

# Appendix F

**Purpose:** Prevent crashes at the Western Kentucky Parkway (WKP) Exit 107 (KY 259) westbound ramp.

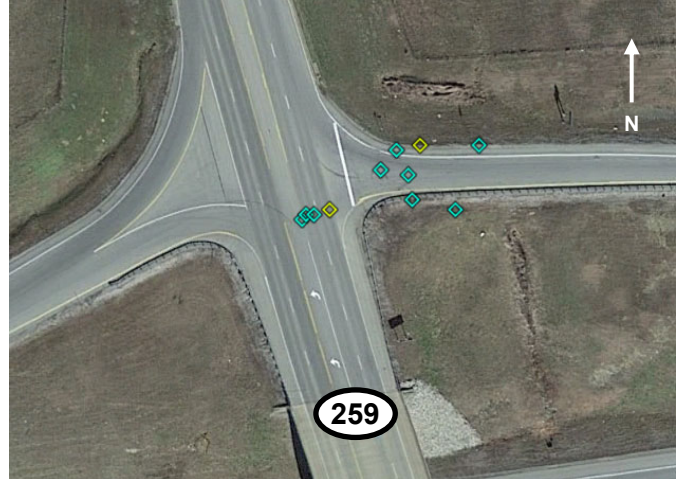
### Identified Needs:

#### Safety

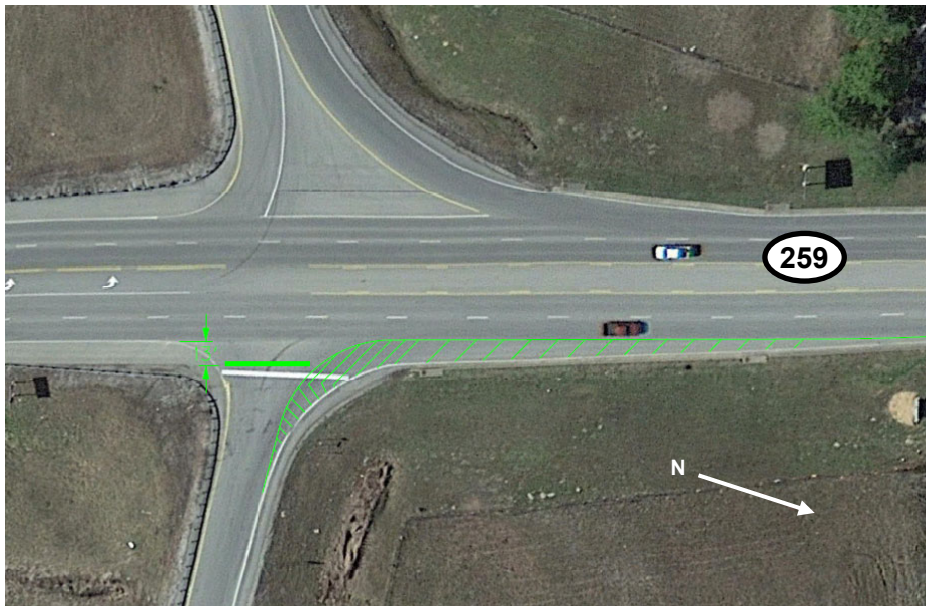
- There were 11 crashes over 5 years that appeared to be related to the right turn movement from the westbound off-ramp at KY 259 (Burkesville Road).

#### Economic Growth

- The interchange serves local employers and retail businesses. KY 259 is also an important thoroughfare for the City of Leitchfield and nearby communities.
- The area surrounding the interchange has the potential for economic growth.



WKP Exit 107 (KY 259), area of crash locations (above).



**Improvement Strategy:** The potential improvement strategy that could be considered for this location is to restripe the ramp terminal intersection as well as the approach and departure legs on the cross-street. KY 259 northbound just north of the intersection has a wide right lane. This right lane could be restriped so that the intersection and cross-street all have 11- or 12-foot-wide lanes, clarifying where drivers are expected to travel.

Restriping improvements (left).

