



# KY 151 Corridor Scoping Study

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Anderson & Franklin Counties

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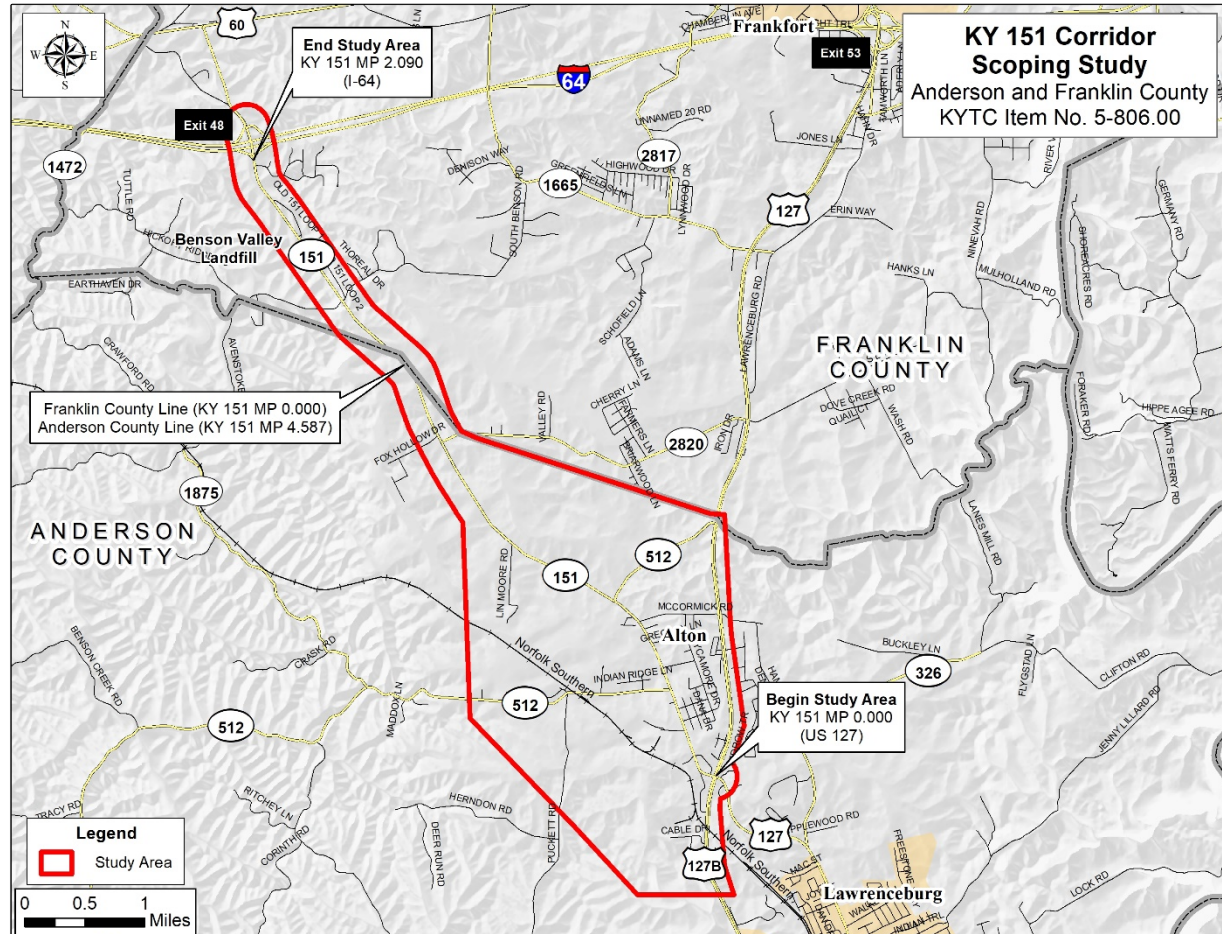
Item No. 5-806.00

March 2022

Executive Summary

## Introduction

The KY 151 Corridor Scoping Study (KYTC Item No. 5-806) was initiated by the Kentucky Transportation Cabinet (KYTC) to examine the need for and evaluate improvement concepts along the KY 151 corridor from US 127 in Anderson County (MP 0.000) to the Franklin County line (MP 4.587) and from the Anderson County line (MP 0.000) to I-64 in Franklin County (MP 2.141). The study area is shown in red in **Figure ES-1**.



