. Of these, six (1.5 percent) resulted in fatalities and 105 (26.4 percent) resulted in injuries. Along the study corridor, 19 spots were identified to have a critical crash rate factor (CRF) greater than 1.0<sup>2</sup>.

### ALTERNATIVE DEVELOPMENT

As noted in the Purpose and Need Statement, safety is the primary concern along KY 86. Based on early input from stakeholders and local officials, the project team decided the focus of the study would be to identify safety improvements that can be implemented quickly and independently. Along with spot improvements, this study examined a complete reconstruction alternative and the no-build alternative.

#### Alternatives Considered

- No-Build
- Complete Reconstruction
- Spot Improvements

The No-Build alternative does not meet the project purpose but was carried forward as a baseline for comparison.

<sup>1</sup> American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 6<sup>th</sup> Edition, 2011.

<sup>2</sup> Per the Kentucky Transportation Center’s (KTC) annual *Analysis of Traffic Crash Data in Kentucky (2011-2015)*, a CRF greater than 1.00 indicates that crashes may be occurring more often than can be attributed to random occurrence.



Complete reconstruction consists of widening driving lanes and shoulders along the study portion of KY 86 and bringing roadway geometrics to a 55-mph design speed. The total cost of this improvement concept would be approximately \$160 million. The high cost would likely make such an undertaking infeasible as it would have to compete against other statewide projects for funding. The project team decided the complete reconstruction alternative was not a viable improvement concept and should not be carried forward in the alternative development process.

The Spot Improvements generally include short segments of the corridor with relatively lower costs that can be implemented individually. Nineteen locations were identified as spot improvement projects, shown in **Figure ES-2**.

## PUBLIC INVOLVEMENT

Public engagement for the KY 86 Scoping Study was undertaken through a two-step process involving meetings with project stakeholders and local officials, followed by meetings with the general public in both Breckinridge and Hardin Counties. The purpose of the meetings was to provide information about the study and the improvements under consideration, discuss conceptual alternatives, and solicit input.

Surveys were distributed to the local officials, stakeholders, and the public. Twenty-five surveys were returned during the Hardin County public meeting and 39 surveys were returned during the Breckinridge County meeting.

- When asked what issues exist on KY 86 that should be addressed by this project, the most common responses were safety, excessive speeds, sharp curves, and narrow shoulders.
- 75 percent of Hardin County respondents and 57 percent of Breckinridge County respondents preferred spot Improvements over the complete reconstruction alternative.
- Spot Improvements 10, 13, and 19 were identified as the top three priorities at the Hardin County public meeting. One survey was received from the local officials/stakeholders meeting in Hardin County. Spot Improvement 19 was selected as the top priority.
- Spot Improvements 2, 4, and 6 were identified as the top three priorities at the Breckinridge County public meeting. Four surveys were received from the local officials/stakeholders meeting in Breckinridge County. Spot Improvement 2 was selected as the top priority.



