



I-71 Corridor Study Executive Summary

Final

Between I-64 in Jefferson County and I-75 in Boone County

Jefferson, Oldham, Henry, Trimble, Carroll, Gallatin and Boone Counties, Kentucky

Item No.: 99-394.00

Prepared for:



Kentucky Transportation Cabinet
Division of Planning and Highway
Districts 5 & 6

Prepared by:



March 2014



Begin Project
MP 0.000

End Project
MP 77.724

EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) has initiated a strategic corridor planning study to address safety and congestion and identify and evaluate improvements along the I-71 Corridor between I-64 in Jefferson County (Spaghetti Junction) and I-75 in Boone County, a distance of 77.7 miles (see Figure ES1: Study Area, p. ES2). Between Louisville and Cincinnati, I-71 is primarily a four-lane, divided highway, except for a six-lane section near the Kentucky Speedway around KY 35 near MP 57. Although the entire mainline corridor is encompassed in this study, only a portion of the interchanges are included in the scope of work as indicated in Table ES1:

Table ES1: Interchanges Located in the I-71 Corridor

ID #	County	Exit #	Crossroad	Note	KYTC Item No. or Referenced Study
1	Jefferson	0	I-64	1	5-21.00 & 5-715.00
2	Jefferson	2	Zorn Ave	1	5-48.10
3	Jefferson	5	I-264	1	5-48.2 & 48.3
4	Jefferson	9	I-265	1	5-68.00 Alternatives Study I-71/I-265 Aug. 2010
5	Oldham	14	KY 329	2	
6	Oldham	17	KY 146	2	
7	Oldham	18	KY 393	1	5-234.00
8	Oldham	22	KY 53	3	Oldham Co. IJS February 2011; 5-8201.01
9	Henry	28	KY 153	2	
10	Henry	34	US 421	2	
11	Carroll	43	KY 389	2	
12	Carroll	44	KY 227	2	
13	Gallatin	55	KY 1039	2	
14	Gallatin	57	KY 35	4	Kentucky Motor Speedway
15	Gallatin	62	US 127	2	
16	Boone	72	KY 14	2	
17	Boone	77	I-75	1	

Notes:

1 – Not addressed or studied in this study. Those in Jefferson County are already under redesign as Item Nos. 5-21.0, 715.0, 48.1, 48.2, 48.3, 68.0, 5-234.00, and 804.00; Exit 18 in Oldham County is relatively new and designed to current standards and the interchange is currently under capacity; and the I-75 interchange is excluded from this study. At KYTC’s request, the I-75 interchange is excluded from this study due to recent improvements made to the interchange to extend the southbound I-75 entrance to SB I-71 two-lane on ramp through the interchange area.

2 – Will be studied and addressed in this study (**in bold**).

3 – KY 53 has been studied in Oldham County shall be incorporated by reference into this study, including data and recommendations.

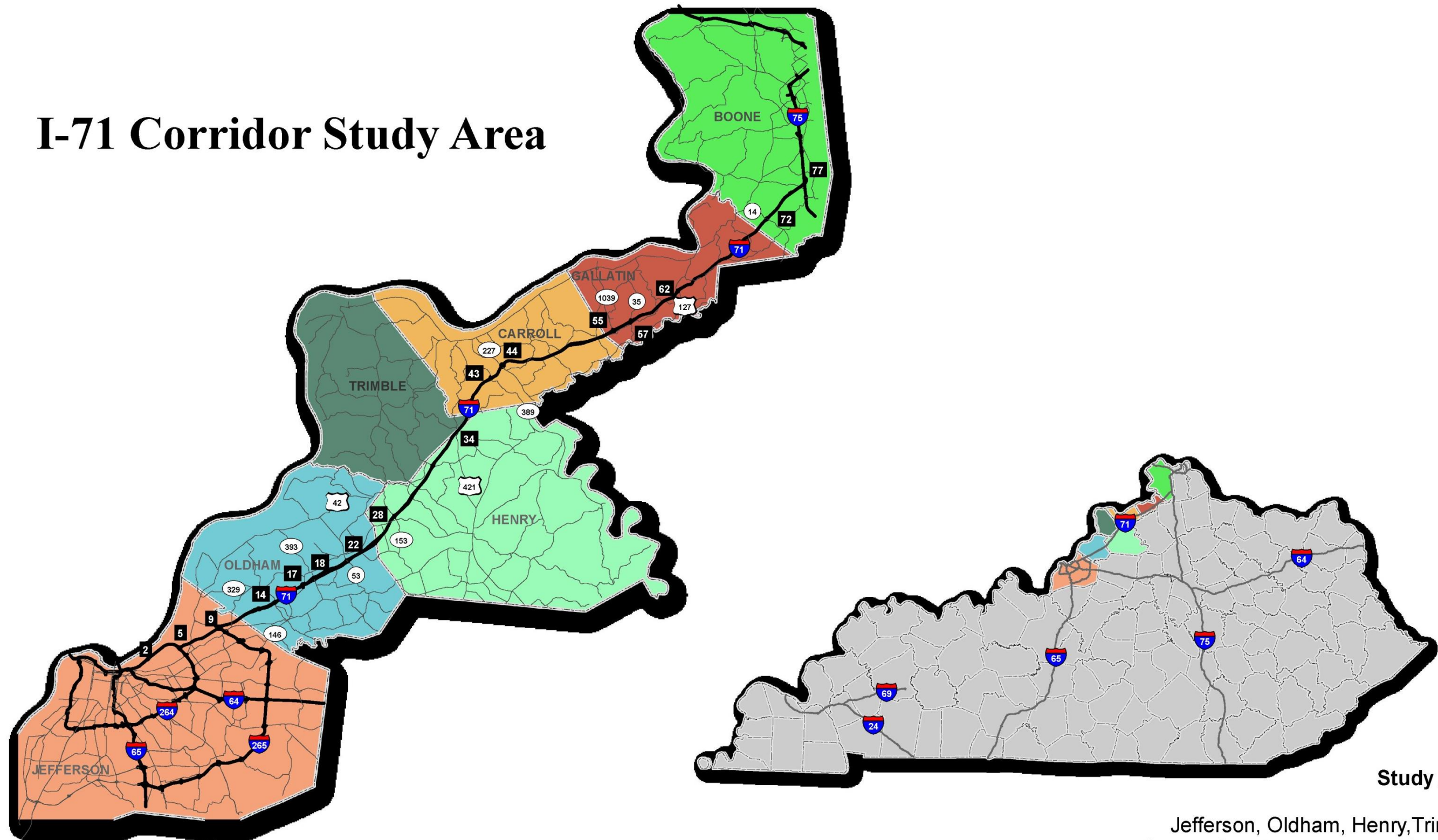
4 – The Kentucky Speedway (Exit 57) has been recently reconstructed and studied for event traffic. During normal operations it operates well under capacity. Event day traffic, however, could possibly be improved at this interchange. Therefore this interchange will be included in the Planning Study, but only to the extent necessary for including Event Day operations.

