FINAL REPORT



KY 69 Scoping Study Hancock County KYTC Item No. 2-8708.00

Prepared for:



Kentucky Transportation Cabinet Central Office, Division of Planning Highway District 2, Madisonville

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KY 69 Scoping Study KYTC Item No. 2-8708.00

Executive Summary

The Kentucky Transportation Cabinet (KYTC) initiated the KY 69 Scoping Study in Hancock County to examine the need for and types of improvements necessary along KY 69 between the Ohio County Line (MP 0.000) and US 60 (MP 13.080). The study serves as the first step in establishing the purpose and goals of the project, identifying potential concerns, and evaluating preliminary alternatives.

Purpose and Need

The purpose of the KY 69 Improvement Project is to enhance regional mobility and to provide a safer, more efficient north/south corridor through Hancock County. KY 69 provides the most direct regional connection for areas between the William H. Natcher Parkway, Wendell H. Ford/Western Kentucky Parkway, and the Bob Cummings Lincoln Trail Bridge over the Ohio River in Hawesville (which is the Hancock County seat). The Lincoln Trail Bridge provides easy access to Indiana and Interstate 64, and is the only Ohio River Bridge crossing between Maceo (18 miles west) and Brandenburg (45 miles east), Kentucky.

KY 69 was built in the 1930's and as a result, the existing alignment is characterized by horizontal and vertical curvature that does not meet current Green Book¹ guidelines. A review of the asbuilt plans reveals there are 63 horizontal curves in the study area, 23 (37 percent) of which have radii less than 960 feet, indicating they do not satisfy a 55 mph design speed. Of the 114 vertical curves in the study area, 67 (59 percent) have stopping sight distance less than 495 feet, which would not satisfy a 55 mph design speed. Additionally, the ten-foot driving lanes and two-foot shoulders are less than what is currently recommended. The narrow shoulders and shoulder breaks along the corridor do not provide sufficient recovery opportunity for vehicles leaving the travel way.

Safety is the primary concern along KY 69. Over the five-year period between January 2010 and December 2014, there were 103 crashes reported between the Ohio County Line and US 60 in Hancock County. This includes three fatal crashes and 36 injury collisions. The percentages of fatal and injury collisions are higher along KY 69 than similar roads in Kentucky. Injury crashes along rural major collectors generally make up 26 percent of the total crashes; but along KY 69 injury crashes represent 35 percent of the total crashes. Fatal crashes generally make up one percent of the total crashes, but represent three percent of the total crashes along this portion of KY 69.

Of the 103 reported crashes, 77 (75 percent) were single vehicle collisions. A majority of the single vehicle collisions are where a vehicle ran off the road. The high number of these types of

¹ AASHTO's A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011

collisions demonstrates the roadway geometry does not match driver expectations and may require improvement.

The current traffic volumes on KY 69 range from 1,300 vehicles per day (vpd) at the southern end of the study area to 3,000 vpd near the northern end of the study area, with 14 percent of that being trucks. Future traffic volumes are expected to reflect minimal growth. The results of the traffic analyses indicate a two-lane road can adequately accommodate the existing and future traffic demand.

Alternatives Development

Community outreach helped guide the study, particularly in identifying potential issues and developing alternatives. Over the course of the study, the project team held three in-person project team meetings, two local officials/stakeholders meetings, and one meeting with the general public.

Based on early input from stakeholders and local officials, the project team decided the focus of the study would be to identify improvements that can be implemented quickly and independently, along with a complete reconstruction alternative that can be implemented if funding becomes available. As noted in the purpose and need, safety is the primary concern along KY 69. Conceptual projects developed using current design standards are aimed at improving safety along the study area by updating roadway geometrics. This study examined two types of improvement concepts: (1) Spot Improvements and (2) a Complete Reconstruction Alternative.

The Spot Improvements generally include short segments of the corridor with relatively lower cost improvements that can be implemented individually. Ten locations were identified as spot improvement projects, shown in **Figure ES-1**. In order to improve the vertical alignment and maintain traffic during construction, most of these spot improvements are shown on new alignment. However, the deficiencies found at each spot could be addressed in a number of ways and thus the ultimate alignment and design details will need to be examined in subsequent project phases.

The Complete Reconstruction Alternative widens KY 69 and improves the existing roadway alignment to a 55 mph design speed from the Ohio County Line to the improved portion of KY 69 near Happy Hollow Road (KY 1265). It would also replace or widen the existing structures. This corridor wide improvement can be obtained over time by connecting Spot Improvements 1 through 10. The Complete Reconstruction Alternative uses the proposed alignment from the spot improvements so resources would not be wasted if any or all of the spot improvements were built first.

Following the development of the improvement concepts, the project team met with local officials/stakeholders and interested members of the public in October 2015. Improvement concepts were presented and attendees were asked to complete a survey. Respondents were asked whether several transportation issues along KY 69 should be addressed as part of the project. Of the 11 transportation issues identified in the survey, safety, large trucks, sharp grades,



Figure ES-1: Spot Improvements

sharp curves, narrow lanes, and narrow shoulders were selected most. Respondents were then asked to rank their top five spot improvements. Looking at the total responses from the local officials/stakeholders and the public, Spot Improvement 9 (Coal Bank Hollow Road) scored the highest followed by Spot Improvement 10 (Tick Ridge Road).

In addition to the paper survey, each attendee at the public meeting was given one green sticker and one yellow sticker and they were asked to "vote" for their preferred projects by placing the stickers on the exhibit boards showing the alternatives. The green sticker was to be placed on the Spot Improvement project that should be, in their opinion, given the highest priority for moving forward. The yellow sticker was to be placed on the Spot Improvement project that should be, in their opinion, given the highest priority for moving forward. The yellow sticker was to be placed on the Spot Improvement project that should be, in their opinion, given the noving forward. Looking at the total responses, Spot Improvement 10 (Tick Ridge Road) received the most votes (15 votes) and Spot Improvements 9 (Coal bank Hollow Road) received the second most votes (11 votes).

Recommendations

In light of the technical data, comments from local officials/stakeholders and the public, and results of the survey, the project team worked together to prioritize each of the individual spot improvements.

- High Priority (in order)
 - Spot Improvement 10 Tick Ridge Road: This concept improves the existing roadway geometry to 55 mph along 1.1 miles of KY 69 near Tick Ridge Road. The proposed improvement also corrects the skew at the Tick Ridge Road intersection and ties back to the improved portion of KY 69 near Happy Hollow Road (KY 1265). This portion of KY 69 has a critical rate factor (CRF)² of 2.29, five deficient horizontal curves, and seven deficient vertical curves. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 78.44.
 - Spot Improvement 9 Coal Bank Hollow Road: This concept improves the existing roadway geometry to 55 mph along 0.8 miles of KY 69 near Coal Bank Hollow Road. The proposed improvement also replaces the 1932 structurally deficient culvert for Caney Creek (SR 33.8). This portion of KY 69 has a CRF of 1.43, four deficient horizontal curves, and four deficient vertical curves. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 78.43.
 - 3. **Spot Improvement 2 Water Tower Loop**: This concept improves the existing roadway geometry to 55 mph along 0.9 miles of KY 69 near Water Tower Loop.

² 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 similar roadways throughout the state. If the CRF is 1.00 or greater, it is assumed that crashes cannot likely be attributed to random occurrence.

This portion of KY 69 has a CRF of 1.10, eight deficient vertical curves, and five deficient horizontal curves.

4. Spot Improvement 7 – Blackford Creek: This concept replaces the 1932 functionally obsolete bridge over Blackford Creek (SR 59.7) and the 1932 culvert (SR 61.3) by Truman Young Road. This concept also improves the existing roadway geometry to 55 mph along 0.8 miles of KY 69. This portion of KY 69 has a CRF of 1.43, one deficient horizontal curve, and three deficient vertical curves. To maintain traffic during construction the structures are replaced on new alignment.

• Medium Priority (in no particular order)

- Spot Improvement 3 Bates Hollow Road: This concept improves the existing 35 mph horizontal curve to 55 mph. It also corrects the skew at the Bates Hollow Road intersection and replaces the 1935 culvert over Bates Hollow Stream. This portion of KY 69 has a CRF of 1.47 and one deficient horizontal curve.
- **Spot Improvement 5 Moxley Lane**: This concept improves the existing roadway geometry to 55 mph along 0.5 miles of KY 69 near Moxley Lane. This portion of KY 69 has a CRF of 2.00, one deficient horizontal curve, and three deficient vertical curves. The proposed alignment goes west to avoid the two homes along the existing road.
- Spot Improvement 6 Ed Brown Road: This concept improves the existing roadway geometry to 55 mph along 1.4 miles of KY 69 near Ed Brown Road. There are steep grades at this location. As a result the proposed improvement also adds northbound and southbound passing lanes/truck-climbing lanes for vehicles that get stuck behind slow moving trucks. This portion of KY 69 has a CRF of 1.15, four deficient horizontal curves, and twelve deficient vertical curves.

• Low Priority (in no particular order)

- **Spot Improvement 1 Pellville Road**: This concept improves the existing roadway geometry to 55 mph along 0.7 miles of KY 69 near Pellville Road. This portion of KY 69 has a crash critical rate factor (CRF) of 1.47 and four deficient vertical curves. Improvements must avoid South Hancock Park and Roseville Cemetery. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 77.00.
- Spot Improvement 4 KY 144 Intersection: This concept converts the existing twoway stop intersection at KY 69 and KY 144 to a four-way stop intersection. Advanced warning signs on KY 69 would be placed and the existing flashing beacon would be converted from yellow to red so oncoming vehicles would have plenty of warning of the new stop signs on KY 69. This portion of KY 69 has a CRF of 1.72 and one deficient vertical curve. Four of the five crashes at this

location were angle collisions at the KY 69/KY 144 intersection. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 78.41. Note: additional traffic data and analysis is required to determine if this intersection meets the multi-way stop warrants from the Manual on Uniform Traffic Control Devices (MUTCD)³.

• Spot Improvement 8 – B Rice Road: This concept improves the existing roadway geometry to 55 mph along 1.5 miles of KY 69 near B Rice Road. This portion of KY 69 has a CRF of 1.15, one deficient horizontal curve, and eight deficient vertical curves. Improvements must avoid Mount Eden Baptist Church and its two cemeteries, located north of B Rice Road. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 78.42.

No Priority (not recommended)

• **Complete Reconstruction Alternative:** Future design, right-of-way, utility and construction phases for this project are not included in the current Six Year Highway Plan. The project team has estimated the Complete Reconstruction Alternative to cost \$77.9 million, which will likely make such an undertaking infeasible as a single project.

The project team decided Spot Improvement 10 (Tick Ridge Road) should be the top priority and Spot Improvement 9 (Coal Bank Hollow Road) should be the second priority. Both received the most survey votes, have the highest number of total crashes, and have a number of geometric deficiencies. Spot Improvement 10 ties back to the improved portion of KY 69 near Happy Hollow Road (KY 1265) which makes it a logical starting point.

