KENTUCKY TRANSPORTATION CABINET

STATEWIDE PLANNING
KY 90 CORRIDOR STUDY
ITEM NO. 8-80104.00

Executive Summary • November 2022

WSP HDR TAYLOR SIEFKER WILLIAMS design group

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Executive Summary

The Kentucky Transportation Cabinet (KYTC) initiated this study to identify potential improvements along Kentucky Route (KY) 90 in Pulaski County, Kentucky. The study area, shown in **Figure ES-1**, extends from the Wayne County Line to the New Cumberland River Bridge, mile point (MP) 0.000 to MP 3.061. The objective of the study is to identify short- and long-term improvements to reduce congestion and improve safety, capacity, and mobility along KY 90 between the Wayne County Line and the New Cumberland River Bridge.

The project team identified goals for the study based on the transportation challenges in the area. The goals of the study are to:

- Perform an inventory of existing conditions with respect to geometrics, traffic, safety, and environmental features to identify needs along the corridor.
- Propose a list of short- and long-term potential improvement concepts.
- Evaluate and prioritize improvement concepts based on transportation needs, environmental impacts, economic benefit and impact, benefit/cost, safety, and existing pavement conditions.
- Evaluate long-term improvement concepts with respect to grant criteria from the Infrastructure Investment and Jobs Act (IIJA) Grant Program emphasis areas.
- Engage local stakeholders throughout the study process.
- Produce a technical report to document the study process and results.

Committed and Potential Projects

There are five projects included in *Kentucky's Enacted Fiscal Year (FY) 2022 – FY 2028 Highway Plan (Six Year Plan)*, and five projects in the vicinity of the study area in the KYTC Continuous Highway Analysis Framework (CHAF) database:

Six Year Plan Projects

- Item Number 8-80104.00 (Pulaski Co., MP 0.000 to MP 3.061): Reduce congestion and improve safety, capacity and mobility along KY 90 between Wayne County line and New Cumberland River Bridge.
- Item Number 8-80105.00 (Wayne Co., MP 12.931 to MP 15.617): Reduce congestion and improve safety, capacity, and mobility of KY 90 between KY 90X/KY 1275 and KY 3106.
- Item Number 8-80108.00 (Wayne Co., MP 1.264 to MP 1.327): Address safety, mobility, and connectivity by relocating along KY 92 in Monticello between Locust Street and Elk Springs Creek Road.
- Item Number 8-80006.00 (Wayne Co., MP 4.000 to MP 4.479): Reduce congestion and improve safety, capacity, and mobility along KY 1275, including sidewalks from KY 90 to Bell Lane.
- Item Number 8-20010.00 (Wayne Co., MP 0.000 to MP 3.535): Address condition of KY 90X from MP 0 to MP 3.54.
- Item Number 8-22374.00 (Wayne Co., MP 12.900 to MP 17.700): Address condition of KY 90 from MP 12.9 to MP 17.7.

CHAFs

- IP20070240 – Improve safety and mobility along KY 1275 between KY 1765 and KY 90 near Touristville.
- IP20080506 – Reduce congestion and improve safety, capacity and mobility of KY 90 between KY 1275 / KY 1619 and KY 1568.
- IP20080507 – Reduce congestion and improve safety, capacity, and mobility of KY 90 between KY 1568 in Wayne County and the Wayne/Pulaski County Line.
- IP20090015 – New construction connecting Monticello to the Louie B. Nunn Expressway in Pulaski County, including a new bridge across Lake Cumberland.

Existing Conditions

A detailed inventory of the existing physical and geometric design characteristics was completed to evaluate the existing conditions along KY 90. KY 90 is classified as a rural minor arterial throughout the study area. The speed limit along KY 90 is 55 miles per hour (mph) in the study area. Lane widths are 12 feet with 10-foot paved shoulders, and the cross sections are listed in **Table ES-1**. A concrete median barrier starts near the bridge over the Cumberland River.

