I-69 Feasibility Study

Henderson County, Kentucky

SIU #4

Final

January 2014

Prepared for:

KENTUCKY TRANSPORTATION CABINET

Prepared by:

QK4

I-69

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Kentucky

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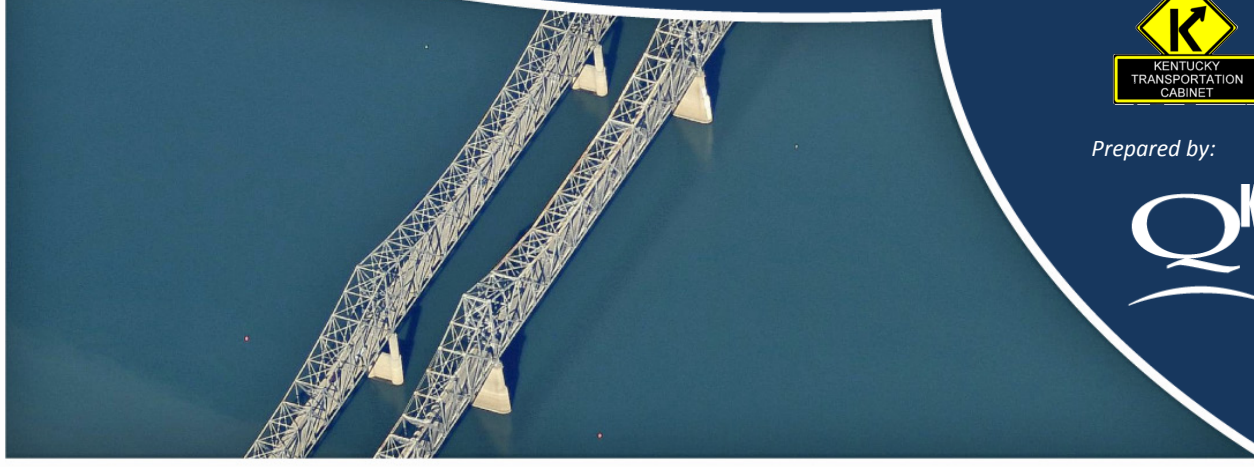

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Forward

I-69 from Canada to Mexico includes 32 "Sections of Independent Utility" (SIU). One of those sections, SIU #4, would connect Evansville, Indiana and Henderson, Kentucky and include a new Ohio River bridge. In June of 2013 the Kentucky Transportation Cabinet (KYTC) engaged Qk4, Inc., to conduct a Feasibility Study to explore engineering options for locating the future I-69 across the Ohio River and connecting to the interstate network in and around Henderson, Kentucky. This report, which presents the Feasibility Study results, addresses the geometric issues associated with providing one river crossing carrying nearly 60,000 vehicles per day (vpd) while maintaining connectivity with the commercial areas along US 41 in Henderson. It also identifies environmental issues and considers the pros and cons of possible corridor locations for a single facility concept.

This is not the first time this issue has been studied. Between 2001 and 2004, the Federal Highway Administration (FHWA) developed a Draft Environmental Impact Statement (DEIS) to explore alternatives for this project. The DEIS, approved January 27, 2004, identified Alternative 2 as the Preferred Alternative, which had an estimated cost of $652 million. The cost analysis prepared for this Feasibility Study estimated that the DEIS Alternative 2, which is just east of Henderson, would have a 2013 cost (for design, right-of-way, utilities, and construction) of approximately $1.1 billion, including a new interchange with I-69 (formerly I-164*) in Indiana and rehabilitation of I-69 (formerly I-164) north approximately 19 miles.

Following the publication of the 2004 DEIS, no funding source could be identified for this project; therefore, this section (SIU #4) has remained dormant. In contrast, several sections of SIU #3 (north to Indianapolis) are either open to traffic or in final design or under construction, and SIUs #5 and #6 through Kentucky are in various phases of construction or final design and will be open to traffic in the foreseeable future.

A May 2008 Technical Memorandum, "Conceptual Financing Plan for I-69 Henderson, Kentucky and Evansville, Indiana," considered tolling the bridge for SIU #4. The study showed that tolling the new bridge would not generate enough revenue to fund the project because there would be substantial traffic diversion to the un-tolled, existing US 41 Ohio River twin bridges.

This Feasibility Study has considered seven alternatives: an alternative to the east of Henderson, similar to the DEIS Preferred Alternative 2, but shorter; and six alternatives (some with variations) parallel to US 41 between US 41 and the Ohio River. Each is very expensive, ranging from $200 million to over $800 million.

Each alternative studied herein would have substantial direct and indirect environmental and/or social impacts. The primary business center for Henderson is along US 41. The DEIS's recommended corridor would bypass the US 41 corridor. Any alternative that would use or be adjacent to this corridor—and thus have the one river crossing in the same location as the existing US 41 twin bridges—would have substantial business, residential, and mostly likely Section 4(f) impacts. Adjacent to the east side of US 41 is the John James Audubon State Park, which is a protected Section 4(f) resource. As recently as September 2013, the State purchased land between the state park property and the Ohio River, adjacent to the existing US 41 crossing. This expands the protected site and will complicate the process to locate I-69 within the downtown corridor.

* On November 15, 2013, the Indiana Department of Transportation designated I-164, from Evansville north to the I-64 interchange, as I-69 to conform with the designation of the Evansville-to-Indianapolis I-69 project (SIU #3), which begins at the I-64/I-69 (former I-164) interchange.

Although not yet investigated in detail, direct and indirect impacts to the local economy and community, including the Environmental Justice concerns, are also anticipated as a result of providing only one crossing (I-69 bridge) over the Ohio River.

In summary, this study identified the variety of social, environmental, and economic issues with each alternative. With the advancement of I-69 nationwide, and particularly in Kentucky and Indiana, the need to advance SIU #4 remains. Due to the passage of time since the DEIS, the potential environmental constraints, estimated increased costs and tolling (should it be considered), the National Environmental Policy Act (NEPA) process would have to be renewed. At that time, the build alternatives presented in this Feasibility Study should be considered for use in identifying an alternative that has the least overall impacts and is financially feasible.

Table of Contents

Table of Contents (*Continued*)

Table of Contents (*Continued*)

Executive Summary

I-69 from Canada to Mexico includes 32 "Sections of Independent Utility" (SIU). One of those sections, SIU #4, would connect Evansville, Indiana and Henderson, Kentucky and include a new Ohio River bridge. A January 2004 Draft Environmental Impact Statement (DEIS) identified a Preferred Alternative 2 with a then-estimated cost of $652 million, making it a mega-project (projects over $500 million) according to the Federal Highway Administration. The 2013 cost estimate is $1.1 billion from the Edward T. Breathitt Parkway to I-64.

Mega-projects are very challenging for transportation agencies across the country to fund with their federal apportionment and state gas tax revenue. With traditional funding programs inadequate, states are increasingly looking at tolling as a revenue source for these projects. A May 2008 technical memorandum, "Conceptual Financing Plan for I-69 Henderson, Kentucky and Evansville, Indiana," considered tolling the bridge for SIU #4. The study showed, however, that tolling the new bridge would not generate enough revenue to fund the project because there would be substantial traffic diversion to the un-tolled, existing US 41 Ohio River twin bridges. Traffic diversion to un-tolled facilities limits the effectiveness of tolls as a revenue source. If both of the existing crossings (the existing US 41 twin bridges and the future I-69 bridge) were to be tolled, there would be a more equal distribution of vehicles on both facilities; however, current federal toll programs may limit the use of tolls on the existing US 41 bridges to operations and maintenance of those structures.

Before moving forward with the DEIS Preferred Alternative 2, the Kentucky Transportation Cabinet (KYTC) requested a Feasibility Study with an emphasis on geometrics, to further investigate a way to have one facility carrying nearly 60,000 vehicles per day (vpd) while maintaining connectivity with the commercial areas along US 41. This study is to identify any environmental issues, pros and cons of the single facility concept, and possible corridor location options, with an emphasis on the existing US 41 corridor in northeast Henderson. All alternatives' traffic and cost estimates have been adjusted to year 2013 for a like comparison.

During the 2001 through 2004 DEIS alternatives evaluation process, corridors along existing US 41 (Corridors F and G) northeast of Henderson were not recommended for detailed analysis. According to the DEIS "Level 1 Alternatives Analysis Report" these corridors were eliminated due to engineering constraints, impacts, maintenance of traffic issues, and environmental and social impacts. Neither corridor provided an additional river crossing for the region, which was a goal of the project.

In this Feasibility Study, seven alternatives, some with variations, are examined at the concept level. Two of the seven are and two at a more detailed level.

Alternatives 1 through 7 are illustrated on the Figure ES1 (p. ES4) together with their environmental constraints. A summary of the cost estimates is included in Table ES1 (p. ES5).

Eastern Corridor

Alternative 1 — This corridor begins just north of the KY 351/US 41 interchange, provides a new trumpet interchange to connect back to US 41, and continues northeast to crossing the Ohio River near the same location as the DEIS Preferred Alternative 2. This alternative would have a new interchange with US 60, and require the extension and reconstruction of and a new interchange with Wolf Hills Road to provide access to the north side of the developed part of Henderson (US 41). This alternative would close the aging US 41 twin bridges across the Ohio River. This alternative is 8.5 miles in length and is estimated to cost $226M. This alternative is approximately $91 million less than the Kentucky approach for the DEIS Alternative 2 ($226M vs. $317M) because it would use more of the existing Breathitt Parkway.

Alternative 1a — This alternative is the same as Alternative 1, except it would not include the reconstruction/extension of and interchange with Wolf Hills Road. In addition, it would keep in place the existing US 41 twin bridges to provide local access into Henderson from the north. This alternative is 6.2 miles in length and is estimated to cost $181M.

West of Existing US 41

Alternative 2 — This alternative begins with a reconstructed US 41/US 60 interchange, and then heads west of US 41. Alternative 2 parallels US 41 and would cross the Ohio River west of the existing US 41 bridges. The northern terminus includes an interchange with US 41 to provide local access on the northern end of this corridor. This alternative is 3.7 miles in length and is estimated to cost $217M.

Alternative 2a — This alternative follows Alternative 2 but provides an access point to US 41 midway through the corridor via an interchange at Watson Lane. It also provides for widening of Watson Lane to US 41. The alternative would impact Park Field and Hays Boat Ramp, a Section 4(f) protected resource. This alternative is 3.7 miles in length and is estimated to cost $261M.

Alternative 3 — This alternative is the same as Alternative 2a until its southern terminus where it shifts to avoid Park Field and Hays Boat Ramp, a Section 4(f) protected resource. This alternative is 3.7 miles in length and is estimated to cost $255M.

Over Existing US 41

Alternative 4 — This alternative is elevated over existing US 41 from the US 60/US 41A interchange north to a new bridge over the Ohio River. US 41 would be the local road under the new I-69. This alternative reconstructs the US 60/US 41 interchange to an urban diamond and provides for a one-way Collector Distributor (C/D) system between US 60 and the new Ohio River bridge. This alternative does not provide access to Watson Lane. (Alternatives 4a, 4b, and 4c do provide such access.) Alternative 4 is 3.8 miles in length and is estimated to cost $770M.

Alternative 4a — This alternative is the same as Alternative 4 but it also provides for a new interchange at Watson Lane and US 41, and widening Watson Lane west to Sunset Lane and east 1,000 feet. This interchange would include a weaving option from US 41 to the new I-69 off and on ramps. This alternative also includes a C/D system. Alternative 4a is 3.8 miles in length and is estimated to cost $820M.

Alternative 4b — Alternative 4b the same as Alternative 4a but with a roundabout option under the I-69 mainline at the Watson Lane interchange. This alternative also includes a C/D system. Alternative 4b is 3.8 miles in length and is estimated to cost $807M.

Alternative 4c — This alternative includes an interchange at Watson Lane, but does not include a C/D system. Because this alternative does not include C/D lanes, it provides for a traditional intersection at the ramp termini. Alternative 4c is estimated to cost of $523M.

Construct I-69 At Grade Within or Near US 41

Alternative 5 — Because Alternative 5 replaces US 41 with I-69, it provides one-way frontage roads to access local developments and connecting roads. This alternative would be at grade except at the following three local roads where it would bridge over and provide grade-separated interchanges: Marywood Drive, Watson Lane, and John James Audubon State Park. Alternative 5 is 3.8 miles in length and is estimated to cost $309M.

Alternative 6 — Alternative 6 is similar to Alternative 5; however, it would be shifted slightly west of US 41 to minimize business impacts. Alternative 6 is 3.9 miles in length and is estimated to cost $320M. Alternative 6 was advanced from a planning level Concept Design to a Schematic Design.

Alternative 7 — Alternative 7 is west of Alternative 6 (but east of Alternatives 2, 2a, and 3). This alignment takes advantage of an existing frontage road to minimize major business impacts, and leaves US 41 in place for local access. This alternative has an interchange with Watson Lane and underpasses at Canary Lane and Race Track Road. Alternative 7 is 3.6 miles in length and is estimated to cost $252M. Alternative 7 was advanced from a planning level Concept Design to a Schematic Design.

Cost Estimates and Impacts

A 2013 cost estimate has been developed for each alternative studied herein, including the 2004 DEIS Preferred Alternative 2. The cost estimates are for the Kentucky portion of the project, only, not the Ohio River bridge or the Indiana approaches. Table ES1 (*p. ES5*) provides the cost estimates.

Each alternative's other impacts were assessed using information from the 2004 DEIS, supplemented by readily available data and a field review. Impacts that are assessed herein include community impacts, business and residential relocations, 4(f) resources, wetlands, floodplain, environmental justice, and contaminated and hazadous materials.

A summary of concept phase costs and selected impacts are shown on Tables ES2 and ES3 (*pp. ES6 and ES7*), respectively.