Spot Improvements 9 and 10 could be designed and constructed together depending on available funds. This would address the top two ranked spot improvements and tie back to the already improved portion of KY 69 at Happy Hollow Road (KY 1265). The total construction cost, including improving the 0.9 mile section between the two spot improvements, is estimated to be \$13 million.

A corridor-wide improvement can be obtained over time by connecting all the spot improvements. The spot improvements correct 8.1 miles of the route, leaving 4.7 miles of additional reconstruction to achieve a corridor-wide improvement. Studies have demonstrated that greater pavement widths encourage higher driving speeds, which is a concern for the spot improvement projects where improved sections could be located within a larger unimproved portion of the route. As a result, the project team recommended spot improvements include 11foot lanes and six-foot shoulders (two-foot paved, four-foot graded) – a typical section that meets design guidelines, improves safety, and is more compatible with adjacent sections that may not be improved at the same time. This will provide a greater level of consistency between

³ http://mutcd.fhwa.dot.gov/

improved and unimproved sections and discourage higher driving speeds between improvements.

If funding becomes available for the Complete Reconstruction Alternative, logical termini for the project will need to be examined further. KY 69 extends almost 20 miles from KY 54 in Ohio County to US 60 in Hancock County. The KY 69 Scoping Study was scoped to examine the need for and types of improvements necessary along route in Hancock County between the Ohio County Line and US 60. Starting the project at the Ohio County line would likely not be a logical terminus for the Complete Reconstruction Alternative. Therefore, consideration should be given in the early design phases of the project to extend the Complete Reconstruction Alternative 5.7 miles to the south to KY 54 in Ohio County. KY 54 is an east/west connection between Owensboro and Leitchfield. Improving KY 69 between KY 54 in Ohio County and US 60 in Hancock County would better enhance regional mobility, which is one of the overall purposes of the project.

Cost estimates were prepared for each improvement concept, shown in **Table ES-1**, based on average KYTC unit costs plus additional costs for special features such as culverts and bridges. KYTC District 2 assisted in this effort by providing approximate right-of-way and utility cost estimates.

	Project Length (miles)	2015 Cost Estimates (millions)					
Improvement Concept		Design	Right of Way	Utility	Construction	Total	
No Build	13.08	\$0.00	\$0.00	\$0.00	\$0.00	\$0.0	
Spot Improvement 1: Pellville Road	0.7	\$0.60	\$1.00	\$0.35	\$3.90	\$5.9	
Spot Improvement 2: Water Tower Loop Road	0.9	\$0.80	\$1.00	\$0.35	\$5.50	\$7.7	
Spot Improvement 3: Bates Hollow Road	0.4	\$0.40	\$0.50	\$0.35	\$2.90	\$4.2	
Spot Improvement 4: KY 144 Intersection	N/A	\$0.02	\$0.05	\$0.05	\$0.03	\$0.1	
Spot Improvement 5: Moxley Lane	0.5	\$0.40	\$0.50	\$0.35	\$1.80	\$3.1	
Spot Improvement 6: Ed Brown Road	1.4	\$1.00	\$1.50	\$0.35	\$6.60	\$9.5	
Spot Improvement 7: Blackford Creek	0.8	\$0.60	\$0.50	\$0.35	\$4.10	\$5.6	
Spot Improvement 8: B Rice Road	1.5	\$0.90	\$1.50	\$0.35	\$6.20	\$9.0	
Spot Improvement 9: Coal Bank Hollow Road	0.8	\$0.60	\$1.00	\$0.35	\$4.20	\$6.2	
Spot Improvement 10: Tick Ridge Road	1.1	\$0.70	\$2.00	\$0.35	\$4.80	\$7.9	
Complete Reconstruction	12.8	\$5.30	\$15.00	\$5.00	\$52.60	\$77.9	

Table ES-1: Spot Improvement and Complete Reconstruction Cost Estimates

1.0 INTRODUCTION

The KY 69 Scoping Study, Kentucky Transportation Cabinet (KYTC) Item Number 2-8708.00, was initiated by KYTC to evaluate the need for and impacts of transportation improvements along KY 69 in Hancock County. The project includes an examination of the route between the Ohio County Line (MP 0.000) and US 60 (MP 13.080) just east of Hawesville. The study area is shown in **Figure 1**.

The KY 69 Scoping Study is listed in the 2014-2020 KYTC Six Year Highway Plan. The project is currently funded through the planning phase with \$200,000 in State Priority Project (SPP) funds. Future design, right-of-way, utility and construction phases for this project are not included in the 2014-2020 KYTC Six Year Highway Plan.

1.1 STUDY AREA

The study area for the KY 69 Scoping Study is a 2,000-foot wide corridor, highlighted in orange on **Figure 1**, centered along the existing alignment for KY 69. The study corridor serves primarily residential homes and farmland. The study area is bounded to the south by the Ohio County Line and to the north by US 60. KY 69 is a north-south connector through Hancock County and provides the most direct regional connection for areas between the William H. Natcher Parkway, Wendell H. Ford/Western Kentucky Parkway, and the Bob Cummings Lincoln Trail Bridge over the Ohio River in Hawesville, Kentucky. The Lincoln Trail Bridge provides easy access to Indiana and Interstate 64, and is the only Ohio River Bridge crossing between Maceo (18 miles west) and Brandenburg (45 miles east), Kentucky.

1.2 COMMITTED PROJECTS

There are three other projects listed in the 2014-2020 KYTC Six Year Highway Plan in Hancock County, shown in **Figure 2**. None of the proposed projects connects to KY 69. Outside of the Six Year Plan Projects, there are six projects on KYTC's unscheduled needs list that have active Project Identification Forms (PIF's) along KY 69 within the study limits:

- PIF 02 046 D0069 77.00 Address safety, condition, and service issues at the intersection of KY-69 and Pellville-Lyonia Road. (MP 0.476 to 0.576)
- PIF 02 046 D0069 78.40 Address safety concerns of KY-69 from KY-144 to US-60 at Hawesville excluding spot improvements. (MP 4.627 to 13.080)
- PIF 02 046 D0069 78.41 Address safety concerns of the KY-69 and KY-144 intersection to provide for better sight distance. (MP 4.627 to 4.727)
- PIF 02 046 D0069 78.42 Address safety concerns of the KY-69 and B. Rice Road intersection to provide for better sight distance. (MP 9.093 to 9.193)
- PIF 02 046 D0069 78.43 Address safety and condition concerns of KY-69 from Coal Bank Hollow Rd and Middle Patesville Rd. (MP 10.400 to 11.480)
- PIF 02 046 D0069 78.44 Address safety and condition concerns of KY-69 near Tick Ridge Rd. (MP 12.00 to 13.00)



Figure 1: Study Area – KY 69 Scoping Study



Figure 2: Hancock County 2014 Highway Plan Projects (Source: KYTC Division of Program Management)

1.3 PREVIOUS STUDY

In January 1998, a Corridor Planning Study was completed for KY 69 between Hartford and Hawesville, Kentucky. The report included an existing conditions analysis, travel demand forecasts, environmental overview, economic analysis, and analyzed three improvement alternatives. The three improvement alternatives included a new two-lane facility, a new fourlane facility, and a partial rebuild. A preferred alternative was not selected as part of the study.

This current KY 69 Scoping Study builds upon the 1998 Corridor Planning Study. It includes a more in-depth look at the corridor through Hancock County, provides an updated Environmental Overview and Traffic Forecast, analyzes the corridor based on current design standards, and defines specific recommendations and cost estimates that can be carried forward to future project development phases.

2.0 PURPOSE AND NEED STATEMENT

As a result of the existing conditions analysis, project team input and local officials/stakeholders input, a purpose and need statement for this study was developed to be used during future project development efforts, including design and environmental activities. The purpose and need statement establishes why KYTC is proposing to advance a transportation improvement and drives the process for improvements, alternative consideration, analysis, and selection.

The purpose of the KY 69 improvement project is to enhance regional mobility and to provide a safer, more efficient north/south corridor through Hancock County.

Safety is the primary concern along KY 69. The following needs were identified over the course of the study.

2.1 IMPROVE GEOMETRY

A detailed discussion of the geometric analyses performed for the KY 69 Scoping Study is found in Chapter 3. The route has numerous geometric features that do not meet Green Book⁴ guidelines:

- Ten-foot driving lanes and two-foot shoulders along 12.78 miles of the 13.08 mile corridor;
- Narrow two-foot-wide paved shoulders and shoulder breaks along the corridor do not allow recovery for vehicles leaving the travel way;
- 23 (37 percent) horizontal curves have radii less than 960 feet indicating they do not satisfy a 55 mph design speed; and
- 67 (59 percent) vertical curves have stopping sight distance or headlight stopping sight distance less than 495 feet which would not satisfy a 55 mph design speed.

⁴ AASHTO's A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011

2.2 IMPROVE SAFETY

A detailed discussion of the crash analysis along KY 69 is found in Chapter 3. Over the five-year period between January 2010 and December 2014, there were 103 crashes reported between the Ohio County Line and US 60 in Hancock County. This includes three fatal crashes and 36 injury collisions. The percentages of fatal and injury collisions are higher along KY 69 than similar roads in Kentucky.

Of the 103 reported crashes, 77 (75 percent) were single vehicle collisions. A majority of the single vehicle type collisions ran off the road. The high number of these types of collisions demonstrates the roadway geometry does not match driver expectations and may require improvement. Critical crash rate factors (CRF) were calculated for the five-year study period. A CRF greater than 1.0 suggests crashes are likely not occurring at random but instead are attributable to some causative factor or factors. There are thirteen 0.3- mile long spots with CRF values greater than 1.0.

South Hancock Elementary School (located along KY 69), Hancock County Middle School, and Hancock County High School (both located off US 60 west of Hawesville) rely on KY 69 for access, including a number of school bus stops. Of the 103 reported crashes along KY 69, three were crashes involving school buses. Two of the school bus crashes were single vehicle collisions (ran-off-the-road and collision with a fixed object) and the third was a sideswipe collision. All three school bus crashes resulted in injuries. Most of the school bus crashes appear to be the result of narrow roadway and shoulder widths.

Of the 103 reported crashes along KY 69, eight were crashes involving large trucks. Four of the truck crashes were single vehicle collisions, two were sideswipe collisions, one was an angle collision, and one was a rear end collision. All the semi-truck crashes were property damage only collisions. Given the types of crashes involving trucks, it would appear the narrow roadway and shoulder widths may be a contributing factor.

2.3 ENHANCE REGIONAL MOBILITY

KY 69 provides the most direct regional connection for areas between the William H. Natcher Parkway, Wendell H. Ford/Western Kentucky Parkway, and the Bob Cummings Lincoln Trail Bridge over the Ohio River in Hawesville which is the Hancock County seat. The Lincoln Trail Bridge provides easy access to Indiana and Interstate 64, and is the only Ohio River Bridge crossing between Maceo (18 miles west) and Brandenburg (45 miles east), Kentucky.