### Return on Investment: Benefit/Cost Ratio > 1

- This design approach could result in a right turn crash reduction of 47% based on recent research (<http://cmfclearinghouse.org/detail.cfm?facid=8428>). This is a reduction of approximately one crash per year based on the historical data.
- The observed crashes were all property damage crashes. Using an approximate cost per crash of \$10,000 results in a savings of \$100,000 over 10 years (undiscounted). The benefit/cost ratio for the project is expected to be over 1.0.

### Cost

#### Estimate:

D: \$0

R: \$0

U: \$0

C: \$10,000

**Total: \$10,000**

**Purpose:** Prevent crashes on the loop ramp at the WKP and US 31W interchange.

**Identified Needs:**

**Safety**

- The eastbound on-ramp from US 31W was flagged during project team discussions as a ramp where there were rollover crashes in the past.
- A review of the 2015 to 2019 crash data showed eight crashes on the ramp. One was a possible injury crash and seven were property damage only. One involved an animal.
- Six of the eight crashes were single-vehicle crashes that occurred when the pavement was wet.
- Two of the wet pavement crashes, including the possible injury crash, involved overturned vehicles.
- The other four wet weather crashes were roadway departure crashes involving barrier.



*WKP Exit 136 (US 31W): Add high friction surface treatment on US 31W southbound to WKP eastbound ramp (right).*



*Example of high friction surface treatment (left) [FHWA].*

**Improvement Strategy:** Install high friction surface treatment on ramp. Run off road crashes can be reduced with high friction surface treatment for vehicles at high speeds under normal conditions or vehicles driving too fast for weather conditions.

**Return on Investment: Benefit/Cost Ratio near 1 Based on Crash Severity**

- High Friction Surface Treatments (HFST) on ramps have been shown to reduce crashes by 34.7%. (<http://www.cmfclearinghouse.org/detail.cfm?facid=7898>) The benefits are even greater during wet weather events. Based on the existing crash data, it is estimated that there could be 16 crashes over a 10-year period under a no-build condition. The HFST could prevent 6 of those crashes.
- The value of the prevented crashes will depend on the assumed crash severity. If only low severity crashes are prevented (similar to those observed) then the benefit-cost will be less than 1.0. But if several injury or even one serious injury crash is prevented, then it will exceed 1.0.

