APPENDIX D: MEETING SUMMARIES

Meeting Minutes

TO:	Darren Back Project Manager KYTC District #10 Office 473 Highway 15 South Jackson, KY 41339	Jared Jeffers Project Manager KYTC Central Office Planning 200 Mero Street Frankfort, KY 40622

FROM: Brian Aldridge
Project Manager
Stantec Consulting Services Inc.

DATE: June 22, 2023

SUBJECT: US 460 Corridor Study
US 460 (MP 14.570 – MP 20.406, Magoffin County)
US 460 (MP 0.000 – MP 7.620, Johnson County)
Magoffin County and Johnson County
KYTC Item No. 10-80101.00
Project Team Meeting No. 1

The first Project Team Meeting for the subject project was held at the KYTC District 10 office and virtually via Microsoft Teams on June 19, 2023, at 1:00 p.m. EDT. The following individuals were in attendance:

Jayalakshmi Balaji*	KYTC – Central Office Planning
Darren Back	KYTC – District 10
Corbett Caudill	KYTC – District 10
Charlie Dale*	KYTC – District 12
Libbie Dockemeyer	KYTC – Central Office Planning
Cody Fouts	KYTC – District 10
Samuel Hale*	KYTC – District 12
Chris James*	KYTC – District 12
Jared Jeffers	KYTC – Central Office Planning
John Johnson*	KYTC – District 12
Connor Ouellette*	KYTC – Division of Environmental Analysis
Mikael Pelfrey*	KYTC – Central Office Planning
Jason Siwula*	KYTC – Deputy State Highway Engineer
Aric Skaggs	KYTC – District 10
David Souleyrette*	KYTC – Central Office Planning
Brian Aldridge	Stantec Consulting Services Inc.
Graham Winchester	Stantec Consulting Services Inc.

*Joined via Microsoft Teams

Brian Aldridge welcomed everyone and said the purpose of the meeting was to discuss the progress to-date for the US 460 Corridor Study. Brian then delivered a presentation.

The following enumerated items were discussed.

1. The purpose of the meeting is to present the results from the existing conditions analysis and to get feedback from the project team on transportation issues and preliminary improvement concepts.

2. There are four projects on or near the US 460 study corridor. These projects are listed in *Kentucky's FY 2022 – 2028 Highway Plan*:

    - KYTC Item No. 10-169.00 includes extending the Mountain Parkway Corridor from US 460 to the Magoffin/Floyd County line. The length of this project is 5.03 miles (D = $1 million, R = $10.42 million, U = $4.22 million, C = $35 million).
    - KYTC Item No. 10-20013.00 includes addressing pavement conditions on US 460 from MP 14.57 to 20.37 in Magoffin County (C = $1.485 million).
    - KYTC Item No. 12-80250.00 includes constructing an access road to the proposed Johnson County High School and Middle School Campus (D = $1.5 million, R = $750 thousand, U = $350 thousand, C = $10,609,253)
    - Item No. 10-80101: Improve US 460 from the intersection with KY 114 to the interchange with US 23. Length is 13.46 Miles. $176,641,800 is budgeted.

3. The purpose of the US 460 Corridor Study is to enhance regional mobility and to provide a safer, more efficient connection between Salyersville and Paintsville. US 460 provides the most direct connection between Paintsville and the Mountain Parkway at Salyersville for vehicles traveling west. Listed on the National Highway System (NHS) and the National Truck Network (NN), US 460 also provides connectivity to important regional resources such as Paintsville Lake State Park and Paintsville Appalachian Regional Healthcare (ARH) Hospital.

4. The study corridor is 13.456 miles and includes US 460 beginning at KY 114 (MP 14.570) in Magoffin County and ends at US 23 (MP 7.620) in Johnson County.

5. Highlights from the existing conditions analysis were discussed. The study corridor consists of two 12-foot lanes and 10-foot outside shoulders, with four eastbound passing lanes and four westbound passing lanes with approximately 1.5 to three miles between passing lanes. This principal arterial has a speed limit of 55 miles per hour (mph) for the entire corridor.

6. Crash data from the Kentucky State Police database indicates that in the five years between January 1, 2018 and December 31, 2022, a total of 77 crashes were reported on the US 460 study corridor. Of the 77 crashes, five resulted in a fatality (six percent), 23 resulted in an injury (30 percent), and 49 were property damage only collisions (64 percent). Three of the fatal collisions were angle collisions at intersections, one was a rear end, and one was a single vehicle collision along the rural portion of the study corridor.

   Crash reports were requested for the 26 injury collisions on US 460 between 2017 – 2021. These collisions were analyzed to determine the severity of the injury collisions using the KABCO categorization scale, shown in **Figure 1**. Of the 26 injury crashes, 15 (58 percent) were classified as "C" indicating a possible collision, seven (27 percent) were "B" indicating a non-incapacitating injury, and four (15 percent) were "A" indicating an incapacitating injury.

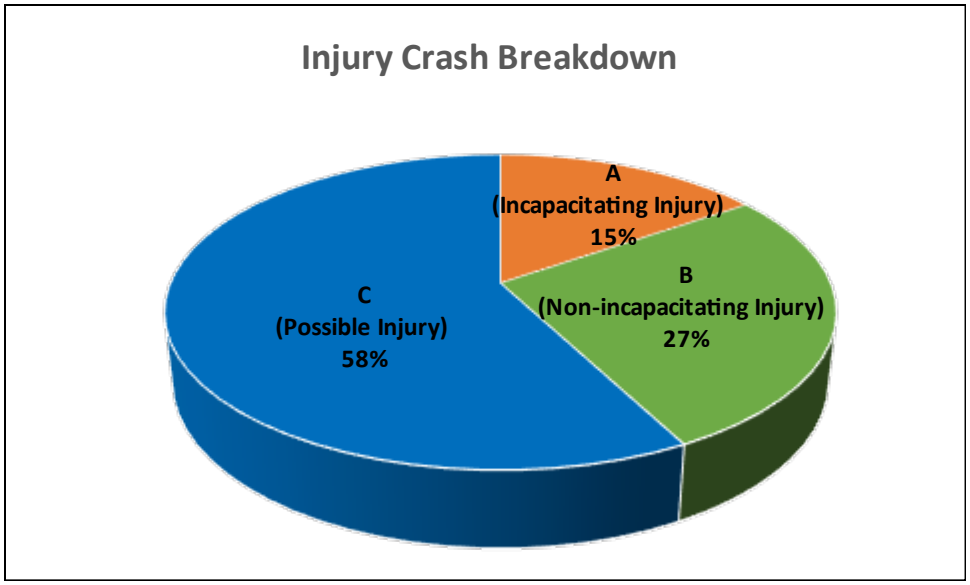

Figure 1: Injury Collision Breakdown

   In addition to analyzing the severity of the injury collisions, the fatal and injury collisions were also summarized based on reason for crash. Of the 30 fatal and injury crashes, 10 were due to inattention, five were due to poor visibility (fog, rain, glare), three were due to sickness, 3 involved a DUI, three were animal collisions, two involved vehicle malfunction, two occurred on wet pavement, one was a rear end collision, and one involved a pedestrian crossing US 460.

   - Question: Were there clusters of animal collisions?
     Answer: No, the animal collisions were dispersed along the study corridor.

   Single vehicle crashes were the most prominent types of collisions (56 percent), followed by rear end collisions (25 percent). The crash types of the reported crashes over the past five years are shown in **Figure 2**.

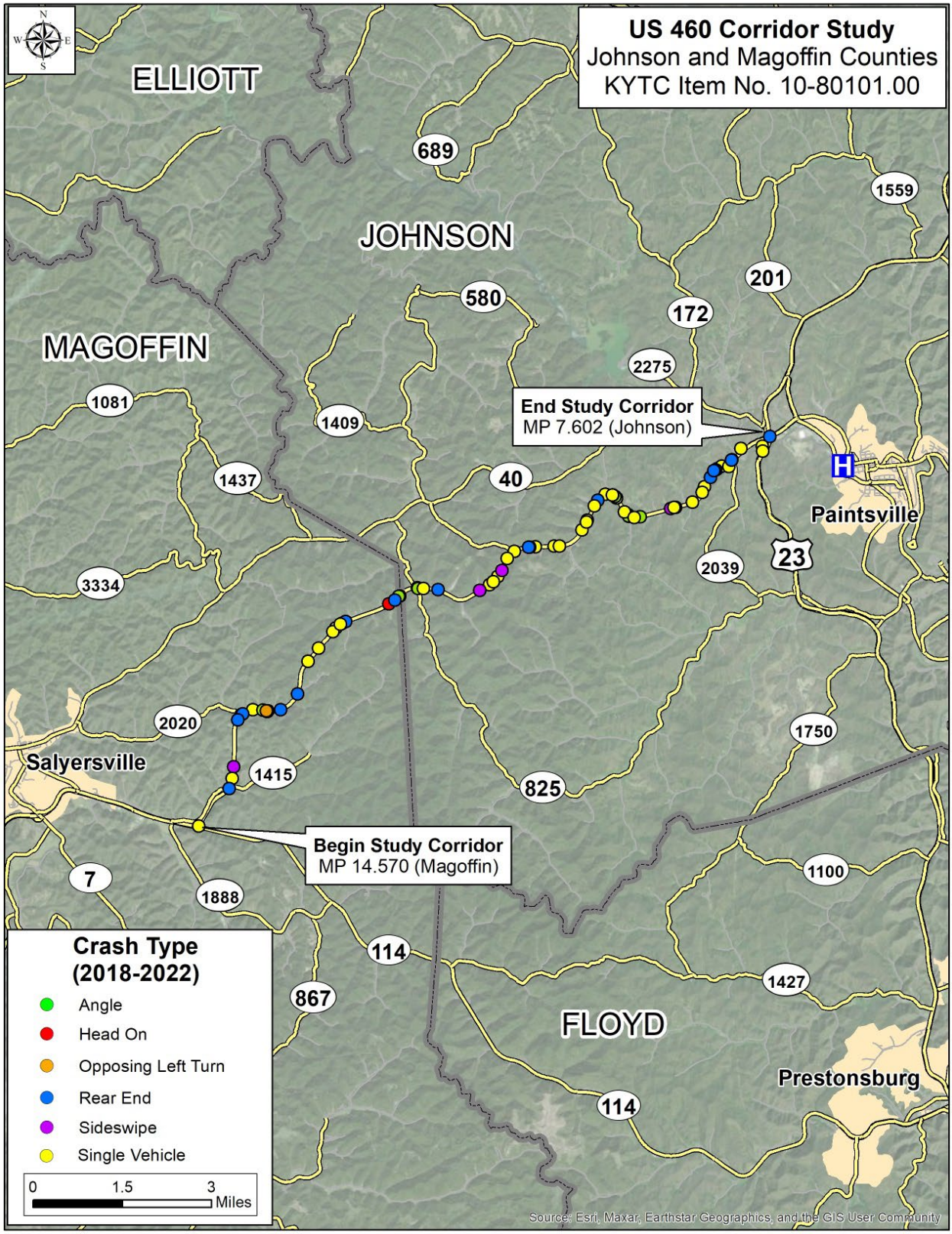

Figure 2: Crash Type (2018 – 2022)

7. The Crash Data Analysis Tool (CDAT) was used to perform an Excess Expected Crashes (EEC) analysis. EEC is a measure of the crash frequency at a given site compared to what is expected based on current conditions (geometrics, traffic, etc.). A positive EEC indicates more crashes are occurring than should be expected. All segments on US 460 had negative EECs. Two intersections, James Holbrook Road and Barnetts Creek Road, had slightly positive EECs.