KY 69 extends almost 20 miles from KY 54 in Ohio County to US 60 in Hancock County. The KY 69 Scoping Study was scoped to examine the need for and types of improvements necessary along KY 69 in Hancock County between the Ohio County Line and US 60. Starting the project at the Ohio County line would likely not be a logical terminus to best improve regional mobility. Consideration should be given in the early design phases of the project to extend the project 5.7 miles to the south to KY 54 in Ohio County. KY 54 is an east/west connection between Owensboro and Leitchfield.

3.0 EXISTING CONDITIONS

Conditions of the study area's existing transportation network are examined in the following section. The information compiled includes roadway facilities and geometrics, crash history, and traffic volumes within the study area. Data for this section were collected from the Kentucky Transportation Cabinet's (KYTC's) Highway Information System (HIS) database, aerial photography, as-built plans, and field reviews. A summary of the information contained within the KYTC HIS database is included in **Table 1**.

Section	Begin Milepoint	End Milepoint	Section Length (miles)	Functional Classification	AADT (Year)	Truck %	Terrain	Speed Limit	Facility Type	Lane Widths	Shoulder Widths
1	0.000	4.627	4 627		1,300 (2015) Rural Major Collector 2,200 (2015)			55 mph	2 lanes	10'	
	Ohio County Line	KY 144	4.027								2'
2	4.627	12.815	0 100	Rural Major Collector		13.7%	Rolling				
	KY 144	KY 1265	8.188								
3	12.815	13.080	0.265		3,000 (2015)					12'	8'
	KY 1265	US 60	0.205								

Table 1: KY 69 Existing Conditions Summary

3.1 ROADWAY SYSTEM

Functional classification is the grouping of roads, streets, and highways into integrated systems ranked by the level of mobility for through movements and access to adjoining land. This grouping acknowledges that roads serve multiple functions and it provides a basis for comparing roads. Functional classification can be used for, but is not limited to, the following purposes:

- Provide a framework for highways serving mobility and connecting regions and cities within a state.
- Provide a basis for assigning jurisdictional responsibility according to the roadway's importance.
- Provide a basis for development of minimum design standards according to function.

- Provide a basis for evaluating present and future needs.
- Provide a basis for allocation of limited financial resources.

Figure 3 shows the functional classification of roadways within the study area.

KY 69 is the primary regional corridor that provides north-south regional connectivity for both commerce and the traveling public in Hancock County. KY 69 is a Rural Major Collector with a 55 mile per hour (MPH) posted speed limit and an average daily traffic (ADT) of 1,300 vpd at the south end of the corridor to 3,000 vpd near US 60 at the north end of the corridor.

3.2 ROADWAY GEOMETRIC CHARACTERISTICS

As part of the study effort, a review of existing geometrics along study area roadways was performed and compared against geometric standards in AASHTO's A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011, commonly referred to as the "Green Book".

The estimated lane widths throughout study area roadways are shown on **Figure 4**. Current Green Book design guidelines suggest a minimum of 11-foot wide lanes on rural collector roadways with an ADT between 400 and 1,500 vpd and 12-foot wide lanes on rural collector roadways with an ADT greater than 2,000 vpd (Green Book Table 6-5). For roadways to be reconstructed, a 22-foot traveled way may be retained where the alignment is satisfactory and there is no crash pattern suggesting the need for widening. KY 69 has 10-foot-wide lanes throughout the study area, which is less than the recommended minimum widths in the Green Book.

Estimated shoulder widths throughout the study area are shown in **Figure 5**. KY 69 in the study area has two-foot-wide paved shoulders, which is less than the recommended minimum widths in the Green Book. Five-foot shoulder widths are recommended for rural collector roadways with an ADT between 400 and 1,500 vpd (Green Book Table 6-5). Shoulder widths may be reduced for this traffic volume range for design speeds greater than 30 mph provided a minimum roadway width of 30 feet is maintained. Where the ADT is greater than 2,000 vpd, eight-foot wide shoulders are recommended (Green Book Table 6-5). Where roadside barriers are included (i.e., retaining walls or bridge walls), a minimum offset of four feet from the traveled way to the barrier should be provided, wherever practical (Green Book Section 6.2.2).

A review of the as-built plans for KY 69 reveals there are 63 horizontal curves in the study area, 23 (37 percent) of which have radii less than 960 feet indicating they do not satisfy a 55 mph design speed (Green Book Table 3-10b). Of the 114 vertical curves in the study area, 67 (59 percent) have stopping sight distance less than 495 feet which would not satisfy a 55 mph design speed (Green Book Table 6-3). No grades along the corridor exceed the maximum seven percent requirement (Green Book Table 6-4). The detailed geometric analysis and standards for KY 69 are located in **Appendix A** as well as shown in more detail in **Figure 6**.



Figure 3: Functional Classification



Figure 4: Lane Widths



Figure 5: Shoulder Widths



Figure 6: KY 69 Geometric Analyses from As-Built Plans

3.3 STRUCTURES

Numerous culverts and two bridges are located along the study corridor, as summarized in **Figure 7**. From the KYTC Bridge Data Miner, existing structure sufficiency ratings were identified during 2011 bridge inspections. This rating assigns individual structures with a measure of "sufficiency" to remain in service. The higher sufficiency rating a bridge has, the better the condition of the bridge. Bridges considered structurally deficient or functionally obsolete with a sufficiency rating less than 50.0 are regularly considered for funding to replace or rehabilitate. Those with a sufficiency rating of 80.0 or less are regularly considered for funding to rehabilitate. Bridges are considered structurally deficient if significant load carrying elements are found to be in poor condition due to deterioration and and/or damage, or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing overtopping with intolerable traffic interruptions. Bridges are considered functionally obsolete if they do not meet geometric design standards of today.

There are six culverts along the corridor, three of which have a sufficiency rating below 80 percent and one is considered structurally deficient with a sufficiency rating of 33.8 percent. There are two bridges along KY 69, one of which (Blackford Creek bridge) has a sufficiency rating of 59.7 percent and is considered functionally obsolete because of its narrow deck width. The second bridge over Lead Creek was replaced in 1994 and has a sufficiency rating of 95.2 percent. All of the structure and sufficiency ratings are shown on **Figure 7**.

3.4 OTHER MODAL USERS

South Hancock Elementary School (located along KY 69), Hancock County Middle School, and Hancock County High School (both located off US 60 west of Hawesville) rely on KY 69 for access, including a number of school bus stops.

Currently, no bike lanes or sidewalks are provided along the corridor.

3.5 TRAFFIC ANALYSIS (YEAR 2015)

A summary of the traffic volumes contained within the KYTC HIS database is shown in Figure 8.

As part of this study, traffic counts were conducted by the KYTC in January 2015 at traffic stations 046509 (KY 69 MP 1.9), 046503 (KY 69 MP 7.3), as well as a turning movement count at the KY 69/US 60 intersection. Based on the 2015 counts, the current average daily traffic (ADT) volumes on KY 69 range from 1,300 vehicles per day (vpd) at the southern end of the study area to 3,000 vpd near the northern end of the study area, with 13.7 percent of the ADT being trucks.

To evaluate the adequacy of roadway segments, 2015 design hour volumes were compared to the road's theoretical capacity. This is the preferred KYTC methodology for evaluating the adequacy of roadway segments. A volume-to-capacity ratio (V/C) represents the number of



Figure 7: Structure Locations and Sufficiency Ratings



Figure 8: Average Daily Traffic (ADT) Volumes

vehicles using the road in a specific time period (i.e., design hour volume, or DHV) 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. A V/C greater than this indicates the road is congested (i.e., operating above its design capacity). V/C ratios were estimated along KY 69 based on the January 2015 traffic counts. After performing a V/C analysis using Highway Capacity Manual (HCM) procedures, all roadway segments currently operate at less than full capacity with a V/C less than 0.18, as shown in **Table 2**.

Level of service (LOS) is a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. There are six levels of service, having letter grades A through F. LOS A is associated with free-flow conditions, high freedom to maneuver, and little or no delay. Conditions at or near capacity typically are associated with LOS E.

At LOS F, traffic conditions are oversaturated and beyond capacity, with low travel speeds, little or no freedom to maneuver, and high delays. In rural areas, LOS C or better is desirable.

Levels of service for different facility types are based on service measures deemed most appropriate for describing operations. For two-lane highways, levels of service are determined based on two parameters – average travel speed and percent time spent following in a platoon. After performing a LOS analysis using Highway Capacity Manual (HCM) procedures, all segments of KY 69 were found to operate at LOS C or better.

Section	Begin Milepoint	End Milepoint	Section Length (miles)	ADT	Truck % (ADT)	DHV	Truck % (DHV)	LOS	V/C
	0.000	4.627							
1	Ohio County Line	KY 144	4.627	1,300	13.7%	130	9.0%	В	0.09
2	4.627	12.541	7.914	914 2,200		210		В	
	KY 144	Tick Ridge Rd							0.14
3	12.541	13.080	0.539 3,00			300		С	
	Tick Ridge Rd	US 60		3,000					0.18

The results of this analysis indicate a two-lane road can adequately accommodate the existing traffic demand. **Table 2** presents 2015 ADT, DHV, LOS and V/C for each segment.

Table 2	: 2015	Traffic	Analysis	Summary
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3.5.1 Intersection at KY 69 and US 60

A turning movement count was collected during peak traffic periods at the KY 69/US 60 intersection in January 2015. Turning movement volumes during the AM and PM peak hours are presented in **Figure 9**.

LOS was calculated at the intersection based on the existing lane configuration, traffic control, and peak hour volumes. **Table 3** presents detailed information about delay and LOS for individual approaches at the intersection. In rural areas such as this, LOS C or better is desirable. With a LOS B or better, this intersection currently operates at an acceptable level of service.

Intersection	LOS	Approach	Delay (sec/veh)	LOS
KY 69 at US 60	в (В)	Westbound US 60 Turning Left	8 (8)	A (A)
		Northbound KY 69 Turning Left	14 (15)	B (B)
		Northbound KY 69 Turning Right	9 (9)	A (A)

Table 3: 2015 LOS during AM (PM) Peak Hour at KY 69/US 60 Intersection



Figure 9: 2015 Peak Hour Turning Movement Counts at KY 69/US 60 Intersection

3.6 CRASH HISTORY

To quantify safety concerns, a crash analysis was performed for the study portion of KY 69. Historical crash data from the Kentucky State Police collision database were collected along the study area for a five-year period between January 1, 2010 and December 31, 2014. The crash records and locations are included in **Appendix B**.

3.6.1 Crash Severity

Over the analysis period, there were 103 reported crashes along the 13.08-mile corridor. Of these, three crashes resulted in fatalities and 36 resulted in injuries. **Figure 10** summarizes the distribution of crashes by crash severity. Two of the fatal crashes were single vehicle collisions where the vehicle ran off the road. The third fatal crash involved a head on collision where one of the vehicles crossed the centerline in a curve.