**Cost**

**Estimate:**

D: \$0

R: \$0

U: \$0

C: \$193,333

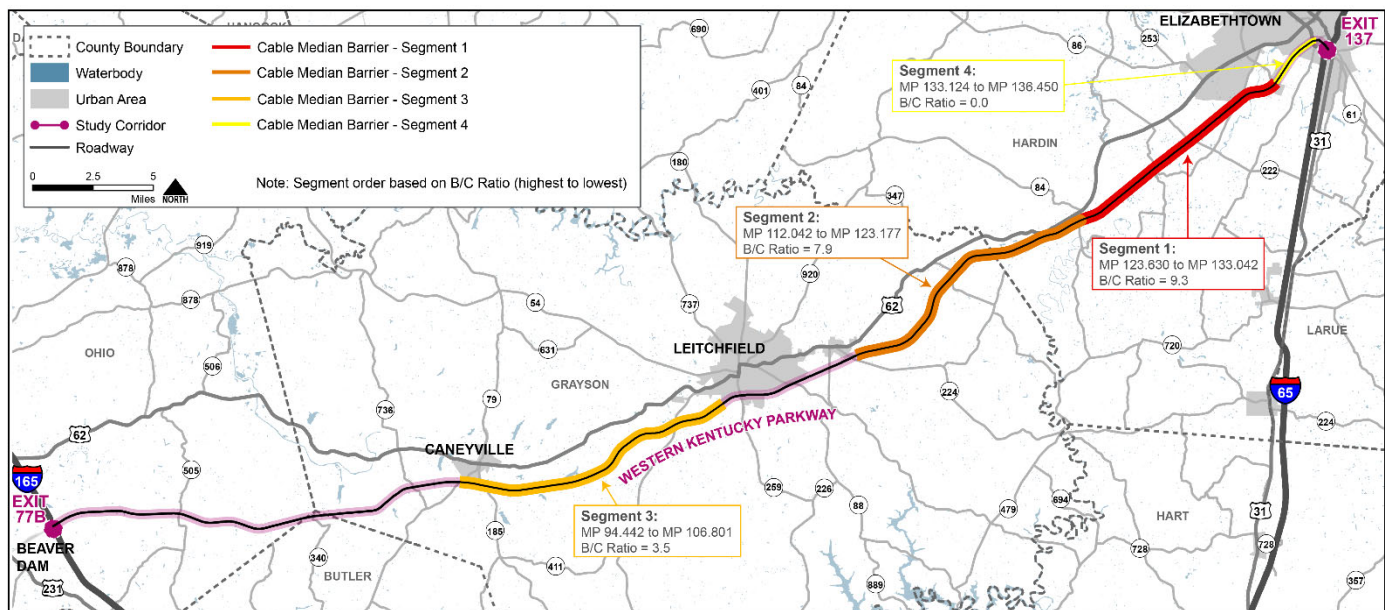
**Total: \$193,333**

**Purpose:** Prevent median crossover crashes.

## Identified Needs:

### Safety

- From Milepoint (MP) 133.124 to MP 136.796, median width and volume warrants are met for cable median barrier and it is recommended for installation.
- Three other sections of the corridor were split up by priority from MP 94.442 to 106.801, MP 112.042 to 123.177, and MP 123.630 to 133.042. These areas do not meet median width and volume warrants for cable median barrier, but median crossover crashes occur and cable median barrier installation is optional.
- A review of crash data showed 88 median crossover crashes from 2015 to 2019, including 10 fatal or serious injury crashes.



Cable median barrier prioritization (above).



Example of cable median barrier benefits (left) [FHWA].

**Improvement Strategy:** Install cable median barrier. Installing cable median barrier is the best solution to preventing median crossovers and enhancing safety per guidance in the *2011 Roadside Design Guide*. A significant portion of the Western Kentucky Parkway could benefit from cable median barriers, but some segments gain priority over others based on crash data.

## Return on Investment: Benefit/Cost Ratio 3.5-9.3

- Based on recent cable median barrier research, the installation of a barrier can prevent 62% of fatal crashes, 31% of serious injury crashes, and 26% of injury crashes.<sup>1</sup> However, it is predicted to increase possible injury crashes by 11% and property damage only crashes by 108%.
- Installing cable median barrier in the recommended and three high priority segments could prevent eight fatal or serious injury crashes over 10 years, with a total crash cost benefit of over \$68.5 million (undiscounted) and \$42.0 million (discounted at 7% annually).
- The benefit-cost ratios for the recommended and high priority segments ranges from 3.5 to 9.3.

## Cost Estimate:

D: \$0  
 R: \$0  
 U: \$0  
 C: \$6,750,000  
**Total: \$6,750,000**

<sup>1</sup> [https://intrans.iastate.edu/app/uploads/2018/07/iowa\\_median\\_cable\\_barrier\\_eval\\_w\\_cvr.pdf](https://intrans.iastate.edu/app/uploads/2018/07/iowa_median_cable_barrier_eval_w_cvr.pdf)

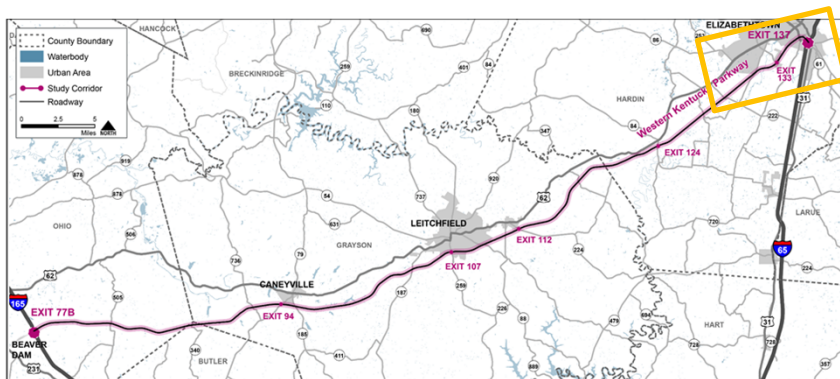
# Improvement Strategy: Widen Outside Shoulders to 12 FT Priority: Low

**Purpose:** Improve safety for vehicles utilizing the shoulder.

## Identified Needs:

### Safety

- From milepoint (MP) 133.833 to MP 136.796, the truck DDHV is greater than 250.
- There were approximately 60 crashes along the WKP mainline in this section and approximately half of them were single vehicle crashes. Almost all of the single-vehicle crashes were flagged as both lane departure and roadway departure crashes.
- Of the 26 identified roadway departure crashes, two were serious injury crashes and five were injury crashes.
- The current outside shoulder width is 10 feet throughout the Western Kentucky Parkway.