Purpose and Need of the Study

The purpose of this study is to evaluate the safety and congestion of the I-71 Corridor from I-64 in Jefferson County to I-75 in Boone County and to determine needed improvements and relative priorities. The study examines geometric characteristics, crash history, physical constraints, and existing and projected operational characteristics of the I-71 Corridor. The need for the project is supported by the following facts:

- Age of the Interstate and Changing Design Standards – The first section of I-71 in Louisville opened in 1966 between its terminus with I-64 and Zorn Avenue. Its junction with the Watterson Expressway (I-264) opened in 1968, and the complete Kentucky portion of the interstate was opened to the public in 1969 replacing US 42 as the primary route between Louisville and Cincinnati. Although it met design standards and common practices in the 1960’s, those standards and practices have changed over the years in an effort to improve safety.
- Between the project limits, 2,705 crashes occurred on I-71 between January 1, 2009 and December 31, 2011. Approximately 535 of those were injury crashes and 15 were fatal crashes. There were 65 0.1-mile spots with a critical crash rate factor (CCRF) exceeding 1.0 and considered high crash locations. Approximately 1,068 crash reports were reviewed over a three-year period from years 2009 – 2011. A review of 2012 crashes revealed three (3) fatalities were found to occur in a 0.2 mile spot in Carroll County (MP 38.9 to MP 39.1). Within a three year span, there were several recurring crashes (65) recorded at MP 62.8 to MP 64.0 in Gallatin County.
- Current Level of Service (LOS) analysis in the study area indicates that over nine (9) miles of I-71 is currently operating at LOS F and eight (8) miles are operating at LOS E with volume/capacity (v/c) ratios in excess of 1.0.
- Design year 2038 capacity analysis shows, even with the I-265 approach to the Ohio River (east end bridge) in Jefferson County, over 21 miles of I-71 operating at LOS F and 4 miles operating at LOS E with frequent traffic backups anticipated at these locations.
- Existing truck traffic as a percent of the overall traffic ranges from 7% in Jefferson County to 35% in Gallatin County. Actual trucks per day range from approximately 5,000 trucks per day in downtown Louisville between Zorn Avenue and I-264 to approximately 11,000 trucks per day between I-265 and KY 329 in Oldham County and KY 35 and US 127 in Gallatin County. It is anticipated that in the future the range in truck traffic as a percent of the overall traffic will continue to grow from 7% to 11% in Jefferson County and from 35% to 46% in Gallatin County, respectively. The actual trucks per day in 2038 are expected to grow between 9,100 from Zorn Avenue to I-264 to as many as 19,600 trucks per day between I-265 and KY 329. There are locations along I-71 with long, steep grades that result in trucks riding alongside each other, either up or down the grade making it nearly impossible for other vehicles to pass.
- As documented herein, there have been several previous studies conducted throughout the I-71 study corridor, each with their own recommendations and conclusions. It is KYTC’s desire to develop an overall improvement plan for the I-71 Corridor that focuses on congestion and safety.
- A key element to this study is public involvement and more specifically the involvement of the I-71 Corridor Group, which has been identified as a key stakeholder for this project. This group’s focus is the overall I-71 corridor with an emphasis on the rural counties that are not contained within the metropolitan planning organizations of Kentuckiana Regional Planning and Development Agency (KIPDA) and the Ohio Kentucky Indiana Regional Council of Governments (OKI). Most of the counties are agricultural in nature and because farming is rarely a full-time occupation today, the farmers must seek work in industry to fill the void for the creation of new jobs. This focus group feels that widening I-71 plays a vital role in keeping existing industries and attracting new industry while expanding on the potential for tourism growth. The I-71 Corridor Group is very much supportive of a plan for widening I-71.

I-71 Corridor Study Area



Study Area
I-71
Jefferson, Oldham, Henry, Trimble,
Carroll, Gallatin, and Boone Counties
Milepoint 0.000 to 77.724

Figure ES1: I-71 Study Area

Recommendations

Using an evaluation of existing roadway conditions including an analysis of grades and horizontal and vertical alignment, field reviews, a review of as-built and current drawings, a review of past I-71 studies, crash data analysis, capacity analysis of existing (2013) and design year (2038) conditions, input from stakeholders and discussions following the 2nd Project Team Meeting, deficiencies for the I-71 Corridor were identified and documented for this report.

Based on the review of crash records and the crash analysis, it was determined that there were seven (7) areas or locations of principal concern in regards to the critical crash rate. These areas were identified as:

1. MP 0 - 0.3 (Approaching Spaghetti Junction) CCRF: > 1.7
2. MP 1.7 - 2.1 (Zorn Avenue Interchange) CCRF: 1.02-1.08
3. MP 4.6 - 5.3 (Watterson Expressway Interchange) CCRF: 1.04-2.98
4. MP 8.4 - 9.1 (Gene Snyder Interchange) CCRF: 1.10-2.13
5. MP 62.8 - 64.0 (1.0 mile north of US 127 interchange in Gallatin County) CCRF: 1.02-2.72
6. MP 71.6 - 72.5 (KY 14 Interchange at Verona) CCRF: 0.96-2.58
7. MP 38.9 - MP 39.1 in Carroll County: three (3) fatalities in 2012

Based on these deficiencies and identified areas of concern, a prioritized list of recommended mainline and crossroad projects were developed. The screening and prioritization of the recommendations for the corridor were based on the purpose and need of the project and input by the Stakeholders groups. The recommendations were divided into 4 main components: Mainline, Mainline Improvements under \$10 million, Crossroad Improvements and Intelligent Transportation System (ITS) Improvements. The I-71 Corridor Improvements are listed in Table ES2 (p. ES4-ES5) and shown in Figures ES2 (p.ES6) and ES3 (p. ES7). Quick Wins, low-cost improvements that can be implemented in a short period of time, were identified as a result of the Stakeholder and Project Team input, are also shown in Table ES2.