The percentage of fatal and injury collisions is higher along KY 69 than similar roads in Kentucky. Based on the most recent statewide crash data compiled in the Kentucky Transportation Center research report Analysis of Traffic Crash Data in Kentucky (2009-2013)⁵, injury crashes along rural minor collectors generally comprise 26 percent of total crashes; along the study portion of KY 69, injury crashes comprise 35 percent of the total reported crashes. Fatal crashes along rural minor collectors generally comprise one percent of total crashes; along the study portion of KY 69, fatal crashes comprise three percent of the total reported crashes.



Figure 10: Distribution of Crashes by Severity

⁵ http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=2446&context=ktc_researchreports

3.6.2 Crash Type

To help better understand the crash records along this corridor, the crash type was examined. Single vehicle crashes were the most commonly reported crash type (77 crashes, 75 percent). Of the 77 single vehicle crashes, 21 were collisions with an animal. The remaining 56 single vehicle crashes were usually the result of a vehicle running off the road. **Figure 11** and **Figure 12** demonstrate the distribution of crashes by crash type.



Figure 11: Distribution of Crashes by Type

A contributing factor to the high number of single vehicle crashes could be the narrow roadway width and deficient roadway alignment. A majority of the single vehicle crashes have occurred in locations where the roadway alignment does not meet current design guidelines for 55 MPH.

Of the 103 reported crashes along KY 69, eight were crashes involving semi-trucks and three were crashes involving school buses. Two of the school bus crashes were single vehicle collisions (ran-off the road and collision with a fixed object) and the third was a sideswipe collision. All three school bus crashes resulted in injuries. Four of the semi-truck crashes were single vehicle collisions, two were sideswipe collisions, one was an angle collision, and one was a rear end collision. All the semi-truck crashes were property damage only collisions. Most of the school bus and semi-truck crashes appear to be the result of narrow roadway and shoulder widths.



Figure 12: Distribution of Crash Type by Location

3.6.3 Critical Rate Factor

Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above average crash rates. The methodology is defined in the Kentucky Transportation Center research report Analysis of Traffic Crash Data in Kentucky (2009-2013)⁶. As defined in the methodology report, segments vary in length and are divided along roadways where geometry or traffic volumes change. For each segment, analysts looked at the number of crashes, traffic volume, rural/urban, number of lanes, and segment length 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 critical crash rate for similar roadways throughout the state. If the CRF is 1.00 or greater, it is assumed that crashes cannot likely be attributed to random occurrence. Analysts also conducted a spot analysis along KY 69. Spots were defined by observing 3/10 mile sections where crashes were concentrated. Crashes were again geospatially referenced and compared to statewide data to identify locations experiencing above average crash rates. The CRF was again used as a measure of the safety of a particular spot.

Analysis of segments along KY 69 did not yield any locations with a CRF over the 1.00 threshold. CRF values ranged from 0.62 to 0.68 for roadway segments. Along the study corridor, eleven 3/10 mile spots were found to have a CRF greater than 1.00, as shown in detail in **Figure 13**.

3.6.4 High Crash Spots versus Roadway Alignment

A contributing factor to the high crash spot locations is likely the narrow roadway width and deficient roadway alignment. Six of eleven high crash spots have horizontal curves that do not meet current design guidelines for 55 MPH and ten of eleven high crash spots have vertical curves that do not satisfy a 55 mph design speed, as shown in **Figure 14** and **Figure 15**, respectively.

⁶ http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=2446&context=ktc_researchreports



Figure 13: Critical Crash Rate Factors


Figure 14: Horizontal Alignment versus High Crash Spots



Figure 15: Vertical Alignment versus High Crash Spots

4.0 ENVIRONMENTAL OVERVIEW

An environmental overview was performed to identify environmental resources of significance, potential jurisdictional features, and other environmental areas of concern that should be considered during project development. Natural and human environment resources within the study area were identified from a literature/database review, as well as a windshield survey. The study area for the environmental overview is a 2,000-foot wide corridor centered along the existing alignment for KY 69. The study area is bounded to the south by the Ohio County Line and to the north by US 60. The complete document is included in **Appendix C**. More detailed environmental studies may be required as the project is further developed. If a future project is federally-funded, the National Environmental Policy Act (NEPA) requires that potential environmental impacts with regard to jurisdictional wetlands, archaeological sites, cultural historic sites and federally endangered species must be avoided if at all possible. If not, then minimization efforts are required. Mitigation for the impacts, if unavoidable, may also be necessary.

4.1 NATURAL ENVIRONMENT

Natural environment resources include: surface streams; floodplains; wetlands; ponds; groundwater; threatened, endangered and special concern species and habitat; woodland and terrestrial areas; and parks. Through a literature/database review and field reconnaissance, potentially sensitive resources that affect the natural environment were identified in the study area and are discussed in the following sections and presented in **Figure 16** and **Figure 17**.

4.1.1 USGS Streams

32 USGS streams (approximately 81,000 linear feet of channel) are located within the study area, including Lead Creek, Caney Creek, Blackford Creek, and Horse Fork.

Ten streams flow generally parallel to the KY 69 corridor with potential impact lengths within the study area that could range between 3,100 feet and 7,200 feet. These ten streams include Horse Fork and nine unnamed tributaries. Stream impacts are subject to 404/401 permitting requirements and potential mitigation.

There are no streams classified as Special Use Waters within the study area as defined by the Kentucky Division of Water (KDOW). In addition, no streams in the study area are listed by US Environmental Protection Agency (EPA) or KDOW as impaired (not supporting designated uses).



Figure 16: Natural Environment Part 1 (South)



Figure 17: Natural Environment Part 2 (North)

4.1.2 Other Streams

More than 60 additional unnamed or unmapped streams are located throughout the study area and are likely jurisdictional and subject to 404/401 permitting requirements and potential mitigation.

4.1.3 Wetlands

42 National Wetlands Inventory (NWI) wetlands are located within the study area, including 37 palustrine unconsolidated bottom (PUB), one palustrine unconsolidated shore (PUS), and four palustrine scrub-shrub (PSS) features. NWI mapped features often indicate the presence of jurisdictional wetlands, with the exception of PUB features, which are often non-wetland open water ponds. Jurisdictional wetlands are subject to 404/401 permitting requirements and potential mitigation.

Mapped hydric soils occur in a few areas associated with floodplains of larger streams, and indicate the potential presence of jurisdictional wetlands. Extensive scrub-shrub and forested wetlands were observed to occur along Caney Creek in the northern portion of the study area.

4.1.4 Ponds

Approximately 47 ponds occur within the study area. Many of these ponds are NWI mapped features, which can indicate the presence of jurisdictional wetlands.

4.1.5 USFWS Species List

Indiana bat (endangered) and northern long-eared bat (threatened) are listed by the United States Fish and Wildlife Service (USFWS) and have the potential to occur in Hancock County. Interior least tern (endangered) is listed by USFWS and is known to occur in Hancock County. Eight USFWS listed endangered mussels are either known to occur in Hancock County (Orangefoot pimpleback) or have the potential to occur in Hancock County (pink mucket, ring pink, sheepnose, clubshell, rough pigtoe, fat pocketbook, and fanshell). Rabbitsfoot mussel is listed as threatened by the USFWS and is known to occur in Hancock County.

Potential summer roost and foraging habitat for Indiana bat and northern long-eared bat (mature woodlands) are found throughout the study area, particularly in forested areas along elevated hillsides and ridges above the floodplains between Blackford Creek and Horse Fork in the middle of the study area, as well as between Horse Fork and the community of Roseville towards the southern end of the study area. No Priority Swarming or Maternity Sites for Indiana bat or mapped northern long-eared bat habitat occur in the study area.

Of the nine federally-listed mussel species, only rabbitsfoot has the potential to occur in study area streams. All other federally listed mussel species are found in large rivers and are not expected to occur in the study area.

Habitat for the interior least tern consists primarily of barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lakes and reservoir shorelines. This type of habitat is generally not found in the study area. Approximately 47 ponds occur within the study area.

4.1.6 KDFWR Species List

The Kentucky Department of Fish and Wildlife Resources (KDFWR) list several State and Federal Threatened, Endangered, and Special Concern Species as having occurred (either recently or historically) in Hancock County. These include:

- The federal and state endangered orangefoot pimpleback, sheepnose, and interior least tern;
- The federal and state threatened rabbitsfoot;
- The federal threatened shovelnose sturgeon;
- The state endangered American coot, pocketbook, and Ohio shrimp (historic);
- The state threatened bald eagle; and
- The state special concern sharp-shinned hawk, armored rocksnail, spottail shiner, bank swallow, and eastern ribbon snake.

Of the listed mussel species, only the rabbitsfoot and little spectaclecase have the potential to occur in study area streams. All other listed mussel species are typically found in large rivers.

Habitat for the shovelnose sturgeon (large turbid rivers), American coot (open water lakes, sluggish rivers, and marshes), bald eagle (mature forested areas along large river and lake shorelines; marshes and estuaries), and spottail shiner (large rivers and lakes) is not found within the study area. Armored rocksnail is a freshwater snail known to the Cumberland River and is not likely to occur in the study area. Potential habitat for sharp-shinned hawk (wide range of forested and shoreline habitats), eastern ribbon snake (wetlands, shorelines of streams, rivers and lakes), and bank swallow (fields and marshes; typically near streams and lakes) is found throughout the study area.

4.1.7 KSNPC Species Database

Based on the Kentucky State Nature Preserves Commission (KSNPC), there are no known records of endangered, threatened, or special concern plants and animals or exemplary natural communities within one mile of the study area.

Historically, orangefoot pimpleback (federal endangered), sheepnose (federal endangered), rabbitsfoot (federal threatened), and Ohio shrimp (state endangered) were known to occur within five miles of the study area (Ohio River), while pocketbook (state endangered, Ohio River) and little spectaclecase (state special concern, South Fork Panther Creek) are known to occur within five miles of the study area. Sharpshinned hawk (state special concern) and sedge wren

(state special concern; wet grasslands, sedge marshes) are known to occur within ten miles of the study area.

See the USFWS and KDFWR sections above for additional discussion of these species and their habitats.

4.1.8 Groundwater

Four (4) Water Wells occur within the study area. No Source Water Protection Areas (SWPA) or mapped karst areas occur in the study area.

4.1.9 Floodplain

FEMA 100-Year floodplain occurs in five (5) areas within the study area including: along Lead Creek (ranging from approximately 230 to 730 feet in width), along Caney Creek (ranging from approximately 530 to 1,000 feet in width), along Blackford Creek (ranging from approximately 1,100 to 2,200 feet in width), along Horse Fork (ranging from approximately 570 to 1,260 feet in width), and along unnamed Horse Fork Tributary (ranging from approximately 380 to 780 feet in width).

4.1.10 Floodway

There is no FEMA mapped floodway within the study area.

4.1.11 Farmland

'Prime farmland' soils (including soils classified 'prime farmland if drained') occur across approximately 29% of the project area principally associated with valley bottoms and drainage features. 'Farmland of statewide importance' soils occur across an additional 14% of the study area, associated with narrow ridgetops, shoulders, and lower portions of slopes.