*Example of Interstate with 12 ft shoulders (left) [FHWA].*

**Improvement Strategy:** Widen outside shoulders from 10 feet to 12 feet where truck daily directional hourly volume (DDHV) is greater than 250. Widening the outside shoulder width to 12 feet would decrease crashes and increase safety related to roadside vehicle maintenance, specifically between MP 133.8 and MP 136.8 where truck volumes are high.

### Return on Investment: Benefit/Cost Ratio near 1 Based on Crash Severity

- Based on the equations in the Highway Safety Manual it is expected that increasing the outside shoulder width from 10 feet to 12 feet could reduce single-vehicle fatal and injury crashes by 14% and property damage only (PDO) crashes by 5%. Assuming 8 serious injury crashes, 20 injury crashes, and 96 PDO crashes over 20 years, it is expected that the change could prevent 1 serious injury crash, 3 injury crashes and 5 PDO crashes.
- The crash cost savings for these crashes would be approximately \$1.0 million (undiscounted). With discounting, the benefit-cost ratio would drop below 1.0.

### Cost

#### Estimate:

D: \$0

R: \$0

U: \$0

C: \$894,526

**Total: \$894,526**

Mainline Improvement Concepts

Mainline														
Category	Subcategory	Measured Value	Design Standard	Deficiency	Direction	Length	Begin MP	End MP	Cost	Initial Conversion	Full Compliance	Requires Design Exception	Requires Design Variance	Possible Design Related Safety Issue
Shoulders	Widen inside shoulder to consistent 4' minimum (Currently varies from 2' to 4')	3	4	1	Both	17.15	119.65	136.80	\$2,546,000	✓				YES
Superelevation	Adjust Superelevation	NC	2.0	3.58	Both	1.305	77.029	78.334	\$658,000	✓		YES		YES
	Adjust Superelevation	RC	2.6	0.60	EB	0.508	79.410	79.918	\$196,000	✓				YES
	Adjust Superelevation	NC	2.0	0.42	EB	0.595	79.918	80.513	\$187,000	✓				YES
	Adjust Superelevation	RC	2.6	0.60	Both	0.664	81.817	82.481	\$255,000		✓	YES		-
	Adjust Superelevation*	NC	3.4	4.98	EB	0.594	83.079	83.673	\$853,000		✓	YES		-
	Adjust Superelevation*	NC	3.4	4.98	EB	0.596	84.123	84.719	\$863,000	✓				YES
	Adjust Superelevation*	NC	4.6	6.18	EB	0.487	85.254	85.741	\$1,499,000	✓				YES
	Adjust Superelevation	5.2	6.6	1.40	EB	0.316	90.333	90.649	\$366,000	✓				YES
	Adjust Superelevation	5.2	6.6	1.40	WB	0.310	90.352	90.662	\$362,000	✓				YES
	Adjust Superelevation	3.2	6.4	3.20	EB	0.187	91.793	91.980	\$600,000	✓				YES
	Adjust Superelevation	4.9	6.4	1.50	WB	0.172	91.793	91.965	\$430,000	✓				YES
	Adjust Superelevation	2.0	4.6	2.60	WB	0.144	106.509	106.653	\$340,000	✓				YES
	Adjust Superelevation	2.8	4.6	1.80	EB	0.192	106.566	106.758	\$342,000	✓				YES
	Adjust Superelevation	3.4	5.0	1.60	WB	0.077	106.691	106.768	\$175,000	✓				YES
	Adjust Superelevation	2.8	5.2	2.40	EB	0.050	106.825	106.875	\$164,000	✓				YES
	Adjust Superelevation	3.7	4.6	0.90	EB	0.049	115.520	115.569	\$50,000		✓	YES		-
	Adjust Superelevation	3.6	5.2	1.60	EB	0.481	118.455	118.936	\$727,000	✓				YES