List of I-71 Improvement Priorities

Based on further evaluations and discussions at the November 13, 2013 Project Team Meeting, the following projects were identified priorities through 2038. Only the mainline widening projects that were through the build year 2038 were detailed and included with few exceptions. Cost estimates that were obtained from previous studies were updated to 2013 using the construction cost index to 2012 and then increasing the costs by 4% to represent 2013 dollars.

1. Improve Safety north of US 127 MP 62.8 to MP 64.0 in Gallatin County—Priority #1.

The purpose of this project is to improve safety by reducing the number of crashes. The Critical Crash Rate Factor (CCRF) for this 1.2-mile stretch of I-71 is 1.86. From the years 2009-2011, there were 41 crashes in wet or snowy weather, 38 single vehicle run-off-the-road crashes; 8 vehicle malfunctions and 2 collisions with deer. Four (4) crashes were located within the spiral horizontal curve near MP 63.0. From January 1, 2013 to July 24, 2013, there have been more crashes in this stretch than all of year 2012. These crashes have occurred following complete pavement rehabilitation in 2011 to repair deficient cross slopes. Motorists must negotiate 4% grades leading to back-to-back spiral curves. According to KYTC District 6 staff, I-71 has closed due to some of these crashes, or narrowed to one lane. Due to the continual crashes at

this location and disruption of traffic service and improvement in safety expected, the recommended alternative by the Project Team is a complete reconstruction option which has total cost of \$35,200,000.

2. Add Capacity and Improve Safety

The purpose of these projects is to reduce congestion and improve safety on I-71. Today, the following I-71 segments are operating at LOS F with v/c ratios exceeding 0.95 and are recommended for widening to six lanes:

- I-64 to Zorn Avenue in Jefferson County (2.0 Miles) – \$23,800,000—Priority #2.
- Zorn Avenue to I-264 in Jefferson County (3.0 Miles) – \$27,700,000—Priority #4.
- KY 329 to KY 146 in Oldham County (2.5 miles) – \$21,800,000—Priority #11.
- KY 146 to KY 393 in Oldham County (1.0 Mile) – \$16,000,000—Priority #38.

Even with the Kennedy Interchange reconstruction and the new east end approach to the bridge over the Ohio River (I-265/Gene Snyder Freeway), these additional I-71 segments will operate at LOS E or F with v/c ratios exceeding 0.90 by the design year 2038.

- KY 393 to KY 53 in Oldham County (4.0 miles) – \$25,000,000—Priority #39.
- KY 14 to I-75 in Boone County (5.0 miles) – \$32,400,000—Priority #42.

3. Add Truck Climbing Lanes to Reduce Congestion and Improve Safety

Both locations below have heavy trucks with continuous uphill climbs decreasing truck speeds by at least 25 mph.

- **Southbound from MP 38.3 to MP 40.8 in Carroll County – \$7,900,000—Priority #8.**

The initial evaluation of crashes in this area did not yield an area with any CCRF greater than 1.0. However, a check of the 2012 crashes revealed three (3) fatalities in a 0.2 mile spot. Looking beyond this 0.2 mile spot, expanding 1.0 mile on either side, this area has multiple maximum 4% grades within back-to-back spiral curves, and two long narrow bridges at the end of a 3% downgrade heading northbound. The reverse is the case travelling southbound, there is a continuous uphill climb for approximately 2.5 miles beginning at approximately MP 38.3 to MP 40.8, with grades ranging from -0.5% to -4.0% and a possible deficient sag curve. The equivalent southbound grade was 3.62% for 2.33 miles. This length, according to the design manual and field observation, slows trucks by nearly 30 mph and increasing the crash involvement rate by nearly five times.

- **Northbound from MP 44.8 to MP 46.1 in Carroll County – \$5,500,000—Priority #10.**

In 2012, the vehicle composition included 33.2% trucks. More than 9,700 trucks currently utilize this roadway segment with that number expected to grow. “Trucks passing trucks” affects the free flow speed in the passing lane. A 4,850 foot-long grade northbound begins just east of the KY 227 interchange. This length, according to the *Green Book* and field observation, slows trucks by over 25 mph, increasing the crash involvement rate by nearly five times. Many truck drivers use their flashers to warn other motorists of their slow speeds. Also, the length of the current acceleration ramp from KY 227 to northbound I-71 is short of the desired length under current design standards. The approximate total cost for the northbound truck climbing lane is \$5,500,000.