4.1.12 Section 4(f)

South Hancock Park is located at the southern end of the study area. This is a Section 4(f) resource as it is a publicly owned recreational facility that is open to the public. Section 4(f) resources are subject to impact avoidance, minimization and mitigation requirements on federally funded projects.

4.1.13 Section 6(f)

South Hancock Park is a Section 6(f) resource as it has received a grant from the Land and Water Conservation Fund (LWCF). Section 6(f) resources are subject to impact avoidance, minimization and mitigation requirements on federally funded projects.

4.1.14 Air Quality

The study area is in attainment for each of the transportation related criteria pollutants for which the US EPA has established National Ambient Air Quality Standards (NAAQS). There are no project level concerns expected for PM 2.5, MSATs, or carbon monoxide; one US EPA air emissions facility is located within the 2,000-foot study area.

4.1.15 Noise

Noise sensitive land use areas are located throughout the study area (Activity Category "B" and "C" land uses – consisting of approximately 180 residences, two churches, four cemeteries, one school, and one park).

Residential land use in the study area is generally rural/low density in nature along the KY 69 corridor. There are a few higher density areas in the vicinity of Water Tower Loop and Stinnett Lane near the southern end of the study area, as well as near Roseville at the southern end of the study area. The school is along KY 69, just south of Goering Road in the middle of the study area; the Mt. Eden Baptist Church and two cemeteries are located on the east side of KY 69, just north of B Rice Road; and the Roseville Baptist Church and Roseville Cemetery are located in the Roseville area toward the southern end of the study area.

4.1.16 Geotechnical

A geotechnical overview for the study area was completed based upon research of available published data and experience with highway design and construction within the region. The purpose of this overview was to provide a general summary of the bedrock, soil and geomorphic features likely to be encountered within the proposed alignment and to identify geotechnical features that may have an adverse impact on roadway improvements. The complete document is included in **Appendix D**. The overview concluded:

- The potential exists for encountering old mine works. Mine voids encountered in cut sections will require back-stowing. In addition, depending on the roadway grade relative the coal seam/mine works elevation, over excavation of the coal seam/mine works may be required to reduce the potential for roadway collapse. Because of the age and limited available information concerning the mining, a detailed geotechnical exploration will be required to further investigate the old mining. Additional borings in conjunction with deepened borings will be required to help define the mine works.
- Geotechnical drilling will be needed for replacement or widened culverts, bridges, and retaining walls. It is anticipated that conventional spread footing and/or pile foundation systems can be utilized for these structures.
- Because a portion of this project may be a widening project, information on pavement structure should be obtained to assist the team on pavement structure and California

Bearing Ratio (CBR) information. Other projects in the vicinity have utilized rock roadbed and generally CBR values of approximately six or less.

- Once alignment and sections are identified, then open faced logging of exposed cuts and/or drilling should be performed. Sampling of foundation soils should be performed for embankment situations of sufficient height to evaluate stability.
- Several oil and gas wells have been drilled near/along the proposed corridor. Many have reportedly been abandoned. Future design teams should inventory and survey active wells. Additional costs could be incurred if the selected alignment disturbs a well site.

4.2 HUMAN ENVIRONMENT

Human environment is defined as what we live in and around and what we have built. Through a literature/database review and field reconnaissance, potentially sensitive resources that affect the human environment were identified in the study area and are discussed in the following sections and presented in **Figure 18** and **Figure 19**. The complete document is included in **Appendix C**.

4.2.1 Hazardous Materials

A database review shows 12 sites of potential concern occur within the study area, including one state hazardous waste (SHWS) record, (Johnson Property - 13380 KY 69), four underground storage tank (UST) sites (two records on US 60 at KY 69, McCarty Property, Weber Store/BP 455 and Roseville General Store), two SPILLS sites (diesel spills at Truman Young Road and at KY 144), three illegal dump site records (McFall Residence, Brown, Powers & Paine and South Hancock Park Road Dump #1), one MINES site (Kelco Inc.) and one AIRS site (AT&T Mobility).

A US EPA Envirofacts database review (Facilities Reporting to US EPA) showed no Resource Conservation and Recovery Act (RCRA) generators occur in the study area; no toxic releases, brownfields, or superfund sites occur in the study area; one air emissions facility is present in the study area (AT&T Mobility).

A Kentucky Department of Natural Resources (KDNR) mine map review indicates two coal mines occur in the study area (Kelco Inc. and Scales Coal Co, north of Coal Bank Hollow Road).



Figure 18: Human Environment Part 1 (South)



Figure 19: Human Environment Part 2 (North)

Aerial photography, topographic mapping and field reviews indicate 11 potential utility crossings/structures occur in the study area, including three electrical transmission line crossings, three pipeline crossings, two cell towers, one electrical substation, one water tower, and one unknown facility structure.

Concentrations of these features within the study area include the Roseville area at the southern end of the study area, where there are four potential hazardous materials sites, and near the intersection of KY 144 and KY 69 where there are three potential hazardous materials sites and utility infrastructure.

4.2.2 Socioeconomic Study

Socioeconomic issues pertaining to minority, elderly, disability, and low income (persons living in poverty) populations in the project study area were evaluated and documented by the Green River Area Development District (GRADD) in a Socioeconomic Study completed in June 2015. A copy of the report is found in **Appendix E**.

The study area includes portions of Census Tracts 9601 and 9603 in Hancock County. Block Group 2 of Census Track 9603 was noted as having an elevated percentage of elderly population, population below poverty, and disabled population compared to Hancock County as a whole.

Overall, approximately 3.5 percent of the study area population is minority and approximately 12.7 percent of the population is low income. These percentages are less than both the county and state percentages for minority and low income populations. No localized environmental justice concern areas were identified during the April 14, 2015 windshield survey.

During future phases of project development, a more detailed and robust analysis would be required for the NEPA documentation when assessing the potential for adverse and disproportionate impacts to poverty status, and minority populations. Environmental justice (EJ) issues will be addressed further in accordance with KYTC Policy in Phase 1 Design.

4.2.3 Special Communities

There is a horse/buggy sign along Middle Patesville Road, indicating that there could be an Amish community in this portion of the study area.

4.2.4 Archaeology

The Kentucky Office of State Archaeology (KOSA) database search indicated that there have been two archaeology surveys completed in the study area. Of the areas surveyed, one previously recorded archaeology site was identified within the study area. This site has not been assessed for National Register of Historic Placed (NRHP) eligibility. Three historic cemeteries are present in the study area based on topographic maps. Historic maps show the locations of KY 69 map structures which may have archaeological remains associated with them. Due to the presence of alluvial soils in several floodplain settings in the study area, there is the potential that buried archaeological deposits may be present since these soil types have the greatest potential to contain buried archaeological deposits. The full records review report is provided in **Appendix C**. Further study may be required, once the proposed improvements are more defined.

4.2.5 Historic

The Kentucky Heritage Council (KHC) database search did not identify any NRHP-listed or eligible properties within the study area. There are ten previously recorded cultural historic sites in the study area, five of which have been determined to be ineligible for NRHP listing and five have not been assessed for eligibility. The full records review report is provided in **Appendix C**.

4.2.6 Churches

There are two churches (Mt. Eden Baptist Church and Roseville Baptist Church) located within the study area. Mt. Eden Baptist Church is located off of KY 69, just north of B Rice Road in the middle of the study area and the Roseville Baptist Church is located in the Roseville area at the southern end of the study area.

4.2.7 Schools

There is one school (South Hancock Elementary School) located within the study area. The school is located off of the west side of KY 69, just south of Goering Road in the middle of the study area.

4.2.8 Cemeteries

Four (4) cemeteries are known to exist within the study area. These include two cemeteries associated with Mount Eden Baptist Church, located north of B Rice Road in the middle of the study area; Powers Cemetery, located on the east side of KY 69 just south of Truman Young Road in the middle of the study area; and Roseville Cemetery, located on the west side of KY 69 in the Roseville area in the southern end of the study area.

4.2.9 Residences and Businesses

Approximately 180 residences and four businesses (Flea Market, Moffit Trucking, Weber Store, and NaDeans Beauty Shop) are located within the study area. Residential land use in the study area is generally rural/low density in nature along the KY 69 corridor. There are a few higher density areas in the vicinity of Water Tower Loop and Stinnett Lane near the southern end of the study area, as well as near Roseville, also near the southern end of the study area.

5.0 INITIAL PUBLIC INVOLVEMENT

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 (KYTC) Central and District 2 offices, representatives of the Green River Area Development District (GRADD), and the consultant team Stantec. The project team also reached out to stakeholders, local officials, and the public. Detailed summaries of each are presented in **Appendix F**.

5.1 PROJECT TEAM MEETING #1

Staff from the KYTC Central Office, KYTC District 2 Office, GRADD, and consultant firm met at South Hancock Elementary School in Hancock County on June 9, 2015. The purpose of the meeting was to discuss the project purpose and history, the results of the existing conditions analysis, design considerations, and get feedback from the project team before developing improvement alternatives. Key discussion items included the following:

- The project team had no comments on the draft purpose and need statement.
- After performing a capacity analysis of the existing and future traffic, all roadway segments operate at less than full capacity with a V/C less than 0.21 and a LOS C or better. The results of this analysis indicate a two-lane road can adequately accommodate the existing and future traffic demand.
- Single vehicle crashes were by far the most commonly reported crash type (75 percent). A contributing factor to the high number of single vehicle crashes is likely the narrow roadway width and deficient alignment.
- This study will examine two improvement concepts: (1) Complete Reconstruction Alternative and (2) Spot Improvements.
- The Complete Reconstruction Alternative is, at best, a long term improvement option because of the cost (\$65 to \$80 million).
- The alternative development process should focus on Spot Improvements. These locations will be based on geometric review of the existing alignment, the results of the crash history and traffic analyses, and local input.
- Trucks traveling to and from the paper mill north of US 60 use KY 69 as the main route. There are also timber and lumber yards located on KY 69. Trucks also carry steel on KY 69 to get to the barges on the Ohio River.
- Of the 103 reported crashes along KY 69, eight were crashes involving semi-trucks and three were crashes involving school buses. Most of these crashes appear to be the result of narrow roadway and shoulder widths.

5.2 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 69 Scoping Study:

- United States Legislators
- State Legislators
- Judge Executive in Hancock County
- Mayor of Hawesville
- Hawesville City Commissioners
- Hancock County Magistrates
- Hancock County Road Supervisor
- Hancock County Attorney
- Hancock County Planning
 Commission

- Hancock County Sheriff Department
- Hawesville Police Department
- Hawesville Fire Department
- Kentucky State Police Department
- Hancock County Emergency
 Management
- Hancock County Chamber of Commerce
- Hancock County Public Schools
- Hancock County Industrial
 Foundation

The project team met with key stakeholders and local officials on June 9, 2015. In addition to the project team, the Judge Executive of Hancock County, the State Representative for the 10th District, the State Senator for the 8th District, and the Mayor of Hawesville attended along with representatives from the Kentucky State Police Department, Hawesville Police Department, Hawesville Water Works, GRADD, Hancock County Magistrates, and United States Representative for the 2nd District. The purpose of the meeting was to discuss the project purpose and history, the results of the existing conditions analysis, design considerations, and get feedback before developing improvement alternatives. Key discussion items included the following:

- Narrow shoulders and shoulder failures caused by tractor/semi-trailer trucks do not allow recovery for vehicles leaving the travel way. The shoulders should be fixed and widened along the entire corridor.
- The narrow roadway widths at bridges and culverts are a safety concern.
- Of the 103 reported crashes between 2010 and 2014; 21 (20 percent) were animal collisions.
- Of the 103 reported crashes; eight were crashes involving semi-trucks and three were crashes involving school buses.