	Adjust Superelevation	3.8	5.2	1.40	WB	0.482	118.460	118.942	\$733,000	✓				YES
	Adjust Superelevation	3.2	4.4	1.20	EB	0.046	124.108	124.154	\$143,000	✓				YES
	Adjust Superelevation	3.5	5.2	1.70	EB	0.362	131.965	132.327	\$507,000	✓				YES
	Adjust Superelevation	3.5	5.2	1.70	WB	0.336	131.977	132.313	\$505,000	✓				YES
	Adjust Superelevation	2.8	5.0	2.20	EB	0.032	133.251	133.283	\$286,000	✓				YES
	Adjust Superelevation	2.0	4.6	2.60	WB	0.029	133.432	133.461	\$271,000	✓				YES
	Adjust Superelevation	2.0	5.8	3.80	EB	0.044	134.986	135.030	\$353,000	✓				YES
Adjust Superelevation	7.10	8.0	0.90	EB	0.566	135.601	136.167	\$602,000	✓				YES	
Adjust Superelevation	8.80	8.0	-0.80	WB	0.557	135.610	136.167	\$50,000		✓	YES		-	
Headlight Sight Distance	Increase H LSD of the curve by 84 feet	646	730	84	WB	0.151	87.788	87.939	\$440,000		✓		✓	YES
	Increase H LSD of the curve by 120 feet	610	730	120	EB	0.137	87.807	87.944	\$399,000		✓		✓	YES
	Increase H LSD of the curve by 28 feet	702	730	28	WB	0.264	104.067	104.331	\$769,000		✓		✓	YES
Guardrail	Replace damaged guardrail	-	-	-	-	13.8	-	-	\$2,565,240	✓				N/A
	Add new guardrail to address safety issues	-	-	-	EB	0.271	90.096	90.367	\$65,081	✓				YES
		-	-	-	EB	0.038	92.156	92.194	\$22,022	✓				YES
		-	-	-	EB	0.044	94.205	94.249	\$23,131	✓				YES
		-	-	-	EB	0.064	100.771	100.835	\$26,827	✓				YES
		-	-	-	EB	0.747	117.814	118.561	\$153,046	✓				YES
		-	-	-	EB	0.103	132.932	133.035	\$34,034	✓				YES
		-	-	-	EB	0.167	134.425	134.592	\$45,862	✓				YES
		-	-	-	EB	0.073	134.696	134.769	\$28,490	✓				YES
		-	-	-	EB	0.098	135.052	135.15	\$33,110	✓				YES
		-	-	-	EB	0.082	135.469	135.551	\$30,154	✓				YES
		-	-	-	EB	0.218	135.571	135.789	\$55,286	✓				YES
		-	-	-	EB	0.039	135.882	135.921	\$22,207	✓				YES
		-	-	-	EB	0.048	136.046	136.094	\$23,870	✓				YES
		-	-	-	WB	0.284	103.987	104.271	\$67,483	✓				YES
		-	-	-	WB	0.364	104.926	105.29	\$82,267	✓				YES
		-	-	-	WB	0.683	107.702	108.385	\$141,218	✓				YES
		-	-	-	WB	0.326	108.565	108.891	\$75,245	✓				YES
		-	-	-	WB	0.196	108.931	109.127	\$51,221	✓				YES
		-	-	-	WB	0.048	109.29	109.338	\$23,870	✓				YES
		-	-	-	WB	0.036	118.142	118.178	\$21,653	✓				YES
		-	-	-	WB	0.049	118.523	118.572	\$24,055	✓				YES
		-	-	-	WB	0.107	133.582	133.689	\$34,774	✓				YES
		-	-	-	WB	0.058	133.935	133.993	\$25,718	✓				YES
		-	-	-	WB	0.05	134.25	134.3	\$24,240	✓				YES
		-	-	-	WB	0.046	134.332	134.378	\$23,501	✓				YES
		-	-	-	WB	0.147	134.424	134.571	\$42,166	✓				YES
		-	-	-	WB	0.054	134.757	134.811	\$24,979	✓				YES
		-	-	-	WB	0.139	135.063	135.202	\$40,687	✓				YES
		-	-	-	WB	0.086	135.251	135.337	\$30,893	✓				YES
		-	-	-	WB	0.106	135.48	135.586	\$34,589	✓				YES
		-	-	-	WB	0.158	135.627	135.785	\$44,198	✓				YES
		-	-	-	WB	0.057	135.925	135.982	\$25,534	✓				YES
	Add new guardrail to address clear zone issues	-	-	-	Both	12.818	-	-	\$2,443,766		✓		✓	-
	Replace all guardrail less than 31"	-	-	-	Both	25.7	-	-	\$4,949,360		✓			-
	Regrade at Crash Cushions	-	-	-	-	-	-	-	\$10,000	✓			✓	-