**Figure ES-1: Study Area**

KY 151 provides a direct connection between I-64 (Exit 48) and Lawrenceburg, and indirectly connects to the Bluegrass Parkway via US 127 through and south of Lawrenceburg. However, the US 127 corridor is a parallel route which was reconstructed in the early 1990's to provide an improved alternative and to serve as the primary truck route between Lawrenceburg and I-64. As US 127 has four lanes with wide shoulders and is more compatible with higher traffic volumes and large truck operation, it is listed on the NN and negates the need for the parallel KY 151 to be listed.

## Project Needs

In the southern portion of the study area near the US 127 intersection, KY 151 serves a mix of residential, commercial, and industrial traffic. Traveling north, the land surrounding KY 151 is mostly residential through the community of Alton, where houses and businesses line both sides of the roadway. North of Alton, KY 151 serves mostly farmland and associated residences until it nears the I-64 interchange. Just south of I-64, KY 151 serves a regional landfill, Huntington Woods neighborhood, a service station, and a liquor store.

Lane widths along the KY 151 corridor range between 11 and 12 feet with paved shoulder widths varying between 1.5 and 10 feet. The speed limit ranges from 35 miles per hour (mph) at the south end to 55 mph along the majority of the corridor. Somewhat inconsistent typical sections (particularly the shoulder widths) create undesirable 'transition zones' where drivers tend to travel too fast for the roadway geometrics. For example, a driver may travel southbound at a higher rate of speed where the wide lanes and shoulders are provided in Franklin County and may not slow down before reaching the narrower lane and shoulder widths to the south in Anderson County which may be a contributing factor for the higher-than-expected percentage of injury collisions (22 percent).

Based on the existing and future conditions analyses, the goal of the *KY 151 Corridor Scoping Study* is to enhance regional mobility and to provide a safer north-south corridor between US 127 and I-64. An evaluation of existing and future year traffic demand on KY 151 indicates a two-lane road provides adequate capacity. However, there is one intersection (KY 151 / US 127) with less than desirable traffic operations, a second intersection (KY 151 / Alton Station Road) where turn lanes are warranted, and other "spot" locations along the corridor with higher-than-expected crash frequencies.

## Development of Improvement Concepts

Over the course of the study, the Project Team worked to identify and evaluate concepts to improve safety and enhance mobility. A range of improvement concepts were developed based on the existing conditions analysis and input from the project team. Along with the No-Build, this study examined spot improvements, minor widening, and a partial new route around the community of Alton.

As the right-of-way is constricted with homes immediately adjacent to the route through and surrounding the community of Alton, opportunities for improvement to the existing roadway are limited. A new route to the south would allow through traffic to bypass Alton, but the estimated 2021 construction cost for this concept is \$9.3 million. Due to the relatively high cost of the new route, the project team eliminated this concept from further consideration.





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The minor widening concept involves widening lanes and shoulders, as needed, along the entire study portion of KY 151. Several typical sections were considered including a full build with 12-foot lanes and 10-foot shoulders, a performance-based flexible solution (PBFS) which includes a minimum of 11-foot lanes and eight-foot shoulders (four-foot paved), and a Highway Safety Improvement Program (HSIP) alternative which includes minimum 11-foot lanes and four-foot paved shoulders. A Benefit-to-cost (B/C) analysis was performed to evaluate these concepts, and the resulting Benefit-Cost ratios (BCR) were well below 1.0 for all three concepts, suggesting the costs for such improvements would far outweigh the potential benefits. Therefore, the project team determined that minor widening is not recommended at this time.

Conceptual spot improvements were identified based on the traffic and crash analyses and can be implemented individually. Six locations were identified as spot improvement concepts, shown in **Figure ES-2**. The spot improvement concepts are all located at areas along the study portion of KY 151 with safety concerns or where traffic warrants the addition of turn lanes. Detailed Project Sheets are also included for all six candidate spot improvements at the end of the Executive Summary.