Table ES-1: KY 90 Corridor Typical Sections

Begin MP	End MP	Cross-Section
0.000	0.378	4-lane undivided
0.378	2.434	2-lane undivided
2.434	2.757	2-lane divided w/ median (0 feet - 20 feet)
2.757	3.100	4-lane divided w/ turn lanes

There are 95 total access points across the KY 90 study area, of which 73 are private driveways, 12 are three-way intersections and five are four-way intersections, counted as two access points per four-way intersection. Two intersections do not meet stopping sight distance requirements, and eight intersections are skewed.

Bicycle and pedestrian activity is low within the study area and occurs mostly on the eastern end of the corridor near the New Cumberland River Bridge.

Traffic Volume and Operations

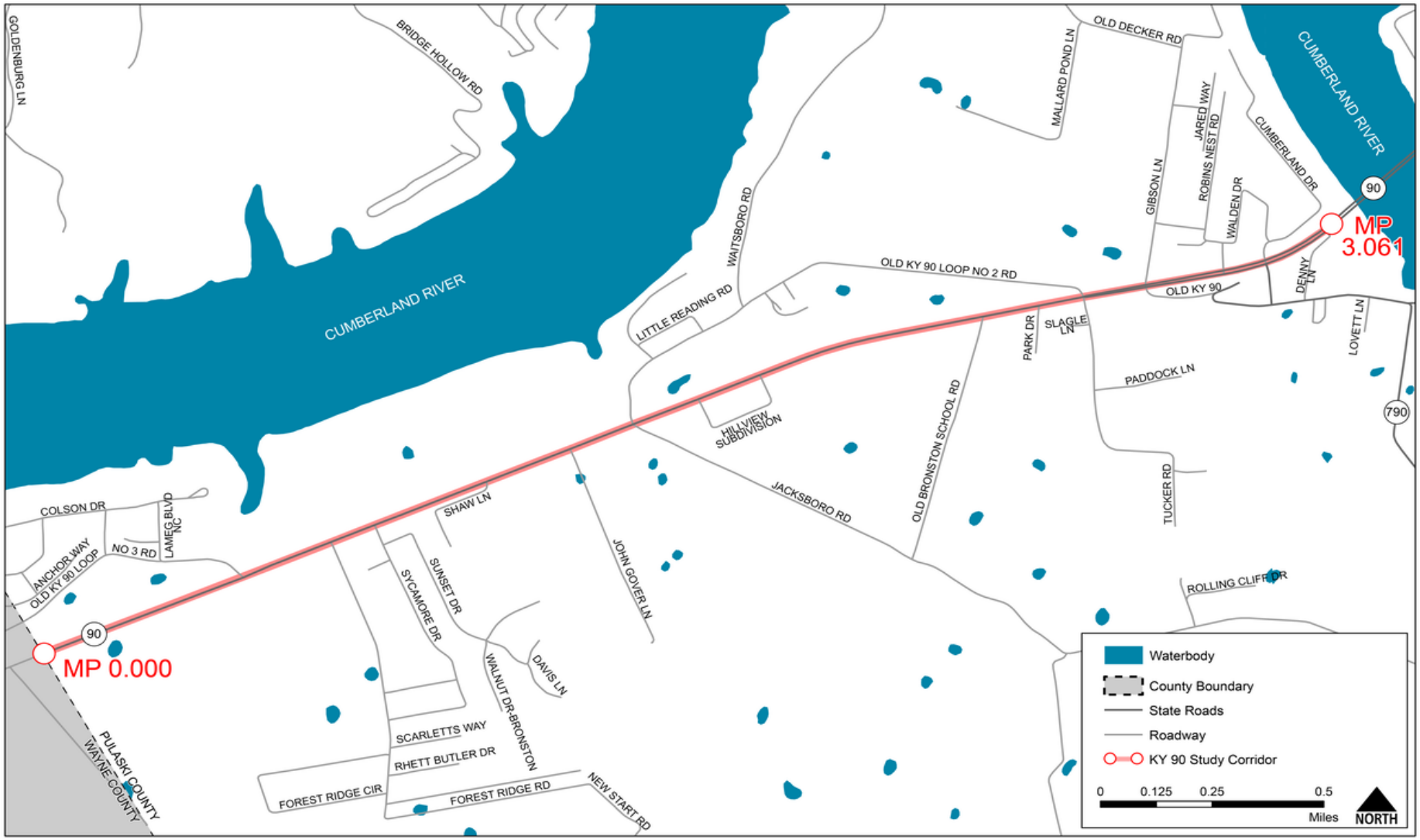
A traffic analysis was performed addressing three major topics: volumes, operations, and safety. Tasks included examining historical and existing (2022) traffic volumes as well as forecasting future traffic to the design year of 2045.