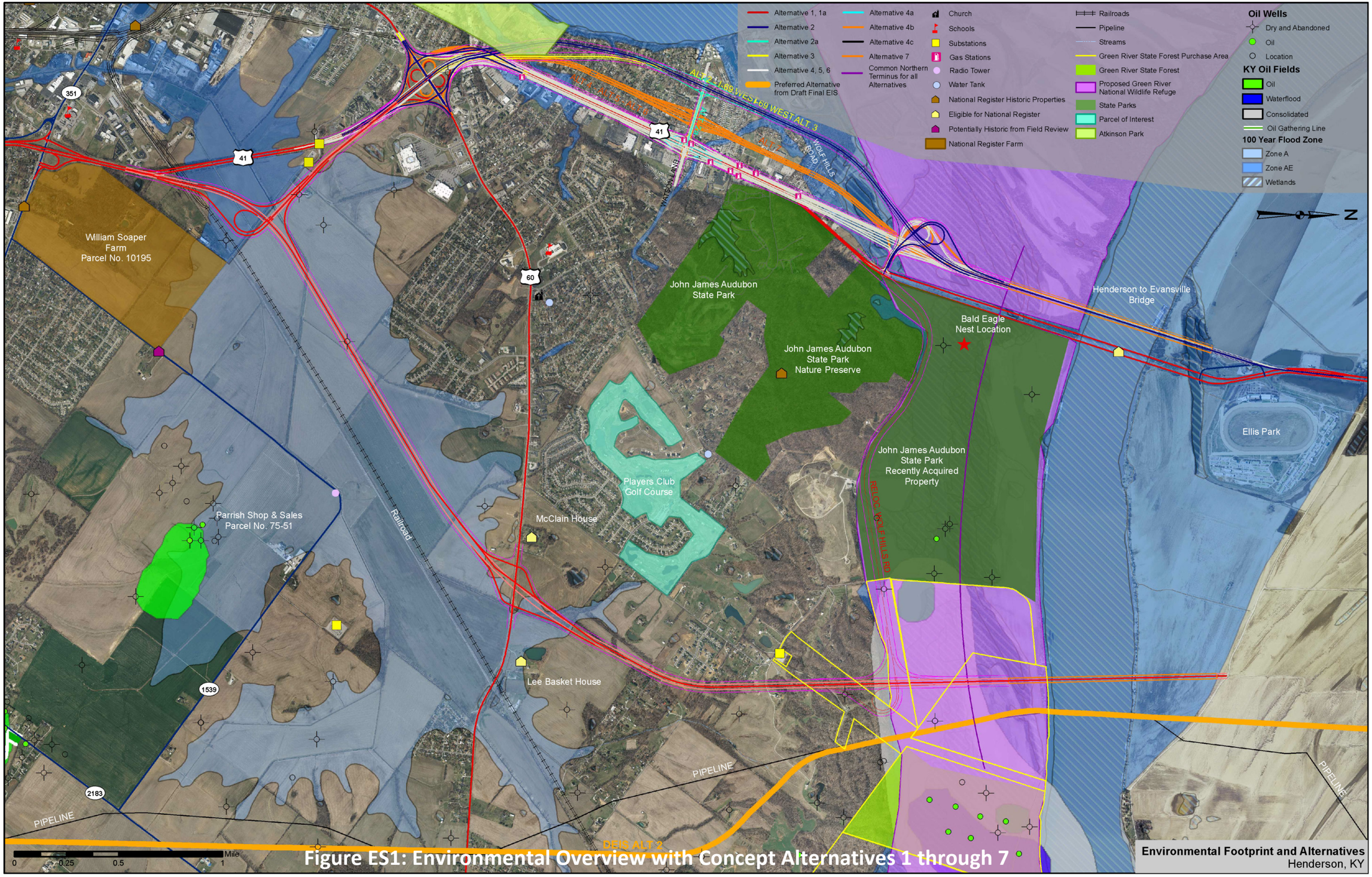

Figure ES1: Environmental Overview with Concept Alternatives 1 through 7

Table ES1: Concept Alternatives 1 through 7 Cost Estimates

		ALTERNATE										Adjusted ALTERNATE 2 from DEIS	Adjusted ALTERNATE 2 from DEIS	ALSO CONSIDERED ALTERNATE	
		1	1a	2	2a	3	4	4a	4b	5	6			4c w/o CD	7
Length (miles)		8.5	6.2	3.7	3.7	3.6	3.8	3.8	3.8	3.8	3.9	9.8	9.8	3.8	3.6
												2003 Costs	2013 Costs*		
Design	10%	$14,866,528	$11,960,343	$11,666,556	$12,983,452	$12,909,601	$45,761,872	$47,738,482	$47,922,325	$14,040,420	$16,061,848	$13,505,726	$22,000,547	$31,184,260	$14,059,553
Right of Way		$14,329,500	$10,810,500	$42,811,500	$63,118,500	$59,494,500	$103,621,500	$121,207,500	$108,934,500	$89,689,500	$75,855,000	$4,372,879	$7,320,911	$69,081,000	$44,286,000
Utilities	2.0%	$2,973,306	$2,392,069	$2,333,311	$2,596,690	$2,581,920	$9,152,374	$9,547,696	$9,584,465	$2,808,084	$3,212,370	$2,701,145	$4,400,109	$6,236,852	$2,811,911
Construction		$148,665,279	$119,603,425	$116,665,557	$129,834,521	$129,096,006	$457,618,718	$477,384,815	$479,223,255	$140,404,204	$160,618,479	$135,057,260	$220,005,467	$311,842,597	$140,595,529
MOT	0.5%	$718,190	$577,794	$563,602	$627,220	$623,652	$2,210,718	$2,306,207	$2,315,088	$678,281	$775,935	$652,451	$1,062,828	$1,506,486	$679,205
Drainage	3.0%	$4,309,139	$3,466,766	$3,381,610	$3,763,319	$3,741,913	$13,264,311	$13,837,241	$13,890,529	$4,069,687	$4,655,608	$3,914,703	$6,376,970	$9,038,916	$4,075,233
Earthwork															
Cut (CY)	$4 cy	$1,254,394	$914,970	$546,030	$546,030	$531,273	$560,788	$560,788	$560,788	$560,788	$575,545	$1,446,242	$1,446,242	$560,788	$531,273
Fill (CY)	$6.5 cy	$14,829,602	$10,816,886	$6,455,239	$6,455,239	$6,280,773	$6,182,746	$6,182,746	$6,182,746	$6,629,705	$6,804,170	$13,152,045	$17,097,659	$4,365,394	$6,280,773
Roadway		$40,664,399	$29,661,091	$17,700,974	$17,700,974	$17,222,569	$20,394,640	$23,108,167	$21,929,437	$18,179,378	$18,657,783	$28,004,242	$46,883,660	$14,735,112	$17,222,569
Structures												-	-		
Ret Walls	$70 sf						$1,211,700	$1,883,700	$1,883,700	$8,954,400	$20,643,560	-	-	$1,047,900	
Bridges	$150 sf						$325,729,800	$328,718,315	$328,718,315	$20,767,950	$27,895,950	-	-	$194,800,350	$11,110,650
Noise Wall	$50 sf			$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$7,500,000	$7,500,000				$15,000,000
Roundabout									$2,955,000						
ITS		$2,846,584	$2,846,584	$1,698,768	$1,698,768	$1,652,855	$1,744,681	$1,744,681	$1,744,681	$1,744,681	$1,790,593	$2,687,576	$4,499,439	$1,744,681	$1,652,855
Interchanges															
Service (S-S)		$25,447,274	$12,723,637	$12,723,637	$25,447,274	$25,447,274	$12,723,637	$25,447,274	$25,447,274	$12,723,637	$12,723,637	$15,200,000	$25,447,274	$25,447,274	$25,447,274
System (F-F)		$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$70,000,000	$117,191,394	$58,595,697	$58,595,697
Subtotal		**$180,834,612**	**$144,766,336**	**$173,476,923**	**$208,533,163**	**$204,082,027**	**$616,154,464**	**$655,878,493**	**$645,664,545**	**$246,942,208**	**$255,747,696**	**$155,637,010**	**$253,727,034**	**$418,344,708**	**$201,752,992**
Contingency 25%		$45,208,653	$36,191,584	$43,369,231	$52,133,291	$51,020,507	$154,038,616	$163,969,623	$161,416,136	$61,735,552	$63,936,924	$38,909,252	$63,431,759	$104,586,177	$50,438,248
ET Breathitt Upgrade		$3,915,000	$3,915,000	$4,445,000	$4,445,000	$4,445,000	$4,385,000	$4,385,000	$4,385,000	$4,385,000	$4,385,000			$4,385,000	$4,385,000
TOTAL		**$226,043,265**	**$180,957,921**	**$216,846,154**	**$260,666,454**	**$255,102,534**	**$770,193,080**	**$819,848,116**	**$807,080,682**	**$308,677,760**	**$319,684,620**	**$194,546,262**	**$317,158,793**	**$522,930,885**	**$252,191,240**

* Calculated using KYTC Construction Cost INDEXED to 2012 x 1.04% to 2013

ALT 1 – 8.5 miles - East I-69 from US 41 just north of KY 351 north to proposed bridge over Ohio River. South IC connector to south US 41. North IC connector via relocated Wolf Hills Road to north US 41. IC at US 60.
ALT 1a – 6.2 miles - Alt 1 without the North IC & US 41 connector via relocated KY 414 (Wolf Hills Road).
ALT 2 – 3.7 miles – West I-69 from US 41 north to proposed bridge over Ohio River. Revised IC at US 60 with I-69 over US 60. Elevated alignment with SB US 41 to US 60 connector under I-69.
Alignment impacts Park Field and Hays Boat Ramp on Ohio River. New northern IC at US 41 and KY 414 (Wolf Hills Road) intersection.
ALT 2a – 3.7 miles -Alternate 2 with new IC at Watson Lane and widened Watson Lane east to US 41.
ALT 3 – 3.6 miles – Same as Alternate 2 with alignment shift to the east north of US 60 to avoid Park Field and Hays Boat Ramp.
ALT 4 – 3.8 miles – I-69 and CD system elevated over existing US 41 from north of US 60 to approximately 0.25 miles north of existing Audubon Park entrance. US 41 is local road under I-69/CD. Revised IC at US 60 with I-69 over US 60.
NB CD begins south of US 60 and terminates north of new IC at US 41 and KY 414 intersection. SB CD begins at new Ohio River bridge end and terminates south of US 60.
ALT 4a – Alternate 4 with Weaving option at I-69/Watson Lane IC from US 41 to new CD off/on ramps.
ALT 4b – Alternate 4 with Roundabout option at I-69/Watson Lane IC.
ALT 4c - Alternate 4 without CD system
ALT 5 – 3.8 miles – I-69 with one-way frontage roads on US 41 at grade with elevated section over Marywood Drive, Watson Lane, and Audubon Park entrance. Separate U-Turn Movement between frontage roads and said elevated sections.
ALT 6 – 3.9 miles – Same as Alt 5 but shifted west along US 41 and elevated with retaining walls. Underpasses every 800-1000 feet.
ALT 7 - 3.6 miles - I-69 West from US 41 north to proposed bridge over Ohio River. Revised IC at US 60 with I-69 over US 60. New IC at Watson Lane. Underpasses at Canary Lane and Race Track Road.

Table ES2: Evaluation Matrix for Concept Alternatives

ALTERNATIVES	1	1a	2	2a	3	4	4a	4b	4c	5	6	7
CRITERIA												
TRAFFIC												
DECREASE CONGESTION												
I-69	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C
US 41	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B
US 41 BRIDGES		LOS B										
I-69 BRIDGE	LOS B	LOS B	LOS C	LOS C	LOS B	LOS B	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C
TRAFFIC (2040)												
I-69	44495	50290	44495	44495	44495	44495	44495	44495	44495	44495	44495	44495
US 41	23960	18195	23960	23960	23960	23960	23960	23960	23960	23960	23960	23960
US 41 BRIDGE		18195										
I-69 BRIDGE	68455	50290	68455	68455	68455	68455	68455	68455	68455	68455	68455	68455
ENVIRONMENTAL												
TOTAL FLOODPLAINS CROSSED (MILES)	7.7	13.6	4.8	5	4.6	2.7	0.1	0	1.6	3.6	3.6	3.5
4(F) PROPERTY IMPACTS TOTALS (ACRES)	156	212	8	8	1.5	0.9	0.9	0.9	0.5	0.6	0.1	0.1
FOREST PURCHASED AREAS (ACRES)	63	95	0	0	0	0	0	0	0	0	0	0
AUDUBON STATE PARK	4.9	0	0	0	0	0.9	0.9	0.9	0.5	0.6	0.1	0
WILDLIFE REFUGE (ACRES)	88	112	0	0	0	0	0	0	0	0	0	0
ATKINSON PARK (ACRES)	0	0	7.7	7.7	1.5	0	0	0	0	0	0	0
ENVIRONMENTAL JUSTICE	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
POVERTY												
RACE												
STREAMS CROSSED	10	18	7	8	7	7	8	7	4.1	7	6	5
WETLANDS (IN ACRES)	33	49	67	67	67	64	64	64	37.6	64	58	44
RIGHT OF WAY												
BUSINESS RELOCATIONS	40	76	53	74	113	131	152	140	77.1	127	133	80
TOTAL HOMES/ APARTMENT UNITS	12	22	103	170	59	36	37	38	21.2	34	39	20
UTILITY RELOCATION												
MAJOR KNOWN UTILITY IMPACTS TRANSMISSION LINES (FEET)	5240	8897	1272	1272	1249	576	576	576	338.8	553	630	710
RADIO TOWERS	0	0	0	0	0	2	0	0	0	0	0	
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF BRIDGES												
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF EXISTING OHIO RIVER BRIDGES		$90.8M	0	0	0	0	0	0	0	0	0	0
LOCAL ACCESS												
US 41 BUSINESS ACCESS (US 60 TO AUDUBON STATE PARK)	YES-3	YES-2	YES-2	YES-3	YES-3	YES–2	YES-3	YES-3	YES-3	YES-2	YES-2	YES-3
COST												
ESTIMATED COST (MILLIONS)	$226M	$181.00	$216.80	$260.70	$255.10	$770.20	$819.90	$807.10	$522.90	$308.70	$319.70	$252.20

Schematic Designs – Alternatives 6 and 7

Following the concept phase, the Project Team made the decision to advance Alternatives 6 and 7 to a Schematic Design that provides more horizontal and vertical detail, and uses quantity-based cost estimates rather than cost estimates based on ratios. Table ES3 shows the refined cost estimates compared to the updated cost estimates for the 2004 DEIS Preferred Alternative 2. The following pages show Alternative 6 and 7 in more detail, and summarize their associated impacts.

To ensure all costs were considered equally, a "Value for Money" comparison was completed for these alternatives. Operating and maintenance (O & M) costs for the Ohio River bridges were projected to year 2040 and brought back to year 2013 for Alternatives 6, 7, and the DEIS Preferred Alternative 2. Alternatives 6 and 7 include costs to upgrade the Breathitt Parkway and US 41 facilities from the DEIS Preferred Alternative 2 to the southern terminus of this project (US 60/US 41 interchange). Table ES3 shows the funding necessary to link I-69 to I-164 (now designated I-69) for SIU #4 considering future O & M cost.

Table ES3: Value for Money

Cost Estimates		Alternative 2 from DEIS	Concept Alternative 6	Concept Alternative 7
CONSTRUCTION COSTS				
Kentucky Roadway[1]		$162,062,857	$269,361,233	$205,063,629
New River Crossing	**Indiana Approach to Ohio River Structure**[2]	$156,353,492	$156,353,492	$156,353,492
	Ohio River Structure[3]	$125,963,658	$125,963,658	$125,963,658
	Kentucky Approach to Ohio River Structure[2]	$52,191,236	$26,547,597	$26,547,597
OPERATING AND MAINTENANCE COSTS (Through 2040)				
New I-69 Bridge [3 and 4]		$18,770,290	$18,776,538	$18,776,538
Existing US 41 Bridges Cost[5]		$83,807,797	$0	$0
Total Cost		**$599,149,330**	**$597,002,517**	**$532,704,914**

[1] *These estimates were developed as a part of this Feasibility Study.*

[2] *These estimates were extracted from the Conceptual Financing Plan for I-69 Corridor Henderson, KY and Evansville, Indiana Technical Memorandum and inflated for the construction index to 2012 and then increased from 2012 to 2013 utilizing 4% interest rate.*

[3] *This DEIS Preferred Alt 2 figure was extracted from the Conceptual Financing Plan for I-69 Corridor Henderson, KY and Evansville, Indiana Technical Memorandum, estimating $1.85M maintenance and operating costs (includes tolls) per year projected to 2040 utilizing a 4% interest rate brought to present year 2013 dollars assuming a 2016 open to traffic date.*

[4] *Concept Alternatives 6 and 7 were estimated from the Louisville Bridges project, estimating $1.3M maintenance and operating costs per year projected to 2040 utilizing 4% interest rate brought to present year 2013 dollars assuming a 2016 open to traffic date.*

[5] *This estimate was projected from the operating and maintenance costs furnished by KYTC, then projected to 2040 by Qk4, and brought to present year 2013 dollars.*

TYPICAL SECTIONS

ALTERNATE 6

6-LANE URBAN SECTION

Figure ES2: Alternative 6

Not to scale.