Table ES2: I-71 Corridor Improvements

I-71 CORRIDOR IMPROVEMENTS WITH PHASE COSTS

MAINLINE							COST ESTIMATE DETAIL						
COUNTY	NEW PRIORITY	BEG ROUTE	BEG EXIT OR MP	END ROUTE	END EXIT OR MP	CROSSROAD	PROJECT	PLANNING	DESIGN	R/W	UTILITIES	CONSTRUCTION	TOTAL
Gallatin	1		62.8		64.0		Reconstruct I-71 from US 127 MP 62.8 to MP 64 to improve geometrics		\$ 2,200,000	\$ 1,500,000	\$ 500,000	\$ 31,000,000	\$ 35,200,000
Jefferson	2	I-64	0	ZORN	2		Widen to 6 lanes		\$ 1,500,000	\$ -	\$ 476,000	\$ 21,800,000	\$ 23,776,000
Jefferson	4	ZORN	2	I-264	5		Widen to 6 lanes		\$ 1,500,000	\$ -	\$ 514,000	\$ 25,700,000	\$ 27,714,000
Jefferson	6	I-264	5	I-265	9		Reevaluate needs at I-264/I-71 interchange and I-71 between I-264 and I-265 after I-265 East End bridge has been open at least one year to see if previous recommendations, based on forecasted usage, are still valid.	\$ 500,000	\$ 9,500,000	\$ 30,000,000	\$ 3,000,000	\$ 150,000,000	\$ 193,000,000
Jefferson/Oldham	7	I-265	9	KY 329	14		Widen to 6 lanes and widen clear zones		\$ 3,500,000	\$ -	\$ 700,000	\$ 50,000,000	\$ 54,200,000
Carroll	9		44.0			Kentucky River	Replace 2 Structurally Deficient Bridges over Kentucky River (021B00042L, 021B00042R)		\$ 2,000,000			\$ 14,764,800	\$ 16,764,800
Oldham	11	KY 329	14	KY 146	17		Widen to 6 lanes		\$ 1,500,000	\$ -	\$ 300,000	\$ 20,000,000	\$ 21,800,000
Oldham	38	KY 146	17	KY 393	18		Widen to 6 lanes		\$ 1,500,000	\$ -	\$ 500,000	\$ 14,000,000	\$ 16,000,000
Oldham	39	KY 393	18	KY 53	22		Widen to 6 lanes		\$ 2,000,000	\$ -	\$ 500,000	\$ 22,500,000	\$ 25,000,000
Carroll	40	KY 227	44	KY 1039	55		Construct new interchange near KY 47 and make improvements connecting to US 42		\$ 1,500,000	\$ 4,000,000	\$ 3,000,000	\$ 15,000,000	\$ 23,500,000
Oldham/Henry	41	KY 53	22	KY 153	28		Widen to 6 lanes		\$ 5,600,000		\$ 900,000	\$ 56,200,000	\$ 62,700,000
Boone	42	KY 14	72	I-75	77		Widen to 6 lanes		\$ 2,000,000	\$ -	\$ 400,000	\$ 30,000,000	\$ 32,400,000
Gallatin	43	US 127	62	KY 14	72		Widen to 6 lanes		\$ 6,500,000	\$ -	\$ 800,000	\$ 80,000,000	\$ 87,300,000
Henry	44	KY 153	28	US 421	34		Widen to 6 lanes		\$ 4,000,000	\$ -	\$ 480,000	\$ 48,000,000	\$ 52,480,000
Henry/Trimble/Carroll	45	US 421	34	KY 389	43		Widen to 6 lanes		\$ 7,000,000	\$ -	\$ 720,000	\$ 72,000,000	\$ 79,720,000
Gallatin	46	KY 35	57	US 127	62		Widen to 6 lanes		\$ 3,500,000	\$ -	\$ 400,000	\$ 40,000,000	\$ 43,900,000
Carroll	48	KY 227	44	KY 1039	55		Widen to 6 lanes		\$ 7,500,000	\$ -	\$ 1,000,000	\$ 88,000,000	\$ 96,500,000
													\$ 891,954,800

MAINLINE IMPROVEMENTS UNDER \$10,000,000							COST ESTIMATE DETAIL					
COUNTY	NEW PRIORITY	BEG ROUTE	BEG EXIT OR MP	END ROUTE	END EXIT OR MP	CROSSROAD	PROJECT	DESIGN	R/W	UTILITIES	CONSTRUCTION	TOTAL
Gallatin/Boone	1A		69.60		77.00		Install cable guardrail				\$ 1,200,000	\$ 1,200,000
Jefferson	3		9.80			Chamberlain Lane	Address Structurally deficient bridge @ MP 9.8 SB (056B00062L)	\$ 500,000			\$ 892,800	\$ 1,392,800
Jefferson	5	I-264	5	I-265	9		Replace Structurally Deficient Bridge SB over US 42; consider making other geometric improvements to bridges depending, in part, on outcome of study identified in previous priority.	\$ 750,000			\$ 1,936,800	\$ 2,686,800
Carroll	8		38.30		40.80		Add truck climbing lane southbound from MP 38.3 to MP 40.8, including widening bridges	\$ 600,000	\$ 100,000	\$ 200,000	\$ 7,000,000	\$ 7,900,000
Carroll	10		44.80		46.10		Add truck climbing lane northbound from MP 44.8 to MP 46.1, including extending merge length from KY 227 to I-71 NB	\$ 400,000	\$ -	\$ 100,000	\$ 5,000,000	\$ 5,500,000
Oldham/Henry	12	I-265	9	US 421	34		Install deer warning signs at 7 locations Priority #12 - IMPLEMENTED AS PART OF THIS STUDY				\$ 2,800	\$ 2,800
Oldham/Henry	13		22.53		28.32		Install cable guardrail: Oldham/Henry MP 22.53 - MP24.73; Henry MP 25.73 - MP 28.32				\$ 718,000	\$ 718,000
Henry	14		30.70		31.87		Install cable guardrail				\$ 175,500	\$ 175,500
Carroll	15		43.90		50.75		Install cable guardrail				\$ 1,027,500	\$ 1,027,500
Carroll	16		52.54		53.43		Install cable guardrail				\$ 133,500	\$ 133,500
Henry	17		33.02		38.81		Install cable guardrail				\$ 747,750	\$ 747,750
Gallatin	18		53.43		56.45		Install cable guardrail				\$ 453,000	\$ 453,000
Gallatin	19		58.60		59.50		Install guardrail for Steep Slopes NB near KY 465 structure outside lane				\$ 17,200	\$ 17,200
Carroll	20		50.90		51.20		Install guardrail for Steep Slopes NB inside median side slope steep				\$ 30,200	\$ 30,200
Carroll	21		53.40		53.50		Install guardrail for Steep Slopes SB outside lane 1.5 miles south of KY 1039 Exit				\$ 15,600	\$ 15,600
Henry	22		25.9	KY 3320, KY 712			Provide median pier protection @ MP 25.9 (KY 3320) and KY 712				\$ 104,000	\$ 104,000
Boone	23		76.2	KY 1292			Provide median pier protection @ MP 76.2 (KY 1292)				\$ 52,000	\$ 52,000
Gallatin	24		59.4	KY 465			Provide median pier protection @ MP 59.4 (KY 465)				\$ 52,000	\$ 52,000
Gallatin	25		61.8	US 127			Provide median pier protection @ MP 61.8 (US 127)				\$ 52,000	\$ 52,000
Gallatin	26		66.3	KY 562			Provide median pier protection @ MP 66.3 (KY 562)				\$ 52,000	\$ 52,000
Gallatin	27		69.8	KY 2850			Provide median pier protection @ MP 69.8 (KY 2850)				\$ 52,000	\$ 52,000
Carroll	28		46.92			KY 1112	Replace Structurally Deficient Bridge SB over KY 1112 and Whites Run Creek overpass (021B00036L)	\$ 750,000			\$ 3,190,080	\$ 3,940,080
Carroll	29		46.88			KY 1112	Remove curb from KY 1112 and Whites Run Creek (021B00036R)				\$ 15,000	\$ 15,000
Gallatin	30		53.46			KY 47	Remove curb from KY 47 mainline bridge (039B00023L) or add guardrail protection				\$ 11,000	\$ 11,000
Gallatin	31		53.46			KY 47	Remove curb from KY 47 mainline bridge (039B00023R) or add guardrail protection				\$ 11,000	\$ 11,000
Carroll	32		44.33			CSX RR & KY 227	Remove curb from CSX RR & KY 227 mainline bridge (021B00037L) or add guardrail protection				\$ 13,000	\$ 13,000
Carroll	33		44.33			CSX RR & KY 227	Remove curb from CSX RR & KY 227 mainline bridge (021B00037R) or add guardrail protection				\$ 13,000	\$ 13,000
Oldham	34		22.0			KY 53	Widen NB off ramp @ KY 53 to 2 lanes	\$ 160,000	\$ 120,000	\$ 120,000	\$ 1,100,000	\$ 1,500,000
Oldham	35	KY 153	28	KY 153	28		Extend merge length from KY 153 to I-71 NB				\$ 160,000	\$ 160,000
Henry	36	US 421	34	US 421	34		Extend merge length from US 421 to I-71 SB				\$ 150,000	\$ 150,000
Carroll	37	KY 227	44	KY 227	44		Extend merge length from KY 227 to I-71 SB				\$ 1,000,000	\$ 1,000,000
Carroll	47	KY 389	43	KY 227	44		Widen to 6 lanes; includes new structures over KY 227/KY River	\$ 600,000	\$ -	\$ 80,000	\$ 8,000,000	\$ 8,680,000
												\$ 37,854,930