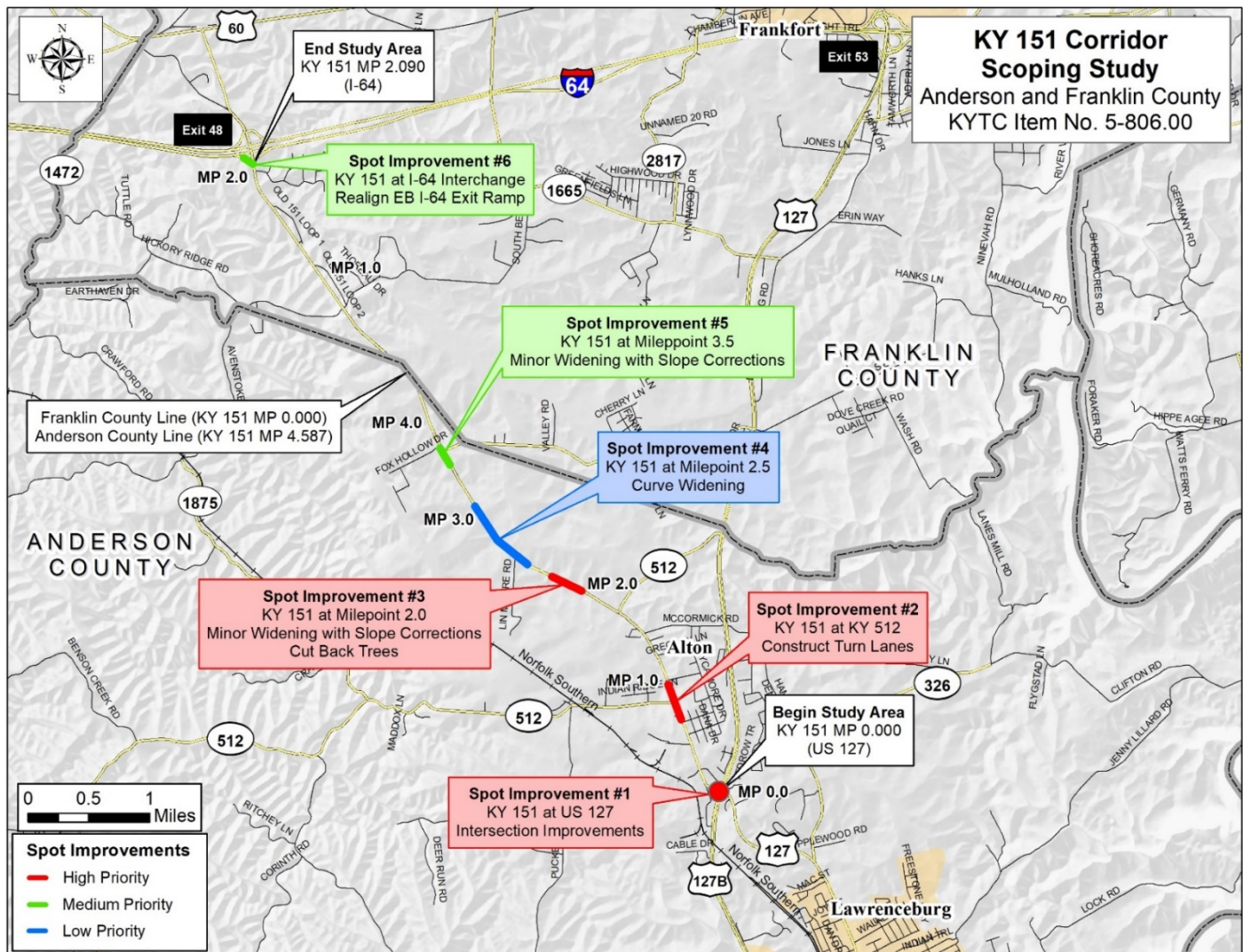


Figure ES-2: Spot Improvements



## Recommendations

Prioritization for the study was based on how well each concept satisfied the study goals, findings from the existing conditions analyses, project team input, and the B/C analysis. As traffic congestion and travel times are not a significant issue affecting the corridor, the B/C analysis focused on estimating benefits related to crash reduction. The evaluation matrix in **Table ES-1** provides a description of the improvement(s), the construction cost estimate, 10-year crash reduction savings, BCR, and the project team recommended prioritization. The improvement concepts were categorized as high, medium, low, or “not recommended”.