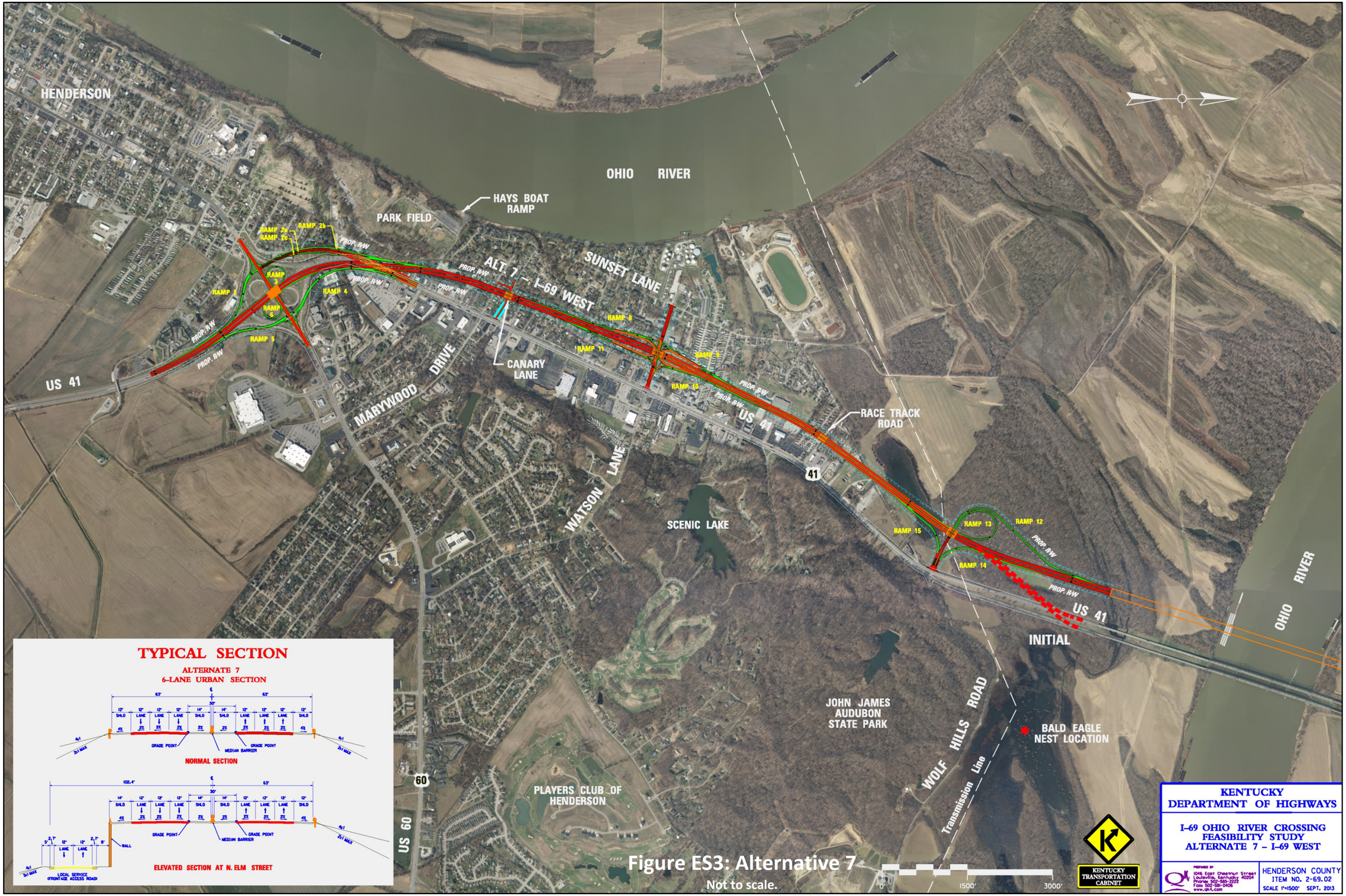

Figure ES3: Alternative 7

Not to scale.

Table ES4: Schematic Design Phase Alternatives 6 and 7

Mainline Length (miles)			ALTERNATE 6		ALTERNATE 7		Adjusted ALTERNATE 2 from FDEIS		** ET Breathitt Sections 2 & 3
			3.7		3.6		9.2		5.8
	Unit	Unit Cost	Quantity	Cost	Quantity	Cost	Quantity	2013 Costs*	2013 Costs
Design		10%		$13,620,008		$9,885,496		$10,695,488	$12,640,657
Right of Way				$59,436,900		$49,825,350		$9,860,819	$6,259,476
Utilities		2%		$2,724,002		$1,977,099		$2,139,098	$2,528,131
Construction				$136,200,077		$98,854,958		$106,954,881	$126,406,570
MOT		0.5%		$657,971		$477,560		$516,690	
Drainage		3.0%		$3,947,828		$2,865,361		$3,100,141	
Earthwork									
Cut (CY)	CY	$4	356,546	$1,426,184	514,757	$2,059,027	487,000	$1,948,000	
Fill (CY)	CY	$7	3,561,222	$24,928,554	3,083,523	$21,584,663	3,543,000	$24,801,000	
Roadway	SY	$70	518,558	$36,299,052	375,914	$22,554,847	672,423	$47,069,610	
Structures								-	
Bridges	SF	$150	244,403	$36,660,450	166,680	$25,002,000	150,800	$22,620,000	
Retaining Wall	SF	$70	353,864	$24,770,480	107,155	$7,500,850	0	$0	
Noise Wall	SF	$50	114,000	$5,700,000	301,000	$15,050,000	48,000	$2,400,000	
ITS				$1,809,557		$1,760,650		$4,499,439	
Subtotal				**$211,980,986**		**$160,542,904**		**$129,650,285**	**$147,834,835**
Contingency 25%				$52,995,247		$40,135,726		$32,412,571	
ET Breathitt/US 41 Upgrade (5.77 miles, 3 IC's)				$4,385,000		$4,385,000			
TOTAL				**$269,361,233**		**$205,063,629**		**$162,062,857**	**$147,834,835**

* Calculated using FDEIS Alt 2 quantities, URS Feasibility Study Structures Cost Estimate, estimated roadway quantities, and projected R/W x Unit Cost.

ALT 6 – 3.7 miles – I-69 with one-way frontage roads shifted west of US 41. Frontage Roads at grade with elevated section over Marywood Drive, Watson Lane, and Audubon Park entrance.
ALT 7 - 3.6 miles - I-69 West from US 41 north to proposed bridge over Ohio River. Revised IC at US 60 with I-69 over US 60. New IC at Watson Lane. Underpasses at Canary

EVALUATION MATRIX FOR SCHEMATIC ALTERNATIVES			
ALTERNATIVES	DFEIS Preferred Alternative 2 from DFEIS in KY	6	7
CRITERIA			
TRAFFIC			
DECREASE CONGESTION ON			
I-69	LOS C	LOS C	LOS C
US 41	LOS B	LOS B	LOS B
US 41 BRIDGES	LOS B		
I-69 BRIDGE	LOS B	LOS C	LOS C
TRAFFIC (2040)			
I-69	50290	47400	47400
US 41	22580	25500	25500
US 41 BRIDGE	22580		
I-69 BRIDGE	50290	72900	72900
ENVIRONMENTAL			
TOTAL FLOODPLAINS CROSSED (MILES)	2.40	3.6	2.0
4(F) PROPERTY IMPACTS TOTALS (ACRES)	132.1+	49.66	35.06
FOREST PURCHASE AREAS (ACRES)	46.3+	0	0
AUDUBON STATE PARK (ACRES)	0	0	0
PROPOSED WILDLIFE REFUGE (ACRES)	85.8+	49.7	35
ATKINSON PARK (ACRES)	0	0	0.07
HISTORIC	4 (VISUAL) HISTORIC NO SIGN. ARCH SITES	1 KNOWN US 41 BRIDGE	1 KNOWN US 41 BRIDGE
ENVIRONMENTAL JUSTICE	NO	YES	YES
POVERTY			
RACE			
STREAMS CROSSED	21.9	6	5
WETLANDS (IN ACRES)	9.4 (jurisdictional) 64 total	58.3	47.0
RIGHT OF WAY			
COMMERCIAL RELOCATIONS / IMPACTS	0 says will shift 515 commercial jobs away from the US 41 corridor	85 IMPACTED[1] 64 RELOC.	50 IMPACTED[2] 35 RELOC.
TOTAL HOMES / RESIDENTIAL IMPACTS	6 1 RELOC.	56 IMPACTED 51 RELOC.	148 IMPACTED 140 RELOC.
EXEMPT, EXEMPT OTHER, EXEMPT CITY/COUNTY	NOT KNOWN	8 IMPACTED 5 RELOC.	6 IMPACTED 3 RELOC.
FARM	1 IMPACTED (INCLUDED IN TOP TOTAL RESIDENTIAL IMPACTS) 573.3 (496.1 prime + unique) acres	4 IMPACTED 62 acres	3 IMPACTED 53.4 acres
UTILITY RELOCATION			
MAJOR KNOWN UTILITY IMPACTS TRANSMISSION LINES (FEET)	Not available in DFEIS	630	655
RADIO TOWERS		0	0
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF BRIDGES to 2040 in (2013 dollars)			
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF EXISTING OHIO RIVER BRIDGES	$83.8M (US 41)3 $18.8M (I-69)****	18.8M****	18.8M****
LOCAL ACCESS			
US 41 BUSINESS ACCESS (US 60 TO AUDUBON STATE PARK)	NO	YES-2	YES-3
COST IN KENTUCKY			
ESTIMATED 2013 COST (MILLIONS)	$162.10	$269.40	$205.10

[1]Approximately 5 trailers in 1 commercial class properties that are not in the total # of parcels impacted, nor in the total commercial properties affected.

[2]Approximately 50 trailers in 6 commercial class properties that are not in the total # of parcels impacted, nor in the total commercial properties affected.

***From KYTC projected to year 2040 using 4% interest and brought to 2013 dollars.

****From Conceptual Financing Plan 2007 and LSIORB similar project

+ Measured by QK4

Conclusion and Summary

In this Feasibility Study, seven alternatives and some variations were examined at the concept level. All but one of these alternatives (1a) would close the existing US 41 twin bridges over the Ohio River northeast of Henderson and construct a new bridge.

As the study progressed two of the alternatives — Alternatives 6 and 7 — were advanced to the Schematic Design phase to examine in greater detail the potential impacts of abandoning the twin bridges and constructing a new bridge while maintaining connectivity with the commercial areas along US 41 in Henderson. Projections show a new bridge would to carry over 60,000 vpd in Year 2025 and nearly 70,000 vpd in Year 2040.

Each of the alternatives is viable; however, each is very expensive, is not without substantial impacts to the project area, and has no funding source.

An additional challenge will have to be considered as this project progresses. Near the conclusion of this Feasibility Study, the John James Audubon State Park manager provided information regarding park property adjacent to the existing US 41 bridges to the east. KYTC learned that several parcels are now all owned by Audubon Park or Kentucky Department Fish and Wildlife Services (KDFWS), which now owns the parcel west of the existing US 41 structures, and land that parallels Wolf Hills Road. Each alternative in some way would impact these Section 4(f) properties.

Table ES5: Evaluation Matrix for Schematic Alternatives

As stated, no funding source for the project could be identified at the time of the DEIS publication, and the project could not be included in the Evansville Metropolitan Planning Organization's metropolitan transportation plan; therefore a project-specific financial plan could not be developed, and the project has not been advanced past the DEIS stage. Due to the number of years since the issuance of the DEIS, should a funding source for the project be identified, the alternatives, environmental analysis, and NEPA documentation would need to be re-assessed, beginning with the publication of a new Notice of Intent. Much of the previous work and this Feasibility Study could be used as background information, which would be built upon as the project progressed.

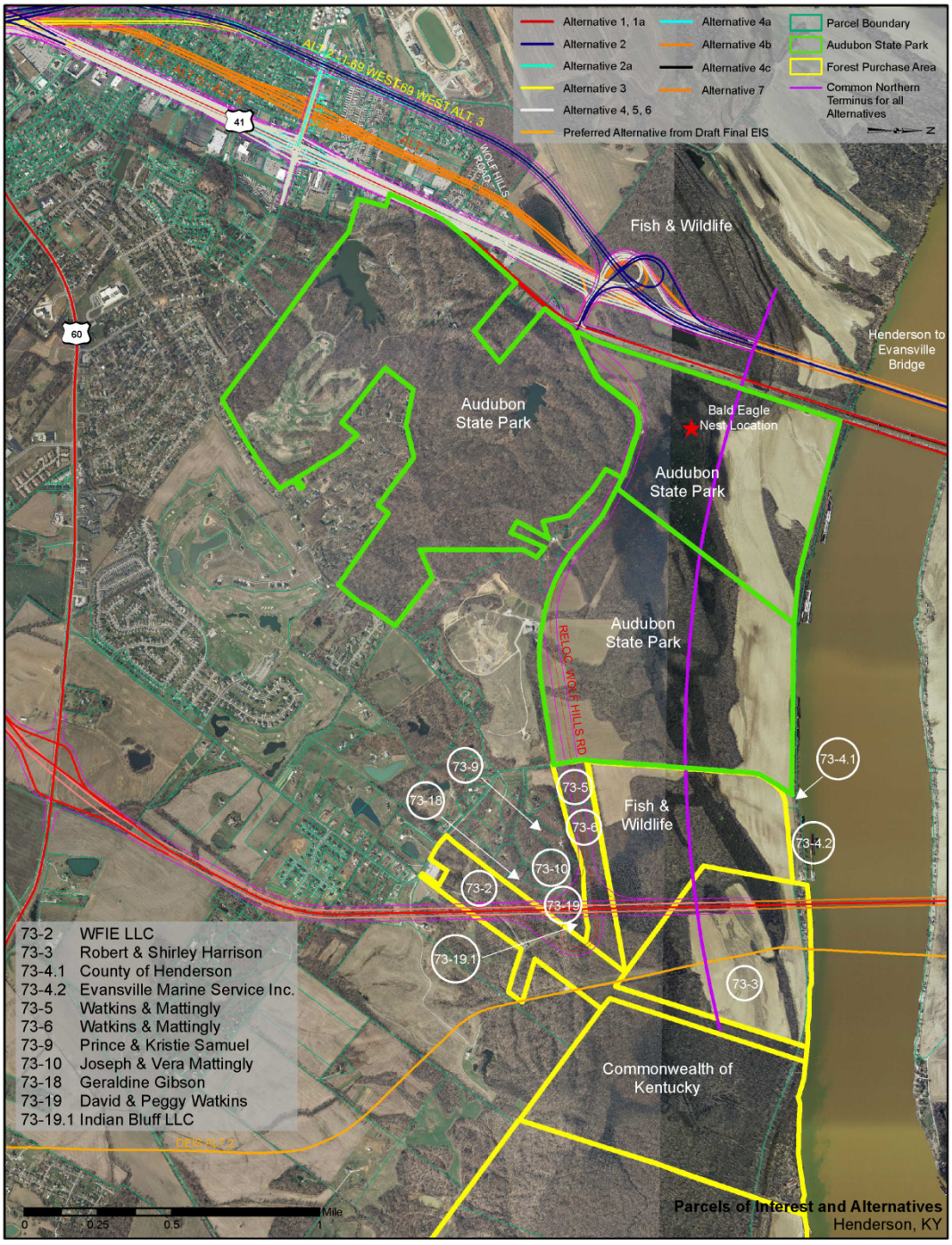

Figure ES4: New Audubon Park Property and Fish and Wildlife Property Potential 4(f)