Table ES2: I-71 Corridor Improvements (continued)

I-71 CORRIDOR IMPROVEMENTS WITH PHASE COSTS (CONTINUED)

CROSSROADS				COST ESTIMATE DETAIL					
COUNTY	NEW PRIORITY	ROUTE	PROJECT	PLANNING	DESIGN	R/W	UTILITIES	CONSTRUCTION	TOTAL
Oldham	1	KY 329	Signalize SB ramps, add left turn lane between ramp terminals		\$ 100,000			\$ 900,000	\$ 1,000,000
Oldham	2	KY 146	Signalize SB ramp					\$ 200,000	\$ 200,000
Jefferson	3	Zorn Avenue	Signalize SB ramps, coordinate with existing signal @ NB ramps					\$ 200,000	\$ 200,000
Oldham	4	KY 393	Option 4c-3: signalize both intersections, add a second NB left turn lane onto I-71 from KY 393, add a free flow right turn lane from I-71 to KY 393 SB, and widen KY 393 to 4 lanes through the interchange.		\$ 600,000	Not Included	Not Included	\$ 9,200,000	\$ 9,800,000
Oldham	5	KY 53	Option 4c-4: Widen SB exit ramp to separate left & right turns onto KY 53; a second NB left turn lane onto I-71; widen bridge		\$ 600,000	Not Included	Not Included	\$ 7,500,000	\$ 8,100,000
Boone	6	KY 14	Separate left and right turns on SB exit ramp 100'					\$ 22,000	\$ 22,000
Boone	7	KY 14	Add left turn lanes to entrance ramps		\$ 200,000			\$ 1,440,000	\$ 1,640,000
Carroll	8	KY 227	Separate left and right turns on SB exit ramp 100' and channelize right turns to KY 227 NB					\$ 22,000	\$ 22,000
Henry	9	KY 153	Separate left and right turns on NB exit ramp 700'					\$ 140,000	\$ 140,000
Henry	10	KY 153	Add left turn lanes to entrance ramps		\$ 200,000			\$ 1,480,000	\$ 1,680,000
Henry	11	KY 153	Signalize NB ramps					\$ 150,000	\$ 150,000
Henry	12	US 421	Add left turn lanes to entrance ramps		\$ 200,000			\$ 1,652,000	\$ 1,852,000
Carroll	13	KY 227	Conduct a planning study to improve access management on KY 227 north of I-71 interchange	\$ 250,000	\$ 1,000,000	\$ 1,500,000	\$ 1,000,000	\$ 2,500,000	\$ 6,250,000
Boone	14	KY 14	Correct access control to meet 300' standard					\$ 50,000	\$ 50,000
Henry	15	US 421	Separate NB left and right turns on NB exit ramp					\$ 50,000	\$ 50,000
Oldham	16	KY 329	Signalize NB ramp, and add dual left		\$ 100,000			\$ 400,000	\$ 500,000
									\$ 31,656,000

INTELLIGENT TRANSPORTATION SYSTEM									
COUNTY**	PRIORITY	BEG* ROUTE SEGMENT	BEG EXIT OR MP	END* ROUTE SEGMENT	END EXIT OR MP	CROSSROAD	PROJECT	ESTIMATED COST	POTENTIAL QUICK WIN
Jefferson	1	FRANKFORT AVE.	0.5	ZORN AVE	0.6		Install one (1) additional camera between Zorn Avenue and Frankfort Avenue on the outside of the curve for monitoring daily traffic, detecting stranded motorists or incidents, and aiding in emergency response.	\$ 75,000	X
Jefferson	2	ZORN AVE.	3.4	I-264	5.0		Install two (2) cameras possibly three (3) cameras between Zorn Avenue and I-264 interchange on the outside of the curve to view entire curve for monitoring daily traffic, detecting stranded motorists or incidents, and aiding in emergency response.	\$ 255,000	X
Jefferson	3	I-264	6.5	I-265	7.5		Install two (2) cameras on the outside of two double curves for monitoring daily traffic, detecting stranded motorists or incidents, and aiding in emergency response.	\$ 170,000	X
Jefferson	4	I-265	10.0	KY 329	10.8		Install one (1) camera on the curve north of I-265 interchange on the outside of curve for monitoring daily traffic, detecting stranded motorists or incidents, and aiding in emergency response.	\$ 85,000	X
Jefferson	5	ZORN AVE.	4.0	KY 329	11.0		Install enhanced mile marker signs at 0.2 mile intervals beginning at MP 4.0 to MP 11.0 to provide a reference device for emergency response and for motorist assistance.	\$ 14,400	X
Jefferson	6	ZORN AVE.	0.0	KY 329	11.0		Install Wide Beam Radar Stations every 0.5 miles to monitor operational speeds and calculate travel times.	\$ 550,000	
Jefferson	7	I-264	22.1	I-264	22.1	I-264 EB	Install one (1) overhead truss-mounted full Dynamic Message Sign just before the US 42 underpass to disseminate roadway condition information to motorists and aid in reducing congestion, delays, and secondary collisions. This will provide information to motorists on I-264 regarding conditions on I-71.	\$ 250,000	X
Jefferson	8	US 42	5.6	US 42	5.9	US 42	Install two (2) roadside Dynamic Message Signs on both US 42 approaches to I-264 to disseminate roadway condition information to motorists and aid in reducing congestion, delays, and secondary collisions.. This would provide information regarding conditions on I-71 to motorists on US 42 and also aide in redirecting traffic when incidents or congestion occur on the interstate system.	\$ 400,000	X
								\$ 1,799,400	

**The county represents the specific county that the improvement is in.

*Beg route and end route are segments intended to assist the reader in locating the improvement the actual improvement is between those two segments.