8. Superelevation data was collected at several points along the study corridor during a December 2022 site visit. **Table 1** presents a summary of the superelevation measurements.

Table 1: US 460 Superelevation Measurements

County	Route	MP	Superelevation
Magoffin	US 460	15.5	9.3%
Johnson	US 460	0.3	12.8%
Johnson	US 460	4.3	10.7%

9. A review of record drawings revealed no substandard horizonal curves. **Figure 3** presents a comparison of passing lanes, horizontal curves, and fatal/injury crash density. Two locations were identified as high crash spots with horizontal curves including near the county line, where three collisions resulted in a fatality, and near milepoint 4.0 in Johnson County, where two collisions resulted in a fatality.

10. The review of record drawings revealed one substandard vertical curve, at milepoint 16.9, with a headlight stopping sight distance (HSSD) of 486 feet, as shown in **Figure 4**. The recommended HSSD at this location is 495 feet.

11. Historical KYTC traffic volumes show an Average Daily Traffic (ADT) of 3,200 to 3,400 vehicles per day (VPD) on US 460 in Magoffin County and 5,100 to 5,500 VPD in Johnson County with 125 to 165 trucks per day. **Figure 5** presents the most recent ADTs for US 460 and surrounding roadways.

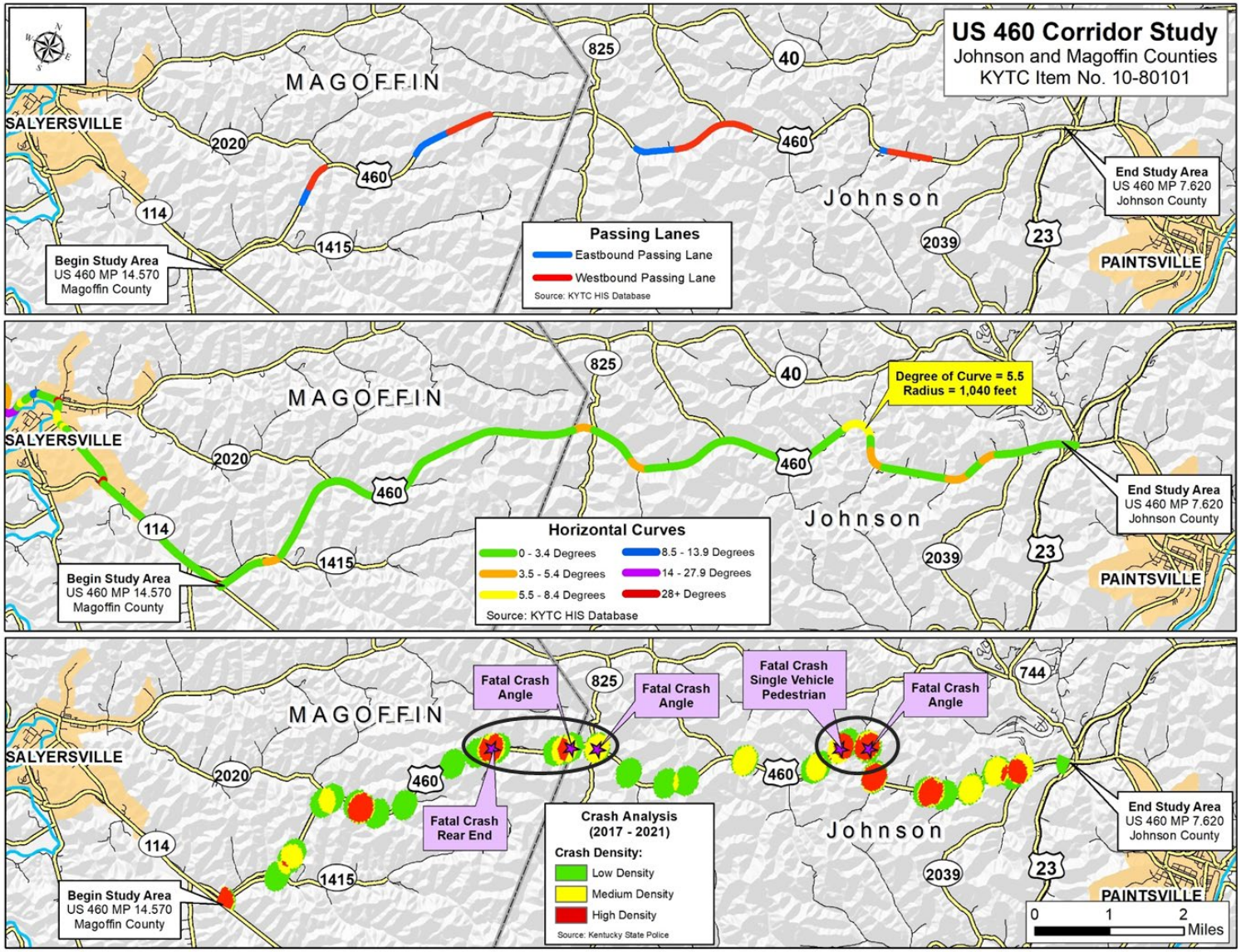

Figure 3: Horizontal Curve Comparison

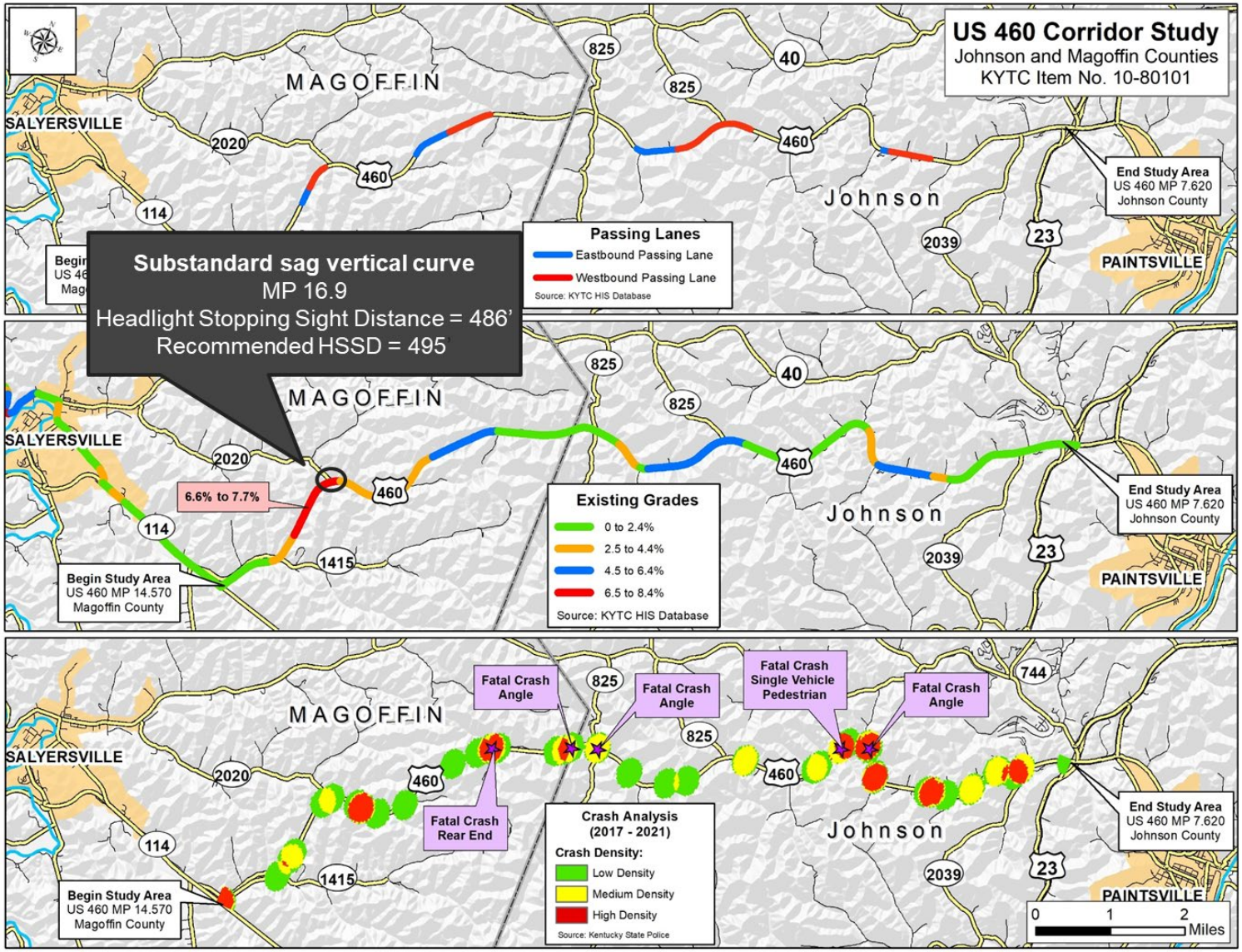

Figure 4: Vertical Curve Comparison

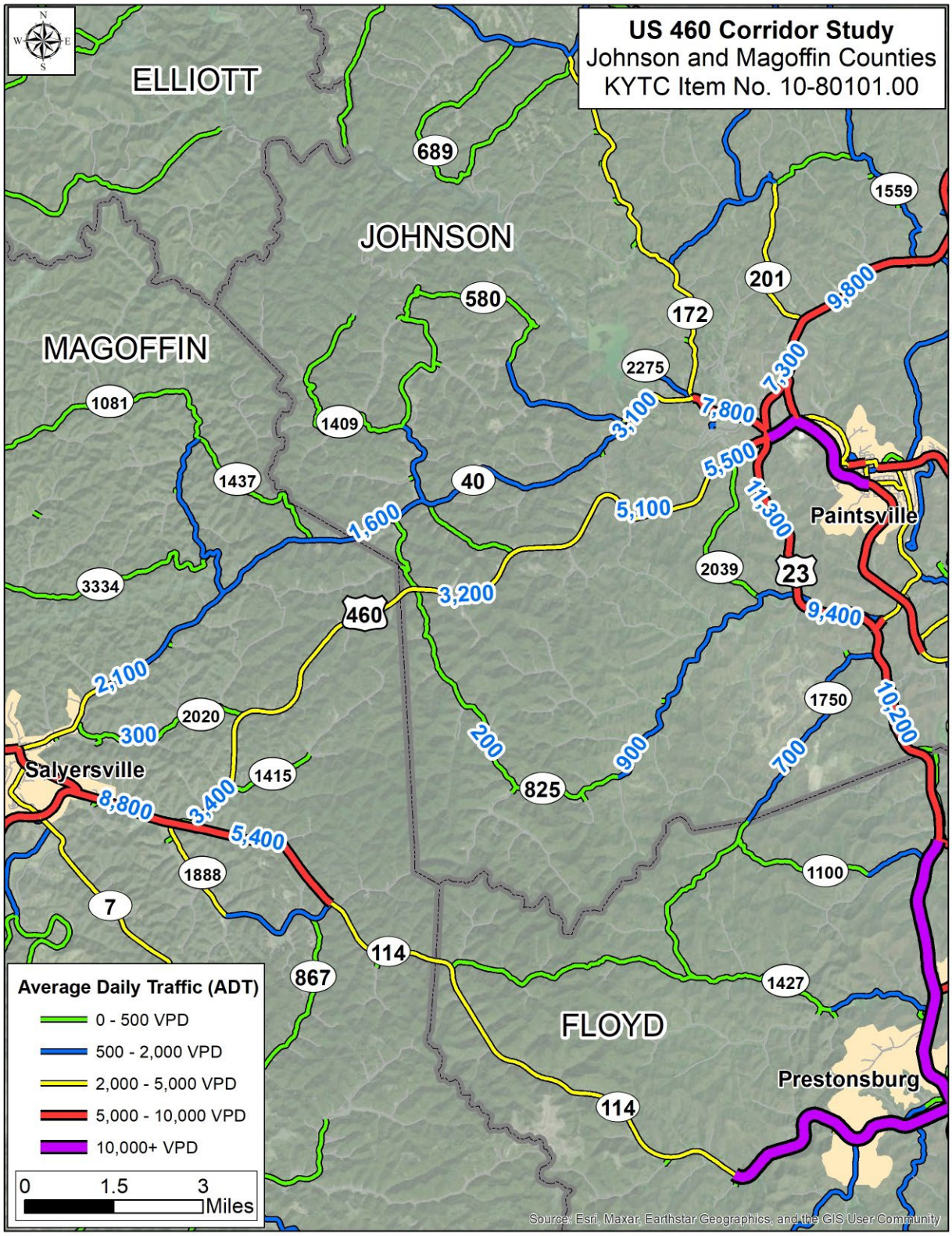

Figure 5: Average Daily Traffic (ADT)

12. A Highway Capacity Software (HCS) analysis was conducted to analyze existing AM and PM peak hour traffic on US 460. Results from the analysis show the entirety of the corridor currently operates at LOS B or better, as shown in **Table 2**.

Table 2: Existing Peak Hour Traffic Analysis

County	Route	Begin	End	% HV	AM Peak		PM Peak	
					EB LOS	WB LOS	EB LOS	WB LOS
Magoffin	US 460	KY 114	County Line	7%	A	A	A	A
Johnson		County Line	KY 580	14%	A	A	A	A
		KY 580	KY 2039	14%	A	A	A	A
		KY 2039	KY 23	9%	B	A	A	A