Traffic volumes were projected to the 2045 design year and include projections for Average Annual Daily Traffic (AADT), Design Hourly Volume (DHV), and truck volumes. The 2045 AADT volumes range from a low of 13,200 vehicles per day (vpd) at the western end of the study area to a high of 15,800 vpd at the eastern end of the study area. The DHVs, Average Annual Daily Truck Traffic (AADTT), and Truck DHVs (TDHV) all follow the same pattern of increasing by segment approaching the New Cumberland River Bridge.

A traffic operational analysis was conducted to determine capacity and Level of Service (LOS). KY 90 is classified as a rural minor arterial highway. American Association of State Highway and Transportation Officials (AASHTO) Green Book guidelines suggest the rural section be designed LOS C and the urban section be designed to LOS D. Given the urban section covers a larger portion of the study area and the corridor has the potential for further development, LOS D was selected. The analysis was completed for the no-build scenario on KY 90 with both existing (2022) and future (2045) traffic. Under existing traffic conditions, the study area segments operate at LOS D or better. The volume to capacity (v/c) ratio of KY 90 is expected to increase as volumes increase at a rate of 1.2% per year to the future year 2045. However, all segments are expected to continue operating at LOS D or better during both the AM and PM peak hours, except between Gibson Lane and KY 790. This segment just dips under the LOS E threshold in the eastbound direction during the AM peak hour and in the westbound direction in the PM peak hour.

Intersection turning movement counts at seven study intersections (Forest Ridge Road, Sycamore Drive, Jacksboro Road, Old Bronston School Road, Tucker Road, Gibson Lane, and KY 790) were obtained to evaluate intersection level traffic operations. All seven intersections are stop-sign controlled on the minor street approaches. The intersections were analyzed using Synchro Version 11 (HCM 6th Edition) analysis software to evaluate the AM and PM peak hours. All seven intersections currently operate at LOS D or better. In 2045 three intersections (Tucker Road, Gibson Lane, and KY 790) have at least one side street approach that operates at LOS F in one or both peaks, and Jacksboro Road has one approach that operates at LOS E in the PM peak.

Figure ES-1: KY 36 Study Area



Corridor Speeds

Travel speeds along a corridor are an indicator of how a roadway facility is operating. KYTC provided 2019 HERE speed data for the KY 90 study area, which was used to determine typical operating speeds throughout the day. Operating speeds were analyzed temporally and geographically to determine their relation to KY 90 operations. Speeds along KY 90 were generally at or above the posted speed limit of 55 mph. The analysis showed speeds are generally consistent by time of day. By location, speeds were generally higher on the western and eastern ends of the study area. More access points are prevalent in the center of the study area as compared to the ends which may be a contributing factor to the comparably slower speeds in that portion of the study area. A clear correlation does not exist between operating speeds and crash locations. Crashes along the study area typically occurred at intersections.

Safety

A historical crash analysis was performed to examine traffic safety trends and to identify potential safety issues on KY 90 within the study area. Within the five-year (2015 – 2019) analysis period, 108[1] crashes were reported in the study area. A breakdown of the crashes by severity found there were no fatal crashes and three serious injury crashes (2.8%) over the five-year period. Most crashes (81, 75%) were property damage-only crashes.

An examination of the crashes by manner of collision showed most crashes in the study area (48, 44.4%) were rear end crashes. A closer review of rear end crashes was performed to determine if trends or contributing factors contributed to the occurrences. Approximately 57% of rear end crashes involved a vehicle slowing down to turn left or queueing as result of left turning vehicles, and 35% of rear end crashes involved a vehicle slowing down to turn right or queueing as a result from right turning vehicles.