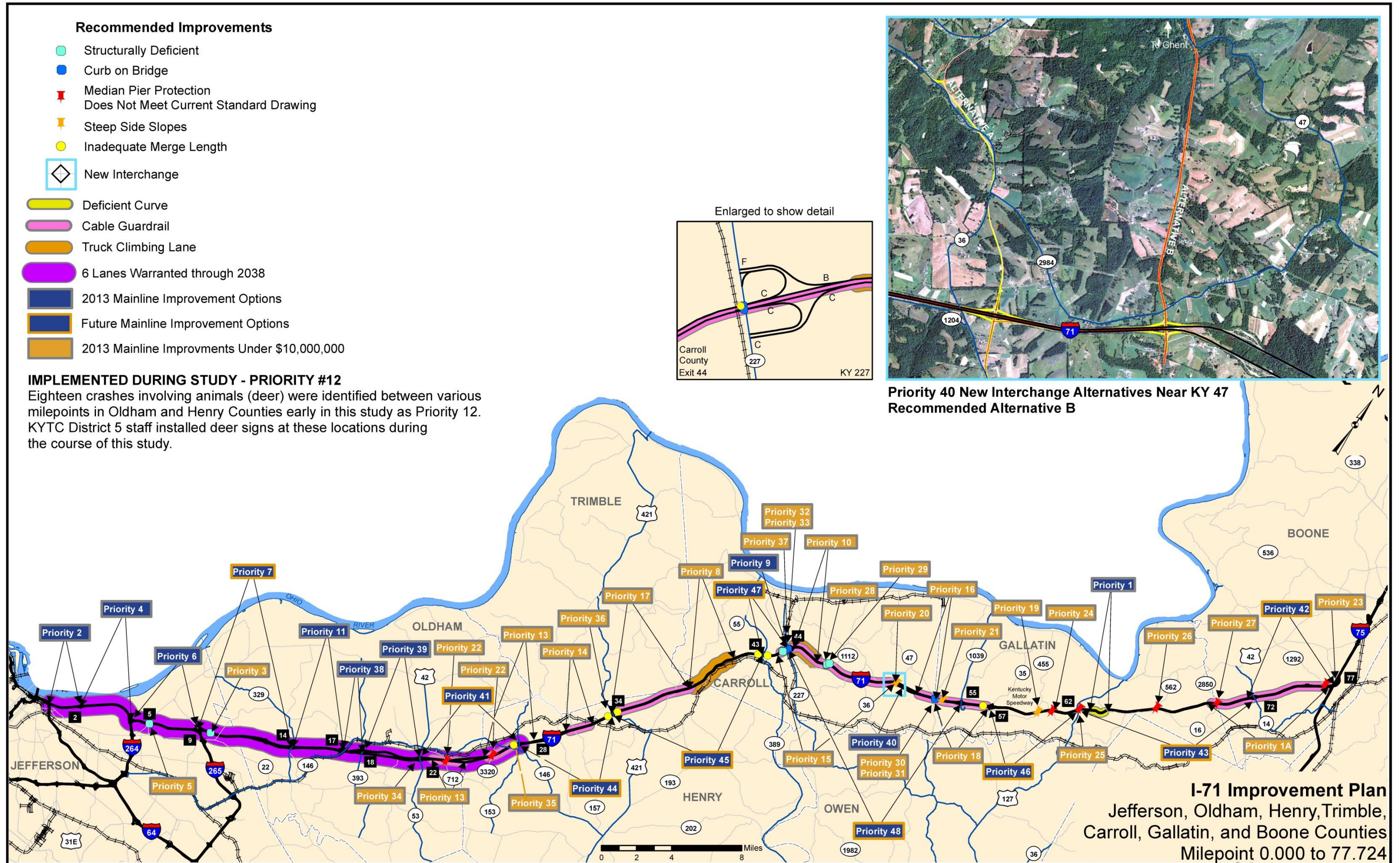


Figure ES2: I-71 Improvement Plan

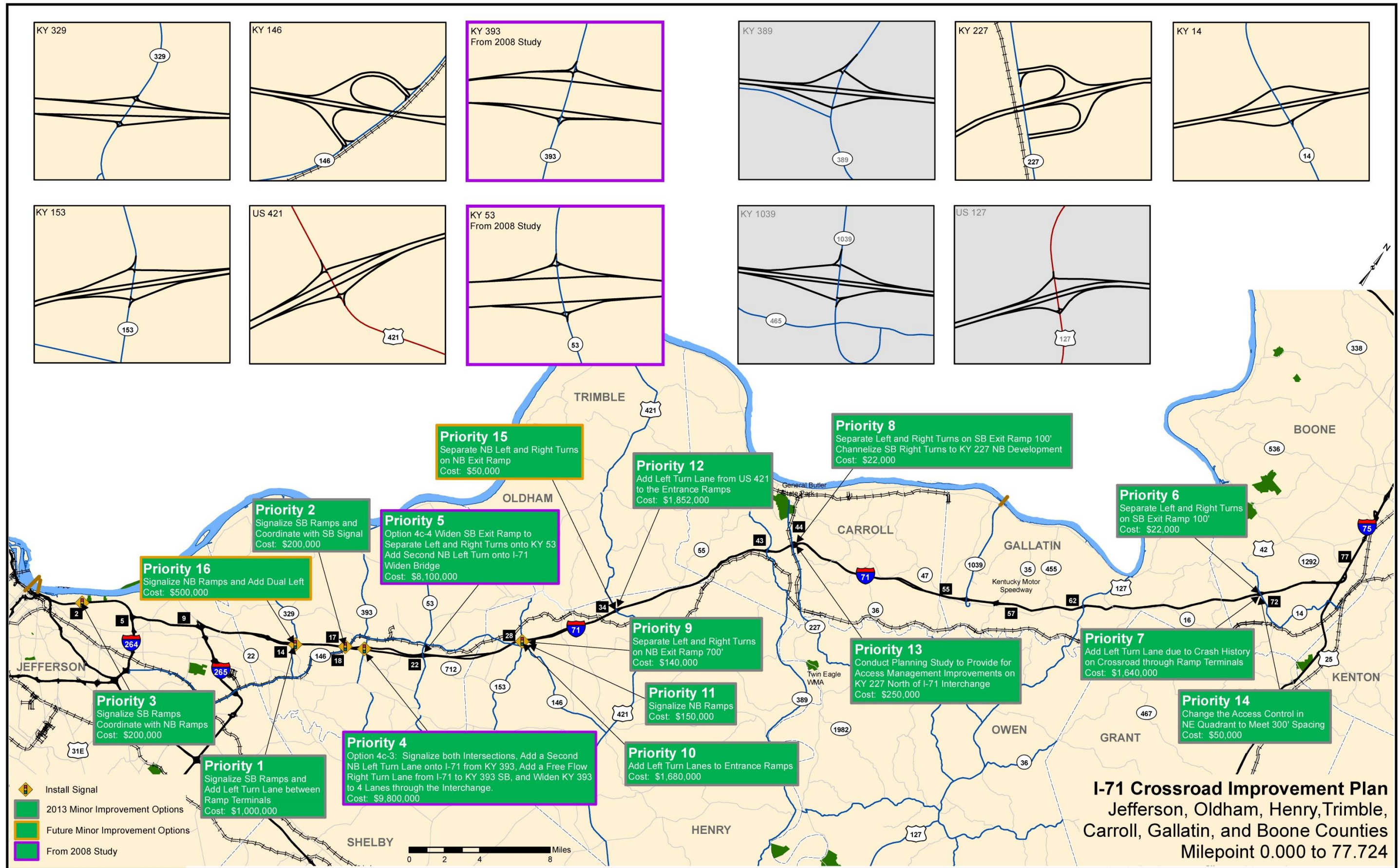


Figure ES3: I-71 Crossroad Improvement Plan

4. Improve System Reliability and Improve Safety by Replacing or Improving Structures.

Each of these structures has a sufficiency rating below 67.0 or is designated as structurally deficient and was recommended for replacement or additional evaluation.

- Replace Southbound Bridge at MP 9.8 over Chamberlain Lane (056B00062L) in Jefferson County – \$1,392,000—Priority #3.
- Replace Bridge over US 42 in Jefferson County – \$2,687,000—Priority #5.
- Replace Bridges (021B00042L and 021B00042R) over Kentucky River in Carroll County – \$16,765,000—Priority # 9.

5. Mainline Structures Recommended for Removal of Curb or Added Crash Protection.

Each of these structures is recommended for curb removal or added crash protection.

- KY 1112 and Whites Run Creek (021B00036R) in Carroll County – \$15,000—Priority #29.
- KY 47 (038B00023R) in Gallatin County – \$15,000—Priority #30.
- KY 47 (038B00023R) in Gallatin County – \$15,000—Priority #31.
- CSX RR & KY 227 (021B00037L) in Carroll County – \$13,000—Priority #32.
- CSX RR & KY 227 (021B00037R) in Carroll County – \$13,000—Priority # 33.

6. Reevaluate Needs at I-264 to I-265 In Jefferson County (4.0 Miles) – \$250,000—Priority #6.

The purpose of this project is to reevaluate recommendations from previous studies after the new I-265 Ohio River Bridge is constructed and open to traffic. The project will include a reevaluation of the I-264/I-71 Interchange and I-71 between I-264 and I-265. Currently I-71 from I-264 to I-265 has a v/c ratio of 0.95 and the 2038 v/c ratio is anticipated to be 1.12 without improvements. The estimated cost for this reevaluation is \$500,000. The estimated cost for widening I-71 to six lanes is \$57,000,000. The most recent interchange costs that improve I-264 interchange to fully meet design standards and has a desirable LOS operation is approximately \$90,300,000 (reconstruction tri-level bridge including a braid to US 42 to