13. Over the past 20 years, population in Magoffin and Johnson Counties has declined between -0.17 percent and -0.68 percent per year based on data from the KY State Data Center. This trend is expected to continue into 2040, as shown in **Table 3.**

Table 3: Population Estimates and Projections

Area	Census Estimates			Annual Growth	2040 Projection	Annual Growth
	2000	2010	2020	2000 - 2020		2020 - 2040
Kentucky	4,041,769	4,339,367	4,505,836	0.54%	4,886,381	0.41%
Johnson County	23,445	23,356	22,680	-0.17%	19,470	-0.76%
Magoffin County	13,332	13,333	11,637	-0.68%	8,768	-1.41%
Paintsville	4,132	3,459	4,312	0.21%	N/A	
Salyersville	1,604	1,883	1,591	-0.04%	N/A	

14. Traffic forecasts were developed in 2022 for the Mountain Parkway Expansion Project. A growth rate of 1.92 percent per year was used to grow truck traffic and a growth rate of -0.25 percent was used for autos for this project.

15. Based on population projections, historical traffic, results from the Kentucky Statewide Travel Demand Model (KYSTM), and forecasts for the adjacent Mountain Parkway Expansion Project, a growth rate of 0.3 percent per year was used. Based on this annual growth rate, US 460 is expected to carry up to 6,000 VPD in 2045.

    Based on the assumption that a two-lane road with passing lanes operates with a LOS D at 16,000 VPD, annual daily traffic would have to grow at a rate ranging from 3.74 to 6.87 percent per year before US 460 operates at LOS D.

16. Brian then led a discussion of potential improvement concepts, including a 2+1 roadway, spot improvements, and four-lane widening.
    - 2+1 Concept – A three-lane road with two lanes in one direction (one meant for passing). The direction of the passing lane alternates every couple of miles and provides increased capacity and less waiting time behind slow vehicles and trucks. **Figure 6** presents the preliminary location of the passing lanes**.**
    - Spot improvements – Lowering the superelevation and flattening horizontal curves in 3 locations, as shown in **Figure 7.**