### High Priority (in no particular order)

- Spot Improvement 1: This is a high crash location with the critical crash rate factor (CRF) equal to 3.93 and the benefits of the improvements outweigh the costs.
- Spot Improvement 2: Based on KYTC'S Highway Design Manual, KY 151 satisfies the warrants for a left-turn lane and a right-turn lane at Alton Station Road (KY 512).
- Spot Improvement 3: Narrow shoulders and steep slopes with reduced clear zone may be a factor in a number of roadway departure crashes resulting in injuries. The benefits of the improvements outweigh the costs.

### Medium Priority (in no particular order)

- Spot Improvement 5: This is a high crash location (CRF = 1.23) with narrow shoulders and steep side slopes. These unstable steep slopes may be a contributing factor to roadway departure crashes and have also contributed to ongoing pavement deterioration that requires regular maintenance projects to maintain a smooth driving surface.
- Spot Improvement 6: This is a high crash location (CRF = 2.61). Realigning the right-turn lane at the eastbound I-64 exit ramp would remove the weaving segment on KY 151 and reduce crashes.

### Low Priority (in no particular order)

- Spot Improvement 4: There are two horizontal curves near Lin Moore Road that show potential for minor off-tracking for STAA vehicles. In 2016 STAA vehicles were prohibited from using KY 151 as a through route, making the need for this concept a low priority so long as the ban on through trucks remains in place.

### Not Recommended at This Time

- Widening lanes and shoulders, as needed, along the entire study portion of KY 151: The costs for such improvements would far outweigh the potential benefits.
- A new route to the south of KY 151 to allow through traffic to bypass Alton: Not recommended due to the relatively high cost.

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**Table ES-1: Prioritized Improvement Concepts**

Improvement Concept	Project Length (miles)	Improvement Options	2021 Construction Cost Estimate	10-YR Crash Savings	B/C Ratio	Priority
No Build	6.7	No Build	N/A	N/A	N/A	N/A
Spot 1	0.3	Reduce Right-Turn Radius	\$130,000	\$274,000	2.11	High
		Optimize Signal Timing				
		Install Curve/Speed Warning Sign				
		Convert Village Circle Entrance to a Right-In, Right-Out				
Spot 2	0.3	Construct Left-Turn Lane and Right-Turn Lane on KY 151	\$400,000	\$236,000	0.52	High
Spot 3	0.3	Cut Trees Away from Roadway	\$300,000	\$325,000	1.59	High
		Minor Widening and Improve Clear Zone				
		Install Flashing Speed Warning Sign				
Spot 4	0.6	Minor Curve Widening through Two Curves	\$300,000	\$9,000	0.03	Low
Spot 5	0.3	Minor Widening and Improve Clear Zone	\$400,000	\$88,000	0.88	Medium
Spot 6	0.3	Realign Channelized Right-Turn Lane	\$200,000	\$162,000	0.81	Medium
Minor Widening	6.7	Widen Shoulders for Entire Study Area	\$5,100,000	\$1,086,000	0.21	Not Recommended
New Route	1.6	Construct New Road Around Alton	\$16,900,000	N/A	N/A	Not Recommended

As previously discussed, the minor widening and new route improvement concepts are not recommended at this time. The project team determined the spot improvement concepts meet the study goals and together will enhance regional mobility and provide a safer north-south corridor between US 127 and I-64.

## Next Steps

The next phase for any of the recommended improvement concepts would be Phase 1 Design (Preliminary Engineering and Environmental Analysis). Further funding will be necessary to advance to the design phase. Future phases are listed with state funding in Kentucky's FY 2020 – FY 2026 Highway Plan. However, a new project estimate and scope would need to be created based on the findings of this study.

## Contacts

Written requests for additional information should be sent to Mikael Pelfrey, Director KYTC Division of Planning, 200 Mero Street, Frankfort, KY 40622. Additional information regarding this study can also be obtained from the KYTC District 7 Project Manager, Casey Smith, at (859) 246-2355 (email at [Casey.Smith@ky.gov](mailto:Casey.Smith@ky.gov)).