accommodate future traffic). The approximate cost for the reconstruction interchange I-265 to accommodate future traffic which includes a flyover ramp from northbound I-265 to southbound I-71 that is compatible with the new east end bridge is approximately \$65,500,000. Each interchange cost assumes replacement of all structures.

7. Implemented During Study—Priority #12.

Eighteen crashes involving animals (deer) were identified between various mileposts in Oldham and Henry Counties and were identified early in this study as Priority Improvement #12. KYTC District 5 staff has implemented this improvement by installing deer signs at these locations during the course of this study.

Cable Guardrail

A review of crossover crashes, existing head-on crashes, guardrail locations, and relevant proximity to the seven crash concerns, the following locations as shown are recommended for cable guardrail:

- MP 69.60 - MP 77.00 in Gallatin/Boone Counties – \$1,200,000—Priority #1A.
- MP 22.53 - MP 28.32 in Henry County – \$718,000—Priority #13.

- MP 30.50 - MP 31.87 in Oldham/Henry Counties – \$175,500—Priority #14.
- MP 43.90 - MP 50.75 in Carroll County – \$1,027,500—Priority #15.
- MP 52.54 - MP 53.43 in Carroll County – \$133,500—Priority #16.
- MP 33.02 - MP 38.81 in Henry County – \$747,500—Priority #17.
- MP 53.43 - MP 56.45 in Gallatin County – \$453,000—Priority #18.

Guardrail for Steep Slopes

The following locations are recommended for guardrail along steep slope areas:

- MP 58.6 - 59.5 in Gallatin County – \$17,200—Priority #19.
- MP 50.9 - 51.2 in Carroll County – \$30,200—Priority #20.
- MP 53.4 - 53.5 in Carroll County – \$15,600—Priority #21.

Provide Updated Median Pier Protection

The following locations are recommended for median pier protection:

- MP 25.9 in Henry County – \$104,000—Priority #22.
- MP 59.4 in Gallatin County – \$52,000—Priority #23.
- MP 61.8 in Gallatin County – \$52,000—Priority #24.
- MP 66.3 in Gallatin County – \$52,000—Priority #25.
- MP 69.8 in Gallatin County – \$52,000—Priority #26.
- MP 76.2 in Boone County – \$52,000—Priority #27.