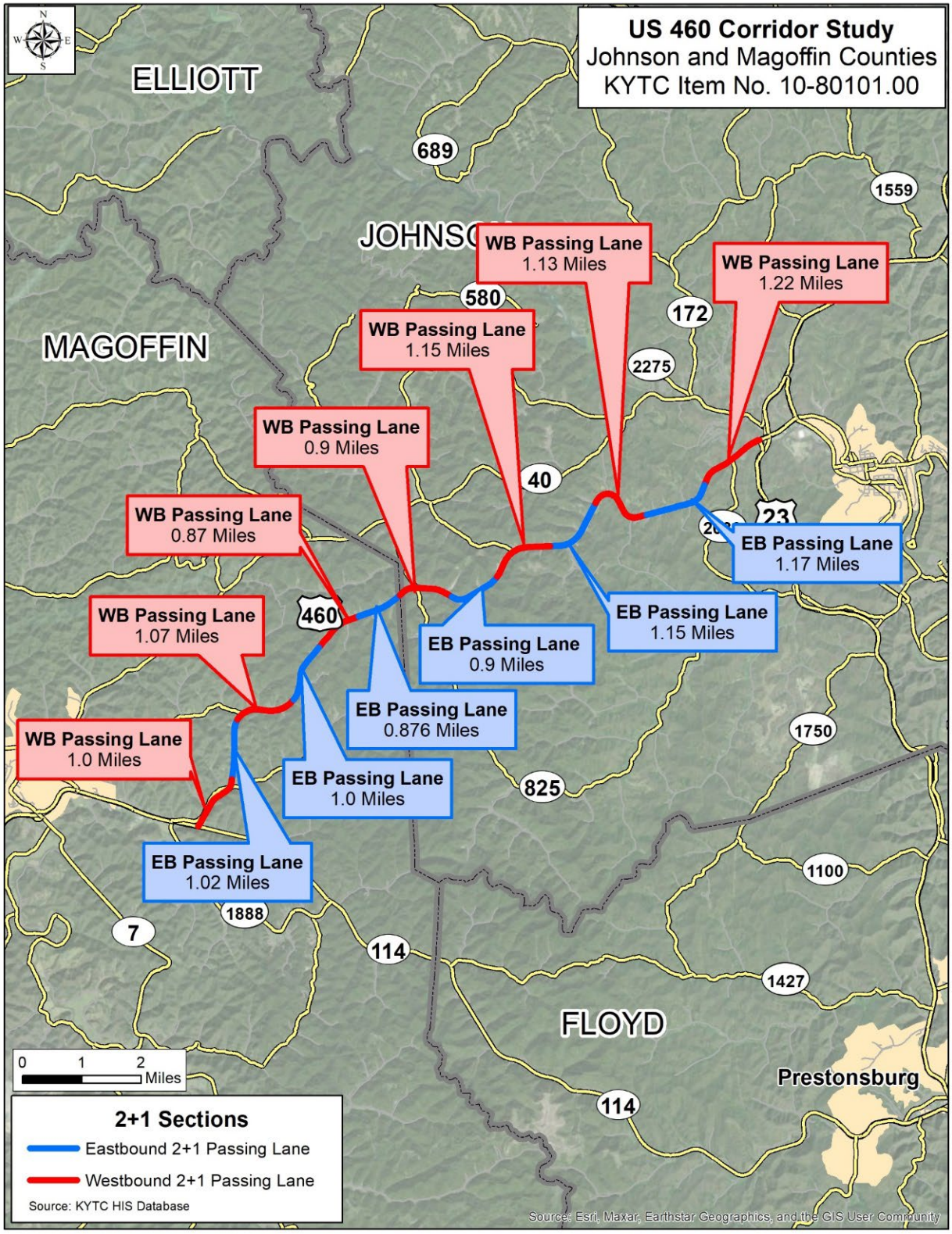

Figure 6: Potential 2+1 Sections

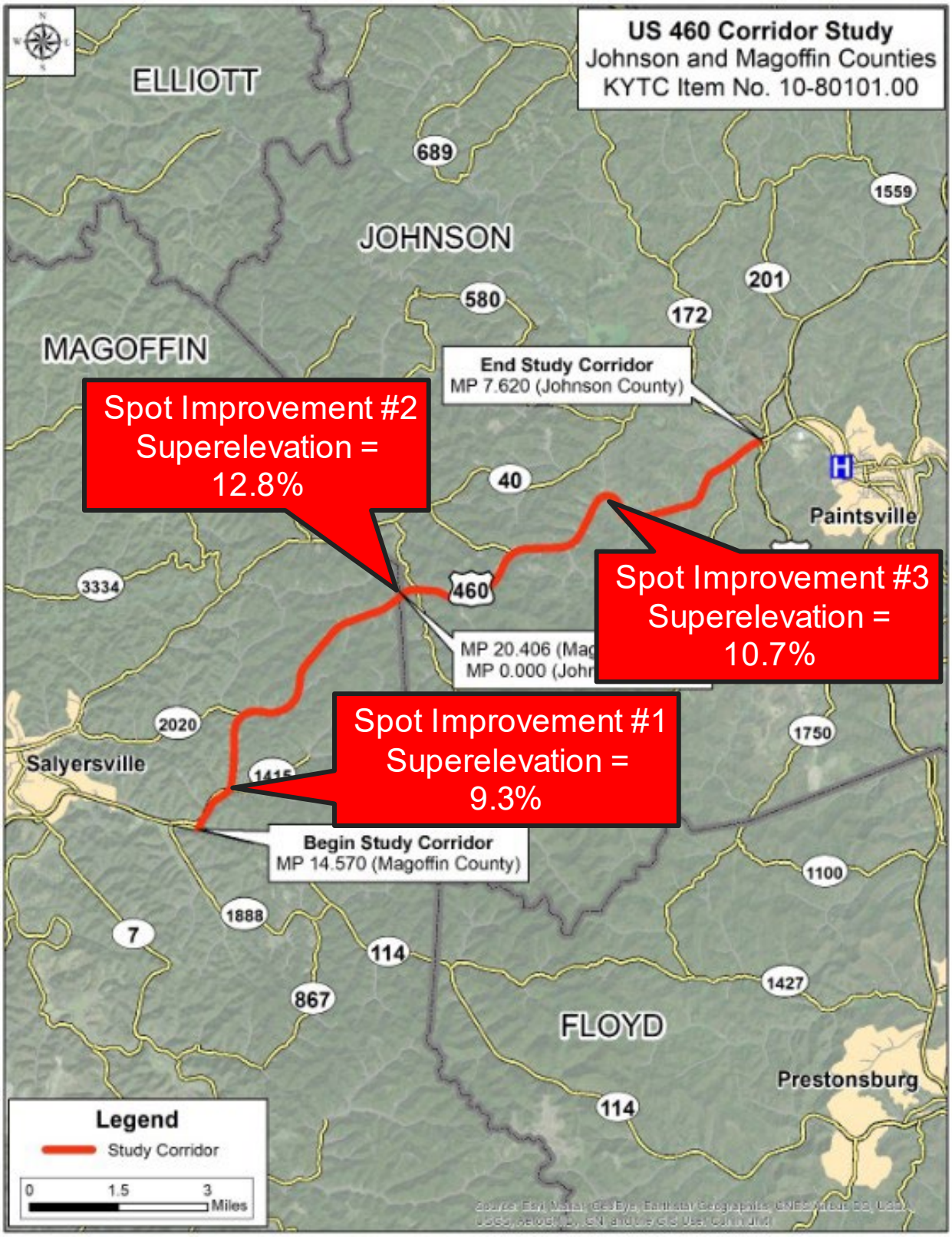

Figure 7: Spot Improvement Locations

- 4-Lane Widening – Widening the existing roadway from two to four lanes with a depressed grass median. **Figure 8** presents the typical section for the widening, which includes two twelve-foot lanes in each direction, 12-foot outside shoulders, and a 40-foot depressed median. This typical section is consistent with the Mountain Parkway Expansion.
    - Question: Was a narrower typical section with 11-foot lanes and a barrier wall considered?
      Answer: No, this typical section was chosen to remain consistent with the Mountain Parkway Expansion.

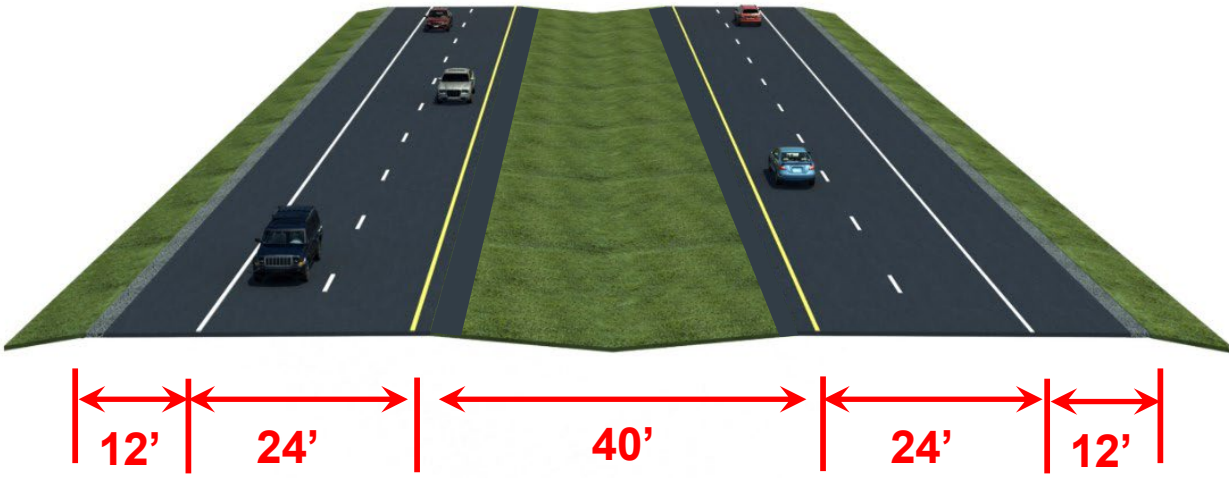

Figure 8: Four-Lane Widening Typical Section

17. A return on investment (ROI) analysis was performed to compare the design and construction costs to the 20-year safety benefit for each improvement concept. The safety benefits were estimated using crash modification factors (CMFs) from the Crash Modification Clearinghouse. A CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site[1]. An ROI above 1.0 indicates the safety benefits outweigh than cost. Spot improvements have the highest ROI at 9.55, as shown in **Table 4**. The 2+1 concept roadway has an ROI ranging between 0.63 and 2.74 and the four-lane widening concept has an ROI of 0.33. The ROI analysis will be updated once costs are refined.

    - Stantec will work with District 10 and District 12 to develop right-of-way, utility, and environmental mitigation cost estimates.
    - Asphalt and earthwork cost estimates were similar to estimates from the Mountain Parkway Expansion.

[1] https://www.cmfclearinghouse.org/faqs.php#q1

Table 4: Return on Investment (ROI) Summary

Concept	Design Cost	Construction Cost	Safety Benefit	20-Yr ROI
Spot Improvements	$600,000	$6,000,000	$63,000,000	9.55
2 + 1	$3,500,000	$35,000,000	$105,400,000	2.74
			$24,400,000	0.63
4-Lane Widening	$17,600,000	$176,000,000	$64,100,000	0.33

18. The next steps include refining the cost estimates and meeting with local officials / stakeholders.

The meeting ended at 2:15 PM EDT.

Meeting Minutes

TO:	Darren Back Project Manager KYTC District #10 Office 473 Highway 15 South Jackson, KY 41339	Jared Jeffers Project Manager KYTC Central Office Planning 200 Mero Street Frankfort, KY 40622
FROM:	Brian Aldridge Project Manager Stantec Consulting Services Inc.	
SUBJECT:	US 460 Corridor Study US 460 (MP 14.570 – MP 20.406, Magoffin County) US 460 (MP 0.000 – MP 7.620, Johnson County) Magoffin County and Johnson County KYTC Item No. 10-80101.00 Local Officials Meeting	

The Local Officials Meeting for the subject project was held at the KYTC District 10 office and virtually via Microsoft Teams on September 20, 2023, at 10:30 a.m. EDT. The following individuals were in attendance:

Darren Back	KYTC – District 10
John Blanton*	Kentucky State Legislature
Corbett Caudill	KYTC – District 10
Charlie Dale	KYTC – District 12
Stephen DeWitte*	KYTC – Central Office Planning
Samuel Hale*	KYTC – District 12
Jared Jeffers	KYTC – Central Office Planning
Regina McClure	Johnson County Fiscal Court
Bobby McCool	Kentucky State Legislature
Mark McKenzie	Johnson County Fiscal Court
Jason Siwula*	KYTC – Assistant State Highway Engineer
Matt Wireman*	Magoffin County Judge Executive
Brian Aldridge	Stantec Consulting Services Inc.
Clint Goodin	Stantec Consulting Services Inc.
Len Harper	Stantec Consulting Services Inc.
Graham Winchester*	Stantec Consulting Services Inc.

*Joined via Microsoft Teams

Brian Aldridge welcomed everyone and said the purpose of the meeting was to discuss the revised improvement concepts for the US 460 Corridor Study. Brian then delivered a presentation.

The following enumerated items were discussed.

1. The purpose of the meeting is to review the results from the existing conditions analysis, get feedback from the project team on improvement concepts, and discuss the revised alternative concepts to determine the next steps.

2. The study corridor is 13.456 miles and includes US 460 beginning at KY 114 (MP 14.570) in Magoffin County and ends at US 23 (MP 7.620) in Johnson County.

3. There are four projects on or near the US 460 study corridor, as shown on **Figure 1**. Two of the four projects are listed in *Kentucky's FY 2022 – 2028 Highway Plan*:

    - Item No. 10-80101: Improve US 460 from the intersection with KY 114 to the interchange with US 23. Length is 13.46 Miles. $176,641,800 is budgeted.
    - KYTC Item No. 10-169.00 includes extending the Mountain Parkway Corridor from US 460 to the Magoffin/Floyd County line. The length of this project is 5.03 miles (D = $1 million, R = $10.42 million, U = $4.22 million, C = $35 million).

    Two projects were listed in previous versions of the Highway plan:

    - KYTC Item No. 10-20013.00 includes addressing pavement conditions on US 460 from MP 14.57 to 20.37 in Magoffin County (C = $1.485 million).
    - KYTC Item No. 12-80250.00 includes constructing an access road to the proposed Johnson County High School and Middle School Campus (D = $1.5 million, R = $750 thousand, U = $350 thousand, C = $10,609,253)

4. The purpose of the US 460 Corridor Study is to enhance regional mobility and to provide a safer, more efficient connection between Salyersville and Paintsville. US 460 provides the most direct connection between Paintsville and the Mountain Parkway at Salyersville for vehicles traveling west. Listed on the National Highway System (NHS) and the National Truck Network (NN), US 460 also provides connectivity to important regional resources such as Paintsville Lake State Park and Paintsville Appalachian Regional Healthcare (ARH) Hospital.