Feasibility Study

I-69 Corridor Overview

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) designated specific highway corridors as having national significance. One of those (Corridor 18) connected Indianapolis, Indiana to Memphis, Tennessee through Evansville, Indiana. Corridor 18 was later expanded, and conceptually rebranded, I-69 to connect Canada and Mexico through Indiana and Kentucky, among other states *(see Figure 1).*

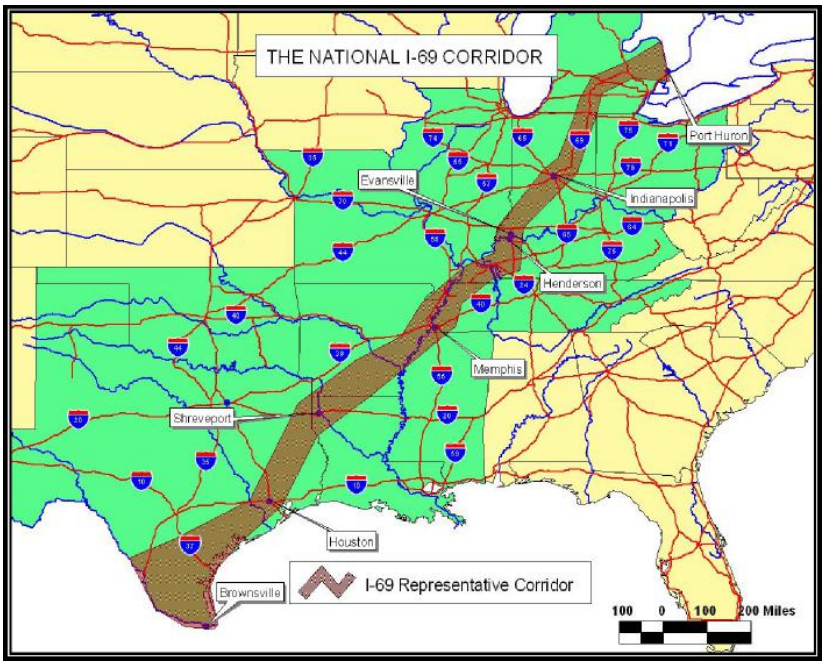

Figure 1: National I-69 Corridor

I-69 included 32 "Sections of Independent Utility" (SIU). Indiana is addressing SIU #3 between Evansville and Indianapolis. Kentucky is addressing SIU #5 between Henderson and Eddyville and SIU #6 between Eddyville and Fulton *(see Figure 2).* These SIUs are either in final design or under construction.

SIU #4 would connect Evansville, Indiana and Henderson, Kentucky and is the focus of this Feasibility Study.

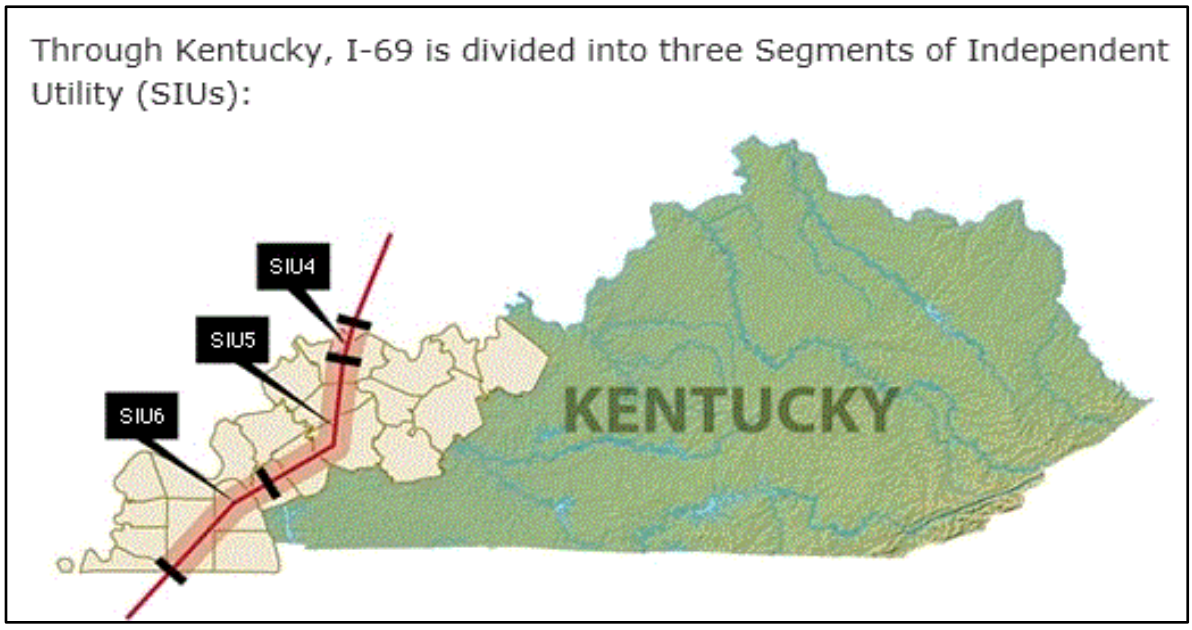

Figure 2: Segments of Independent Utility in Kentucky

SIU #4 Feasibility Study; Evansville Indiana to Henderson Kentucky

The Kentucky Transportation Cabinet (KYTC) has requested that Qk4 perform this Feasibility Study with an emphasis on geometrics, to investigate the opportunity to consolidate SIU #4 and existing US 41 structures into one corridor. This Feasibility Study addresses only the Kentucky portion of SIU #4. The purpose of this study is to identify environmental issues, and pros and cons of the single facility concept, and possible corridor location options, with an emphasis on the existing US 41 corridor in northeast Henderson. A key issue will be to identify a way to connect the north end of the Kentucky segment of the future I-69 corridor with the existing US 41 corridor, abandon the two existing bridges, and have one facility carrying nearly 60,000 vehicles per day in Year 2025, while also maintaining connectivity with the commercial areas along US 41.

The following goals were identified for the project Feasibility Study:

- Provide for a single river crossing for US 41 and I-69.
- Shorten the project from its original concept so that as much of the existing Breathitt Parkway and US 41 are used for the future I-69 as possible.
- Provide access from I-69 to the businesses along US 41.

This Feasibility Study is composed of the following summary of tasks:

Task 1.0:	**Project Management**[1]
Task 2.0:	**Review and Summarization of Previous Work**
Task 3.0:	**Identify Project Information**
Task 4.0:	**Project Team Meetings** (See Footnote 1)
Task 5.0:	**Environmental Summary**
Task 6.0:	**Concept Feasibility** Development of an alternative, which adjusts the Draft EIS recommended Alternative #2 for the goals identified above, established by this scope will consist of a three step process: (1) Study six (6) alternatives at a Draft Scoping level, (2) refine two selected alternatives at a Schematic level, and (3) make recommendations for a preferred alternative considering: • Environmental • Traffic • Utility Impacts • Life expectancy and future maintenance costs of existing Ohio River bridges • Safety • Right-of-Way/Property Impacts • Costs • Local access to the developed area along US 41
Task 7.0:	**Study Documentation**

[1] Tasks 1.0 and 4.0 consist primarily of administrative functions such as project team meetings, correspondence, and project monitoring. While they are identified as tasks in the project's Scope of Work, and the work defined for each task is being/has been conducted, they are not addressed further in this Feasibility Study.

Task 2.0 Review and Summarization of Previous Work

2.1 Review of Previous Work for I-69, Henderson to Evansville (SIU #4)

For this Feasibility Study, previous work was to be used to the maximum extent possible to evaluate the findings and design parameters, identify new concepts (including consideration of practical solutions and/or other design options to reduce costs), and produce a single Feasibility Report that can be used as a decision making document for proposed future actions as they relate to I-69 SIU #4 and a new Ohio River Crossing at or near Henderson. The development and study of SIU #4 is being performed independently of SIU #3 and SIU #5.

This task involved reviewing recommendations from previous studies, as-built plans, bridge inspection reports, completed environmental documentation and other pertinent reports as they relate to this project. Documents reviewed as they relate to this study include:

- Signed Draft Environmental Impact Statement—DEIS: signed January 27, 2004 (*Appendix A*)
- Draft Final Environmental Impact Statement—DFEIS: dated December 31, 2004 (*Appendix A*)
- Synopsis of the 2005 HNTB draft EIS (*Appendix A*)
- KYTC Traffic Forecast, Henderson County, I-69 Item Number 2-69.00 (2007) (*Appendix B*)
- Technical Memorandum Conceptual Financing Plan for I-69 Corridor, Henderson, Kentucky and Evansville, Indiana, May 2008 (*Appendix C*)

As-built roadway and bridge plans, along with recent bridge inspection reports were provided to Qk4 for their use in the development of alternatives. KYTC provided a summary document that addressed the existing US 41 twin structures' life expectancy and the estimated cost of maintenance for that lifetime.

2.2 Summarization of Previous Work for I-69, Henderson to Evansville (SIU #4)

The following documents were reviewed for pertinent information related to this study.

Draft Final Environmental Impact Statement (2004) Previously, Indiana and Kentucky completed project development work on SIU #4 through the Draft Final Environmental Impact Statement (DEIS) dated December 31, 2004). That assessment included a three-prong purpose and need (P&N) assessment of SIU #4:

1. Support the completion of the National I-69
2. Provide sufficient cross-river mobility in the Henderson-Evansville area
3. Strengthen the transportation network in Henderson-Evansville area

Ten, 2,000-foot-wide, alternative corridors (A–J), were identified that satisfied all three elements of the Purpose and Need *(see Figure 3[2], p. 5)*. These alternatives were evaluated in a "Level 1 Alternatives Analysis Report" (see *Appendix A*) based on screening measures

[2] Source: Draft Final Environmental Impact Statement (December 2004).

shown in Table 1[3] *(p. 6)* and a typical section shown in Figure 4 *(p. 7[4]).* A 400-foot-wide area (using the approximate centerline of each of the 2,000-foot-wide corridors) was investigated for potential impacts to a variety of environmental resources. Where applicable, the values in Table 1 evaluated as being best for each criterion were highlighted in green, and the poorest values are highlighted in red.

According to the "Level 1 Alternatives Analysis Report," Corridors A through E performed poorly with respect to environmental and traffic evaluations, and were considered difficult to construct. These corridors were dismissed from further consideration. Corridors F, G, and J performed well on given evaluations, with J and G receiving slightly higher rankings than F. From an engineering standpoint, both Corridors F and G were considered to be difficult to construct under traffic. Neither corridor provided an additional river crossing for the region. Both alternatives had significant negative impacts on property and business owners, both as a result of relocations and construction activities. Corridor F was estimated considerably more than the other proposed corridors and Corridor G had the greatest potential impacts to state listed species. For these reasons, Corridors F and G were not recommended for further study. Corridors H, I, and J were determined to be the highest ranking corridors and were carried forward to the next phase of the project. A variation of Corridor J (J1) that considered a more direct connection to the US 41 corridor near I-64 north of Evansville, was also carried forward.

The DEIS said the following: "neither of the bridge structures on US 41 is constructed to Interstate Standards and neither is wide enough to provide adequate shoulders. It is not possible to upgrade the existing bridges to Interstate standards. Therefore, the construction of a new bridge near the existing location would be required in order to provide an Ohio River crossing that meets current Interstate design standards. It should be noted that the northbound bridge, constructed in 1932, is considered eligible for the National Historic Register." Therefore, to meet the identified goal: Provide Sufficient Cross-River Mobility in the Henderson-Evansville area, a new structure was determined necessary in the Henderson-Evansville area. While an additional river crossing was a desirable component, and ranked high, no alternative was dismissed solely on the grounds that it failed to include an additional river crossing.

[3] Source: Level 1 Alternatives Analysis Report.

[4] Source: Draft Final Environmental Impact Statement (December 2004)

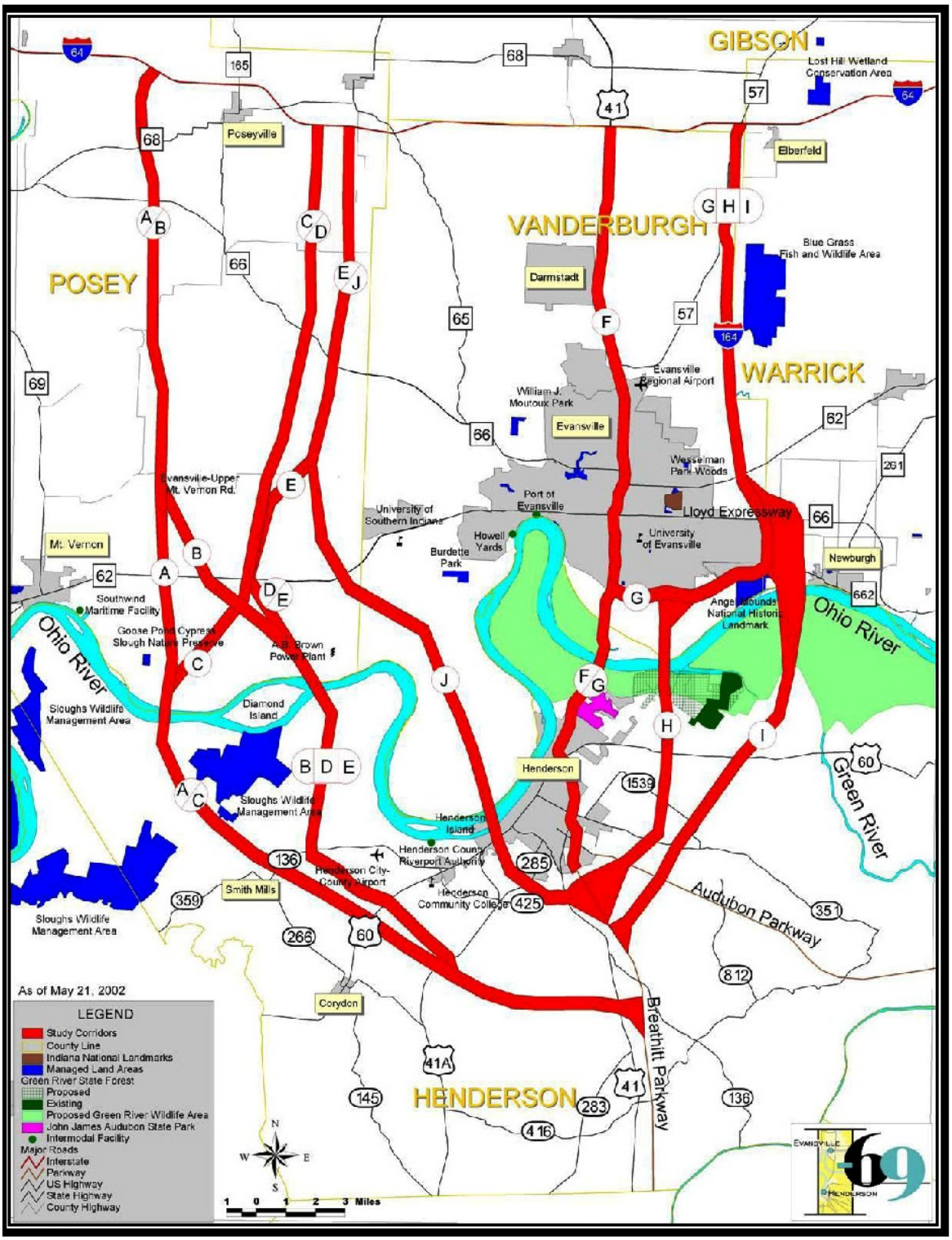

Figure 3: Level 1 Analysis Report: Ten Initial Corridors Identified

Table 1: Level 1 Alternatives Analysis Report Evaluation Data Summary: Potential Impacts as of June 2002.