Extend Merge Lengths

Several ramp merges are deficient due to inadequate mainline capacity. Those issues will be improved only when the mainline is widened. However, the following ramps do not have the appropriate length required for entering I-71 and was therefore recommended for improvement. These priorities are not included as a part of any other priority.

- KY 153 (Exit 28) northbound merge in Oldham County – \$160,000—Priority #35.
- US 421 (Exit 34) southbound merge in Henry County – \$150,000—Priority #36.
- KY 227 (Exit 44) southbound merge in Carroll County – \$1,000,000—Priority #37.

Crossroad Improvement Priorities

Each I-71 crossroad ramp terminal and including the first intersection beyond the ramp terminals, was analyzed for improvements where a crash or capacity issue was identified. These improvements were prioritized based on their immediate/short-term (Quick Win) or future need and whether the crossroad was located in a 0.1 mile crash spot with a pattern. Left turn lane analyses and signal warrants were examined. Each recommendation was a result of less than desirable LOS or was identified as a crash issue.

- Priority #1—Signalize SB Ramps and add left turn lane on KY 329 between the ramp terminals in Oldham County - \$1,000,000.

- Priority #2—Signalize SB Ramp at KY 146 Interchange in Oldham County – \$200,000.
- Priority #3—Signalize SB Ramps at Zorn Avenue (Exit 2) Interchange and coordinate signal with existing NB Ramps signal in Jefferson County – \$1,680,000.
- Priority #4—Signalize both ramp terminal intersections, add a second NB left turn lane from KY 393, add a free-flow right turn lane from I-71 to KY 393 and widen KY 393 to 4 lanes in Oldham County – \$9,800,000.
- Priority #5—Widen the southbound exit ramp at KY 53 Interchange to provide separate left and right turn lanes onto KY 53, add a second NB left turn lane onto I-71 and widen the existing bridge on KY 53 in Oldham County – \$8,100,000.
- Priority #6—Provide separate left and right turns on the southbound exit ramp approximately 100 feet at the KY 14 Interchange in Boone County – \$22,000.
- Priority #7—Add left turn lanes on entrance ramps to I-71 at KY 14 in Boone County – \$1,640,000.
- Priority #8—Provide separate left and right turns on the southbound exit ramp approximately 100 feet and channelize right turns to KY 227 in Carroll County – \$22,000.
- Priority #9—Provide separate left and right turn lanes on the northbound exit ramp approximately 700 feet at KY 153 Interchange in Henry County – \$140,000.
- Priority #10—Add left turn lane to the entrance ramps at KY 153 Interchange in Henry County – \$1,680,000.
- Priority #11—Signalize NB ramps at KY 153 Interchange in Henry County – \$150,000.
- Priority #12—Add left turn lanes to entrance ramps at US 421 Interchange in Henry County – \$1,852,000.
- Priority #13—Conduct Planning Study (\$250,000) to improve access management on KY 227 north of I-71 Interchange in Carroll County – a preliminary estimate of a viable improvement option is \$6,250,000.
- Priority #14—Correct access control to meet 300-foot standard at KY 14 Interchange in Boone County – \$50,000.
- Priority #15—Provide separate left and right turn lanes on the NB exit ramp at US 421 Interchange in Henry County – \$50,000.
- Priority #16—Signalize NB ramp and add dual left turn lanes at KY 329 Interchange in Oldham County – \$500,000.

Intelligent Transportation System (ITS) Improvements

Intelligent Transportation System (ITS) encompasses a broad range of modern computer and communications technologies. When integrated into the transportation system infrastructure or in vehicles, these technologies help monitor and manage traffic flow, reduce congestion, provide improved mobility, safety, air quality, and productivity. The purpose of TRIMARC is to improve the performance of the existing freeway system in the Metropolitan Louisville and Southern Indiana area. Based on coordination with KYTC District 5 staff, listed below is a list of ITS recommendations for the I-71 Corridor. They were prioritized in order based on results of the capacity analysis results.

- Install six (6) additional cameras in Jefferson County – \$585,000 Total—Priorities #1–#4.
- Install Enhanced Mile Marker signs (MUTCD code D10-5, blue background with white legend and border) beginning at MP 4.0 – \$255,000—Priority #5.
- Provide Wide Beam Radar stations every 0.5 mile from MP 0.00 to 11.3 – \$170,000—Priority #6
- Install Dynamic Message Signs (DMS) – \$650,000—Priorities #7 and #8

New Interchanges

Interchanges at five (5) locations were evaluated. Based upon the amount of traffic diverted, interchange spacing, and consideration of analyses in previous studies, it is recommended that the following new interchange be considered for implementation.

- New interchange near KY 47 with improvements connecting to US 42 in Carroll County – \$23,500,000—Priority #40.

Beyond 2038

This study was to also prioritize the entire corridor for widening to six lanes. Priorities 41-48 address those segments of I-71 beyond 2038 for widening and are identified as follows:

- KY 14 to I-75 in Boone County (5.0 miles) – \$32,400,000—Priority #42.
- US 127 to KY 14 in Gallatin County (10.0 miles) – \$87,300,000—Priority #43.
- KY 153 to US 421 in Henry County (6.0 miles) – \$52,480,000—Priority #44.
- US 421 to KY 389 in Henry/Trimble/Carroll Counties – \$79,720,000—Priority #45.
- KY 35 to US 127 in Gallatin County (5.0 miles) – \$43,900,000—Priority #46.
- KY 389 to KY 227 in Carroll County (1.0 mile) – \$8,680,000—Priority #47.
- KY 227 to KY 1039 in Carroll County (11 miles) – \$96,500,000—Priority #48.

Conclusions

The purpose of the I-71 Corridor Study was to evaluate the existing and projected future conditions of I-71 from I-64 in Jefferson County to I-75 in Boone County and their crossroads within the interchange area and one crossroad beyond, as they relate to safety, and congestion; and develop an overall improvement plan for needed improvements and priorities. This document is based on an evaluation of existing conditions and an analysis of future conditions, a crash analysis, I-71 Corridor Group input and Project Team input recommending a total of 48 mainline improvements, 16 crossroad improvements, and 8 ITS improvements for consideration. Although there may not be a substantial difference between projects that are close in priority, i.e. Priorities 4 and 5; there is however, a difference between projects ranked 1-20 versus projects ranked 40-48.