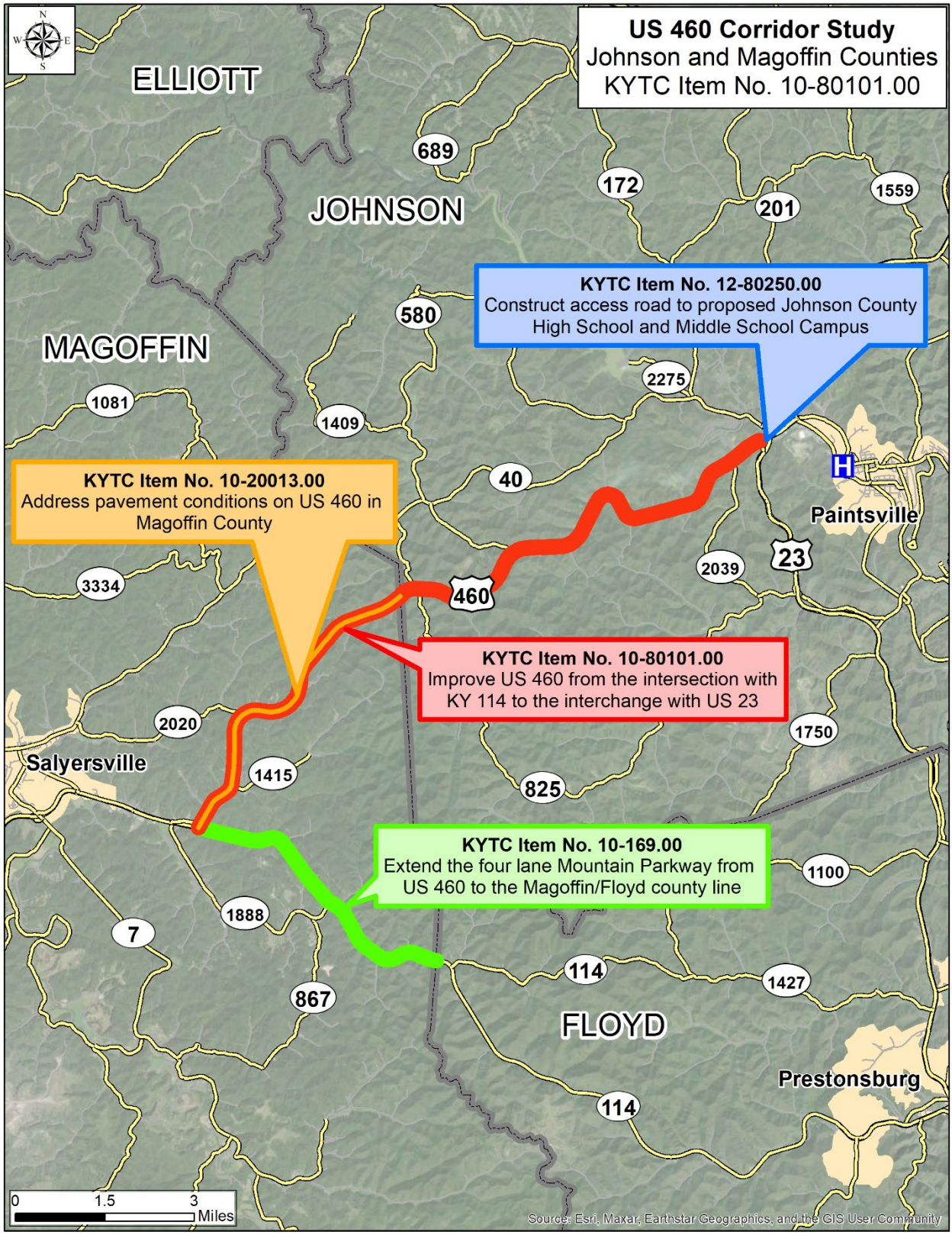

Figure 1: US 460 Current Projects

5. A summary of the existing conditions was presented. The principal arterials in the region include US 460, US 23, and KY 114. The study corridor consists of two 12-foot lanes and 10-foot outside shoulders, with four eastbound passing lanes and four westbound passing lanes with approximately 1.5 to three miles between passing lanes. Centerline striping with dotted lines is used to represent allowed passing and zones with continual lines that overlap the dotted lines is used to represent no passing zones. The principal arterial has a speed limit of 55 miles per hour (mph) for the entire corridor.

6. A crash analysis was performed on US 460 between 2018 and 2022. Single vehicle crashes were the most prominent types of collisions (56 percent), followed by rear end collisions (25 percent). Of the 77 total crashes, 25 were reported to be collisions with animals.

   Five of the crashes resulted in fatalities, with three being angle collisions, one being a single vehicle collision, and one being a rear end. This brings the crash fatality to six percent and the crash injury to be 30 percent during this period, which is higher than the average for the Kentucky Rural Principal Arterial of 1.6 percent for fatal crashes and 22 percent for injury crashes.

7. After extending the crash analysis through December 31, 2023, it was found that all 2023 injury crashes were listed as possible or suspected minor, rather than severe. It was also found that of the 15 property damage only crashes, 13 were animal crashes, as shown in **Figure 2**.

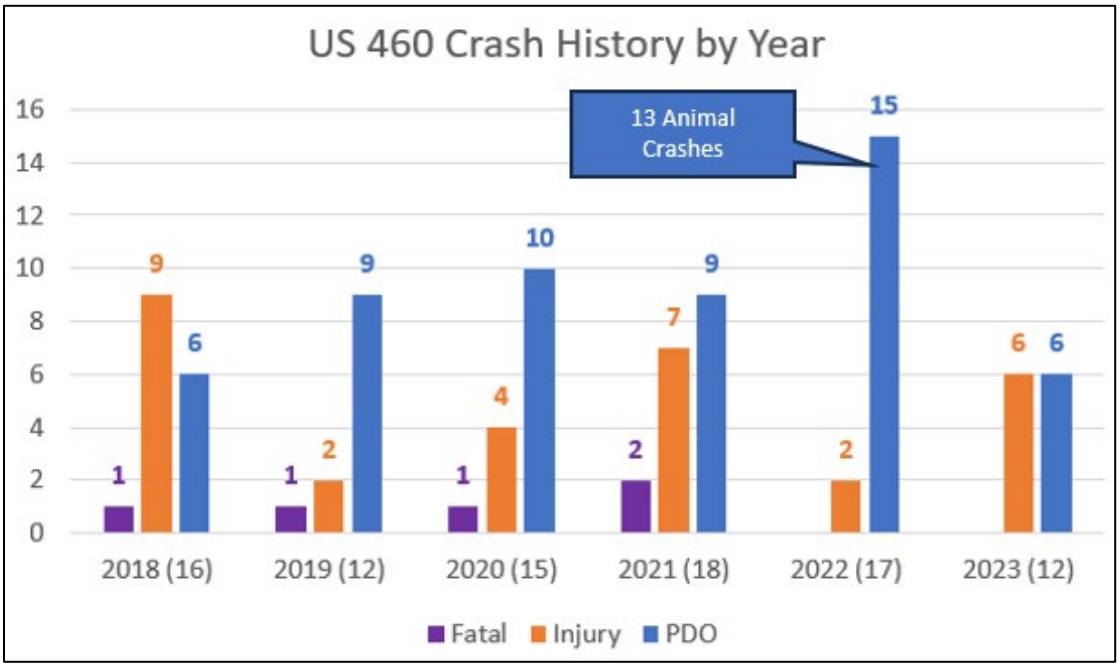

Figure 2: US 460 Crash History by Year (2018-2023)

8. Looking closely at the horizontal curves, three fatal crashes occurred along US 460 on mile points 14.570 (Magoffin County) and 7.620 (Johnson County) between 2017 and 2021. One crash was the result of a concrete truck being rear ended while stopped to make a left turn into Wells Concrete. Two other crashes were angle collisions resulting from a vehicle pulling off the shoulder in front of oncoming traffic and a vehicle crossing the centerline for an unknown reason and was struck by a semi-truck.

   Two other fatal crashes occurred on a horizontal curve in Magoffin County. One of the crashes was a single vehicle collision caused by a pedestrian walking into oncoming traffic. The other was a head on angle collision caused by a vehicle losing control possibly due to wet pavement and crossing the centerline.

9. The Crash Data Analysis Tool (CDAT) was used to perform an Excess Expected Crashes (EEC) analysis. EEC is a measure of the crash frequency at a given site compared to what is expected based on current conditions (geometrics, traffic, etc.). A positive EEC indicates more crashes are occurring than should be expected. All segments on US 460 had negative EECs. Two intersections had slightly positive EECs with 0.03 crashes per year for James Holbrook Road and 0.02 crashes per year for Barnetts Creek Road.

10. An additional crash analysis was performed based on average annual fatal crash rates from the Kentucky Transportation Center *2018-2022*. Average annual fatal crash rates for two-lane rural roads in Kentucky is 2.7 crashes per MVMT, while the annual fatal crash rate for the US 460 segments from north of KY 114 to KY 2039 are significantly higher, ranging between 4.4 to 6.1 crashes per MVMT, as shown in **Table 1**. The annual total crash rates and annual injury crash rates for these segments, however, are significantly lower than the Kentucky average rates for a two-lane rural road.

Table 1: Two-Lane Rural Crash Rates

Begin Segment	Begin MP	End Segment	End MP	Length (mi)	Current ADT (VPD)	Total Crashes			Injury Crashes			Fatal Crashes		
						Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**
North of KY 114	14.57	Johnson County Line	20.133	5.79	3405	31	71.8	201	15	34.7	46.0	2	4.6	2.7
Johnson County Line	0	KY 580 (Caudill Branch Rd)	2.305	2.31	3245	16	97.7		4	24.4		1	6.1	
KY 580 (Caudill Branch Rd)	2.305	KY 2039	7.037	4.73	4409	42	91.9		9	19.7		2	4.4	
KY 2039	7.037	US 23 SB Entrance Ramp	7.62	0.77	4749	4	49.8		3	37.4		0	0.0	

*Rates expressed in 100 million vehicle miles of travel (MVMT)
**Kentucky Statewide averages reported for two-lane rural roads

Crash rates on US 460 were also compared to statewide rates by functional classification. **Table 2** presents a summary of a comparison between the Kentucky average rates for a rural principal arterial and the segments on US 460 from north of KY 114 to KY 2039. The rates for the segments from north of KY 114 to KY 2039 are all comparatively higher than the average Kentucky rates for a rural principal arterial.

Table 2: Rural Principal Arterial Crash Rates

Begin Segment	Begin MP	End Segment	End MP	Length (mi)	Current ADT (VPD)	Total Crashes			Injury Crashes			Fatal Crashes		
						Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**
North of KY 114	14.57	Johnson County Line	20.133	5.79	3405	31	71.8		15	34.7		2	4.6	
Johnson County Line	0	KY 580 (Caudill Branch Rd)	2.305	2.31	3245	16	97.7		4	24.4		1	6.1	
KY 580 (Caudill Branch Rd)	2.305	KY 2039	7.037	4.73	4409	42	91.9	**88**	9	19.7	**19.0**	2	4.4	**1.6**
KY 2039	7.037	US 23 SB Entrance Ramp	7.62	0.77	4749	4	49.8		3	37.4		0	0.0	

*Rates expressed in 100 million vehicle miles of travel (MVMT)
**Kentucky Statewide averages reported for rural principal arterials

11. Traffic forecasts developed in 2022 for the Mountain Parkway Expansion in Magoffin and Floyd counties show a projected growth rate of 1.92 percent per year for trucks and -0.25 percent per year for autos. Based on population projections, historical traffic, results from the Kentucky Statewide Travel Demand Model (KYSTM), and forecasts for the expansion project, an average growth rate of 0.3 percent per year was chosen. This growth rate of 0.3 percent per year was then used to calculate the 2045 traffic forecasts for US 460. US 460 is expected to carry up to 6,000 VPD in 2045, indicating that capacity is not expected to be an issue.