The location and density of crashes within the KY 90 study area was also examined as illustrated in **Figure ES-2**. Two trends emerged from a review of the plotted crash densities. The first is crashes are generally denser east of Jacksboro Road where a higher concentration of driveways and intersecting roadways are present. The second is crashes are denser at intersections, such as at Forest Ridge Road, Jacksboro Road, Old Bronston School Road, Tucker Road, and Gibson Lane, than at segments in between intersections.

The Excess Expected Crashes (EEC) values for KY 90 were obtained from KYTC. KY 90 experiences a mixture of positive and negative EEC values at intersections and segments. Basic trends from the EEC analysis show the intersections with Old KY 90 Loop 3, Forest Ridge Road, Sycamore Drive, Jacksboro Road, and Tucker Road are experiencing greater than expected crashes.

Most segments are experiencing less than expected crashes except between Forest Ridge Road and Sycamore Drive and between John Glover Lane and Jacksboro Road, which have positive EEC values. With minimal variability in crashes observed by day of week and month of year, recreational traffic does not appear to be a contributing factor to crashes in the study area. A comparison of crash rates within the study area shows KY 90 experiences a lower crash rate than other rural and urban two-lane roadways in the state. However, when variables such as lane width, shoulder width, traffic volume, and roadway curvature are considered, the EEC analysis indicates some sections and intersections of KY 90 are experiencing more crashes than would be expected on a similar type of facility.

1 Two crashes of unknown severity were reported in the study area and are not included in this analysis.

Figure ES-2: KY 90 Crash Density Map (2015-2019)

Environmental

Data was collected for an Environmental Overview (EO) based on existing geographic information system (GIS) datasets, state and federal agency databases, literature research, and archival data. Desktop research was performed to identify and locate areas of importance or concern that lie within a 500-foot buffer along KY 90 from the Wayne County Line to the New Cumberland River Bridge.

The natural environment reviewed for the EO included ecological resources, threatened and endangered species, and important habitats. The potential to encounter natural environment resources is limited in this previously disturbed area. The desktop review identified threatened and endangered species potential habitats are limited. The nature of improvement concepts considered as a result of this study, the limited natural environment resources in the study area, and the goal of staying within existing right-of-way and within previously disturbed areas to the extent possible, will greatly minimize the extent of impacts to the natural environment.

The human environment reviewed for the EO included air quality and noise issues; Environmental Justice (EJ)/ socioeconomic data; land use/farmland; hazardous materials; and historic and archaeological resources. The Lake Cumberland Area Development District (LCADD) prepared the *KY 90 Corridor Study, Pulaski County, Socioeconomic Study (LCADD Socioeconomic Study, Appendix E)* to assess EJ populations that must be considered in any future project development phases. As with the natural environment, the potential for the improvement concepts to impact the human environment is limited by the fact that most improvements would likely occur within existing right-of-way.

Development and Evaluation of Potential Improvement Concepts

In addition to project team meetings between the Consultant Team, KYTC, and the LCADD, outreach for this project included a meeting with local elected officials and stakeholders, as well as coordination with resource agencies. Using the existing conditions, traffic and safety analysis, along with input from the local stakeholders, an initial list of potential improvement concepts was developed and presented to the project team. Improvement concepts were grouped by corridor-wide longer-term improvements, and spot shorter-term improvements.

The initial list of improvement concepts was refined based on the feedback from the project team to a list for further evaluation. Each potential improvement concept was evaluated with respect to safety, traffic operations, right-of-way impacts, environmental impacts, and cost estimates. A predictive safety analysis was performed to estimate the potential reduction in crashes over a 20-year period each improvement concept could provide, then a simple benefit cost (B/C) analysis was conducted to determine the value each improvement concept provided. This analysis used a predicted 20-year crash reduction and the construction cost estimates to result in recommendations for potential improvement concepts.