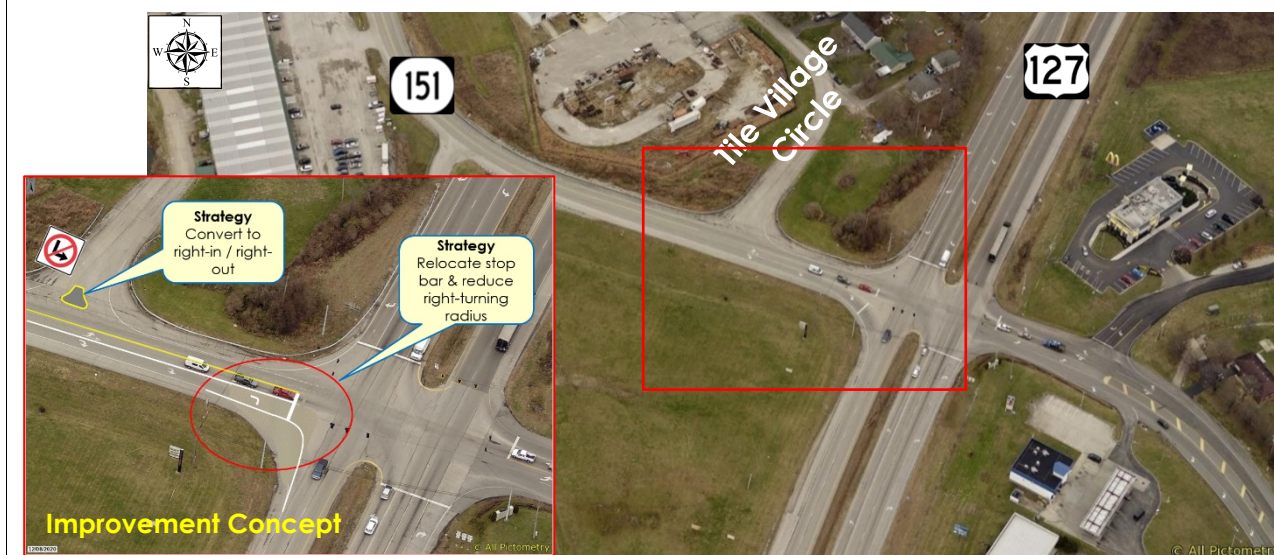
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1	LOCATION KY 151 intersection with US 127 Anderson County KY 151 MP 0.00 to MP 0.30	BENEFIT-COST RATIO  2.11	PROJECT PRIORITY  High
<b>DESCRIPTION</b> Reduce the eastbound KY 151 right-turn radius, optimize signal timing by allowing right-turn overlaps on both KY 151 approaches, install a 35-MPH curve warning sign, and convert Tile Village Circle to a right-in / right-out.		<b>2021 COST ESTIMATES BY PHASE</b>	Design: \$40,000 ROW: \$0 Utilities: \$0 Construction: \$130,000 <b>Total: \$170,000</b>

The KY 151 intersection with US 127 is located near a mix of commercial, industrial, and residential areas, making it one of the more congested intersections in the area. Analysis of the existing traffic volumes indicate the westbound approach operates at LOS E during the p.m. peak hour with all other approaches operating at LOS D. By 2040, this approach is expected to operate at LOS F during the p.m. with all other approaches operating at LOS E. An option to improve traffic operations is to optimize the signal timing by allowing eastbound and westbound right-turn overlaps, providing eastbound and westbound KY 151 right-turns a green arrow during the northbound and southbound US 127 left-turn phases. This modification would improve future LOS for all approaches to no worse than LOS D.