12. Based on the assumption that a two-lane road with passing lanes operates with a LOS D at 16,000 VPD, annual daily traffic would have to grow at a rate ranging from 3.74 to 6.87 percent per year before US 460 operates at LOS D.

    Using the same information as above but based on the assumption that a two-lane road with an undivided highway operates with a LOS D at 14,000 VPD, annual daily would have to grow at a rate ranging from 3.26 to 6.28 percent per year before US 460 operates at LOS D.

13. Brian then led a discussion of the improvement concepts including spot improvements, four-lane widening, and a 2 + 1 roadway.

    Spot improvements – This concept focuses on lowering the superelevation by flattering the horizontal curves in three locations with high measured superelevation rates. The estimated cost is $8.5 million.

    Four-Lane Widening – This concept mimics the typical section proposed for the Mountain Parkway Expansion Project, including a four-lane widening, three 11 to 12-foot lanes with a three-foot flush median, and a four-foot paved outside shoulder on the passing lane side. The developed earthwork, shown in **Figure 3**, and pavement estimates were created using Concept Station. The current cost for widening is estimated to be just over $13 million per mile.

Figure 3: Four-Lane Widening Earthwork

2 + 1 Roadway – This concept has a typical layout of three 11- to 12-foot driving lanes, two 10-foot shoulders, and a three-foot paved median. The estimated cost is $30 to $40 million. Neither District 10 nor District 12 expressed concerns with having 11-foot lanes with a 2+ 1 section and 3-foot offset instead of 12-foot lanes with no offset, as shown in **Figure 4**.

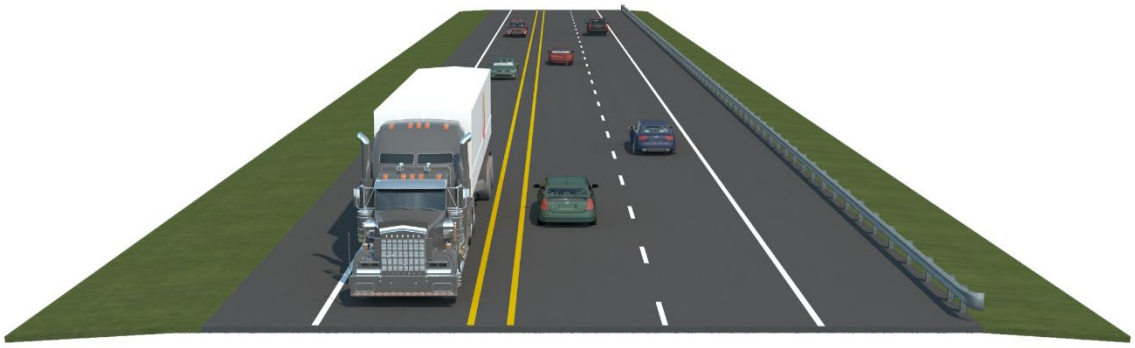

Figure 4: 2+1 Typical Section

Updated 2024 opinions of probable cost are presented in **Table 3**. Construction cost includes the cost for environmental mitigation.

Table 3: Opinions of Probable Cost (2024$)

Concept	Length (miles)	Description	Right-of-Way	Utilities	Design	Construction Cost*	Total Cost
Spot Improvements	1.20	Construct spot improvements at three curves along US 460 - one in Magoffin County (MP 15.2-15.6) and two in Johnson County (MP 0-0.4 & MP 4.2-4.6)	$1,120,000	$300,000	$850,000	$8,500,000	$10,770,000
2+1 Roadway	13.5	Provide a continuous 2+1 Roadway between Salyersville and Paintsville	$1,120,000	$500,000	$3,670,000	$36,700,000	$41,990,000
Four Lane Widening	13.5	Widen US 460 to provide four lanes between Salyersville and Paintsville	$14,700,000	$5,000,000	$18,699,000	$186,990,000	$225,389,000

*Construction cost includes cost for environmental mitigation

14. An updated return on investment (ROI) analysis was performed to compare the design and construction costs to the 20-year safety benefit for each improvement concept, as shown in **Table 4**. The safety benefits were estimated using crash modification factors (CMFs) from the Crash Modification Clearinghouse. A CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site[1]. An ROI above 1.0 indicates the safety benefits outweigh the costs.

[1] https://www.cmfclearinghouse.org/faqs.php#q1

Table 4: Return on Investment (ROI) Summary

Concept	Total Cost	Safety Benefit	20-Yr ROI
Spot Improvements	$10,770,000	$63,000,000	5.85
2 + 1 Widening*	$41,880,000	$105,400,000	2.52
		$24,400,000	0.58
4-Lane Widening	$225,389,000	$64,100,000	0.28
*First option is based on crash reduction for all crash types. Second option considers only head on, rear end, and sideswipe crashes.			

The spot improvements have the highest ROI, while the 2 + 1 widening has ROI's ranging from 0.58 to 2.52. This is due to the first option being based on crash reduction for head on, rear end, and sideswipe crashes while the higher ROI is based on crash reduction for all crash types. The four-lane widening has the lowest ROI of 0.28.

Based on the projected traffic volumes, cost estimates, and anticipated safety benefits, the local officials and stakeholders showed strong support for the 2+1 concept.

15. After the Local Officials / Stakeholder meeting, representatives from Johnson County shared information from their US 460 East-West Gateway project. The purpose of the project, which includes widening US 460 between Salyersville and Paintsville, includes the following:
    - Completes the goal of four-lane connectivity in East KY.
    - Supports Kentucky's presence as a logistical hub.
    - Promotes regional economic development.
    - Improves quality of life.
    - Provides for enhanced roadway safety.
    - Provides the most efficient and cost-effective solution.
    - Improve the transportation infrastructure in the region, correlating to more economic development opportunities.
    - Reduce worker commute times.
    - Reduce transportation costs for businesses.
    - Support job creation and expansion away from traditional population centers

16. The next steps include finalizing improvement concepts and meeting with the project team to determine study conclusions.

The meeting ended at 11:30 a.m. EDT.

Meeting Minutes

TO:	Darren Back Project Manager KYTC District #10 Office 473 Highway 15 South Jackson, KY 41339	Jared Jeffers Project Manager KYTC Central Office Planning 200 Mero Street Frankfort, KY 40622

FROM: Brian Aldridge
Project Manager
Stantec Consulting Services Inc.

SUBJECT: US 460 Corridor Study
US 460 (MP 14.570 – MP 20.406, Magoffin County)
US 460 (MP 0.000 – MP 7.620, Johnson County)
Magoffin County and Johnson County
KYTC Item No. 10-80101.00
Project Team Meeting No. 2

The second Project Team Meeting for the subject project was held at the KYTC District 10 office and virtually via Microsoft Teams on March 12, 2024, at 10:30 a.m. EDT. The following individuals were in attendance:

Darren Back	KYTC – District 10
Ben Coomes*	KYTC – Central Office Design
Charlie Dale*	KYTC – District 12
Amanda Desmond*	KYTC – Central Office Design
Libbie Lowe	KYTC – Central Office Planning
Samuel Hale*	KYTC – District 12
Jared Jeffers	KYTC – Central Office Planning
Aric Skaggs	KYTC – District 10
Mary Westfall-Holbrook*	KYTC – District 12
Brian Aldridge	Stantec Consulting Services Inc.
Clint Goodin*	Stantec Consulting Services Inc.
Len Harper	Stantec Consulting Services Inc.
Ali Vargas	Stantec Consulting Services Inc.
Graham Winchester*	Stantec Consulting Services Inc.

*Joined via Microsoft Teams

Brian Aldridge welcomed everyone and said the purpose of the meeting was to discuss the revised improvement concepts for the US 460 Corridor Study. Brian then delivered a presentation.

The following enumerated items were discussed.

1. The purpose of the meeting is to review the results from the existing conditions analysis, get feedback from the project team on improvement concepts, and discuss the revised alternative concepts to determine the next steps.

2. The study corridor is 13.456 miles and includes US 460 beginning at KY 114 (MP 14.570) in Magoffin County and ends at US 23 (MP 7.620) in Johnson County.

3. There are four projects on or near the US 460 study corridor, as shown on **Figure 1**. Two of the four projects are listed in *Kentucky's FY 2022 – 2028 Highway Plan*:

    - Item No. 10-80101: Improve US 460 from the intersection with KY 114 to the interchange with US 23. Length is 13.46 Miles. $176,641,800 is budgeted.
    - KYTC Item No. 10-169.00 includes extending the Mountain Parkway Corridor from US 460 to the Magoffin/Floyd County line. The length of this project is 5.03 miles (D = $1 million, R = $10.42 million, U = $4.22 million, C = $35 million).

    Two projects were listed in previous versions of the Highway plan:

    - KYTC Item No. 10-20013.00 includes addressing pavement conditions on US 460 from MP 14.57 to 20.37 in Magoffin County (C = $1.485 million).
    - KYTC Item No. 12-80250.00 includes constructing an access road to the proposed Johnson County High School and Middle School Campus (D = $1.5 million, R = $750 thousand, U = $350 thousand, C = $10,609,253)

4. The current draft of House Bill 266 was introduced. This project is listed as Item No. 80101 and includes $3.75 million (2025) in design funds to reconstruct US 460 from KY 114 in Magoffin County to just west of the US 23 interchange near Paintsville in Johnson County. A template of 2 + 1 lanes and a 3-foot median will be used.

5. The purpose of the US 460 Corridor Study is to enhance regional mobility and to provide a safer, more efficient connection between Salyersville and Paintsville. US 460 provides the most direct connection between Paintsville and the Mountain Parkway at Salyersville for vehicles traveling west. Listed on the National Highway System (NHS) and the National Truck Network (NN), US 460 also provides connectivity to important regional resources such as Paintsville Lake State Park and Paintsville Appalachian Regional Healthcare (ARH) Hospital.