	Western Corridors						Corridors		Eastern Corridors	
PURPOSE AND NEED SCREENING MEASURES	**A**	**B**	**C**	**D**	**E**	**J**	**F**	**G**	**H**	**I**
Meet current Interstate design standards	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Improve freight travel time	-4.80%	-4.30%	-6.30%	-6.40%	-6.20%	-7.30%	-10.80%	-6.80%	-6.90%	-7.60%
Provide sufficient capacity for new bridge and new bridge approaches	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Provide additional river crossing	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES
Decrease congestion on existing US 41 river crossing (LOS on existing bridges)	F	F	F	F	F	F	C	C	C	D
Meet current Interstate design Improve safety by providing cross-river transportation that meets interstate design standards	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Decrease vehicle hours of travel on arterials	-2.90%	-2.80%	-4.00%	-3.60%	-3.50%	-4.40%	-7.40%	-6.20%	-6.10%	-6.50%
ENVIRONMENTAL SCREENING MEASURES										
Wetlands (acres)	100.2	104.8	88.3	97.4	116.4	27.7	50.8	47.6	31.3	20.2
Total Floodplains Crossed (miles)	14.5	14.6	11.5	10.8	10.6	11.9	9.0	12.3	4.8	7.9
Endangered Wildlife Habitat (species)	13	14	12	14	14	5	11	21	16	11
4(f) Property Impacts (average)*	6.4	5.1	7.3	5.9	5.9	9.0	7.5	8.5	8.4	9.1
Managed Lands (average)**	7.3	9.1	8.2	10.0	9.1	4.6	8.2	10.0	8.2	10.0
Farmland (acres)	1,739	1,788	1,695	1,648	1,610	1,140	495	148	487	647
Total Homes/Apartment Units Relocations	24	22	36	39	46	153	378	155	14	44
Business Relocations	1	0	1	1	2	3	120	53	0	0
Potential for Archaeological Impacts (High, Moderate, or Low)	H	H	H	H	H	M	M	M	M	M
Environmental Justice Issues	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO
Wellhead Protection Impacts	M	L	L	L	L	L	L	L	L	H
Oil Wells	16	7	17	6	6	4	2	0	1	3
Streams Crossed	68	59	60	52	46	27	29	11	10	13
Potential Noise Barrier Length (feet)	3,000	3,000	1,000	1,000	6,000	9,500	27,800	27,700	11,300	7,000
ENGINEERING SCREENING MEASURES										
Estimated Cost (in Millions)	$982.9	$989.9	$979.8	$974.9	$964.1	$958.9	$1,281.1	$778.4	$580.8	$685.1
Constructability (High, Moderate, Low)	M	M	M	M	M	L	L	H	H	

* These scores were taken from the Level 1 Study Report and were determined by average different types of 4(f) properties.
** These scores were taken from the Level 1 Study Report and were determined by average different types of Managed Lands
*** A high level of constructability indicates relative ease of construction whereas a low level indicates anticipated difficulty with respect to construction
Note: These values were preliminary as of June 2002. Green shading indicated the best performers and red the poorest performers.

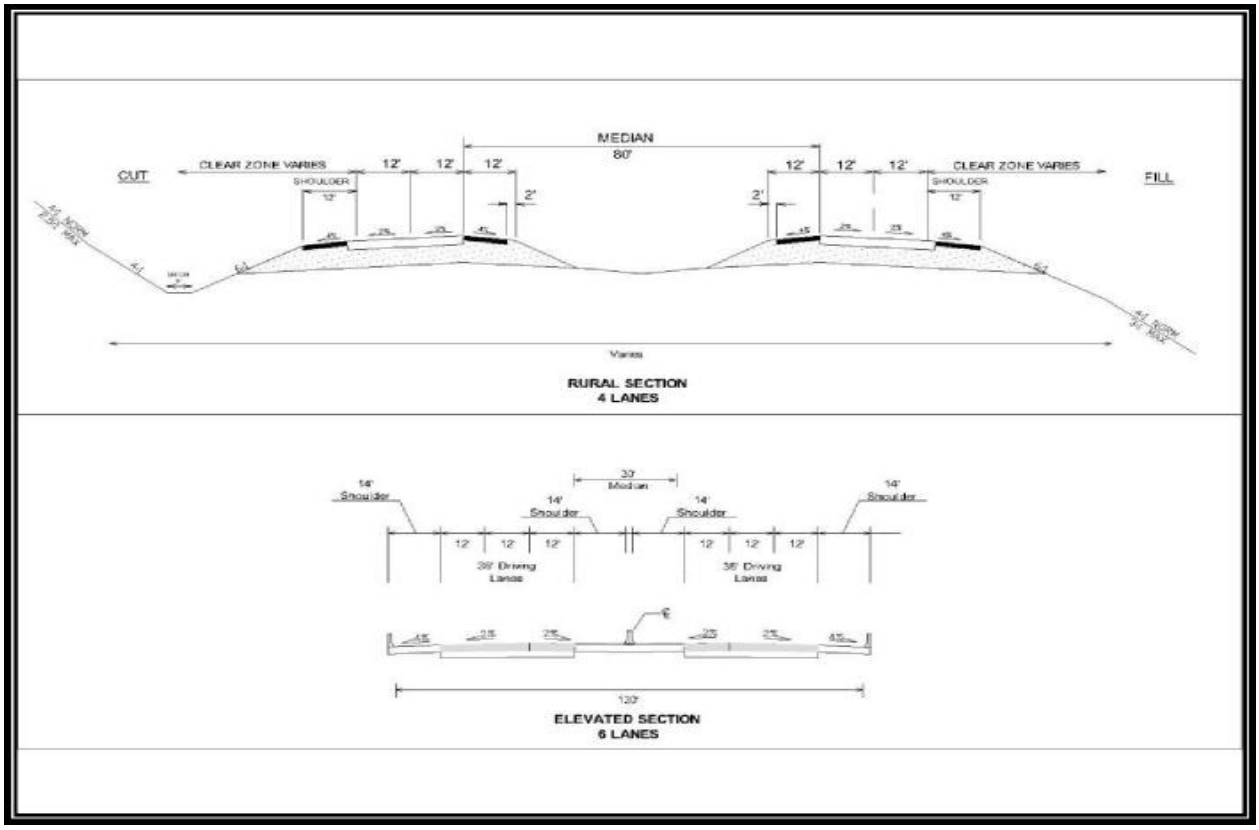

Figure 4: Typical Section for SIU #4 (from DEIS January 2004)

The corridors carried forward into the Level 2 analysis are shown in Figure 5 *(p. 8)*. The corridors from the Level 1 analysis were renamed, proceeding in order from west-to-east. Corridor J became Corridor 1 (and J1 as 1A), Corridor H as Corridor 2, Corridor I as Corridor 3, and then a No-Build Alternative. More detailed engineering and environmental evaluations continued on these alternatives. According to the DEIS, the proposed facility was still anticipated to provide a highway designed to interstate standards and would be signed I-69. Typical roadway sections were prepared for the purpose of evaluating the potential environmental impacts of each of the build alternatives and are shown in Figure 4. More refined typical sections were to be developed during subsequent phases of the project.

After extensive public and resource agency involvement, as well as commentary by various community and civic organizations and local elected officials, the four remaining corridors were evaluated based on a comparison of:

- Impacts on the natural and human environments
- Traffic impacts on the local and regional transportation systems
- Bicycle and pedestrian considerations
- Construction impacts, including costs to construct
- Seismic considerations
- Travel times and hence user operating costs

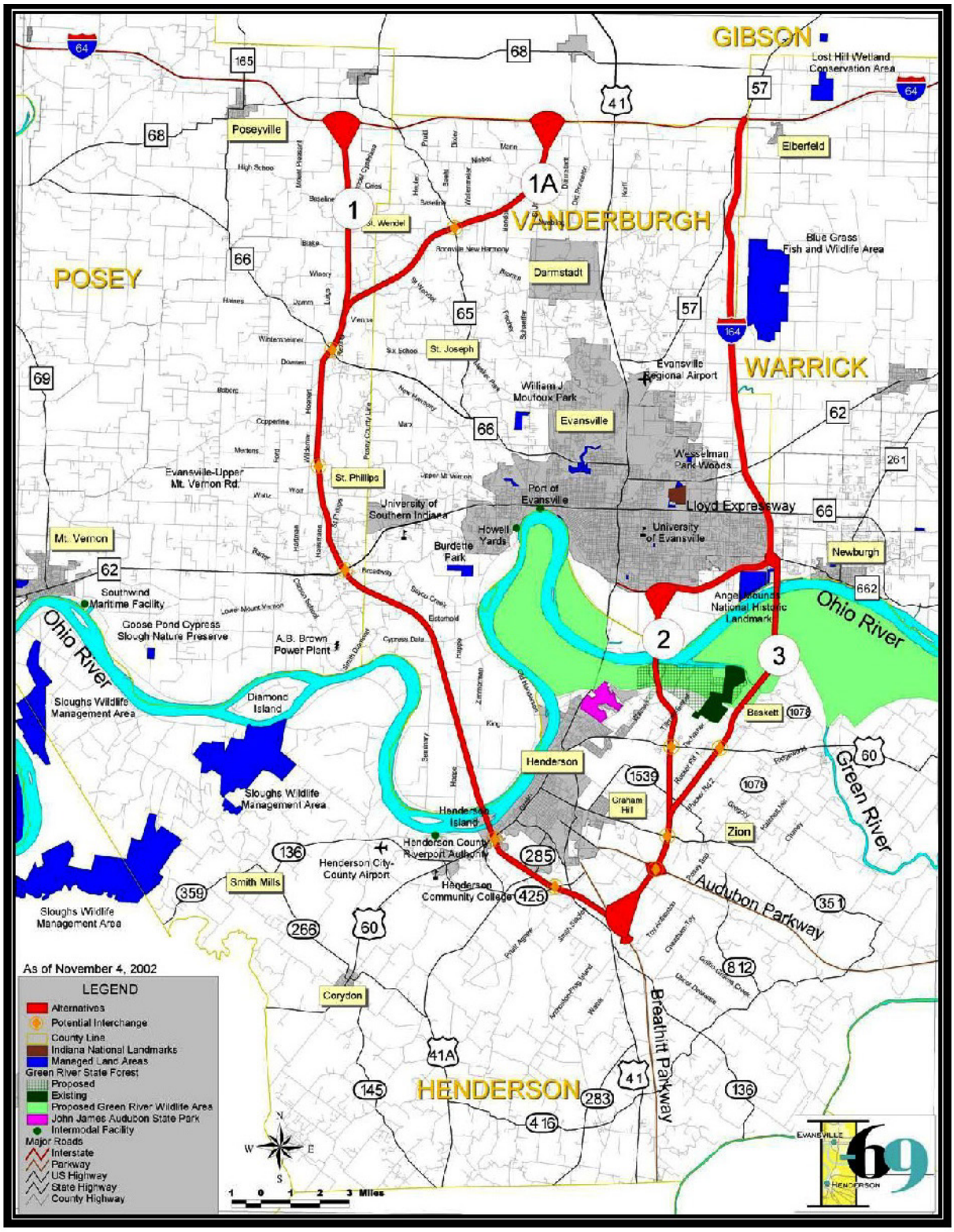

Figure 5: Four Corridors Identified for More Detailed Consideration

Table 2: Alternative Performance from DEIS (Table 2-10)

	ALTERNATIVE				
	No-Build	1	1A	2	3
PURPOSE AND NEED CONSIDERATIONS					
Meet current freeway design standards	NO	YES	YES	YES	YES
Provide sufficient capacity for new bridge and new bridge approaches	NO	YES	YES	YES	YES
Provide additional Ohio River crossing	NO	YES	YES	YES	YES
Decrease congestion on existing US 41 river crossing (LOS on existing bridges)	F	F	F	C	D
Improve safety by providing cross-river transportation that meets freeway design standards	NO	YES	YES	YES	YES
Traffic Performance					
Reduction of VHT on arterials (rank)[1]	--	+9.4% (4)	+5.2% (1)	+6.2% (2)	+6.3% (3)
Reduction of VHT on US 41 (rank)[1]	--	-8.7% (4)	-12.3% (3)	-29.3% (1)	-28.9% (2)
Reduction of truck VHT (rank)[1]	--	+5.5% (4)	+1.7% (3)	+1.1% (2)	+0.3% (1)
ENVIRONMENTAL CONSIDERATIONS					
Total Right-of-Way (acres)	0	1524.9	1737.4	747.2	723.4
Potential Hazardous Material Sites (HazMat)	N/A	4	5	1	4
Total Forest (net loss in acres)	N/A	243	258	55	44
Core Forest (net loss in acres)	N/A	14.7	20.1	13.4	0
Total Wetlands (acres)	N/A	25.85-30.40	24.55-28.85	30.15-36.40	36.45-40.35
USACE Jurisdictional Wetlands (acres)	N/A	22.74-27.29	20.40-24.70	29.35-35.60	35.16-39.06
USACE Non-jurisdictional Welands (acres)	N/A	3.11	4.15	0.8	1.29
Total Floodplains Crossed (mi)	N/A	12.9	14.6	7.0	7.9
4(f) Property Uses	N/A	0	0	0	0
Total Farmland[2] (acres)	N/A	1,077.90	1,292.70	592.8	538.1
Prime & Unique[3] (acres)	N/A	977.4	1,235.40	623.9	645.2
Total Homes/Apartment Units Relocations	N/A	61	71	6	74
Business Relocations	N/A	6	6	0	7
Potential Archaeological Impacts (sites)	N/A	12	12	6	5
Environmental Justice Issues	N/A	NO	NO	NO	NO
Number of Streams Encroached	N/A	58	66	41	42
Number of Noise Impacted Receivers	41	51	51	39	19
Adversely Effected Historic Properties	0	9	9	4	7
Adversely Effected National Historic Landmarks	0	0	0	0	1
Exceed Ambient Air Quality Standards	NO	NO	NO	NO	NO
ENGINEERING CONSIDERATIONS					
Total length (miles)	N/A	31.8	35.2	31.5	29.7
New construction (miles)	N/A	31.8	35.2	13.2	14.7
Structure length (miles)	N/A	9.0	9.0	4.0	7.0
Estimated Total Cost (In 2003 Millions)[4]	$0	$1,058	$1,088	$652	$799
Constructability (High, Moderate, or Low)	N/A	L	L	H	M

The information included in this chart is based upon the most recent available data. As such, it is subject to change during the development of the FEIS.

1. VHT=Vehicle Hours of Travel. Compares the 2025 Build Network including I-69 SIU #3 in the SR 57 corridor to the No-Build Scenario. This information pertains to the Henderson-Evansville regional transportation network.
2. Farmland includes currently used agricultural land, including row crop production, pastures and hay production areas.
3. Prime & Unique farmland includes some woodlands based on soil types.
4. Cost estimates reflect bridging of all floodplains.