- There are likely a number of single vehicle property damage only crashes that go unreported. Unreported crashes are not included in the crash analysis.
- Should the speed limit be lowered? Answer: Most roadways of this type and classification are posted at 55 mph. The yellow and black signs warn drivers to slow down where there are curves with lower design speeds. Lowering the speed limit likely would not slow drivers down unless there is some enforcement of the speed limit.
- Will this scoping study be complete before the next legislative session? Answer: The final report will not be complete but we can provide local officials with the information needed to pursue funding for future project phases.
- This study will examine two improvement concepts: (1) Spot Improvements and (2) a Complete Reconstruction Alternative.
- Can we show the timeframe for each improvement? Answer: There are a lot of factors in determining a project's timeframe. This project is currently funded only through the planning phase. Future design, right-of-way, utility and construction phases for this project are not included in the current Six Year Highway Plan. The Complete Reconstruction Alternative could be built in 10 to 12 years if funding was in place. The project team has estimated the Complete Reconstruction alternative to cost \$65 to \$80 million, which will likely make such an undertaking infeasible as a single project. It will be easier to get \$5 to \$10 million for spot improvements and improve the road in pieces. Spot improvements can ultimately be connected, which would allow for a corridor wide improvement to be constructed over time.
- We understand the limitations of funding the Complete Reconstruction Alternative all at once. Spot Improvements are a more realistic goal.
- Following the presentation, participants were asked to identify trouble spots, environmental resources, and potential spot improvements on the exhibit boards. The locations of several water lines were identified but no trouble spots were provided.

6.0 ALTERNATIVES DEVELOPMENT

This study examined two types of improvement concepts: (1) Spot Improvements and (2) a Complete Reconstruction Alternative. The following section outlines the process by which initial improvement concepts were developed. Alternatives were developed based on the existing conditions analysis (traffic, crash, and environmental), traffic forecast, previous studies, and input received from the project team and local officials/stakeholders.

6.1 TRAFFIC FORECAST

To project future traffic volumes along the study corridor, analysts examined a number of available sources: the Daviess County traffic model (which includes Hancock County), historic traffic volumes along KY 69, and Census projections for Hancock County. A variety of annual growth rates were identified, ranging from 0.1 percent to 1.5 percent. For this project, an annual growth rate of 0.5 percent for traffic was used. The design year volumes were calculated by increasing current traffic volumes at 0.5 percent per year from 2015 to 2035.

Appendix G includes the KYTC Traffic Forecast Report which provides additional detail on the traffic forecast assumptions and findings.

Based on the KYTC Traffic Forecast Report, the 2035 average daily traffic (ADT) volumes are expected to experience minimal growth. The 2035 ADT volumes on KY 69 range from 1,400 vehicles per day (vpd) at the southern end of the study area to 3,300 vpd near the northern end of the study area, with 17 percent of the ADT being trucks.

To evaluate the adequacy of roadway segments, 2035 design hour volumes were compared to the road's theoretical capacity. V/C ratios were estimated along KY 69 based on the 2035 design hour volumes listed in the KYTC Traffic Forecast Report. After performing a V/C analysis using Highway Capacity Manual (HCM) procedures, all roadway segments currently operate at less than full capacity with a V/C less than 0.21.

Levels of service for different facility types are based on service measures deemed most appropriate for describing operations. For two-lane highways, levels of service are determined based on two parameters – average travel speed and percent time spent following in a platoon. After performing a LOS analysis using Highway Capacity Manual (HCM) procedures, all segments of KY 69 were found to operate at LOS C or better.

The results of this analysis indicate a two-lane road can adequately accommodate the future traffic demand. **Table 4** presents 2035 ADT, DHV, LOS and V/C for each segment.

Section	Begin Milepoint	End Milepoint	Section Length (miles)	ADT	Truck % (ADT)	DHV	Truck % (DHV)	LOS	V/C
1	0.000	4.627	4.627	1,400	17.0%	140	13.0%	В	0.11
	Ohio County Line	KY 144							
2	4.627	12.541	7.914	2,400		230		С	0.16
	KY 144	Tick Ridge Rd							
3	12.541	13.08	0.539	3,300		340		С	0.21
	Tick Ridge Rd	US 60							

Table 4: 2035 Traffic Analysis Summary

6.1.1 Intersection at KY 69 and US 60

The 2035 turning movement forecast volumes during the AM and PM peak hours are presented in **Figure 20**.

LOS was calculated at the intersection based on the existing lane configuration, traffic controls, and peak hour volumes. This is the preferred KYTC methodology for analyzing the adequacy of an intersection. **Table 5** presents detailed information about delay and LOS for individual approaches at the intersection. In rural areas such as this, LOS C or better is desirable. With a LOS C or better, this intersection will operate at an acceptable level of service through 2035.

Intersection	LOS	Approach	Delay (sec/veh)	LOS
	в (С)	Westbound US 60 Turning Left	8 (8)	A (A)
KY 69 at US 60		Northbound KY 69 Turning Left	15 (17)	C (C)
		Northbound KY 69 Turning Right	9 (9)	A (A)

Table 5: 2035 LOS during AM (PM) Peak Hour at KY 69/US 60 Intersection



Figure 20: 2035 Peak Hour Turn Movement Forecast at KY 69/US 60 Intersection

6.2 TYPICAL SECTIONS

The existing typical section along KY 69 has a total paved width of 24 feet which is striped as two 10-foot lanes and two-foot shoulders. The one exception is the reconstructed tie-in at the US 60 intersection where KY 69 was realigned with 12-foot lanes and eight-foot shoulders (six-foot paved, two-foot graded). Between the Ohio County Line and KY 144 the average daily traffic is between 400 and 1,500 vpd. Based on the 2006 KYTC Highway Design Manual⁷ for this ADT, 11-foot lanes and five-foot shoulders are recommended for further study. KY 144 to US 60 has an average daily traffic greater than 2,000 vpd. Based on the increased traffic volumes through this section; 12-foot lanes and eight-foot shoulders are recommended for further study.

The project team considered several possible typical sections, understanding that the typical section widths will ultimately be decided during the design phase of the project. For the Complete Reconstruction Alternative the project team decided to use 12-foot lanes and eight-foot shoulders (six-foot paved, two-foot graded) as shown in **Figure 21**. Greater pavement widths can encourage higher driving speeds, which is a concern for the spot improvement projects. As a result, the project team decided to use 11-foot lanes and six-foot shoulders (two-foot paved, four-foot graded) for the Spot Improvements as shown in **Figure 22**. This will provide a greater level of consistency between improved and unimproved sections and discourage higher driving speeds between improvements. KY 69 is almost 20 miles between KY 54 in Ohio County and US 60 in Hancock County, and there are 14 percent trucks, steep grades, and few passing opportunities. Toward the middle of the study area, near Ed Brown Road, there are steep grades. A northbound and southbound passing/truck-climbing lane is proposed at this location for the Complete Reconstruction Alternative and the Spot Improvement. The passing lane/truck-climbing lane typical section concept is shown in **Figure 23**.

⁷ http://transportation.ky.gov/Highway-

Design/Highway%20Design%20Manual/Geometric%20Design%20Guidelines.pdf



Figure 21: Conceptual Typical Section for the Complete Reconstruction Alternative



Figure 22: Conceptual Typical Section for the Spot Improvements



Figure 23: Conceptual Typical Section for Passing/Truck-Climbing Lane at Ed Brown Rd

6.3 INITIAL IMPROVEMENT CONCEPTS

A range of concepts were developed based on the existing conditions analysis and input received from the project team and local officials/stakeholders. As noted in the purpose and need, safety is the primary concern along KY 69. Conceptual projects were identified that improve geometry and safety along the study corridor. This study examined two types of improvement concepts: (1) Spot Improvements and (2) a Complete Reconstruction Alternative.

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

6.3.1 Spot Improvements

The Spot Improvements generally include relatively lower cost improvements that could be implemented individually as solutions to address existing safety and geometric issues. Ten locations were identified as preliminary spot improvement projects, as discussed below and shown in **Figure 24**. In order to improve the vertical alignment and maintain traffic during construction, most of these spot improvements are shown on new alignment. However, the

safety and geometry issues found at each spot could be addressed in a number of ways and thus the ultimate alignment and design details will need to be examined in subsequent project phases.

- Spot Improvement 1 Pellville Road: This concept improves the existing roadway geometry to 55 mph along 0.7 miles of KY 69 near Pellville Road. This portion of KY 69 has a crash critical rate factor (CRF) of 1.47 and four deficient vertical curves. Improvements should avoid South Hancock Park and Roseville Cemetery. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 77.00. The proposed conceptual improvements are shown in more detail in Figure 25.
- **Spot Improvement 2 Water Tower Loop**: This concept improves the existing roadway geometry to 55 mph along 0.9 miles of KY 69 near Water Tower Loop. This portion of KY 69 has a CRF of 1.10, eight deficient vertical curves, and five deficient horizontal curves. The proposed conceptual improvements are shown in more detail in **Figure 26**.
- Spot Improvement 3 Bates Hollow Road: This concept improves the existing 35 mph horizontal curve to 55 mph. It also corrects the skew at the Bates Hollow Road intersection and replaces the 1935 culvert over Bates Hollow Stream. This portion of KY 69 has a CRF of 1.47 and one deficient horizontal curve. The proposed conceptual improvements are shown in more detail in **Figure 27**.
- Spot Improvement 4 KY 144 Intersection: This concept converts the exiting two-way stop intersection at KY 69 and KY 144 to a four-way stop intersection. Advance warning signs on KY 69 would be placed and the existing flashing beacon would be converted from yellow to red so oncoming vehicles would have plenty of warning of the new stop signs on KY 69. This portion of KY 69 has a CRF of 1.72 and one deficient vertical curve. Four of the five crashes at this location were angle collisions at the KY 69/KY 144 intersection. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 78.41. The proposed conceptual improvements are shown in more detail in Figure 28. Note: additional traffic data and analysis is required to determine if this intersection meets the multi-way stop warrants from the Manual on Uniform Traffic Control Devices⁸.
- **Spot Improvement 5 Moxley Lane**: This concept improves the existing roadway geometry to 55 mph along 0.5 miles of KY 69 near Moxley Lane. This portion of KY 69 has a CRF of 2.00, one deficient horizontal curve, and three deficient vertical curves. The proposed alignment goes west to avoid the two homes along the existing road. The proposed conceptual improvements are shown in more detail in **Figure 29**.

