



US 460 Corridor Study

Item No. 10-80101
Johnson and Magoffin Counties, Kentucky

DECEMBER 2024



Executive Summary

The Kentucky Transportation Cabinet (KYTC) initiated the *US 460 Corridor Study*, KYTC Item No. 10-80101.00, in Johnson and Magoffin Counties to evaluate the need for and potential benefits that may be realized from improving the route between Salyersville and Paintsville. The study area is shown in **Figure ES-1**.

Existing Conditions

US 460 is a major east-west arterial through eastern Kentucky and a regionally important route. Within the Appalachian Region, US 460 connects Salyersville and Paintsville while also providing a direct route to the Mountain Parkway in Magoffin County. Because of this connectivity, US 460 serves dual roles: it provides access to local businesses / homes and serves as an artery for regional through traffic. 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.

US 460 is a rural, undivided two-lane principal arterial with 12-foot lanes and ten-foot shoulders with a posted speed limit of 55 miles per hour (mph). The just under 13.5-mile-long study portion of US 460 has four eastbound passing lanes and four westbound passing lanes, with approximately 1.5 to three miles between passing lanes. Approximately 51 percent of the study corridor allows passing via dashed centerline striping or a passing lane. A review of roadway geometrics revealed no substandard horizontal curves (based on a 55 mph design speed) and one substandard sag vertical curve at milepoint 16.9 in Magoffin County. However, travel speeds in excess of 55 mph are common.



Figure ES-1: US 460 Study Corridor

Current daily traffic volumes range from 5,100 vehicles per day (VPD) near Paintsville to 3,400 VPD in Magoffin County. Results from a Highway Capacity Software (HCS) traffic analysis revealed that US 460 currently operates at an acceptable Level of Service (LOS).

Traffic forecasts were developed using growth rates from the 2022 *Mountain Parkway Expansion Traffic Forecast Report*, which included 1.92 percent annual growth for trucks and -0.25 percent for autos. Based on this annual growth rate, US 460 is expected to carry up to 6,000 VPD in 2045 and would continue to operate at an acceptable LOS without additional capacity. Using 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 through 2045 before US 460 operates at a less-than-desirable LOS D.

Current and future traffic volumes along US 460 have acceptable traffic operations without need for additional capacity.

Kentucky State Police Crash data collected from 2018 to 2022 revealed a total of 77 reported crashes on the study portion of US 460, five of which resulted in a fatality (6 percent) and 23 resulted in an injury (30 percent). The most common crash types were single vehicle (56 percent) and rear end crashes (25 percent). 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 would be expected. All segments on US 460 had negative EECs, indicating fewer crashes have occurred than what would be expected.

Superelevation, where the outer edge of the roadway pavement is raised higher than the inner edge within a curve to allow vehicles to more comfortably negotiate the curve, was field-measured at three horizontal curves identified as high-density crash spots, as shown in **Table ES- 1**. The measured superelevation was higher than the recommended maximum of eight percent on rural roads in mountainous terrain, based on KYTC geometric guidelines¹.

Table ES-1: US 460 Superelevation Rates

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

¹ <https://transportation.ky.gov/Highway-Design/Highway%20Design%20Manual/HD-700.pdf>

Local Official / Stakeholder Outreach

Over the course of the study, the project team met with local officials and stakeholders to provide information and to solicit input on transportation concerns and potential improvements to the study corridor. Overall, feedback from the local officials and stakeholders suggested the greatest concern is improving safety on US 460.

Improvement Concepts

Three improvement concepts were developed to improve safety and mobility along the US 460 study corridor. The improvement concepts include spot improvements, four-lane widening, and a 2+1 roadway conversion.

Spot improvements – Safety improvements to lower the superelevation by decreasing the height difference from the inner roadway curve to the outer roadway curve and flattening horizontal curves at three high crash density locations.

Four-Lane Widening – Widening the existing roadway from two to four lanes with a depressed grass median, as shown in **Figure ES-2**. This improvement concept includes two twelve-foot lanes in each direction, 12-foot outside shoulders (10 feet paved), and a 40-foot depressed median. This section is consistent with the Mountain Parkway Expansion.