Alternative 2 in Figure 5 *(p. 8)* was identified as the preferred alternative in the DEIS. As shown in Table 2 *(p. 9)* from the DEIS, some of the advantages included:

- Fewest impacts to historic properties
- Fewest number of streams crossed
- Fewest residential and business relocations
- Low Environmental Justice impacts
- Attracts the highest traffic volumes to a new river crossing
- Crosses the fewest miles of floodplain
- Least costly
- Enables the shortest Ohio River bridge
- Fewest potential HAZMAT sites
- No visual or noise impacts on Angel Mounds State Historic Site (a National Landmark and listed on the National Register of Historic Places)

A DEIS was signed on January 27, 2004. However, a Final Environmental Impact Statement, though prepared in draft form and quoted liberally here, has never been approved because there was not an identified funding source. Thus, the Evansville Metropolitan Planning Organization (MPO) could not approve the project in their fiscally constrained TIP and Long Range Transportation Plan.

Technical Memorandum Conceptual Financing Plan For I-69 Corridor Henderson, Kentucky and Evansville, Indiana (May 2008) was prepared (*see Appendix C*) to identify a series of potential financing planning documents for the I-69 DEIS Preferred Alternative 2 corridor in the vicinity of Henderson, Kentucky and Evansville, Indiana. The DEIS Preferred Alternative 2 is estimated to cost over $1 billion, making it a mega-project (projects over $500 million) according to the Federal Highway Administration.

Mega-projects are very challenging for transportation agencies across the country to fund with their federal apportionment and state gas tax revenue. With traditional funding programs inadequate, states are increasingly looking at tolling as a revenue source for these projects. The 2008 Corridor Study, which was a traffic update considering tolling from Henderson to Evansville, showed a heavy traffic diversion from the DEIS Preferred Alternative 2 to the existing US 41 Ohio River bridges. Traffic diversion to free facilities limits the effectiveness of tolls as a revenue source. Design year 2030 projected cross-river average daily traffic is 57,500 vpd. According to the 2008 study, if only I-69 were tolled, fewer cross-river travelers would use I-69 as toll rates increase. Assuming a $2.00 toll on the new I-69 bridge by year 2030, the projected traffic on that bridge would be only 600 vpd *(see Table 3, p. 11).* The remaining motorists would use the existing un-tolled US 41 bridges over the Ohio River. If both of the existing bridges were also to be tolled; there would be a more equal distribution of vehicles on both facilities (60% I-69/40% US 41). It was noted that current federal toll programs may only allow the revenue generated from the US 41 crossing to be used for operational and maintenance expenses of that facility.

Traffic Forecast Report, Henderson County, I-69 Corridor Item 2-69.00. The traffic utilized in the signed DEIS and the DFEIS is summarized in Table 4 (*p. 12*). KYTC subsequently

prepared a Traffic Forecast which used a current year of 2007 and a forecast year of 2030 (*see Appendix B, KYTC Traffic Forecast Report for I-69 SIU #4*). Qk4 was charged with projecting this information to 2040, covered in more detail in 3.2 *Assess Existing and Future Traffic*.

Table 3: 2030 Analysis for Scenarios With and Without Tolls on I-69 and US 41 in Henderson, KY

Alternative 2030	Tolled	$ 0.00	$ 0.50	$ 1.00	$ 1.50	$ 2.00
No-build						
Total Henderson Volume	No	**57,500**				
US 41 bridges	No	57,500				
Scenario 2, Alternative 2						
Total Henderson Volume	**No**	**57,500**				
US 41 bridges	No	23,000				
I-69 bridges	No	34,500				
Total Henderson Volume	**Partial**	**57,500**	**57,500**	**56,400**	**54,700**	**54,100**
US 41 bridges	No	23,000	36,800	46,000	51,200	53,500
I-69 bridges	Yes	34,500	20,700	10,400	3,500	600
Total Henderson Volume	**YES**	**57,500**	**54,200**	**52,200**	**51,000**	**50,700**
US 41 bridges	Yes	23,000	23,100	23,200	23,300	23,600
I-69 bridges	Yes	34,500	31,100	29,000	27,700	27,100

Impedance modeled as 30 seconds of delay equals $0.10 of toll. For instances when both bridges are tolled, the results assume both bridges are tolled at the same rate.

Task 3.0 Identify Project Information

Qk4 was responsible for obtaining, analyzing, and updating select data, including crash data, traffic data, traffic forecasts, and projects in the corridor identified from KYTC input, the Six Year Plan, long-range plan, and Unscheduled Projects List, as appropriate.

3.1 Obtain Highway Data

Qk4 was to obtain and compile traffic data and Highway Information (HIS) data from the DEIS to the maximum extent possible, and supplement any additional information necessary. General data from HIS was updated for affected routes in the project area and summarized in the Existing and Future No-Build Conditions Inventory, Table 5 *(p.13).* Traffic was projected to year 2040 for the various routes utilizing historical growth rates and the aforementioned traffic documents. (*See Appendix D for the projected traffic forecasts and Appendix E for the capacity analyses performed for this task.*)

As in the DEIS, crash analysis was performed only on US 41 in the project area. Crash information was updated using the Kentucky Transportation Center's Buildup Program for 2009-2011 and is shown in Table 6 *(p. 14).* The sole crash issue appears to be located at US 41 and Watson Lane with a Critical Crash Rate Factor >1.0. A Critical Crash Rate Factor > 1.0 indicates that crashes are not likely occurring at random.

Table 4: Roadway Characteristics and Traffic (EUTS Travel Model 2000, DEIS)

ROADWAY CHARACTERISTICS AND TRAFFIC								
Route	Begin Point	End Point	# of Lanes	Functional Class	2000 ADT[2] (two- way)	Year 2000 LOS[3]	2025 ADT (two-way)	Year 2025 LOS
US 41	I-164	Waterworks Rd. (no signal yet)	4	Urban Principal Arterial	45,463	F	46,847	F
	Waterworks Rd. (Indiana)	Stratman Rd. (KY 414) no signal yet	4	Urban Principal Arterial	51,112	F	56,993	F
	Stratman Rd. (KY 414)	Watson Ln. (signal)	4	Urban Principal Arterial	48,918	E	49,429	F
	Watson Ln.	Harmony Ln. (signal)	4	Urban Principal Arterial	41,024	F	36,7554	E
	Harmony Ln.	Rettig Rd. (signal)	4	Urban Principal Arterial	41,024	F	38,1884	E
	Rettig Rd.	Barrett Blvd. (signal)	4	Urban Principal Arterial	47,595	F	36,8644	E
	Barrett Blvd.	US 60	4	Urban Principal Arterial	47,595	F	39,6124	E
Breathitt Parkway	US 60	KY 351/US 41	4	Urban Freeway	31,429	B	38,810	B
	KY 351/US 41	Audubon Pkwy.	4	Urban Freeway	19,516	A	26,725	B
	Audubon Parkway	KY 425	4	Urban Freeway	17,631	A	23,025	A
	KY 425	KY 416	4	Rural Principal Arterial	12,437	A	17,135	A

Source: EUTS Travel Model (developed in 2000)
NOTES:
[1]Existing and projected traffic volumes do not include traffic resulting from the I-69 National Corridor.
[2]ADT = Average Daily Traffic
[3]LOS = Level of Service
[4]Modeling indicates that volumes will decrease on these segments of US 41 as traffic diverts to less congested routes and because of a forecasted decline in population and employment in the immediate vicinity.

Table 5: Existing and Future No-Build Conditions Inventory

Route	Beginning MP	Beginning Feature	Ending MP	Ending Feature	Length	Signal (Y/N) Type	# of Lanes	Lane Width	Shoulder Type	Shoulder Width	Median Type	Median Width	Speed Limit	Traffic Count (ADT)	Estimate / Actual (Year)	% Total Trucks	FUNCTIONAL CLASS	2013 ADT* (two-way)	2013 LOS	2040 ADT (two-way)	2040 LOS
US 41	13.641	KY 351 Overpass	14.079	KY 351 Overpass	0.438	N	4	12	Paved w/ Bituminous Material	L-5/R-10	Depressed/Conc. Bar.	40/13	55/50	31,900	Actual (2013)	11.00%	Urban Principal Arterial	31,900	C	54,400	D
	14.079	KY 351 Overpass	16.047	US 60/US 41A Underpass	1.968	N															
	16.047	US 60/US 41A Underpass	16.545	Park Way	0.498	Other/N					Conc. Bar./Flush	13/15	50/45	37,717	Actual (2011)	13.90%		38,600	D	68455**	F
	16.545	Park Way	16.582	Barrett Boulevard	0.037	Other/N			Left-No Shoulders or Curbs/Right-Curbed	0/2	Flush	15	45								
	16.582	Barrett Boulevard	16.807	Marywood Drive/Rettig Road	0.225	Y/Actuated															
	16.807	Marywood Drive/Rettig Road	16.848	Canary Lane	0.041	Other/N								40,374	Actual (2011)	15.30%					
	16.848	Canary Lane	16.899	Robin Road	0.051	Other/N															
	16.899	Robin Road	16.944	Harmony Lane	0.045	Other/N															
	16.944	Harmony Lane	16.992	Walker Drive	0.048	Other/N															
	16.992	Walker Drive	17.123	Mall Entrance	0.131	Y/Actuated															
	17.123	Mall Entrance	17.172	Barker Road	0.049	Other/N															
	17.172	Barker Road	17.325	Paul Drive	0.153	Other/N															
	17.325	Paul Drive	17.407	Watson Lane	0.082	Y/Actuated															
	17.407	Watson Lane	17.746	Walnut Lane	0.339	Other/N							45/50	37,557	Actual (2011)						
	17.746	Walnut Lane	17.823	J.J. Audubon State Park	0.077	Other/N							50								
	17.823	J.J. Audubon State Park	17.970	Racetrack Road	0.147	Other/N															
	17.970	Racetrack Road	18.471	KY 414	0.501	Other/N							50/55								
	18.471	KY 414	18.538	Wolf Hills Road	0.067	Other/N			Paved w/ Bituminous Material	10	Depressed	99	55								
	18.538	Wolf Hills Road	20.483	KY 3522	1.945	Stop Sign				10/3		99/45									
	20.483	KY 3522	21.041	KY - IN State Line	0.558	N/A				3		45									
US 41A	17.075	Fourteenth Street	17.152	Herron Avenue	0.077	Other/N	5	12	Curbed	0/1	Raised Non Mountable	4	35/45	29,314	Actual (2011)	9.50%	Urban Principal Arterial	29,900	B	39,900	D
	17.152	Herron Avenue	17.231	Richardson Avenue	0.079	Other/N	5/2						45								
	17.231	Richardson Avenue	17.436	US 60 & US 41 Overpass	0.205	N	2			1											
US 60	10.283	Borax Drive/US 41A	10.283	US 41A & US 41 Overpass	0.000	Y/Actuated	2	12	Paved w/ Bituminous Material/Curbed	3/10/9	Raised Non Mountable/None	4	45	16,188	Actual (2011)	8.20%	Urban Principal Arterial	16,500	B	21,600	B
	10.283	US 41A & US 41 Overpass	10.600	Barret Boulevard	0.317	N	2/4														
	10.600	Barret Boulevard	10.723	Manor Drive	0.123	Other/N	4		Curbed	1	None	N/A									
	10.723	Manor Drive	10.790	Marywood Drive	0.067	Other/N															
	10.790	Marywood Drive	10.828	Green River Road	0.038	Other/N															
	10.828	Green River Road	10.962	Killiecrankie Drive	0.134	Y/Actuated															
	10.962	Killiecrankie Drive	11.124	Deer Lane	0.162	Other/N															
	11.124	Deer Lane	11.197	Starlight / Cosby Drive	0.073	Other/N															
	11.197	Starlight / Cosby Drive	11.310	Bend Gate Road	0.113	Other/N															
	11.310	Bend Gate Road	11.396	Watson Lane	0.086	Y/Actuated															
	11.396	Watson Lane	11.616	Frontier Drive	0.220	Other/N								8,658	Actual (2010)	5.70%	Urban Minor Arterial	9,300	A	12,200	A
	11.616	Frontier Drive	11.714	Pebble Creek Drive	0.098	Other/N															
	11.714	Pebble Creek Drive	12.136	Chambers Place	0.422	Other/N							45/55								
	12.136	Chambers Place	12.351	Wathen Lane	0.215	Other/N	4/3														
	12.351	Wathen Lane	13.178	Tillman-Bethel Road	0.827	Other/N	2		Paved w/ Bituminous Material	9/7	Flush/None	12	55						E		E
	13.178	Tillman-Bethel Road	13.618	Morris Drive	0.440	Other/N				7	None	N/A									
EB 9004 Breathitt Parkway	68.359	KY 416	76.254	KY 425	7.895	N/A	4	12	Paved w/ Bituminous Material	3/10	Depressed	30	70	11,342	2,011	27.40%	Rural Prinicpal	11,500	A	15,100	A
	76.254	KY 425	77.250	Audubon Parkway Underpass	0.9960	N/A	4	12		3/10	Depressed	30	70	18,106	2012		Urban Freeway	19,100	B	25,000	B
	77.250	Audubon Parkway Underpass	78.306	US 41 Overpass	1.0560	N/A	4	12					1	22,010				22,400	B	29,900	B
CS-1372 (Watson Lane)	0.000	US 60	0.000	US 60	0.000	Y/Actuated	2	10	Curbed	0	None	N/A	30	8,820	2012	N/A	City Street	Not Calculated			
	0.000	US 60	0.039	Wilderness Drive	0.039	Other/N															
	0.039	Wilderness Drive	0.099	Flintlock Drive	0.060	Other/N															
	0.099	Flintlock Drive	0.167	Donaldson Drive	0.068	Other/N															
	0.167	Donaldson Drive	0.231	Tippecanoe Trail	0.064	Other/N															
	0.231	Tippecanoe Trail	0.309	Green River Road	0.078	Stop Sign															
	0.309	Green River Road	0.535	Wildwood Creek Lane	0.226	Other/N								6,703	2012						
	0.535	Wildwood Creek Lane	0.575	Park Lane	0.040	Other/N			Combination	4											
	0.575	Park Lane	0.626	Browns Drive	0.051	Other/N															
	0.626	Browns Drive	0.754	Stonegate Drive	0.128	Other/N															
	0.754	Stonegate Drive	0.921	Clayton Place	0.167	Other/N															
	0.921	Clayton Place	0.964	Zehner Lane	0.043	Other/N															
	0.964	Zehner Lane	1.009	Brinson Avenue	0.045	Other/N				6											
	1.009	Brinson Avenue	1.035	Sureway Drive	0.026	Other/N			Curbed	0											
	1.035	Sureway Drive	1.094	US 41	0.059	Y/Actuated															
	1.094	US 41	1.1630	North Elm Street	0.0690	Other/N			Combination	4											

*Projected utilizing most current traffic volumes.
** Projected from the No Build Alternative in the Techinical Memorandum Conceptual Financing Plan for I-69 Corridor May, 2008

Table 6: Roadway Crash Data

				Injury						Fatal			
Route	Beg MP	End MP	ADT	# of Injury Crashes	Actual Injury Crash Rate	Average Injury Crash Rate	Injury Critical Crash Rate	Injury CRF	Number of Fatal Crashes	Actual Fatal Crash Rate	Average Fatal Crash Rate	Fatal Critical Crash Rate	Fatal CRF
US 41	16.047	21.041	36745	86	42.799	69.392	84.779	0.505	1	0.507	1.089	3.256	0.156
US 41	State Line	US 60			70.850*	79.000*			1*	0.800*	0.600*		
*From Final DEIS From 1/1/96 thru 6/30/01 except for Fatal Crashes (1998-2000)													

				Overall				
Route	Beg MP	Ending MP	ADT	Number of Crashes	Actual Overall Crash Rate	Average Overall Crash Rate	Overall Critical Crash Rate	Overall CRF
US 41	16.047	21.041	36745	520	258.719	364.331	399.262	0.648
2009-2011 Data from KTC Lookup Program								

0.1 Mile Spots for US 41 January 1, 2009 to December 31, 2011																	
Route	Suffix	BMP	EMP	Crashes	AADT	R/U	MT	FC	NL	CACT	CR	CRF	CAVG	Fatalities	Injuries	Fatal Crashes	Injury Crashes
US41	Watson Ln	17.405	17.505	58	36777	Urban	Undivided	14 pa non	4	1.440	0.925	1.557	0.599	1	15	1	9

Barge Crashes: An email with attachment dated May 2, 2013 obtained from the U.S. Coast Guard *(see Appendix F, Assessment of US 41 Existing Structures)*, showed the US 41 twin bridges were struck by barges (or associated craft) 10 times between March 23, 1993 and May 1, 2013. Records state that there was minor damage to the bridges for one incident, no damage for seven of the incidents, and two with unknown documentation regarding the damage to the bridge. Coast Guard documentation cites a barge crash every other year.