Recommendations

The final list of corridor-wide and spot improvement concepts to move forward are shown in **Table ES-2** and **Table ES-3**, respectively. Project sheets were created for each improvement concept to be moved forward that provide information on the issues identified, the improvement concept, the safety and operational benefits, and a phased cost estimate that includes Design, Right-of-Way, Utilities, and Construction (D, R, U, C). Upon completion of this study, selected recommended improvement concepts will be further examined and moved through project development. Funds for future project development phases of this corridor are in *Kentucky's Enacted Fiscal Year (FY) 2022 – FY 2028 Highway Plan (Six Year Plan)*.

Table ES-2: KY 90 Corridor-Wide Recommendations

Typical Section Concepts															
Number	Location	Begin MP	End MP	Description	Existing Typical Section	Proposed Typical Section	ROW Impacts		General	Traffic	Environmental	Cost	Construction Cost	Fatal & Injury Crash Reduction	B / C
							Acres	Acquisitions							5yr Crashes / 7yr Crashes
1A	Old KY 90 Loop 3 to Old KY 90/ Gibson Lane	0.448	2.577	3-lane section with TWLTL	12' lanes, 12' shoulders	12' lanes, 12' TWLTL, 8' shoulders	11.14	5	TWLTL's reduce potential conflicts with turning traffic and to provide a refuge for vehicles waiting to turn left. A TWLTL could reduce driveway related crashes by ~20%	TWLTL's do not add substantial capacity to a two-lane roadway, but provide refuge for left turning vehicles and could increase operating speeds. Two-lane section currently operates at LOS C/D in 2022. No two-lane section in 2022 has a v/c ratio above 0.44.	Archaeology, Tree Removal (bats), Possible Historic, UST/HAZ, Potential Noise Screening Tool	D $720,000 R $1,555,700 U $300,000	$7,200,000	21%	0.2 - 1.1
1B	Old KY 90 Loop 3 to Old KY 90/ Gibson Lane	0.448	2.577	3-lane section with TWLTL	12' lanes, 12' shoulders	11' lanes, 12' TWLTL 8' shoulders	9.45	5	TWLTL's reduce potential conflicts with turning traffic and to provide a refuge for vehicles waiting to turn left. A TWLTL could reduce driveway related crashes by ~20%	TWLTL's do not add substantial capacity to a two-lane roadway, but provide refuge for left turning vehicles and could increase operating speeds. Two-lane section currently operates at LOS C/D in 2022. No two-lane section in 2022 has a v/c ratio above 0.44.	Archaeology, Tree Removal (bats), Possible Historic, UST/HAZ, Potential Noise Screening Tool	D $650,000 R $1,547,250 U $ 275,000	$6,500,000	19%	0.2 - 1.1
1C	Old KY 90 Loop 3 to Old KY 90/ Gibson Lane	0.448	2.577	3-lane section with TWLTL	12' lanes, 12' shoulders	12' lanes, 12' TWLTL, curb & gutter	0	0	TWLTL's reduce potential conflicts with turning traffic and to provide a refuge for vehicles waiting to turn left. A TWLTL could reduce driveway related crashes by ~20%	TWLTL's do not add substantial capacity to a two-lane roadway, but provide refuge for left turning vehicles and could increase operating speeds. Two-lane section currently operates at LOS C/D in 2022. No two-lane section in 2022 has a v/c ratio above 0.44.	Noise Screening Tool	D $520,000 RW $0 U $0	$5,200,000	21%	0.4 - 1.9