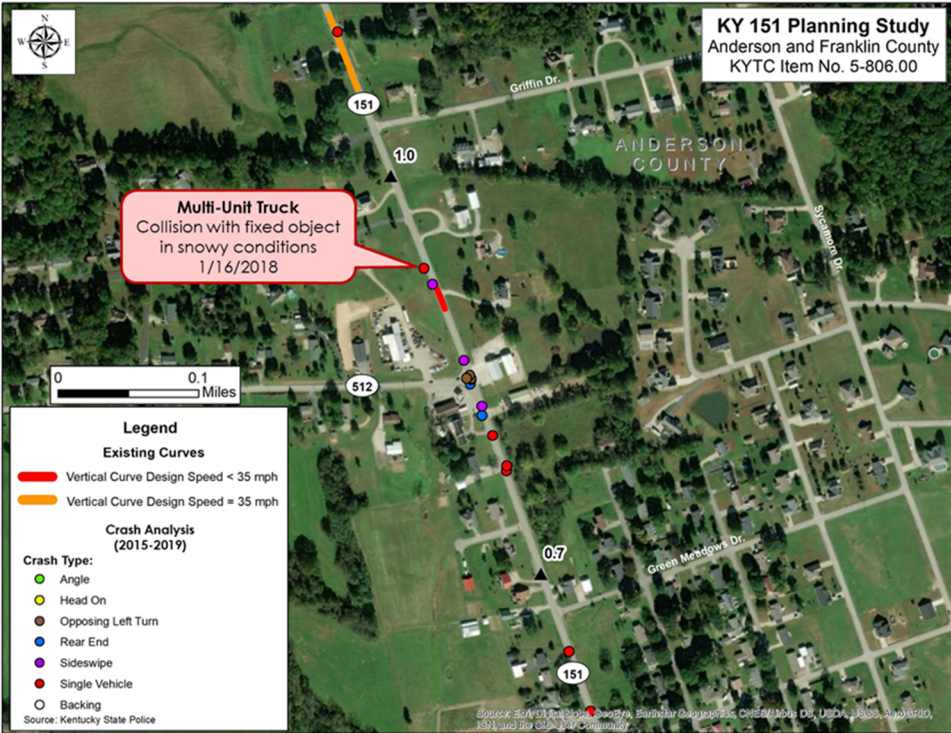
In addition to the congestion issues, the eastbound KY 151 approach is also a high crash location (CRF = 3.93), with 52 crashes occurring between 2015 and 2019. Of these crashes, 25 involved vehicles turning right onto southbound US 127. Reducing the right-turn radius would improve safety (Crash Modification Factor, CMF ID 8428 = 0.56) by encouraging vehicles to come to a complete stop before turning right. Another safety improvement is to convert the eastern Tile Village Circle entrance to a right-in / right-out. Turning left into or out of this entrance is a safety concern as this approach is located less than 150 feet from the US 127 intersection. Full access to Tile Village Circle is available at the entrance to the north. Another safety improvement includes installing a 35-MPH warning sign before the horizontal curve west of Fortune Circle. Since KY 151 consistently has 45- to 55-MPH speed limits, this sign will remind drivers to reduce speeds before the curve. The crash reduction benefits of these improvements outweigh the costs (BCR = 2.11).