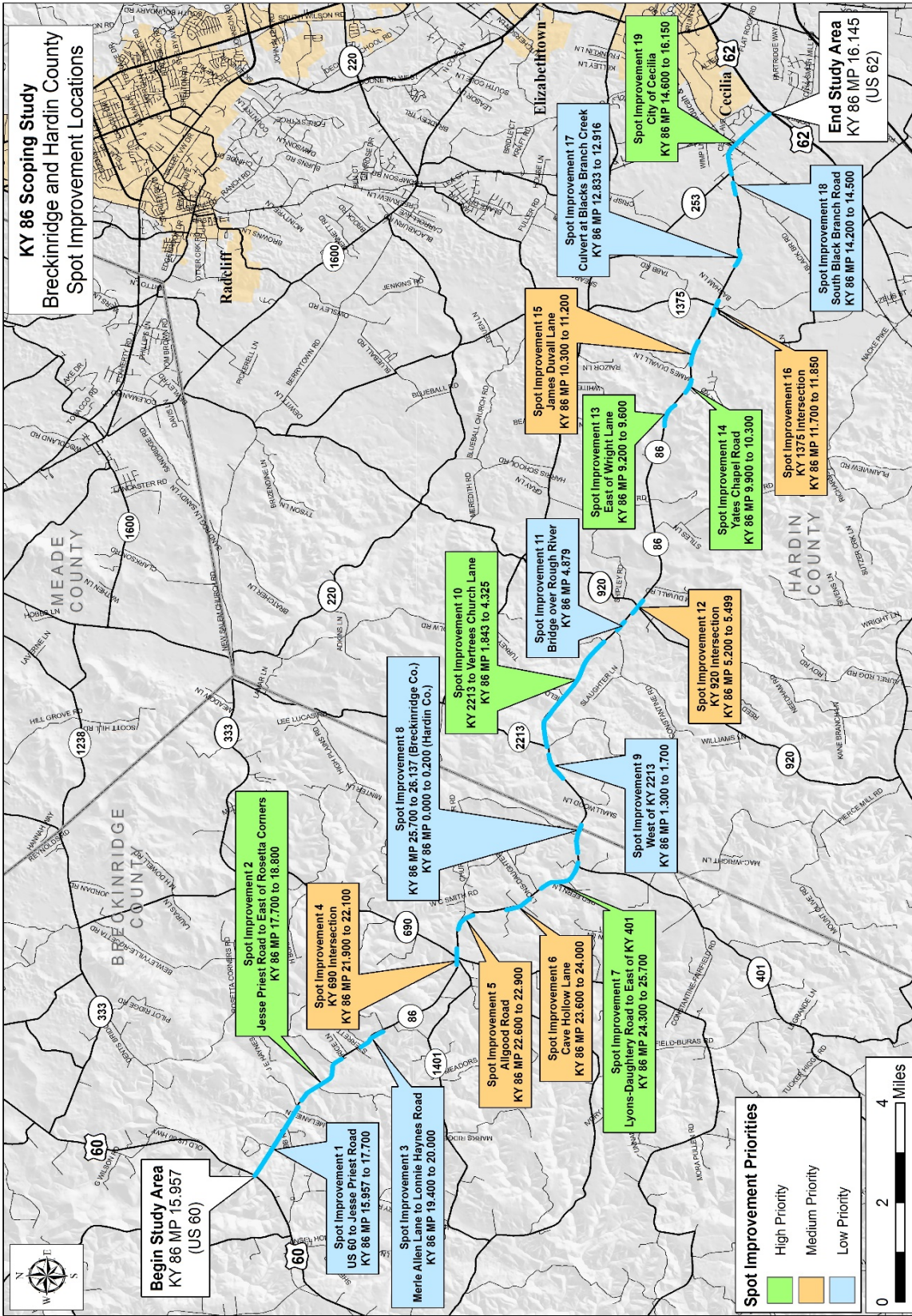


Figure ES-2: Spot Improvement Locations

In addition to the public engagement process, the project team held three meetings to coordinate key issues. The project team consisted of representatives of the KYTC Central Office, KYTC District 4 Office, the Lincoln Trail Area Development District (LTADD), and the consultant.

## RECOMMENDATIONS

Prioritization for the KY 86 Scoping Study was based on the project's ability to meet the purpose and need, the existing conditions analysis, the input received, and the alternative development process detailed in the final report. The project team prioritized the improvements into high, medium, and low priority. **Table ES-1** summarizes the design, right-of-way, utility, construction, and total cost estimates for the six high priority projects. Brief descriptions of all spot improvements developed by the project team follow.