Typical Section Concepts															
Number	Location	Begin MP	End MP	Description	Existing Typical Section	Proposed Typical Section	ROW Impacts		General	Traffic	Environmental	Cost	Construction Cost	Fatal & Injury Crash Reduction	B / C
							Acres	Acquisitions							5yr Crashes / 7yr Crashes
2A-1	Jacksboro Road to Old KY 90/ Gibson Lane	1.377	2.577	2-lane section with 6' raised median & turn lanes at major intersections	12' lanes, 12' shoulders	12' lanes, 6' raised median 8' shoulders	8.66	3	On urban and suburban arterials, reducing the number of median openings and intersections (such as by adding a barrier median) reduces the number of intersection and driveway related crashes, however, the magnitude of the crash benefit is not certain. A reduction in crashes similar to what would occur by reducing the number of access points would be expected. Within the raised median section 25 Rear end, 2 angle, 2 opposing left, and 1 head on crashes occurred.	• Provide left turn lanes at Jacksboro Rd., Old Bronston School Rd., Park Dr., and Tucker Rd. intersections. 345' Left Turn Lane length needed (includes 100' bay taper). • Could be combined with roundabouts at Jacksboro Rd. and Tucker Rd. to provide turning access. Roundabouts would operate acceptably, likely near LOS C. • U-turn loons could be added to accommodate left turning traffic. U-turn movement would operate acceptably, likely near LOS C.	Archaeology, Tree Removal (bats), Possible Historic, UST/HAZ, Potential Noise Screening Tool	D $480,000 R $943,300 U $250,000	$4,800,000	24%	0.3 - 1.7
2A-2	Jacksboro Road to New Cumberland River Bridge	1.377	3.061	2-lane section with 6' raised median & turn lanes at major intersections	12' lanes, 12' shoulders	12' lanes, 6' raised median 8' shoulders	8.66	3	On urban and suburban arterials, reducing the number of median openings and intersections (such as by adding a barrier median) reduces the number of intersection and driveway related crashes, however, the magnitude of the crash benefit is not certain. A reduction in crashes similar to what would occur by reducing the number of access points would be expected.	• Provide left turn lanes at Jacksboro Rd., Old Bronston School Rd., Park Dr., and Tucker Rd. intersections. 345' Left Turn Lane length needed (includes 100' bay taper). • Could be combined with roundabouts at Jacksboro Rd. and Tucker Rd. to provide turning access. Roundabouts would operate acceptably, likely near LOS C. • U-turn loons could be added to accomodate left turning traffic. U-turn intersection would operate acceptable, likely near LOS C.	Archaeology, Tree Removal (bats), Possible Historic, UST/HAZ, Potential Noise Screening Tool	D $510,000 R $943,300 U $250,000	$5,100,000	24%	0.3 - 1.6

Typical Section Concepts															
Number	Location	Begin MP	End MP	Description	Existing Typical Section	Proposed Typical Section	ROW Impacts		General	Traffic	Environmental	Cost	Construction Cost	Fatal & Injury Crash Reduction	B / C
							Acres	Acquisitions							5yr Crashes / 7yr Crashes
2B-1	Jacksboro Road to Old KY 90/ Gibson Lane	1.377	2.577	2-lane section with 6' raised median & turn lanes at major intersections	12' lanes, 12' shoulders	12' lanes, 6' raised median, curb & gutter	0	0	On urban and suburban arterials, reducing the number of median openings and intersections (such as by adding a barrier median) reduces the number of intersection and driveway related crashes, however, the magnitude of the crash benefit is not certain. A reduction in crashes similar to what would occur by reducing the number of access points would be expected. Within the raised median section 25 Rear end, 2 angle, 2 opposing left, and 1 head on crashes occured.	• Provide left turn lanes at Jacksboro Rd., Old Bronston School Rd., Park Dr., and Tucker Rd. intersections. 345' Left Turn Lane length needed (includes 100' bay taper). • Could be combined with roundabouts at Jacksboro Rd. and Tucker Rd. to provide turning access. Roundabouts would operate acceptably, likely near LOS C. • U-turn loons could be added to accomodate left turning traffic. U-turn intersection would operate acceptable, likely near LOS C.	None	D $390,000 R $0 U $0	$3,900,000	24%	0.4 - 2.6
2B-2	Jacksboro Road to New Cumberland River Bridge	1.377	3.061	2-lane section with 6' raised median & turn lanes at major intersections	12' lanes, 12' shoulders	12' lanes, 6' raised median, curb & gutter	0	0	On urban and suburban arterials, reducing the number of median openings and intersections (such as by adding a barrier median) reduces the number of intersection and driveway related crashes, however, the magnitude of the crash benefit is not certain. A reduction in crashes similar to what would occur by reducing the number of access points would be expected.	• Provide left turn lanes at Jacksboro Rd., Old Bronston School Rd., Park Dr., and Tucker Rd. intersections. 345' Left Turn Lane length needed (includes 100' bay taper). • Could be combined with roundabouts at Jacksboro Rd. and Tucker Rd. to provide turning access. Roundabouts would operate acceptably, likely near LOS C. • U-turn loons could be added to accomodate left turning traffic. U-turn intersection would operate acceptable, likely near LOS C.	None	D $630,000 R $0 U $0	$6,300,000	24%	0.3 - 1.6

*v/c ratio is the roadway's volume divided by capacity.