⁸ http://mutcd.fhwa.dot.gov/



Figure 24: Spot Improvements



Figure 25: Spot Improvement 1 – Pellville Road



Figure 26: Spot Improvement 2 – Water Tower Loop



Figure 27: Spot Improvement 3 – Bates Hollow Road



Figure 28: Spot Improvement 4 – KY 144 Intersection



Figure 29: Spot Improvement 5 – Moxley Lane

- Spot Improvement 6 Ed Brown Road: This concept improves the existing roadway geometry to 55 mph along 1.4 miles of KY 69 near Ed Brown Road. There are steep grades at this location. As a result the proposed improvement also adds northbound and southbound passing/truck-climbing lanes for vehicles that get stuck behind slow moving trucks. This portion of KY 69 has a CRF of 1.15, four deficient horizontal curves, and twelve deficient vertical curves. The proposed conceptual improvements are shown in more detail in Figure 30.
- Spot Improvement 7 Blackford Creek: This concept replaces the 1932 functionally obsolete bridge over Blackford Creek (SR 59.7) and the 1932 culvert (SR 61.3) by Truman Young Road. This concept also improves the existing roadway geometry to 55 mph along 0.8 miles of KY 69. This portion of KY 69 has a CRF of 1.43, one deficient horizontal curve, and three deficient vertical curves. To maintain traffic during construction, the structures are replaced on new alignment. The proposed conceptual improvements are shown in more detail in Figure 31.
- Spot Improvement 8 B Rice Road: This concept improves the existing roadway geometry to 55 mph along 1.5 miles of KY 69 near B Rice Road. Improvements should avoid Mount Eden Baptist Church and its two cemeteries, located north of B Rice Road. This portion of KY 69 has a CRF of 1.15, one deficient horizontal curve, and eight deficient vertical curves. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 78.42. The proposed conceptual improvements are shown in more detail in Figure 32.
- Spot Improvement 9 Coal Bank Hollow Road: This concept improves the existing
 roadway geometry to 55 mph along 0.8 miles of KY 69 near Coal Bank Hollow Road. The
 proposed improvement also replaces the 1932 structurally deficient culvert for Caney
 Creek (SR 33.8). This portion of KY 69 has a CRF of 1.43, four deficient horizontal curves,
 and four deficient vertical curves. This location is on KYTC's Unscheduled Needs list as PIF
 02 046 D0069 78.43. The proposed conceptual improvements are shown in more detail in
 Figure 33.
- Spot Improvement 10 Tick Ridge Road: This concept improves the existing roadway geometry to 55 mph along 1.1 miles of KY 69 near Tick Ridge Road. The proposed improvement also corrects the skew at the Tick Ridge Road intersection and ties back to the 1994 improved portion of KY 69 near Happy Hollow Road (KY 1265). This portion of KY 69 has a CRF of 2.29, five deficient horizontal curves, and seven deficient vertical curves. This location is on KYTC's Unscheduled Needs list as PIF 02 046 D0069 78.44. The proposed conceptual improvements are shown in more detail in Figure 34.



Figure 30: Spot Improvement 6 – Ed Brown Road



Figure 31: Spot Improvement 7 – Blackford Creek



Figure 32: Spot Improvement 8 – B Rice Road



Figure 33: Spot Improvement 9 – Coal Bank Hollow Road



Figure 34: Spot Improvement 10 – Tick Ridge Road
6.3.2 Complete Reconstruction Alternative

In addition to Spot Improvements, the project team was also tasked with developing a Complete Reconstruction Alternative than could be implemented if funding becomes available. The Complete Reconstruction Alternative widens KY 69 and improves the existing roadway alignment to a 55 mph design speed from the Ohio County Line to the improved portion of KY 69 near Happy Hollow Road (KY 1265). It would also replace or widen the existing structures. The conceptual layout is presented in **Figure 35**.

This corridor-wide improvement can be obtained over time by connecting Spot Improvements 1 through 10, as shown in **Figure 36**. The Complete Reconstruction Alternative uses the proposed alignment from the spot improvements so resources would not be wasted if any or all of the spot improvements were built first. The Spot Improvements correct 8.1 miles of the study area, leaving 4.7 miles of additional reconstruction to achieve a corridor-wide improvement.



Figure 35: Complete Reconstruction Alternative



Figure 36: Connecting Spot Improvements to achieve Complete Reconstruction

6.4 COST ESTIMATES

Cost estimates were prepared for each improvement concept, shown in **Table 6**, based on average KYTC unit costs plus additional costs for special features such as culverts and bridges. KYTC District 2 assisted in this effort by providing approximate right-of-way and utility cost estimates.

	Droinot		2015 C	ost Estimat	es (millions)	
Improvement Concept	Length (miles)	Design	Right of Way	Utility	Construction	Total
No Build	13.08	\$0.00	\$0.00	\$0.00	\$0.00	\$0.0
Spot Improvement 1: Pellville Road	0.7	\$0.60	\$1.00	\$0.35	\$3.90	\$5.9
Spot Improvement 2: Water Tower Loop Road	0.9	\$0.80	\$1.00	\$0.35	\$5.50	\$7.7
Spot Improvement 3: Bates Hollow Road	0.4	\$0.40	\$0.50	\$0.35	\$2.90	\$4.2
Spot Improvement 4: KY 144 Intersection	N/A	\$0.02	\$0.05	\$0.05	\$0.03	\$0.1
Spot Improvement 5: Moxley Lane	0.5	\$0.40	\$0.50	\$0.35	\$1.80	\$3.1
Spot Improvement 6: Ed Brown Road	1.4	\$1.00	\$1.50	\$0.35	\$6.60	\$9.5
Spot Improvement 7: Blackford Creek	0.8	\$0.60	\$0.50	\$0.35	\$4.10	\$5.6
Spot Improvement 8: B Rice Road	1.5	\$0.90	\$1.50	\$0.35	\$6.20	\$9.0
Spot Improvement 9: Coal Bank Hollow Road	0.8	\$0.60	\$1.00	\$0.35	\$4.20	\$6.2
Spot Improvement 10: Tick Ridge Road	1.1	\$0.70	\$2.00	\$0.35	\$4.80	\$7.9
Complete Reconstruction	12.8	\$5.30	\$15.00	\$5.00	\$52.60	\$77.9

Table 6: Spot Improvement and Complete Reconstruction Cost Estimates

6.5 EVALUATION MATRIX

The improvement concepts were reviewed for potential "red flags" to help with the evaluation process and provide KYTC with information that will be used to make final recommendations regarding alternative(s) to be carried forward for future development.

- All improvement concepts meet the purpose and need of the project.
- All improvement concepts are located in High Crash Spots where there is a CRF greater than 1.0.
- Of the spot improvements under consideration, Spot Improvements 9 and 10 have the highest number of recorded crashes between 2010 and 2014.
- Spot Improvement 10 has the highest number of horizontal curves (11) that do not meet current design guidelines for 55 MPH.
- Spot Improvement 6 has the highest number of vertical curves (12) that do not satisfy a 55 mph design speed.
- Spot Improvement 10 has the highest number of potential relocations (4 relocations) followed by Spot Improvement 1 and Spot Improvement 8 with 3 potential relocations each.
- The Complete Reconstruction Alternative and Spot Improvements 1, 3, 5, 6, 7, 8, 9, and 10 could affect existing prime farmland.
- The Complete Reconstruction Alternative and Spot Improvements 1, 2, 8, and 9 could affect existing wetlands.
- The Complete Reconstruction Alternative and Spot Improvement 1 could impact an existing UST site.
- None of the improvement concepts affect previously surveyed properties with undetermined NRHP status.

A summary of the complete evaluation matrix is shown in Table 7.

								Potential Cor	nmunity & Envi	ironmental Imp	Jacts
Improvement Concept	Project Length (miles)	Does the concept meet the Purpose & Need?	Crash Critical Rate Factor	Total Number of Crashes (2010-2014)	Deficient Horizontal Curves	Deficient Vertical Curves	Potential Relocations (Excludes Barns)	Prime Farmland	Wetlands	HazMat & UST Sites	Previously Surveyed Properties with Undetermined NRHP Status
No Build	13.08	ON	0.00 - 2.29	103	23	67	0	No	No	No	Ŋ
Spot Improvement 1: Pellville Road	2.0	Yes	1.47	4	0	3	3	Yes	Yes	Yes	Ŷ
Spot Improvement 2: Water Tower Loop	6.0	Yes	1.10	4	5	8	٦	No	Yes	No	Q
Spot Improvement 3: Bates Hollow Road	0.4	Yes	1.47	5	1	0	0	Yes	No	ON	Q
Spot Improvement 4: KY 144 Intersection	A/A	Yes	1.72	5	0	1	0	No	No	No	Ŋ
Spot Improvement 5: Moxley Lane	0.5	Yes	2.00	7	1	3	0	Yes	No	N	Ŋ
Spot Improvement 6: Ed Brown Road	1.4	Yes	1.15	8	4	12	2	Yes	No	NO	Ŋ
Spot Improvement 7: Blackford Creek	0.8	Yes	1.43	8	1	3	0	Yes	No	NO	Ŋ
Spot Improvement 8: B Rice Road	1.5	Yes	1.15	6	1	8	3	Yes	Yes	No	Ŋ
Spot Improvement 9: Coal Bank Hollow Road	0.8	Yes	1.43	13	4	4	1	Yes	Yes	N	Ŋ
Spot Improvement 10: Tick Ridge Road	1.1	Yes	2.29	11	5	7	4	Yes	No	N	Ŋ
Complete Reconstruction	12.8	Yes	0.00 - 2.29	103	23	67	15	Yes	Yes	Yes	۶

Table 7: Evaluation Matrix

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7.0 SECOND ROUND OF PUBLIC INVOLVEMENT

Following the development of improvement concepts, the project team met with local officials, stakeholders, and interested members of the public. During the meeting, improvement concepts were presented and attendees were asked to provide feedback regarding their concerns and priorities. Summaries for all project meetings are found in **Appendix F**.

7.1 PROJECT TEAM MEETING #2

Staff from the KYTC Central Office, KYTC District 2 Office, GRADD, and Stantec met at the KYTC District 2 Office in Madisonville, Kentucky on August 24, 2015. The purpose of the meeting was to discuss the initial improvement concepts and get feedback from the project team on changes that should be considered. Key discussion items included the following:

- The project team verified the use of 11-foot lanes and six-foot shoulders (two-foot paved, four-foot graded) for Spot Improvements and 12-foot lanes and eight-foot shoulders (six-foot paved, two-foot graded) for the Complete Reconstruction Alternative.
- KY 69 is approximately 20 miles long between KY 54 and US 60. There are 14 percent trucks, steep grades, and few passing opportunities along this stretch of KY 69. A northbound and southbound passing lane at Spot Improvement 6 (Ed Brown Road) is a good idea.
- Most of the crashes at Spot Improvement 1 occur at the Pellville Road intersection. Consider reducing the footprint of this spot improvement and only correct the deficient crest vertical curve at the Pellville Road intersection.
- KYTC D2 suggested a recommendation cannot be made on the proposed multi-way stop at the KY 144 intersection (Spot Improvement 4) without gathering some additional data and comparing it to the Multi-Way Stop warrants in the MUTCD. There is always a concern when you stop traffic that has never had to stop before.