Seismic Events: According to the DEIS, seismic events are known to occur in and near the project study area. The current Ohio River bridge crossing is not designed to meet current American Associate of Highway and Transportation Officials (AASHTO) design standards for seismic activity. A new Ohio River bridge crossing would provide a crossing that meets current seismic design criteria.

3.2 Assess Existing and Future Traffic

A recent traffic analysis was available with the *Technical Memorandum Conceptual Financing Plan for I-69 Corridor, Henderson, Kentucky and Evansville, Indiana, May 2008 (see Appendix C).* This document was to identify potential elements of a plan that could use a variety of funding mechanisms to pay for the development and construction cost of the I-69 corridor. This memorandum addressed scenarios with and without tolls on I-69 and US 41 in Henderson.

Therefore, using the 2008 document, traffic both vehicular and truck traffic were projected to 2040 for the No-Build and the DEIS Preferred Alternative 2 downtown bridges with no tolls, and various tolling scenarios. The KYTC *Traffic Forecast Report Henderson County I-69 Corridor Study Item No. 2-69.00 (see Appendix B)* uses 2007 as the base year and 2030 as the target year. The growth rates used in the tables therein generally do not correspond to those stated in the text of that report, so the growth rates from 2007 to 2030 were "back-calculated." A growth rate of 1.76% for vehicles and 3.84% for trucks was utilized. Using these back-calculated growth rates, 2013 volumes were estimated and 2030 volumes were projected further out to 2040 (*see Tables 7 and 8*).

The KYTC Forecast includes a traffic projection for the US 41 bridges with no tolls and no I-69 bridge. That document also includes a traffic projection for the US 41 bridges and an I-69 bridge under various tolling scenarios. The KYTC Traffic Forecast produces similar, but not identical, numbers as the DEIS (prepared four years earlier).

The KYTC forecast assumes that the total future traffic crossing the Ohio River at Henderson is the same daily volume **with or without an I-69 crossing** under the no-toll scenario *(see Tables 7 and 8)*. Sixty percent of future year traffic would use I-69 and 40% residual future year traffic would use US 41 in the year 2030. Using the different growth rates in the KYTC forecast for I-69 and US 41, the 2040 traffic projection estimates that 70% of the traffic would use the I-69 crossing.

Table 7: Projected Total Traffic Volumes

		2007	2013	2030	2040
	Tolled	**$0.00**			
Total Henderson Volume	**NO**	**38,500**	**42,747**	**57,500**	**68,455**
Total Henderson Volume	**NO**	**38,500**	**42,747**	**57,500**	**68,455**
US 41 bridges	No	38,500	42,747	57,500	68,455
Scenario 2, Alternative 2	**Tolled**				
Total Henderson Volume	**NO**	**38,500**	**41,914**	**57,500**	**72,869**
US 41 bridges	No	24,000	23,735	23,000	22,578
I-69 bridges	No	14,500	18,179	34,500	50,291

Table 8: Projected Truck Volumes

		2007	2013	2030	2040
	TOLLED	**$0.00**			
Total Henderson Truck Volume	**NO**	**5,400**	**6,651**	**12,000**	**16,982**
Total Henderson Truck Volume	**NO**	**5,400**	**6,651**	**12,000**	**16,982**
US 41 bridges	No	5,400	6,651	12,000	16.982
SCENARIO 2, ALTERNATIVE 2	**TOLLED**	**$0.00**			
Total Henderson Truck Volume	**NO**	**5,400**	**6,513**	**12,000**	**17,462**
US 41 bridges	No	3,400	3,720	4,800	5,576
I-69 bridges	No	2,000	2,793	7,200	11,885

NOTE: Base Numbers from *Technical Memorandum Conceptual Financing Plan for I-69 Corridor, Henderson, Kentucky and Evansville, Indiana,* May 2008.

3.3 Summarize Existing Conditions

Previous data and new data has been reviewed, evaluated and presented with regard to deficiencies, needs, and proposed projects.

In Kentucky, the Breathitt Parkway from the current I-69 Corridor interchange with the Western Kentucky Parkway in Hopkins County north to the US 41 interchange in Henderson, and US 41 north to US 60 are both controlled access facilities. That full control of access ends and US 41 begins as a five-lane roadway north across the Ohio River to I-164 (a fully controlled access facility in Indiana). As shown in the following Figure 6, US 41 from its interchange with US 60 north to I-164 in Indiana is a control of access systems gap.

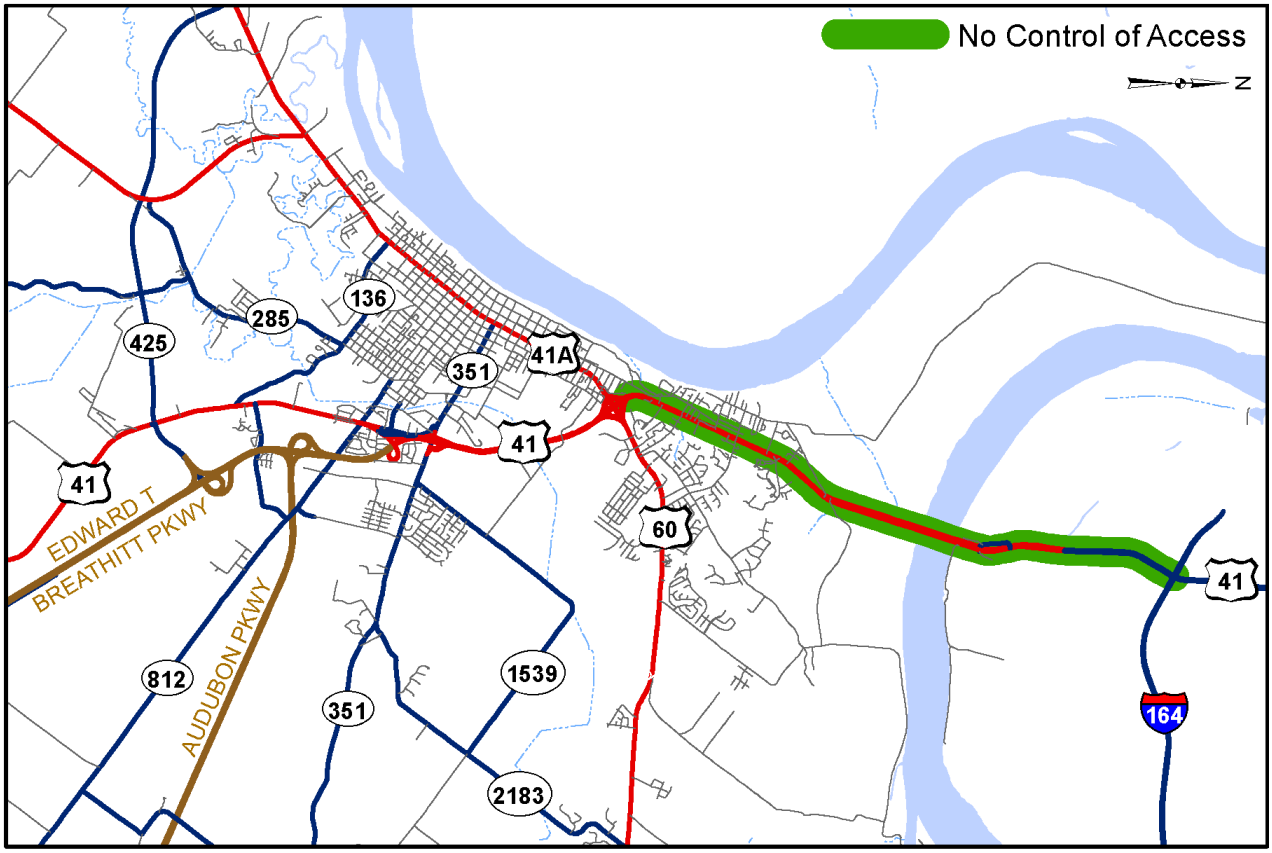

Figure 6: Systems Gap

3.4 Field Review

Qk4 conducted several field review(s) of the project area to collect available information that may have a significant effect on cost estimates (e.g., high pressure gas line). A major gas pipeline at the northern end was identified through existing topographic mapping and field review (*see Figure 7*). Major transmission lines were also identified to ensure a more accurate representation of where those lines

Figure 7: Gas Pipeline

crossed the study area. In addition, a field review revealed some possible minority and low income housing areas, along with a golf course, and an additional park. Therefore, an initial identification of census data was performed to bring those issues to the forefront. PVA information from the City of Henderson identified numerous businesses along US 41 from US 60 to the Ohio River bridges with some total tax values exceeding $20M.

Figure 8: Subdivision Development

A major subdivision expansion was also identified along the DEIS Preferred Alternative 2 corridor as shown in Figure 8.

3.5 Mapping

The Henderson City-County Planning Commission's GIS department provided aerial photography for this project. Utility information was not available. Previous KYTC efforts were used as information sources as much as possible for this task.

3.6 Environmental Issues

This task involved identifying environmental issues addressed in the DEIS and incorporating those into maps and exhibits, adding any readily apparent or available changes or additions of information. These issues are addressed and illustrated in detail in *Task 5.0 Environmental Summary.*

3.7 Assessment of US 41 Existing Structures

KYTC provided a summary that addressed the life expectancy of the existing structures and the estimated cost of maintenance for that lifetime to be addressed in this Feasibility Study (*see Appendix F*). These costs shown in Table 9 were reviewed and incorporated in the concept development alternatives in this Feasibility Report. The barge crashes associated with these structures are addressed in Task 3.1 of this Feasibility Study.

As to life expectancy of the existing US 41 Ohio River bridges, KYTC stated that the paint system put on in 2008 has already failed on both structures and overlays are warranted now as well. Those two items alone are around $40 million. Due to budget concerns, KYTC has projected the painting and overlays will not occur for several years. However, major investments are currently needed. The superstructures are in good condition except for some structural repairs, posting is not expected. If painting, overlays, and some minor structural steel work can occur within the next 10 years, these structures would probably last another 20 to 25 years after the improvements are made. The northbound structure is older and was built in 1932. With a 75-year design life, that structure should be replaced *(see Table 9)*. Each bridge is discussed in detail under their appropriate subheading below.

Henderson Southbound 051B00007L — U.S. 41 Southbound over Ohio River: This bridge was built in 1965 with a deck overlay placed in 1979. The last painting was performed in 2008. The current sufficiency rating is 67 and is classified as functionally obsolete. The main spans are comprised of bolted and welded thru trusses totaling 2,293 feet and girder spans on the Kentucky and Indiana approaches for an overall bridge length of 5,427 feet. Per the 2012 fracture critical inspection the deck is rated a "6", and the superstructure and substructure are both rated a "6" indicating a satisfactory condition. The wearing surface on the bridge deck is currently a "5" indicating a fair condition.

Henderson Northbound 051B00002R — U.S. 41 Northbound over Ohio River: This bridge was built in 1932 with a deck overlay placed in 1982. The last painting was performed in 2008. The current sufficiency rating is 69 and is classified as functionally obsolete. The main spans are comprised of built up members for thru trusses totaling 2,293 feet with deck and girder spans on the Kentucky and Indiana approaches for an overall bridge length of 5,395 feet. Per the 2012 fracture critical inspection the deck is rated a "6", and the superstructure and substructure are both rated a "6" indicating a satisfactory condition. The wearing surface on the bridge deck is currently a "6" indicating a satisfactory condition.

Table 9: Past and Future Projects with Existing US 41 Bridge Costs

Tasks	Southbound Cost	Northbound Cost	Total Cost
2008 Painting	$10,600,000	$10,600,000	$21,200,000
2008 Fracture Critical Inspection	$76,000	$77,000	$153,000
2010 Fracture Critical Inspection	$69,000	$70,000	$139,000
2012 Fracture Critical Inspection	$137,000	$90,000	$227,000
SUBTOTAL PRIOR TO 2013	$10,882,000	$10,844,000	$21,719,000
2014 Fracture Critical Inspection	$140,000	$100,000	$240,000
2015 Structural Steel Repairs	$200,000	$500,000	$700,000
2016 Fracture Critical Inspection	$140,000	$100,000	$240,000
2017 Deck Overlay	$11,000,000	$11,000,000	$22,000,000
2018 In-depth Inspection	$260,000	$200,000	$460,000
2019 Structural Steel Repairs	$1,000,000	$1,000,000	$2,000,000
2020 Fracture Critical Inspection	$140,000	$100,000	$240,000
2021 Painting	$12,000,000	$12,000,000	$24,000,000
2022 Fracture Critical Inspection	$140,000	$100,000	$240,000
2024 Fracture Critical Inspection	$140,000	$100,000	$240,000
2026 Fracture Critical Inspection	$140,000	$100,000	$240,000
2028 Fracture Critical Inspection	$140,000	$100,000	$240,000
2030 Deck Rehabilitation	$20,000,000	$20,000,000	$40,000,000
Anticipated Costs From 2013 To 2030 Totals	$45,440,000	$45,400,000	$90,840,000

Task 5.0 Environmental Summary

A review of the previous environmental documentation is addressed in Task 2.0. Figure 13 *(p. 28)* illustrates what was considered from the previous documentation as "environmental issues" and what features were identified as part of this Feasibility Study. This information was taken from various documents cited in this report and supplemented by additional data. A field review and available mapping investigation did identify a major gas pipeline and subdivision development in the DEIS Preferred Alternative 2 corridor. The pipeline was identified, along with major overhead transmission lines, UST/HAZMAT concerns along US 41, parcels of interest, and possible areas of environmental justice concerns. This environmental overview is to assess potential key environmental resources, impacts, and issues that would be important during the future environmental documentation stage of this project, which is the Kentucky portion of I-69, Section of Independent Utility 4 (SIU #4)[5]. The study area begins just south of the Ohio River, and extends to logical connections with the Breathitt Parkway / future I-69 SIU #5.