Table ES-3: KY 90 Spot Improvement Recommendations

Spot Improvement Concepts									B/C
Number	Location	MP	Description	ROW Impacts (Acres)	Traffic	Environmental	Cost	Fatal & Injury Crash Reduction	5yr Crashes/ 7yr Crashes
1	Forest Ridge Road	0.644	Provide Advance Intersection Warning Signing	0		None	D $5,000 R $0 U $0 C $2,500	35%	0.9 - 0.6
2	Forest Ridge Road & Sycamore Drive	0.675	WB Left Turn Lane on KY 90	0.1	• Mainline Left Turn Lane Warrant met in PM. • 345' Turn Lane Length (includes 100' bay taper) at Forest Ridge Drive and Sycamore Drive.	Archaeology	D $44,000 R $1,000 U $0 C $440,000	44%	1.4 - 1.9
3	Shaw Lane	1.021	Angle shoulder to widen for RTs and improve pavement	0		None	D $5,000 R $0 U $0 C $25,000	10%	0.0 - 0.0
4	Jacksboro Road	1.377	Provide "Con-gestion Ahead" Signing	0	Intersection NB and SB TWSC approaches currently operates at LOS C in the AM and PM.	None	D $5,000 R $0 U $0 C $2,500	0%	
5	Jacksboro Road	1.377	Improve Intersection Skew	0	Intersection NB and SB TWSC approaches currently operates at LOS C in the AM and PM.	Archaeology, Tree Removal (bats), Possible Historic	D $15,000 R $0 U $0 C $75,000	15%	4.4 - 3.2
6	Old Bronston School Road	2.204	Improve Intersection Skew	0		Archaeology, Tree Removal (bats)	D $15,000 R $0 U $ 0 C $30,000	9%	0.1 - 0.4
7	Old Bronston School Road, Park Drive & Tucker Road / Old KY 90 Loop	2.319	WB Left Turn Lane to Old Bronston School Road and Park Drive, EB and WB Left Turn Lanes to Tucker Road / Old KY 90	0.85	• Mainline Left Turn Lane Warrant met in PM for Old Bronston School Road and Tucker Road (no count data avilable for Park Drive). • 500' Turn Lane Length (includes 100' bay taper) at Old Bronston School • 345' Turn Lane Length (includes 100' bay taper) at Park Drive and Tucker Road	Archaeology, Tree Removal (bats)	D $62,000 R $4,000 U $0 C $615,000	44%	0.0 - 13.7

Spot Improvement Concepts									B/C
Number	Location	MP	Description	ROW Impacts (Acres)	Traffic	Environmental	Cost	Fatal & Injury Crash Reduction	5yr Crashes / 7yr Crashes
8	Park Drive	2.332	Improve Intersection Skew	0		Archaeology	D $10,000 R $0 U $0 C $50,00	6%	0.8 - 21.8
9	Gibson Lane / Old KY 90	2.577	Restripe EB & WB Turn Lanes and Improve WB Merge	0	The SB TWSC approach operates at LOS C in the AM and LOS D in the PM.	None	D $5,000 R $0 U $0 C $10,000	N/A	
10	Gibson Lane / Old KY 90	2.852	Eliminate WB merge and make right lane a RT only lane onto Gibson	0		None	D$15,000 R $0 U $0 C $150,000	41%	1.0 - 1.3
11	KY 790 / Cumber-land Drive	2.852	NB Right Turn Lane	0		None	D $10,000 R $0 U $0 C $40,000	N/A	

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TRANSPORTATION
CABINET
wsp
HDR
TAYLOR
SIEFKER
WILLIAMS
design group