\* Indicates discrepancy between HIS data/record plans and field review, may be removed following detailed field survey

Bridges and Interchange Ramp Improvement Concepts

Bridges														
Category	Subcategory	Measured Value	Design Standard	Requirement	Direction	Length	Begin MP	End MP	Cost	Initial Conversion	Full Compliance	Requires Design Exception	Requires Design Variance	Possible Design Related Safety Issue
Bridge Railing	092B00072L - Bridge over I-165 (Natcher Parkway) - Replace bridge railing	Standardard	MASH TL-4	Replace with Standard Drawing BHS-010	EB and WB	0.047	76.766	76.813	122,100	✓				YES
	092B00072R - Bridge over I-165 (Natcher Parkway) - Replace bridge railing	Standardard	MASH TL-4	Replace with Standard Drawing BHS-010	EB and WB	0.047	76.770	76.817	122,100	✓				YES
	092B00130L - Bridge over KY 2713 - Replace bridge railing	Standardard	MASH TL-4	Replace with Standard Drawing BHS-010	EB and WB	0.022	85.717	85.739	67,600		✓			-
	092B00130R - Bridge over KY 2713 - Replace bridge railing	Standardard	MASH TL-4	Replace with Standard Drawing BHS-010	EB and WB	0.022	85.744	85.766	67,600		✓			-
	047B00094L - Bridge over W. Rhudes Creek - Replace bridge railing	Standardard	MASH TL-4	Replace with Standard Drawing BHS-010	EB and WB	0.025	130.886	130.911	73,300		✓			-
	047B00094R - Bridge over W. Rhudes Creek - Replace bridge railing	Standardard	MASH TL-4	Replace with Standard Drawing BHS-010	EB and WB	0.025	130.894	130.919	73,300		✓			-
Bridge Widening	043B00026L - Bridge over KY 187 - Widen bridge 7.5 ft	29.86	37.5	7.64	EB and WB	0.03	104.011	104.041	429,500	✓				YES
	043B00026R - Bridge over KY 187 - Widen bridge 7.5 ft	29.86	37.5	7.64	EB and WB	0.03	104.04	104.07	429,500	✓				YES
	047B00092L - Bridge over CSX rail and Gather St. Rd. - Widen bridge 7.5 ft	29.86	37.5	7.64	EB and WB	0.033	132.579	132.612	549,200		✓			-
	047B00092R - Bridge over CSX rail and Gather St. Rd. - Widen bridge 7.5 ft	29.86	37.5	7.64	EB and WB	0.033	132.574	132.607	549,200		✓			-
	047B00093L - Bridge over Valley Creek - Replace bridge railing	29.86	31	1.14	EB and WB	0.04	132.419	132.459	106,100		✓			-
	047B00093R - Bridge over Valley Creek - Replace bridge railing	29.86	31	1.14	EB and WB	0.04	132.417	132.457	106,100		✓			-
Bridge Vertical Clearance	092B00136N - KY 2712 Bridge over Parkway - Replace at 16 ft clearance	14.75	16	1.25	EB and WB	0.034	77.382	77.416	1,145,300	✓				-
	016B00034N - KY 340 Bridge over Parkway - Replace at 16 ft clearance	14.5	16	1.5	EB and WB	0.041	87.842	87.883	1,279,300	✓				-
	016B00034N - KY 340 Bridge over Parkway - Lower Pavement	14.5	16	1.5	EB and WB	0.041	87.842	87.883	450,000	✓				-
	043B00023N - KY 79 Bridge over Parkway - Replace at 16 ft clearance	13.92	16	2.08	EB and WB	0.064	94.257	94.321	2,997,300	✓				-
	043B00023N - KY 79 Bridge over Parkway - Lower Pavement	13.92	16	2.08	EB and WB	0.064	94.257	94.321	624,000	✓				-
	043B00073N - McDonald Rd. Bridge over Parkway - Replace at 16 ft clearance	14.92	16	1.08	EB and WB	0.041	105.884	105.925	1,351,800	✓				-
	043B00073N - McDonald Rd. Bridge over Parkway - Lower Pavement	14.92	16	1.08	EB and WB	0.041	105.884	105.925	324,000	✓				-
	043B00078N - KY 720 Bridge over Parkway - Replace at 16 ft clearance	14.17	16	1.83	EB and WB	0.036	117.423	117.459	1,207,000	✓				-
	043B00078N - KY 720 Bridge over Parkway - Lower Pavement	14.17	16	1.83	EB and WB	0.036	117.423	117.459	849,000	✓				-
	047B00090N - KY 1904 Bridge over Parkway - Replace at 16 ft clearance	14.58	16	1.42	EB and WB	0.054	131.831	131.885	1,666,900	✓				-
	047B00090N - KY 1904 Bridge over Parkway - Lower Pavements	14.58	16	1.42	EB and WB	0.054	131.831	131.885	375,000	✓				-
	047B00153R/047B00108L - US 31W Bypass over Parkway - Replace at 16 ft clearance	15.33	16	0.67	EB and WB	0.044	135.689	135.733	4,952,000	✓				-