**Table ES-1: High Priority Project Cost Estimates**

High Priority Spot Improvements	County (Begin MP-End MP)	Project Length (miles)	Improvement Options	2017 Cost Estimates				
				Design	Right-of-Way	Utility	Construction	Total
<b>Spot Improvement 2</b> Jesse Priest Rd to East of Rosetta Corners	Breckinridge (17.700-18.800)	1.100	Widen Shoulders	\$50,000	\$0	\$0	\$500,000	\$550,000
			Flexible Delineators					
			High-Friction Pavement Surface					
			Realignment	\$570,000	\$1,000,000	\$1,000,000	\$3,800,000	\$6,370,000
<b>Spot Improvement 7</b> Lyons-Daughtery to East of KY 401	Breckinridge (24.300-25.700)	1.400	Widen Shoulders	\$60,000	\$0	\$0	\$600,000	\$660,000
			Flexible Delineators					
			High-Friction Pavement Surface					
			Pave Intersection Approach					
			Realignment	\$560,000	\$750,000	\$1,000,000	\$3,700,000	\$6,010,000
<b>Spot Improvement 10</b> KY 2213 to Vertrees Church Lane	Hardin (1.843-4.325)	2.482	Remove Vegetation	\$50,000	\$0	\$0	\$500,000	\$550,000
			Widen Shoulders					
			Replace Bridge	\$110,000	\$150,000	\$50,000	\$700,000	\$1,010,000
			Lengthen Culvert and Improve Clear Zone	\$20,000	\$0	\$0	\$100,000	\$120,000
			Passing Lane	\$420,000	\$350,000	\$100,000	\$2,800,000	\$3,670,000
<b>Spot Improvement 13</b> East of Wright Lane (Coon Hunters Club)	Hardin (9.200-9.600)	0.400	Remove Vegetation	\$30,000	\$0	\$0	\$250,000	\$820,000
			Widen Shoulders					
			Flexible Delineators					
			High-Friction Pavement Surface					
			Realignment	\$120,000	\$200,000	\$100,000	\$800,000	\$1,220,000
<b>Spot Improvement 14</b> Yates Chapel Road	Hardin (9.900-10.300)	0.400	Widen Shoulders	\$30,000	\$0	\$0	\$250,000	\$280,000
			Flexible Delineators					
			High-Friction Pavement Surface					
<b>Spot Improvement 19</b> City of Cecilia	Hardin (14.600-16.150)	1.550	Vertical Realignment	\$90,000	\$100,000	\$100,000	\$600,000	\$890,000
			Drainage Improvements	\$80,000	\$100,000	\$100,000	\$500,000	\$780,000
			Signal Ahead Warning Sign	\$0	\$0	\$0	\$250	\$250
			Widen to 3-Lanes with Center TWLTL	\$450,000	\$1,500,000	\$2,000,000	\$3,000,000	\$6,950,000



### High Priority (in no particular order)

- **Spot Improvement 2 – Jesse Priest Road to east of Rosetta Corners Road:** This spot improvement includes KY 86 from Jesse Priest Road to east of Rosetta Corners in Breckinridge County (MP 17.700 to MP 18.800). This portion of the route includes three high crash spots with CRFs ranging from 1.24 to 1.86. Of the 21 reported crashes over the past ten years, one was a fatal collision and eight (38 percent) were injury collisions. This portion of the route also includes a combination of sharp curves and poor stopping sight distance. Short-term improvement options include widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the three horizontal curves. A long-term improvement option is to realign the segment, replacing three of the horizontal curves with a single curve. This location is on KYTC's Unscheduled Needs list as PIF 04 014 D0086 4.10. Looking at logical termini, consideration should be given to combining Spot Improvements 1 and 2 into a single project.



- **Spot Improvement 7 – Lyons-Daughterly Road to east of KY 401:** This spot improvement includes KY 86 from Lyons-Daughterly Road to east of KY 401 in Breckinridge County (MP 24.300 to MP 25.700). This location is a high crash spot with a CRF of 2.49 and was identified as an area of concern at the first Local Officials/Stakeholders Meeting. Of the 27 reported crashes over the past ten years, one was a fatal collision and nine (33 percent) were injury collisions. This portion of the route includes a combination of sharp curves and poor stopping sight distance. Short-term improvement options include widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the four horizontal curves. Wider paved shoulders should also be considered to accommodate bicycles in Dyer. A long-term improvement option is realigning the route to eliminate many of the curves. KY 401 would likely need to be extended to the realignment. An additional improvement option along this portion of KY 86 includes paving the intersection approaches at Lyons-Daughterly Road and Dyer Cemetery Road. There is a local firehouse at the corner of Lyons-Daughterly Road and KY 86. Larger radii should be considered at this intersection as part of repaving the approach to better accommodate fire trucks.