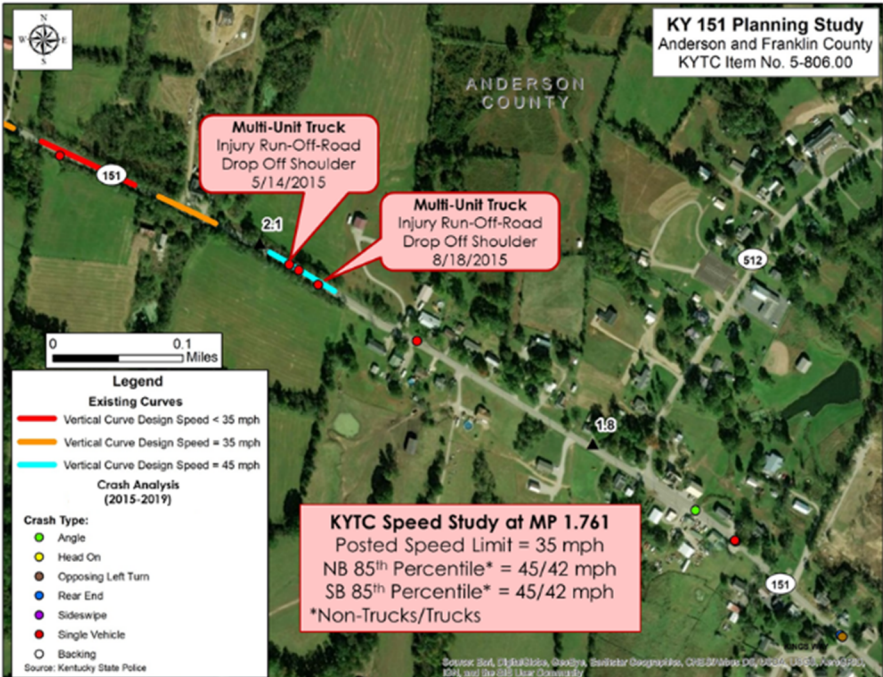
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2	<b>LOCATION</b> KY 151 at Alton Station Road (KY 512) Anderson County KY 151 MP 0.813 to MP 1.113	<b>BENEFIT-COST RATIO</b>  0.52	<b>PROJECT PRIORITY</b>  High
<b>DESCRIPTION</b> Construct a left-turn lane from northbound KY 151 onto KY 512 and a right-turn lane on southbound KY 151 onto KY 512.		<b>2021 COST ESTIMATES BY PHASE</b>	Design: \$60,000 ROW: \$46,000 Utilities: \$75,000 Construction: \$400,000 <b>Total: \$581,000</b>
<p>The KY 151 intersection with Alton Station Road (KY 512) is located between the commercial / industrial areas near the US 127 intersection and the residential area near Alton. There are several neighborhoods on Alton Station Road, including a new development with more than 50 houses. Traffic counts show more than 165 vehicles currently turn left and 110 vehicles turn right onto Alton Station Road from KY 151 during the PM peak hour. Based on KYTC'S Highway Design Manual, this satisfies the warrants for a left-turn lane and a right-turn lane on KY 151.</p> <p>The proposed improvement concept at this location is to construct a left-turn lane on northbound KY 151 and a right-turn lane on southbound KY 151 onto Alton Station Road.</p> <p>This will improve traffic operations at the intersection and will support continued traffic growth on Alton Station Road. Additionally, it will improve safety (CMF ID 7852 = 0.73) by removing turning vehicles from mainline KY 151 and allowing through traffic to continue on rather than stopping behind a turning vehicle.</p>		 <p><b>Improvement Concept</b></p>  <p><b>KY 151 Planning Study</b>            Anderson and Franklin County            KYTC Item No. 5-806.00</p> <p><b>Multi-Unit Truck</b>            Collision with fixed object            in snowy conditions            1/16/2018</p> <p><b>Legend</b>  <b>Existing Curves</b>            Vertical Curve Design Speed &lt; 35 mph            Vertical Curve Design Speed = 35 mph  <b>Crash Analysis (2015-2019)</b>  <b>Crash Type:</b>            Angle            Head On            Opposing Left Turn            Rear End            Sideswipe            Single Vehicle            Backing            Source: Kentucky State Police</p>	

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3	<b>LOCATION</b> KY 151 north of Old Frankfort Rd (KY 512) Anderson County KY 151 MP 2.0 to MP 2.2	<b>BENEFIT-COST RATIO</b>  1.59	<b>PROJECT PRIORITY</b>  High
<b>DESCRIPTION</b> Cut tree canopy and vegetation away from roadway to improve speed reduction sign visibility and improve the clear zone by stabilizing the slopes and widening the paved and unpaved shoulders.		<b>2021 COST ESTIMATES BY PHASE</b>	Design: \$50,000 ROW: \$0 Utilities: \$0 Construction: \$300,000 <b>Total: \$350,000</b>
<p>Through most of Anderson County, KY 151 has 11-foot lanes and 1.5-foot shoulders with rumble stripes. North of Old Frankfort Road (KY 512) and Alton, these narrow shoulders quickly transition into steeper slopes with reduced clear zone. Without adequate clear zone, vehicles that drop off the pavement are unable to recover safely back onto the roadway. An option to improve safety is to stabilize the slopes and widen the paved and unpaved shoulders to reduce the likelihood of run off the road collisions and to provide improved clear zone. It is assumed this minor widening could occur completely within the existing right-of-way.</p> <p>In addition to the clear zone concerns, the area near Alton was found to have high speeds. A 2016 KYTC Safety Study showed that while the posted speed limit in Alton is 35 MPH, the 85<sup>th</sup> percentile speeds are near 45 MPH. An option to reduce speeding is to cut back the overgrown trees north of KY 512 and improve the visibility of the reduced speed warning signs. An additional improvement option is to install a solar, flashing speed warning sign to alert drivers of the change in speed limit. The crash reduction benefits of these improvements outweigh the costs (BCR = 1.59).</p>		 	