\* = Bridge also does not meet clear width minimum. \*\* = Bridge also does not meet bridge railing standard.

Interchanges														
Category	Subcategory	Measured Value	Design Standard	Deficiency	Direction	Length	Begin MP	End MP	Cost	Initial Conversion	Full Compliance	Requires Design Exception	Requires Design Variance	Possible Design Related Safety Issue
Ramps - Accel/Decel	Exit 94 - KY 79 - Extend WB acceleration lane to 580 feet.	325	580	255	WB	-	-	-	\$184,000	✓			✓	-
	Exit 107 - KY 259 - Extend EB deceleration lane to 390 feet.	330	390	60	EB	-	-	-	\$52,000	✓			✓	YES
	Exit 124 - KY 84 - Extend WB acceleration lane to 580 feet.	475	580	105	WB	-	-	-	\$187,000	✓			✓	-
Lane Width	Exit 137 - I-65 Interchange - Widen the EB exit off ramp lane width by 1 foot	14	15	1	EB	0.22727273	-	-	\$148,000		✓			-
Superelevation	Exit 94 - KY 79 - Add auxiliary speed signs for 40 MPH on the EB on ramp	50 MPH	40 MPH	10 MPH	EB				\$5,000	✓				-
	Exit 107 - KY 259 - Add auxiliary speed signs for 30 MPH on the EB on ramp	50 MPH	30 MPH	20 MPH	EB				\$5,000	✓				-
	Exit 107 - KY 259 - Add auxiliary speed signs for 30 MPH on the WB on ramp	50 MPH	30 MPH	20 MPH	WB				\$5,000	✓				-
	Exit 107 - KY 259 - Add auxiliary speed signs for 30 MPH on the EB off ramp	50 MPH	30 MPH	20 MPH	EB				\$5,000	✓				-
	Exit 107 - KY 259 - Add auxiliary speed signs for 30 MPH on the WB off ramp	50 MPH	30 MPH	20 MPH	WB				\$5,000	✓				-
	Exit 112 - KY 224 - Add auxiliary speed signs for 35 MPH on the EB off ramp	50 MPH	35 MPH	15 MPH	WB				\$5,000	✓				-
Control of Access	Exit 94 - KY 79 - Increase control of access spacing to 300 feet north of interchange	180	300	120	WB	0.516	93.922	94.438	\$500,000	✓			✓	-
	Exit 124 - KY 84 - Increase control of access spacing to 300 feet south of interchange	50	300	250	EB	0.414	111.621	112.035	\$2,000,000	✓			✓	YES
	Exit 124 - KY 84 - Increase control of access spacing to 300 feet south of interchange	120	300	180	EB	0.537	123.104	123.641	\$138,000	✓			✓	-
	Exit 124 - KY 84 - Increase control of access spacing to 300 feet north of interchange	160	300	140	WB	0.537	123.104	123.641	\$1,393,000	✓			✓	-
	Exit 136 - US 31W Bypass - Increase control of access spacing to 100 feet south of interchange	0	100	100	EB	0.655	135.294	135.949	\$1,339,000	✓			✓	YES
Interchange Spacing / Reconfiguration	Exit 137 - I-65 Interchange - Phase 1: Add auxiliary lanes and increase superelevation / bridge clearances					-	-	-	\$11,000,000	✓				YES
	Exit 137 - I-65 Interchange - Phase 2A: Provide direct connection from I-65 SB to US 31W Bypass					-	-	-	\$5,500,000		✓			YES
	Exit 137 - I-65 Interchange - Phase 3A: Provide direct connection from I-65 NB and Lincoln Parkway to US 31W					-	-	-	\$31,000,000		✓			YES
	Exit 137 - I-65 Interchange - Phase 3B: Braid movements from I-65 NB, SB and Lincoln Parkway to provide direct connection to US 31W					-	-	-	\$18,000,000		✓			YES