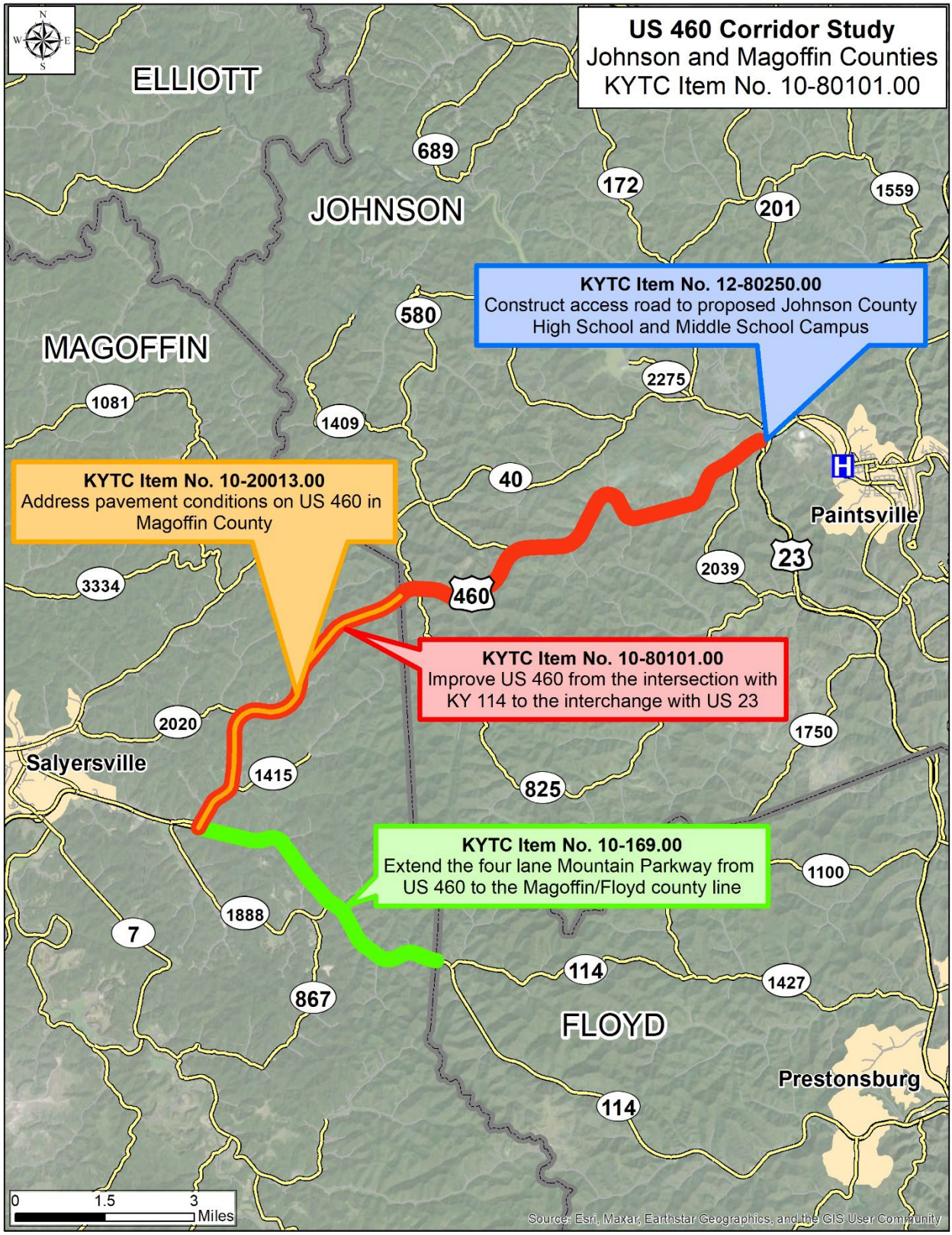

Figure 1: US 460 Current Projects

6. After the Local Officials / Stakeholder meeting, representatives from Johnson County shared information from their US 460 East-West Gateway project. The purpose of the project, which includes widening US 460 between Salyersville and Paintsville, includes the following:
    - Completes the goal of four-lane connectivity in East KY.
    - Supports Kentucky's presence as a logistical hub.
    - Promotes regional economic development.
    - Improves quality of life.
    - Provides for enhanced roadway safety.
    - Provides the most efficient and cost-effective solution.
    - Improve the transportation infrastructure in the region, correlating to more economic development opportunities.
    - Reduce worker commute times.
    - Reduce transportation costs for businesses.
    - Support job creation and expansion away from traditional population centers
        - Question: Would four-lanes improve travel time?
          Answer: Four-lanes would not improve travel time because traffic congestion is not a concern. Widening to four-lanes would not enhance roadway safety because it encourages drivers to drive at faster speeds.

7. A summary of the existing conditions was presented. The principal arterials in the region include US 460, US 23, and KY 114. The study corridor consists of two 12-foot lanes and 10-foot outside shoulders, with four eastbound passing lanes and four westbound passing lanes with approximately 1.5 to three miles between passing lanes. Centerline striping with dotted lines is used to represent allowed passing and zones with continual lines that overlap the dotted lines is used to represent no passing zones. The principal arterial has a speed limit of 55 miles per hour (mph) for the entire corridor.

8. **Figure 2** presents a summary of the types of crashes reported on US 460 between 2018 and 2022. Single vehicle crashes were the most prominent types of collisions (56 percent), followed by rear end collisions (25 percent). Of the 77 total crashes, 25 were reported to be collisions with animals.

   Five of the crashes resulted in fatalities, with three being angle collisions, one being a single vehicle collision, and one being a rear end. This brings the crash fatality to be six percent and the crash injury to be 30 percent during this period, which is higher than the average for the Kentucky Rural Principal Arterial of 1.6 percent for fatal crashes and 22 percent for injury crashes.

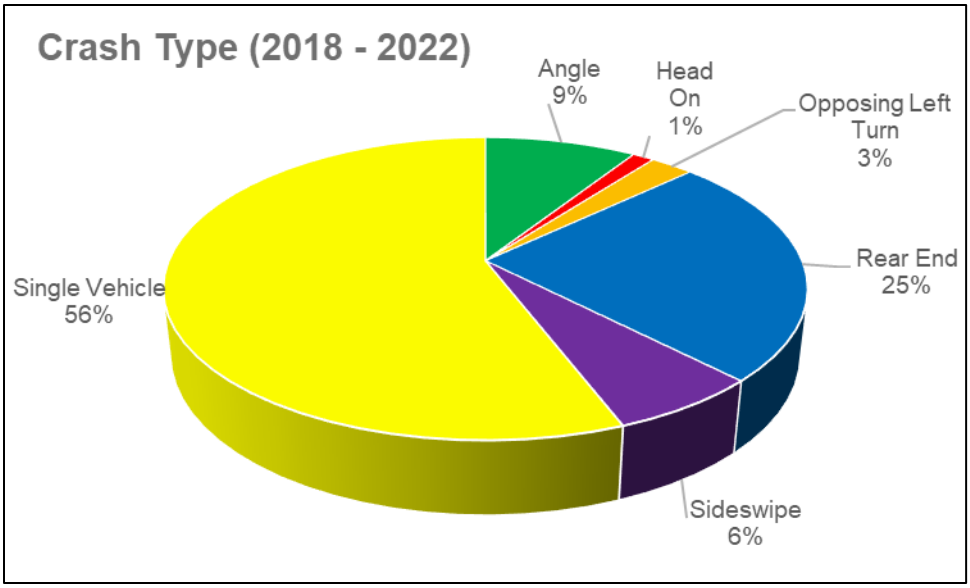

Figure 2: Crash Type (2018-2022)

9. After extending the crash analysis through December 31, 2023, it was found that all 2023 injury crashes were listed as possible or suspected minor, rather than severe. It was also found that of the 15 property damage only crashes, 13 were animal crashes, as shown in **Figure 3**.

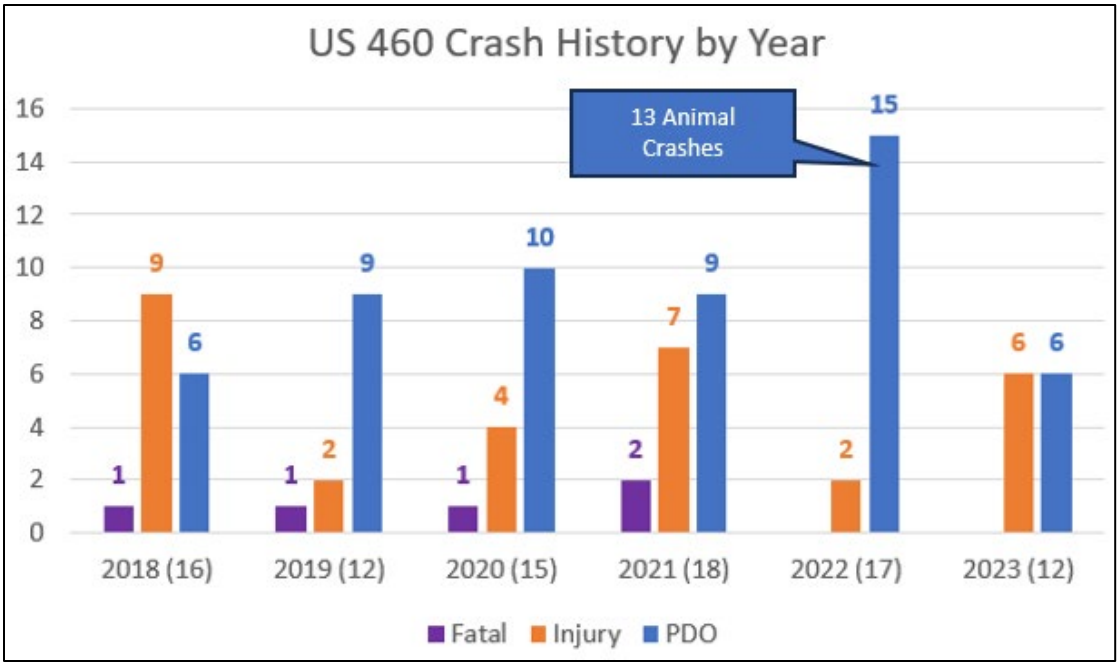

Figure 3: US 460 Crash History by Year (2018-2023)

10. Looking closely at the horizontal curves, three fatal crashes occurred along US 460 on mile points 14.570 (Magoffin County) and 7.620 (Johnson County) between 2017 and 2021. One crash was the result of a concrete truck being rear ended while stopped to make a left turn into Wells Concrete. Two other crashes were angle collisions resulting from a vehicle pulling off the shoulder in front of oncoming traffic and a vehicle crossing the centerline for an unknown reason and was struck by a semi-truck.

    Two other fatal crashes occurred on a horizontal curve in Magoffin County. One of the crashes was a single vehicle collision caused by a pedestrian walking into oncoming traffic. The other was a head on angle collision caused by a vehicle losing control possibly due to wet pavement and crossing the centerline.