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4	LOCATION	BENEFIT-COST RATIO	PROJECT PRIORITY
	KY 151 at Lin Moore Road Anderson County KY 151 MP 2.5 to MP 2.7 and MP 2.85 to MP 3.05	0.03	Low
DESCRIPTION Widen paved shoulders through the two horizontal curves.		2021 COST ESTIMATES BY PHASE	Design: \$50,000 ROW: \$0 Utilities: \$0 Construction: \$300,000 Total: \$350,000

Based on a 2016 KYTC Safety Study, KY 151 has two horizontal curves near Lin Moore Road that show minor off-tracking for STAA vehicles. This means that larger trucks may encroach into the adjacent oncoming lane to avoid dropping off the edge of the pavement while traveling around the curves. In the past five years, there were four single vehicle collisions along these curves, one of which was a roadway departure crash involving a multi-unit truck under wet pavement conditions. In 2016 STAA vehicles were temporarily prohibited from using KY 151 as a through route.

An improvement concept at this location is to construct a minor pavement widening focusing on wider shoulders through the two horizontal curves to satisfy current geometric design guidelines. Providing a slightly wider pavement section would accommodate larger vehicles and reduce the potential for roadway departure, head on, and sideswipe collisions to occur. It is assumed this minor widening could occur completely within the existing right-of-way.





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5	LOCATION KY 151 south of Green Wilson Rd (KY 2820) Anderson County KY 151 MP 3.40 to MP 3.80	BENEFIT-COST RATIO  0.88	PROJECT PRIORITY  Medium
<b>DESCRIPTION</b> Improve the clear zone by stabilizing the slopes and widening the paved and unpaved shoulders.		<b>2021 COST ESTIMATES BY PHASE</b>	Design: \$60,000 ROW: \$35,000 Utilities: \$10,000 Construction: \$400,000 <b>Total: \$505,000</b>
<p>Just south of Green Wilson Road (KY 2820), northbound KY 151 has narrow shoulders that lead directly into steep side slopes. These unstable, steep slopes may be a contributing factor to roadway departure crashes and have certainly contributed to ongoing pavement deterioration that requires regular maintenance projects to maintain a smooth driving surface. This is a high crash location (CRF = 1.23), with five single vehicle crashes and one head on crash involving a semi-trailer between 2015 and 2019. An option to improve safety is to extend the slope and widen the paved shoulder on northbound KY 151. This would reduce the number of run off the road collisions while also reducing recurring maintenance needs.</p> <p>Southbound KY 151 also has narrow paved shoulders and a limited unpaved clear zone, with only a small section of trees separating the traveled way from a private pond. Because of the proximity of the pond on the west side, run off the road collisions at this location have the potential to be severe. While the pond complicates a typical slope extension, installing channel lining / riprap, or a gabion wall along the pond's east bank would help stabilize the slope and allow for minor shoulder widening and guardrail installation.</p>		<div>  <p><b>KY 151 looking south (Approx. MP 3.74)</b></p> </div> <div>  <p><b>KY 151 looking north (Approx. MP 3.72, Note pond to the left)</b></p> </div> <div>  </div>	

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6	LOCATION KY 151 south of the I-64 interchange Franklin County KY 151 MP 1.9 to MP 2.05	BENEFIT-COST RATIO  0.81	PROJECT PRIORITY  Medium
<b>DESCRIPTION</b> Realign the right-turn lane at the eastbound I-64 exit ramp.		<b>2021 COST ESTIMATES BY PHASE</b>	Design: \$50,000 ROW: \$0 Utilities: \$0 Construction: \$200,000 <b>Total: \$250,000</b>
<p>The eastbound I-64 exit ramp (Exit 48) splits into two lanes, providing a stop-controlled left-turn onto northbound KY 151 and a free-flow right-turn onto southbound KY 151. The receiving auxiliary lane for the free-flow right-turn on KY 151 is only 180 feet long, requiring vehicles to merge quickly. A safety analysis showed this location as a high crash location with a CRF equal to 2.61, indicating that more crashes are occurring than would be expected based on current conditions. There were eight crashes reported between 2015 and 2019.</p> <p>An option to improve safety (CMF ID 8428 = 0.56) is to realign the eastbound off ramps and remove the free-flow right-turn. This would eliminate the ramp split and direct all vehicles to the stop-controlled intersection with KY 151, therefore removing the weaving segment on KY 151.</p>		