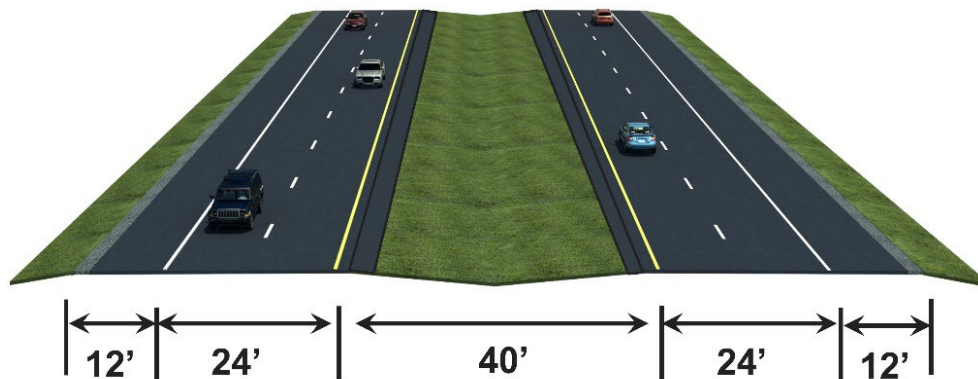


Figure ES-2: Four Lane Widening

2+1 Roadway – A three-lane road with two lanes in one direction (one meant for passing). The direction of the passing lane alternates and provides increased capacity and less waiting time behind slow vehicles and trucks. **Figure ES-3** presents a possible typical section for a 2+1 roadway. Lane, shoulder, and median widths may vary.

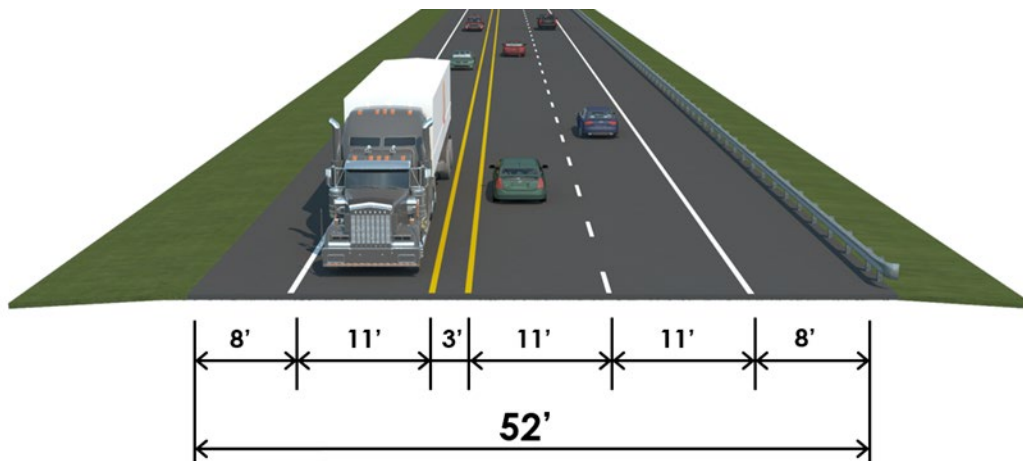


Figure ES-3: 2+1 Improvement Concept

Conclusions

A return on investment (ROI) analysis was performed to compare the improvement concept costs, including design, right-of-way acquisition, utility relocations, and construction, to the 20-year safety benefit, as shown in **Table ES-2**. 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. An ROI above 1.0 indicates the safety benefits outweigh the costs. The spot improvements have the highest ROI as they were specifically targeted to provide proven crash reduction countermeasures in areas with the highest concentrations of injury and fatal crashes, while the 2+1 Roadway has ROIs ranging from 0.58 to 2.52. This range is due to the estimated crash reduction from various CMFs. The lower ROI is based on a CMF that assumes reduction of head on, rear end, and sideswipe crashes only, 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 ES-2: 20-Year Return on Investment

Concept	2024 Total Cost	Safety Benefit	20-Yr ROI
Spot Improvements	\$10,770,000	\$63,000,000	5.85
2+1 Roadway	\$41,880,000	\$105,400,000*	2.52*
		\$24,400,000**	0.58**
4-Lane Widening	\$225,389,000	\$64,100,000	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 Roadway concept. The concept has been found to provide many of the benefits of a four-lane widening (i.e. increased efficiency for traffic flow while improving safety) at a significantly reduced cost and within a smaller footprint. Additionally, the 2+1 improvement concept could extend and / or connect the existing passing lanes on US 460, allowing it to be constructed over time as sections of independent utility.

KYTC has implemented 2+1 concepts along other routes in Kentucky (KY 55 in Adair County, KY 55 in Marion / Washington County) where projected traffic volumes do not justify four lanes but were higher than could be comfortably accommodated with two lanes and limited passing opportunities. The results of these past projects have been positive, including a 38 percent reduction in crashes on KY 55 in Marion and Washington Counties in the two years after construction of the 2+1. While capacity is not expected to be an issue on US 460, the additional passing lanes will improve safety and travel time reliability, while also adding the capacity needed if traffic on the corridor grows more than expected.

Next Steps

The next step following this study for any potential improvements would be Phase 1 Design (Preliminary Engineering and Environmental Analysis). This project is funded as KYTC Item No. 10-80101 in *Kentucky's 2024-2030 Enacted Highway Plan* with \$3,750,000 in Design (2025), \$1.12 million for Right-of-Way (2027), \$500,000 for Utilities (2027), and \$37.5 million for Construction (2028). As part of the preliminary design, the typical section should be revisited to ensure all project goals are addressed.