11. The Crash Data Analysis Tool (CDAT) was used to perform an Excess Expected Crashes (EEC) analysis. EEC is a measure of the crash frequency at a given site compared to what is expected based on current conditions (geometrics, traffic, etc.). A positive EEC indicates more crashes are occurring than should be expected. All segments on US 460 had negative EECs. Two intersections had slightly positive EECs with 0.03 crashes per year for James Holbrook Road and 0.02 crashes per year for Barnetts Creek Road.
    - Question: What Safety Performance Functions were used to determine the EEC? Answer: EECs were based using functional class.

12. An additional crash analysis was performed based on average annual fatal crash rates from the Kentucky Transportation Center *2018-2022*. Average annual fatal crash rates for two-lane rural roads in Kentucky is 2.7 crashes per MVMT, while the annual fatal crash rate for the US 460 segments from north of KY 114 to KY 2039 are significantly higher, ranging between 4.4 to 6.1 crashes per MVMT, as shown in **Table 1**. The annual total crash rates and annual injury crash rates for these segments, however, are significantly lower than the Kentucky average rates for a two-lane rural road.

Table 1: Two-Lane Rural Crash Rates

Begin Segment	Begin MP	End Segment	End MP	Length (mi)	Current ADT (VPD)	Total Crashes			Injury Crashes			Fatal Crashes		
						Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**
North of KY 114	14.57	Johnson County Line	20.133	5.79	3405	31	71.8	201	15	34.7	46.0	2	4.6	2.7
Johnson County Line	0	KY 580 (Caudill Branch Rd)	2.305	2.31	3245	16	97.7		4	24.4		1	6.1	
KY 580 (Caudill Branch Rd)	2.305	KY 2039	7.037	4.73	4409	42	91.9		9	19.7		2	4.4	
KY 2039	7.037	US 23 SB Entrance Ramp	7.62	0.77	4749	4	49.8		3	37.4		0	0.0	

*Rates expressed in 100 million vehicle miles of travel (MVMT)
**Kentucky Statewide averages reported for two-lane rural roads

Crash rates on US 460 were also compared to statewide rates by functional classification. **Table 2** presents a summary of a comparison between the Kentucky average rates for a rural principal arterial and the segments on US 460 from north of KY 114 to KY 2039. The rates for the segments from north of KY 114 to KY 2039 are all comparatively higher than the average Kentucky rates for a rural principal arterial.

Table 2: Rural Principal Arterial Crash Rates

Begin Segment	Begin MP	End Segment	End MP	Length (mi)	Current ADT (VPD)	Total Crashes			Injury Crashes			Fatal Crashes		
						Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**	Crashes	Annual Rate*	KY Average**
North of KY 114	14.57	Johnson County Line	20.133	5.79	3405	31	71.8	88	15	34.7	19.0	2	4.6	1.6
Johnson County Line	0	KY 580 (Caudill Branch Rd)	2.305	2.31	3245	16	97.7		4	24.4		1	6.1	
KY 580 (Caudill Branch Rd)	2.305	KY 2039	7.037	4.73	4409	42	91.9		9	19.7		2	4.4	
KY 2039	7.037	US 23 SB Entrance Ramp	7.62	0.77	4749	4	49.8		3	37.4		0	0.0	

*Rates expressed in 100 million vehicle miles of travel (MVMT)
**Kentucky Statewide averages reported for rural principal arterials

13. Traffic forecasts developed in 2022 for the Mountain Parkway Expansion in Magoffin and Floyd counties show a projected growth rate of 1.92 percent per year for trucks and -0.25 percent per year for autos. Based on population projections, historical traffic, results from the Kentucky Statewide Travel Demand Model (KYSTM), and forecasts for the expansion project, an average growth rate of 0.3 percent per year was chosen. This growth rate of 0.3 percent per year was then used to calculate the 2045 traffic forecasts for US 460. US 460 is expected to carry up to 6,000 VPD in 2045, indicating that capacity is not expected to be an issue.

14. Based on the assumption that a two-lane road with passing lanes operates with a LOS D at 16,000 VPD, annual daily traffic would have to grow at a rate ranging from 3.74 to 6.87 percent per year before US 460 operates at LOS D, as shown in **Table 3**.

    Using the same information as above but based on the assumption that a two-lane road with an undivided highway operates with a LOS D at 14,000 VPD, annual daily would have to grow at a rate ranging from 3.26 to 6.28 percent per year before US 460 operates at LOS D, as shown in **Table 4**.

Table 3: Required Growth for LOS D (Adjusted for passing lanes)

County	Route	MP	Segment	Year	ADT	% Trucks	2045	
							LOS D Vol	Annual GR
Magoffin	US 460	14.68	KY 114 to County line	2021	3,405	7%	16,000	6.66%
Johnson		1.15	County line to KY 580	2021	3,245	14%	16,000	6.87%
Johnson		4.67	KY 580 to KY 2039	2017	5,089	14%	16,000	4.18%
Johnson		7.42	KY 2039 to US 23	2016	5,521	9%	16,000	3.74%

Table 4: Required Growth for LOS D (2-Lane Undivided Highway)

County	Route	MP	Segment	Year	ADT	% Trucks	2045	
							LOS D Vol	Annual GR
Magoffin	US 460	14.68	KY 114 to County line	2021	3,405	7%	14,000	6.07%
Johnson		1.15	County line to KY 580	2021	3,245	14%	14,000	6.28%
Johnson		4.67	KY 580 to KY 2039	2017	5,089	14%	14,000	3.68%
Johnson		7.42	KY 2039 to US 23	2016	5,521	9%	14,000	3.26%

15. Brian then led a discussion of the improvement concepts including spot improvements, four-lane widening, and a 2 + 1 roadway.

    Spot improvements – This concept focuses on lowering the superelevation by flattering the horizontal curves in three locations with high measured superelevation rates. The estimated cost is $8.5 million.

    Four-Lane Widening – This concept mimics the typical section proposed for the Mountain Parkway Expansion Project, including a four-lane widening, three 11–12-foot lanes with a three-foot flush median, and a four-foot paved outside shoulder on the passing lane side. The developed earthwork, shown in **Figure 4**, and pavement estimates were created using Concept Station. The current cost for widening is estimated to be just over $13 million per mile.

    2 + 1 Roadway – This concept has a typical layout of three 11- to 12-foot driving lanes, two 10-foot shoulders, and a three-foot paved median. The estimated cost is $30 to $40 million. Neither District 10 nor District 12 expressed concerns with having 11-foot lanes with a 2+ 1 section and 3-foot offset instead of 12-foot lanes with no offset, as shown in **Figure 5**.

    - Question: How is the pavement widening included in the cost estimate for the 2 + 1 Roadway?
      Answer: The cost estimate includes saw-cutting the existing shoulder, excavation, and matching the future road to the existing full-depth template. Approximately two-thirds of the project length would include road widening, and the remaining one-third would be resurfacing the pavement.

    Updated 2024 opinions of probable cost are presented in **Table 5**. Construction cost includes the cost for environmental mitigation.

Figure 4: Four-Lane Widening Earthwork

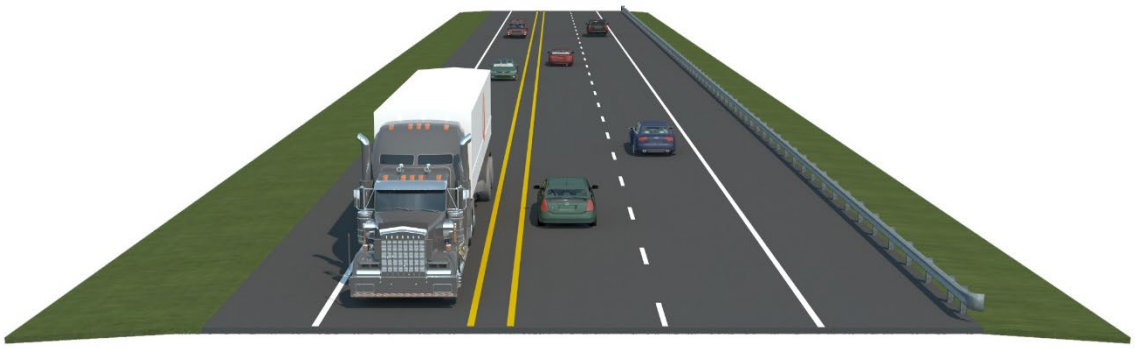

Figure 5: 2+1 Typical Section

Table 5: Opinions of Probable Cost (2024$)

Concept	Length (miles)	Description	Right-of-Way	Utilities	Design	Construction Cost*	Total Cost
Spot Improvements	1.20	Construct spot improvements at three curves along US 460 - one in Magoffin County (MP 15.2-15.6) and two in Johnson County (MP 0-0.4 & MP 4.2-4.6)	$1,120,000	$300,000	$850,000	$8,500,000	$10,770,000
2+1 Roadway	13.5	Provide a continuous 2+1 Roadway between Salyersville and Paintsville	$1,120,000	$500,000	$3,670,000	$36,700,000	$41,990,000
Four Lane Widening	13.5	Widen US 460 to provide four lanes between Salyersville and Paintsville	$14,700,000	$5,000,000	$18,699,000	$186,990,000	$225,389,000

*Construction cost includes cost for environmental mitigation

16. An updated return on investment (ROI) analysis was performed to compare the design and construction costs to the 20-year safety benefit for each improvement concept, as shown in **Table 6**. The safety benefits were estimated using crash modification factors (CMFs) from the Crash Modification Clearinghouse. A CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site[1]. An ROI above 1.0 indicates the safety benefits outweigh the costs. The spot improvements have the highest ROI, while the 2 + 1 widening has ROI's ranging from 0.58 to 2.52. This is due to the first option being based on crash reduction for head on, rear end, and sideswipe crashes while the higher ROI is based on crash reduction for all crash types. The four-lane widening has the lowest ROI of 0.28.

Table 6: Return on Investment (ROI) Summary

Concept	Total Cost	Safety Benefit	20-Yr ROI
Spot Improvements	$10,770,000	$63,000,000	5.85
2 + 1 Widening*	$41,880,000	$105,400,000	2.52
		$24,400,000	0.58
4-Lane Widening	$225,389,000	$64,100,000	0.28
*First option is based on crash reduction for all crash types. Second option considers only head on, rear end, and sideswipe crashes.			

19. The next steps include finalizing improvement concepts and cost estimates and creating a draft report, which will not include recommendations for improvement concepts. Another local officials and stakeholder meeting will not be held.

The meeting ended at 11:30 a.m. EDT.

[1] https://www.cmfclearinghouse.org/faqs.php#q1