➤ **Spot Improvement 10 – KY 2213 to Vertrees**

**Church Lane:** This spot improvement includes KY 86 between KY 2213 and Vertrees Church Lane in Hardin County (MP 1.843 to MP 4.325).

This location was identified as an area of concern at the first Local Officials/Stakeholders Meeting. Of the 22 reported crashes over the past ten years, five were injury collisions (23 percent). Fifteen of the crashes (68 percent) were single vehicle crashes including vehicles that ran-off the road and hit a fixed object such as guardrail.

This portion of KY 86 has minimal clear zone between the roadway and adjacent trees, guardrail, culverts, and bridge. Improvement options include removing vegetation and the tree canopy to improve sight-lines, widening shoulders where guardrail is needed, replacing the bridge, and lengthening the culvert and improving the clear zone. Another improvement option includes adding a passing lane at Arch Hill.



- **Spot Improvement 13 – East of Wright Lane (Cherry Tree Coon Hunters Club):** This spot improvement includes KY 86 east of Wright Lane in Hardin County (MP 9.200 to MP 9.600). This portion of the route includes a 45-mph horizontal curve with poor stopping sight distance. This portion of the route includes two high crash spots with CRFs ranging from 1.21 to 1.70 and was identified as an area of concern at the first Local

Officials/Stakeholders Meeting. Of the 13 reported crashes over the past ten years, three were injury collisions (23 percent). Nine of the crashes (69 percent) were single vehicle crashes including vehicles that ran off the road. Improvement options include removing vegetation to improve the clear zone and sight-lines, widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the horizontal curve. An additional improvement option includes realigning KY 86.





- **Spot Improvement 14 – Yates Chapel Road:** This spot improvement includes KY 86 near Yates Chapel Road in Hardin County (MP 9.900 to MP 10.300). This portion of the route includes a 50-mph horizontal curve and is a high crash spot with a CRF of 1.21. Of the 14 reported crashes over the past ten years, one was a fatal collision and seven were injury collisions (50 percent). The fatal collision was a head-on collision in the horizontal curve. Ten of the crashes (71 percent) were single vehicle crashes. Improvement options include widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the horizontal curve.



- **Spot Improvement 19 – City of Cecilia:** This spot improvement includes KY 86 through the city of Cecilia in Hardin County (MP 14.600 to MP 16.150). This location was identified as an area of concern at the first Local Officials/Stakeholders Meeting. There were 31 crashes on this portion of KY 86 between 2006 and 2016, 15 (48 percent) of which were rear end collisions. One improvement option is to widen KY 86 to three-lanes through Cecilia in Hardin County to include a center two-way left turn lane and bike lanes. A center two-way left turn lane would reduce these types of crashes and reduce congestion<sup>3</sup>. Additional improvements include realigning the vertical alignment on KY 86 at the KY 253/Lewis Lane intersection to improve stopping sight distance, drainage improvements to reduce flooding on KY 86, and adding “Signal Ahead” warning signage prior to KY 86/US 62 intersection to improve intersection and traffic signal conspicuity. The priorities are improving the drainage along KY 86 and improving the sight distance at the KY 253 intersection. Widening this portion of KY 86 to three-lanes is not considered a high priority.



<sup>3</sup> Persaud, B., C. Lyon, K. Eccles, N. Lefler, D. Carter, and R. Amjadi. Safety Evaluation of Installing Center Two-Way Left-Turn Lanes on Two-Lane Roads. Federal Highway Administration, FHWA Report No. FHWA-HRT-08-042, December 2007.