7.2 LOCAL OFFICIALS/STAKEHOLDERS MEETING #2

The project team met with key stakeholders and local officials on October 20, 2015 at South Hancock Elementary School in Hancock County, Kentucky. The purpose of the meeting was to present and discuss the initial improvement concepts with associated cost estimates, and to solicit feedback on changes that should be considered. Attendees were asked to complete a survey to help the project team understand priorities from a local perspective. Completed surveys were submitted by five attendees.

Question 3 asked if respondents felt improvements were needed along KY 69. All respondents (5 responses, 100 percent) indicated improvements are needed. Attendees were then asked whether several transportation issues along KY 69 should be addressed as part of the project. Of

the 11 options provided, safety, sharp grades, sharp curves, narrow lanes, and narrow shoulders were selected by all respondents.

Question 6 asked respondents which alternative they prefer. With five respondents, four (80 percent) preferred the Complete Reconstruction Alternative and one (20 percent) preferred Spot Improvements.

Question 7 asked respondents to rank their top five spot improvements where 1 is the top priority need. Looking at the total responses Spot Improvement 10 scored the highest (14) followed by Spot Improvement 4 (13) and Spot Improvement 9 (12). Attendees were then asked if they had any suggestions for additional spot improvements along KY 69. No one had additional suggestions.

The complete survey results are shown in **Appendix F**.

7.3 PUBLIC MEETING

After meeting with key stakeholders and local officials, the project team held a public meeting on October 20, 2015 at South Hancock Elementary School in Hancock County, Kentucky. The purpose of the meeting was to provide information about the study and the projects under consideration, discuss conceptual alternatives, and solicit input from the public. The meetings were held in an open house format that included a formal presentation to explain the project. Attendees were provided a project handout and survey. All of this information, including the presentation and survey, were made available on the project website.

Twenty seven members of the public attended this meeting. Attendees were asked to complete a survey to help the project team understand priorities from a local perspective. Completed surveys were submitted by 35 people through November 16, 2015.

Question 3 asked if respondents felt improvements were needed along KY 69. All but one respondent (97 percent) indicated improvements are needed. Attendees were then asked whether several transportation issues along KY 69 should be addressed as part of the project. Of the 11 options provided, safety (28 responses), large trucks (27 responses), sharp curves (31 responses), narrow lanes (24 responses), and narrow shoulders (25 responses) were selected most.

Question 6 asked respondents which alternative they prefer. With 31 responses, 23 (74 percent) selected Spot Improvements, and eight (26 percent) selected the Complete Reconstruction Alternative.

Question 7 asked respondents to rank their top five spot improvements where 1 is the top priority need. Looking at the total responses Spot Improvement 9 scored the highest (102) followed by Spot Improvement 7 (90) and Spot Improvement 10 (88). Attendees were then asked if they had any suggestions for additional spot improvements along KY 69. There were 12 suggestions from

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the public meeting. These suggestions included providing additional guardrail, correcting the curve 0.5 miles from Tick Ridge Road, improving the turning radii onto Concord Church Road, widening the road and shoulders along the entire study area, enforcing the speed limit, and adding a northbound passing lane at Coal Bank Hollow.

In addition to the paper survey, each attendee at the public meeting was given one green sticker and one yellow sticker and they were asked to "vote" for their preferred projects by placing the stickers on the exhibit boards showing the alternatives. The green sticker was to be placed on the Spot Improvement project that should be, in their opinion, given the highest priority for moving forward. The yellow sticker was to be placed on the Spot Improvement project that should be placed on the Spot Improvement project that should be placed on the Spot Improvement project that should be, in their opinion, given the second highest priority for moving forward. Spot Improvements 9 (11 votes) and 10 (15 votes) were the most commonly selected Spot Improvements, with Spot Improvement 10 receiving the most votes.

The complete survey results are shown in **Appendix F**.

8.0 CONCLUSIONS AND RECOMMENDATIONS

This section provides the recommendations for the KY 69 Scoping Study based on their ability to meet the purpose and need, the existing conditions analysis, the input received, and the alternative development process detailed in this report.

8.1 FINAL PROJECT TEAM MEETING

The project team met for the final time on December 10, 2015. The purpose of the meeting was to prioritize the improvements, using input from the stakeholders, local officials and public, and determine which improvements have the greatest benefit and are most economical. A detailed summary of the final project team meeting is included in **Appendix F**.

The group had an open discussion about the improvements:

- There were 12 suggestions from the public meeting for additional spot improvements along KY 69. The project team discussed each of these.
 - 1. One person recommended correcting the curve 0.5 miles from Tick Ridge Road. This curve is already being improved as part of Spot Improvement 10.
 - 2. Five people recommended widening the road and shoulders along the entire study area. This improvement would be very costly and is not recommended as a standalone project without also addressing the alignment deficiencies.

- 3. Two people recommended providing additional guardrail. Guardrail is being added systematically along the study area based on a list of districtwide needs and funds.
- 4. One person wanted better enforcement of the speed limit. This is outside the scope of this study.
- 5. One person wanted a northbound passing lane at Coal Bank Hollow Road. Coal Bank Hollow Road is at the northern end of corridor. Ed Brown Road is a better location for passing lanes/truck-climbing lanes, which are included as part of Spot Improvement 6.
- 6. Two people wanted the turning radii onto Concord Church Road improved. There were no crashes reported at this location between 2010 and 2014. This is not recommended to be included as a new standalone spot improvement.
- Six school bus drivers from Hancock County Public Schools submitted surveys. They were all concerned with the narrow shoulders along the study area. Replacing the narrow bridge at Blackford Creek (Spot Improvement 10) was their number one priority.
- Future design, right-of-way, utility and construction phases for this project are not included in the current Six Year Highway Plan. The project team has estimated the Complete Reconstruction alternative to cost \$77.9 million, which will likely make such an undertaking infeasible as a single project.
- The project team decided Spot Improvement 10 should be the top priority and Spot Improvement 9 should be the second priority. Both received the most survey votes, have the highest number of total crashes, and have a number of geometric deficiencies. KY 69 between Happy Hollow Road and US 60 was reconstructed in 1994. Spot Improvement 10 ties to this improved portion of KY 69, which makes it a logical improvement from a continuity standpoint.
- Spot Improvements 9 and 10 could be designed and constructed together depending on available funds. This would address the top two ranked spot improvements and tie back to the already improved portion of KY 69 at Happy Hollow Road. The total construction cost, including improving the 0.9 mile section between the two spot improvements, is estimated to be \$13 million.

8.2 **RECOMMENDATIONS**

The project team decided the focus of the KY 69 Scoping Study would be to identify Spot Improvement projects that can be implemented quickly and independently as well as a Complete Reconstruction Alternative that can be implemented if funding becomes available. In light of the technical data, comments from local officials/stakeholders and the public, and results of the survey, the project team worked together to prioritize each of the individual spot improvements. The Spot Improvements are shown in **Figure 24** and the Complete Reconstruction Alternative is shown in **Figure 35**. Project sheets for each project are included in **Appendix H**.

- High Priority (in order)
 - 1. Spot Improvement 10: Tick Ridge Road
 - 2. Spot Improvement 9: Coal Bank Hollow Road
 - 3. Spot Improvement 2: Water Tower Loop
 - 4. Spot Improvement 7: Blackford Creek

• Medium Priority (in no particular order)

- Spot Improvement 3: Bates Hollow Road
- Spot Improvement 5: Moxley Lane
- Spot Improvement 6: Ed Brown Road
- Low Priority (in no particular order)
 - Spot Improvement 1: Pellville Road
 - Spot Improvement 4: KY 144 Intersection
 - Spot Improvement 8: B Rice Road
- No Priority (not recommended)
 - Complete Reconstruction Alternative: Future design, right-of-way, utility and construction phases for this project are not included in the current Six Year Highway Plan. The project team has estimated the Complete Reconstruction alternative to cost \$77.9 million, which will likely make such an undertaking infeasible as a single project.

The project team decided Spot Improvement 10 (Tick Ridge Road) should be the top priority and Spot Improvement 9 (Coal Bank Hollow Road) should be the second priority. Both received the most survey votes, have the highest number of total crashes, and have a number of geometric deficiencies. Spot Improvement 10 ties back to the improved portion of KY 69 near Happy Hollow Road (KY 1265), which makes it a logical starting point.

Spot Improvements 9 and 10 could be designed and constructed together depending on available funds. This would address the top two ranked spot improvements and tie back to the

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already improved portion of KY 69 at Happy Hollow Road (KY 1265). The total construction cost, including improving the 0.9 mile section between the two spot improvements, is estimated to be \$13 million.

A corridor-wide improvement can be obtained over time by connecting all the spot improvements, as shown in **Figure 36**. The Complete Reconstruction Alternative uses the proposed alignment from the spot improvements so resources would not be wasted if any or all of the spot improvements were built first. The spot improvements correct 8.1 miles of the route, leaving 4.7 miles of additional reconstruction to achieve a corridor-wide improvement. Studies have demonstrated that greater pavement widths encourage higher driving speeds, which is a concern for the spot improvement projects where improved sections could be located within a larger unimproved portion of the route. As a result, the project team recommended spot improvements include 11-foot lanes and six-foot shoulders (two-foot paved, four-foot graded) – a typical section that meets design guidelines, improves safety, and is more compatible with adjacent sections that may not be improved at the same time. This will provide a greater level of consistency between improved and unimproved sections and discourage higher driving speeds between improvements.

If funding becomes available for the Complete Reconstruction Alternative, logical termini for the project will need to be examined further. KY 69 extends almost 20 miles from KY 54 in Ohio County to US 60 in Hancock County. This study examined the need for and types of improvements in Hancock County between the Ohio County Line and US 60. Should the Complete Reconstruction Alternative be advanced to the preliminary design phase, consideration should be given to extending the project limits 5.7 miles to the south to KY 54 in Ohio County. KY 54 is an east/west connection between Owensboro and Leitchfield. Improving KY 69 from KY 54 in Ohio County to US 60 in Hancock County would better enhance regional mobility, which is one of the overall purposes of the project.

8.3 NEXT STEPS

The next phase for the KY 69 Project would be Phase 1 Design (Preliminary Engineering and Environmental Analysis) for one or more of the high priority projects. Further funding will be necessary to advance an improvement to the design phase.

9.0 CONTACTS/ADDITIONAL INFORMATION

Written requests for additional information should be sent to John Moore, Director, KYTC Division of Planning, 200 Mero Street, Frankfort, KY 40622. Additional information regarding this study can also be obtained from the KYTC District 2 Project Manager, Nick Hall, at (270) 824-7080 (email at Nick.Hall@ky.gov).