## Additional Safety and Operational Improvement Concepts

Additional Safety and Operational Improvements							
Category	Subcategory	Direction	Length	Begin MP	End MP	Cost	Possible Design Related Safety Issue
<i>Interchange Ramp Improvements</i>	Improve ramp terminal design at Exit 107 (KY 259) WB ramp	WB	-	-	-	\$10,000	YES
	US31 Bypass SB to EB Loop Ramp - Add High Friction Surface Treatment	EB	0.322	-	-	\$198,333	YES
<i>Shoulders and Cable Median Barrier</i>	Widen outside shoulders to 12'	Both	3.326	133.124	136.45	\$894,526	YES
	Add cable median barrier	Varies	12.359	94.442	106.801	\$2,370,703	YES
	Add cable median barrier	Varies	11.135	112.042	123.177	\$2,135,916	YES
	Add cable median barrier	Varies	9.412	123.63	133.042	\$1,805,410	YES
	Add cable median barrier	Varies	3.326	133.124	136.45	\$498,900	YES

Category	Improvement	Median Mile point	Median Turnaround Needed?	Cost
<i>Median Turnarounds</i>	Remove median turnaround	78.709	NO	\$12,000
		83.43	NO	\$12,000
		92.314	NO	\$12,000
		95.198	NO	\$12,000
		103.681	NO	\$12,000
		105.944	NO	\$12,000
		109.577	NO	\$12,000
		112.681	NO	\$12,000
		117.771	NO	\$12,000
		134.137	NO	\$12,000
	135.949	NO	\$12,000	
	Pave median turnaround	77.1	YES	\$10,000



## Cost Estimates for Improvement Concepts

	Low	High
<b>Total Initial Conversion Construction Cost</b>	\$43,477,153	\$49,357,453
<b>Design + Environmental (15%)</b>	\$6,521,573	\$7,403,618
<b>Miscellaneous (15%)</b>	\$6,521,573	\$7,403,618
<b>Total Initial Conversion Cost</b>	<b>\$56,520,299</b>	<b>\$64,164,689</b>

	Low	High
<b>Total Full Compliance Construction Cost</b>	\$78,916,679	\$97,796,979
<b>Design + Environmental (15%)</b>	\$11,837,502	\$14,669,547
<b>Miscellaneous (15%)</b>	\$11,837,502	\$14,669,547
<b>Total Full Compliance Cost</b>	<b>\$102,591,683</b>	<b>\$127,136,073</b>

<b>Total Operational and Safety Improvement Construction Cost</b>	\$8,055,789
<b>Design + Environmental (15%)</b>	\$1,208,368
<b>Miscellaneous (15%)</b>	\$1,208,368
<b>Total Operational and Safety Improvement Cost</b>	<b>\$10,472,525</b>