### Medium Priority (in no particular order)

- **Spot Improvement 4 – KY 690 Intersection:** There is a general store and a post office located at the KY 690 intersection and access is poorly defined. One improvement option is to realign the skewed intersections at KY 690 and KY 1401 to the north and implement access management improvements in front of the Custer General Store. Wider paved shoulders should also be considered to accommodate bicycles in Custer. An additional improvement includes installing a flashing intersection beacon at KY 690.
- **Spot Improvement 5 – Allgood Road:** Improvement options include removing vegetation to improve the clear zone and sight-lines, widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the horizontal curve. Allgood Road is connected to Conder-St. John Road, and the Allgood Road approach to KY 86 is skewed. Removing the direct connection from Allgood to KY 86 would improve safety at the horizontal curve. Access to KY 86 would be maintained at Conder-St. Johns Road, a more perpendicular intersection located immediately to the east.
- **Spot Improvement 6 – Cave Hollow Lane:** Improvement options include widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the horizontal curve. An additional improvement along this portion of KY 86 includes improving the clear zone and lengthening the culvert. Note: as part of this project wider shoulders, flexible delineators, and the application of a high-friction pavement surface at the horizontal curve were recently completed at Spot Improvement 6, near Cave Hollow Lane.
- **Spot Improvement 12 – KY 920 Intersection:** Field's Grocery is located at this busy intersection and access is poorly defined. One improvement option is to implement access management improvements to better define access. An additional improvement is to move the passing permitted striping away from the intersection.
- **Spot Improvement 15 – James Duvall Lane:** Short-term improvement options include addressing drainage issues and removing vegetation along the vertical curves to improve the clear zone and sight-lines. A long-term improvement includes realigning the vertical curves to improve the stopping sight distance.
- **Spot Improvement 16 – KY 1375 Intersection:** A short-term improvement option includes removing vegetation east of KY 1375 to improve the sight-lines at the intersection. A long-term improvement option includes realigning the vertical curves west of KY 1375 to improve the stopping sight distance. Wider paved shoulders should also be considered as part of the realignment to accommodate bicycles in Franklin Cross Roads.

### Low Priority (in no particular order)

- **Spot Improvement 1 – US 60 to Jesse Priest Road:** One improvement option is to widen the shoulders along this portion of KY 86. The narrow shoulders and shoulder breaks provide less than desirable recovery opportunity for vehicles leaving the travel way. Additional improvements along this portion of KY 86 include improving the clear zone at a steep roadside ditch and paving the minor approaches to KY 86 at Wee Springs Road and Lucas-Moore Lane
- **Spot Improvement 3 – Merle Allen Lane to Lonnie Haynes Road:** Improvement options include widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the two horizontal curves.
- **Spot Improvement 8 – West of Breckinridge County Line and east of Hardin County Line:** Improvement options include widening shoulders, adding flexible delineators, and the application of a high-friction pavement surface at the horizontal curve. An additional improvement along this portion of KY 86 includes improving the clear zone and lengthening the culvert.
- **Spot Improvement 9 – West of KY 2213:** Improvements include removing vegetation to improve the clear zone and sight-lines and widening shoulders where guardrail is needed at the horizontal curve.
- **Spot Improvement 11 – Bridge over Rough River:** A short-term improvement is to remove vegetation to improve the clear zone and sight-lines on the approaches. A long-term improvement is to replace the bridge.
- **Spot Improvement 17 – Culvert at Blacks Branch Creek:** An Improvement option includes lengthening the culvert and improving the clear zone.
- **Spot Improvement 18 – South Black Branch Road:** Improvement options include widening shoulders and improving the clear zone and relocating the utility pole at South Black Branch Road.

### NEXT STEPS

The 2016 Kentucky Highway Plan includes \$500,000 for the planning phase of this project, funds that were used to perform the KY 86 Scoping Study. The next phase for the project would be Phase 1 Design, which would include Preliminary Engineering and supporting Environmental Analysis to further evaluate the high priority projects. As this Scoping Study did not spend the entire planning budget, there are some funds remaining for preliminary design of one or more improvement projects. Additional phases of the project are not funded in the 2016 Highway Plan.