SIU #4 Background and History. On May 10, 2001 the Federal Highway Administration (FHWA) published a Notice of Intent (NOI) to develop a DEIS for SIU #4, which began the environmental process for this section. The process examined alternative corridors on the west and east sides of the two cities. On February 11, 2004, the DEIS was issued and made available for public comment. The recommended alignment in the DEIS was Alternative 2, which would use existing I-164 (now designated as I-69) in Evansville, and therefore be substantially less expensive than the other alternatives. Even so, the 2004 estimated cost of this alignment was $652 million. Federal law classifies projects greater than $500 million as a "Mega Project," and requires a project-specific financial plan be developed. While the Evansville MPO endorsed the plan, federal transportation planning regulations require that the MPO's metropolitan transportation plan (MTP) be "fiscally constrained," meaning that the plan can only be approved if sufficient funding is reasonably anticipated for each project. As stated previously, no identified funding source for the I-69 SIU #4 project could be identified; therefore, the project could not be included in the MTP, a project-specific financial plan could not be developed, and the project has not been advanced past the DEIS stage. Due to the number of years since the issuance of the DEIS, should a funding source for the project be identified, the alternatives, environmental analysis, and documentation would need to be re-assessed, beginning with the publication of a new NOI. Much of the previous work could be used as background information, and would be built upon as the project progressed.

Environmental Considerations. The anticipated environmental impacts associated with the alternatives under consideration are substantial, and would likely warrant another EIS-level of analysis. In the future stages direct, indirect, and cumulative impacts from the following key areas, and possibly others, would be warranted. The future analysis would also warrant coordination with various local, regional, and federal agencies and resources agencies. The Scope of Work addressed two corridors for concept alternatives, one corridor (west) is near the existing US 41 Corridor, the second corridor (east), is east of US 41 near the preferred Alternative 2 from the DEIS. The following discussion uses those corridors to address impacts of anticipated key areas of concern.

[5] SIU #4 is the Henderson, KY / Evansville, IN connection of the national I-69 project, which includes 32 sections from Brownsville, Texas (at the border with Mexico) to Port Huron, Michigan (at the border with Canada).

- Air Quality. Of the six major air quality pollutants—particulate matter (PM), sulfur dioxide (SO2), carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2) and lead (Pb)—Henderson County is currently compliant with all National Ambient Air Quality Standards (NAAQS), except for Ozone. The Kentucky Division of Air Quality's *2012 Annual Report* (the most current available) states Henderson County exceeds the minimum 8-hour average allowed. Due to the anticipated high volumes of traffic, including truck traffic, air quality analysis would be an important factor during the future environmental documentation process. As the alternatives under study in the Planning Report would be in and near the urban area of Henderson, mobile source air toxic (MSAT), carbon monoxide (CO), and particulate matter (PM) would be important health concerns, and FHWA could require alternative-specific quantitative analyses for project-level conformity.

- Highway Noise. The alternatives under consideration in this Feasibility Report are located in and near urban/suburban residential areas, and noise-sensitive rural areas, including the proposed Green River National Wildlife Refuge, John James Audubon State Park Nature Preserve, and Green River State Forest. The urban/suburban areas include noise sensitive homes, churches, day cares, cemeteries, public parks and possibly others. These settings indicate the noise impacts and mitigation would be a key public concern.

  A detailed alternative-specific traffic noise model would need to be conducted to determine if future noise levels approach or exceed the Kentucky adopted FHWA National Abatement Criteria (NAC). Based on the adjacent and nearby land uses, anticipated future traffic volumes and mix of vehicles, it can be reasonably assumed that noise abatement measure would be required, regardless of the alternative. While the construction of noise barriers along the interstate are often given the most consideration as abatement measures, other measures such as quiet pavement design, and quiet bridge joint designs could be warranted.

- Natural Resources. As can be seen on the Environmental Footprint map *(Figure 13, p. 28)*, natural areas and resources exist, prominently along the Ohio River, for both alternative corridors under consideration in this Feasibility Report.

  - ***Threatened and Endangered Species.*** The current list of such species in Henderson County is as follows: Indiana bat (*Myotis sodalis*), nine species of mussels, American burying beetle (*Nicrophorus americanus*), and the copperbelly water snake *(Nerodia erythrogaster neglecta*). To comply with the Section 7 of Endangered Species Act, coordination with the U.S. Fish and Wildlife Service (USFWS) would need to be conducted and a Biological Assessment (BA) performed.

    - Survey for and mitigation to the Indiana bat would be required.
    - The Ohio River would need to be surveyed to determine the presence/absence of mussels at any proposed river crossing.
    - The American burying beetle is considered extirpated and further analysis would most likely not be required by the USFWS.

- The copperbelly water snake is not a federally listed species, but it is currently protected by a State Conservation Agreement (SCA), and is therefore warranted protection.

➲ ***Bald Eagle.*** While no longer a listed species, a bald eagle nest is known to be located within the project area. Protection of that nest, and possibly other nest or migratory areas, would be required under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

- Water Resources

➲ ***Streams***. In addition to the Ohio River, there are two tributaries in Henderson along the west side of US 41, Sugar Creek and Canoe Creek, and numerous drains between the city and the Ohio River. Streams along the eastern corridor include North Fork Canoe Creek, and others drain in proximity to the Ohio River. A U.S. Army Corps of Engineers (USACE) Section 404 and a Kentucky Division of Water Section 401 permit would be required. Crossing of the Ohio River would also require a permit from the U.S. Coast Guard.

➲ ***Wetlands***. A review of the National Wetland Inventory illustrates that wetlands would be a concern with the eastern and western corridors under consideration. The wetlands are located near the Ohio River, and are more prominent in the western corridor. The wetland type most impacted would be forested wetlands, which require higher levels of mitigation, including replacement ratios of up to 10:1. The mitigation requirements would be determined during the 404 and 401 permitting process.

➲ ***Floodplains***. Each alternative would have substantial involvement with floodplains and would require mitigation to obtain a No-Rise Certification from the Federal Emergency Management Agency (FEMA). Both Floodplain Zones A and AE are present in the corridors studied herein, and are both considered “high risk areas” by FEMA.

➲ ***Groundwater***. The area is not known to be within a wellhead protection area, as Henderson Water District obtains water from the Ohio River further downstream, west of Henderson. However, coordination with water suppliers on both sides of the Ohio River would be warranted.

- Socioeconomic. As shown in Figures 9 and 10, the corridors being studied in this Feasibility Report are located in areas that are both urban and suburban and have varying social and economic considerations, both direct and indirect. Following are a few key areas that would warrant specific analysis:

➲ ***Environmental Justice.*** Executive Order 12898, Environmental Justice, requires the avoidance of disproportionate high and adverse impacts to low-income and minority (EJ) populations, and consideration that the adverse impacts of such project are not predominately borne by such populations. As shown in Figures 9 and 10, it is likely that EJ populations reside within or along the corridors. Should tolling be identified as a funding source for the project, cost to EJ populations would also be a concern. In the same

analysis, the benefits of the project, including reduced travel time, travel costs, and overall economic benefit to the community and EJ populations, would also be taken into account.

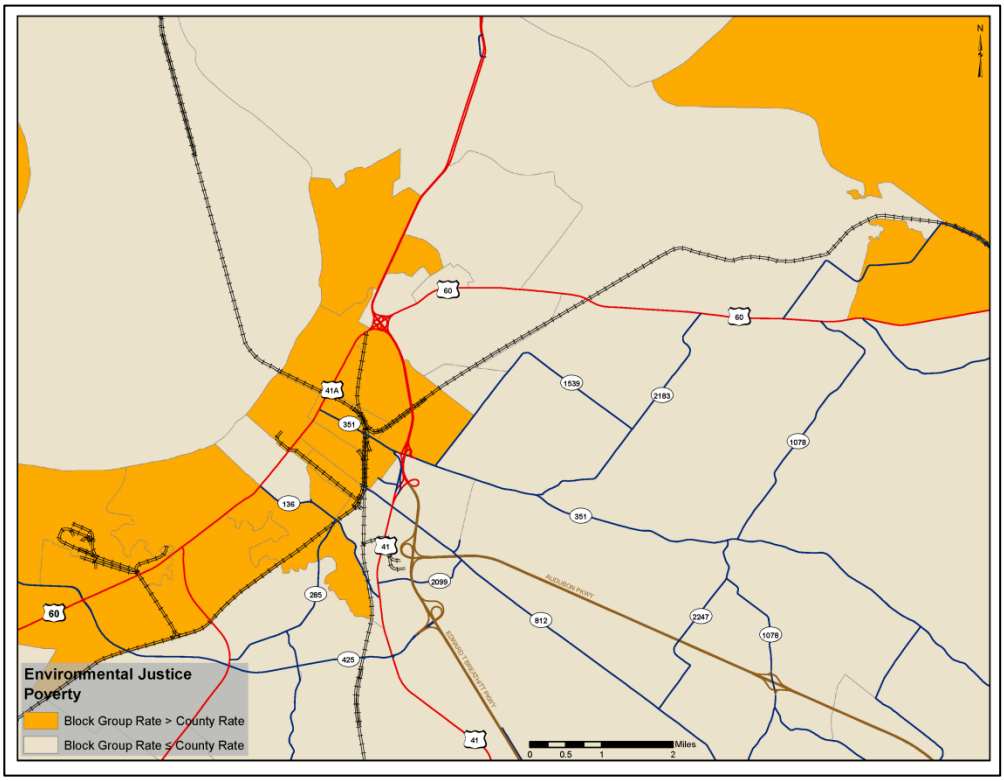

Figure 9: Environmental Justice: Block Group Poverty Levels Below Henderson County Poverty Population

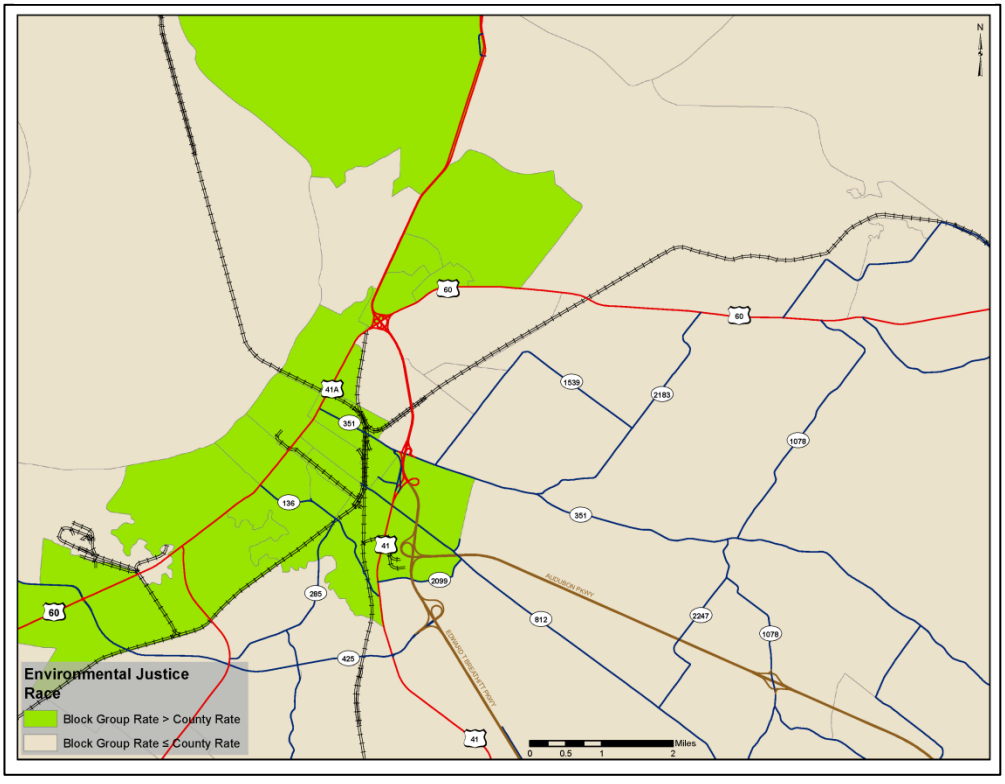

Figure 10: Environmental Justice: Block Group Race (Non-white) Below Henderson County Non-White Population

- ***Viewsheds.*** Aesthetics of a new river crossing, as well as the view of the interstate from exiting communities would need to be addressed through an open public involvement process.

- ***Land Use.*** Agricultural, rural residential, suburban, mixed uses and urban areas exist at various levels throughout the two corridors under consideration *(see Figure 14, p. 29)*. Each corridor would require a specific analysis, and coordination with local stakeholders, before impacts, benefits, and possible mitigation can be determined. Because the alternatives under study in this Feasibility Report are within the Henderson City limits, coordination with local planning officials would be important. Indirect social and economic effects caused by changes in traffic patterns would be a paramount issue for local businesses and employers.

  Over the last 50 years, Henderson has grown from a population of 16,892 in 1960 to 28,400 in 2013. The area has transitioned from a rural to an urban use *(see Figures 11 and 12 on the following page).*

Figure 11: 1950 Study Area

Figure 12: 2012 Study Area

- Cultural Historic and Archaeological Resources. The 2001-2004 EIS process described above included compliance with Section 106 of the National Historic Preservation Act (NHPA). That effort included the identification and involvement of local consulting parties, the development of an Area of Potential Effect (APE), identification of eligible historic resources, and a determination of effects from the then-proposed project. The APE included some, but not all, of the area that is under consideration for this Feasibility Report. The shared area is along the eastern alignments. Within that area, two historic sites were identified as eligible for inclusion in the National Register of Historic Places (NRHP)—the Historic McClain House and the Historic Lee Basket House. The current alignment in this preliminary eastern corridor avoids these resources. Along the western corridor, the US 41 bridge over the Ohio River is considered eligible for inclusion in the NRHP. Due to the passage of time, the Section 106 process, like the overall environmental process, would need to be re-initiated to consider other historic resources and different alignment options.

  Archaeological resources, due to their sensitive nature, are not disclosed in this Feasibility Report. However, cemeteries are known to occur throughout the corridor, and should be avoided if possible, and it is highly likely that historic and prehistoric archaeological resources are located along the Ohio River.

- Hazardous Materials. Contaminated and potentially hazardous materials would be more of a concern for alternatives near US 41, due to this corridor being located in an older, more urban area of Henderson *(see Figure 13, p. 28)*. A detailed database search and field verification effort would be required during future stages to identify potential hazardous conditions, which should be avoided or mitigated. The results of this initial overview to identify existing Underground Storage Tanks at gas stations along US 41 are shown in Figure 13.

- Section 4(f). Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 requires that prior to the use of any of the resource types listed below, it must be determined either (1) that there is no prudent and feasible alternative that avoids such use and that the project includes all possible planning to minimize harm resulting from such use, or (2) that the use will result in a de minimis impact on the resource protected under Section 4(f). Resources protected under Section 4(f) include:

  - A publicly owned and officially designated park
  - A publicly owned and officially designated recreation area
  - A publicly owned and officially designated wildlife or waterfowl refuge
  - A historic property, either publicly or privately owned, that is listed in or eligible for inclusion in the NRHP, except for archeological resources that are important chiefly because of what can be learned by data recovery and have minimal value for preservation in place [CFR 774.13(b)(1)]

  Section 4(f) resources are located throughout both corridors of this study, and a Section 4(f) evaluation would be warranted. At this stage, lack of specific

information prohibits a full understanding how Section 4(f) requirements could affect this project outcome. The most apparent Section 4(f) resource in the area is the John James Audubon State Park.

Task 6.0 Concept Feasibility

Seven alternative concepts with several variations were developed to the concept level for this Feasibility Study. The concepts focused on the purpose and need, the Feasibility Study goals, cost, and known impacts. Important considerations in concept development were:

- Environmental Impacts
- Traffic
- Safety
- Right of Way/Property Impacts
- Utility Impacts
- Costs
- Life expectancy and future maintenance costs of existing Ohio River bridges
- Local access to the developed area along US 41

Grades were not developed for concept layouts; however, the concept layouts were developed with an understanding of grades needed for bridge overpasses. Each alternative stops at a common point short of the Ohio River. After the initial review, two layouts were advanced for future Schematic Design.

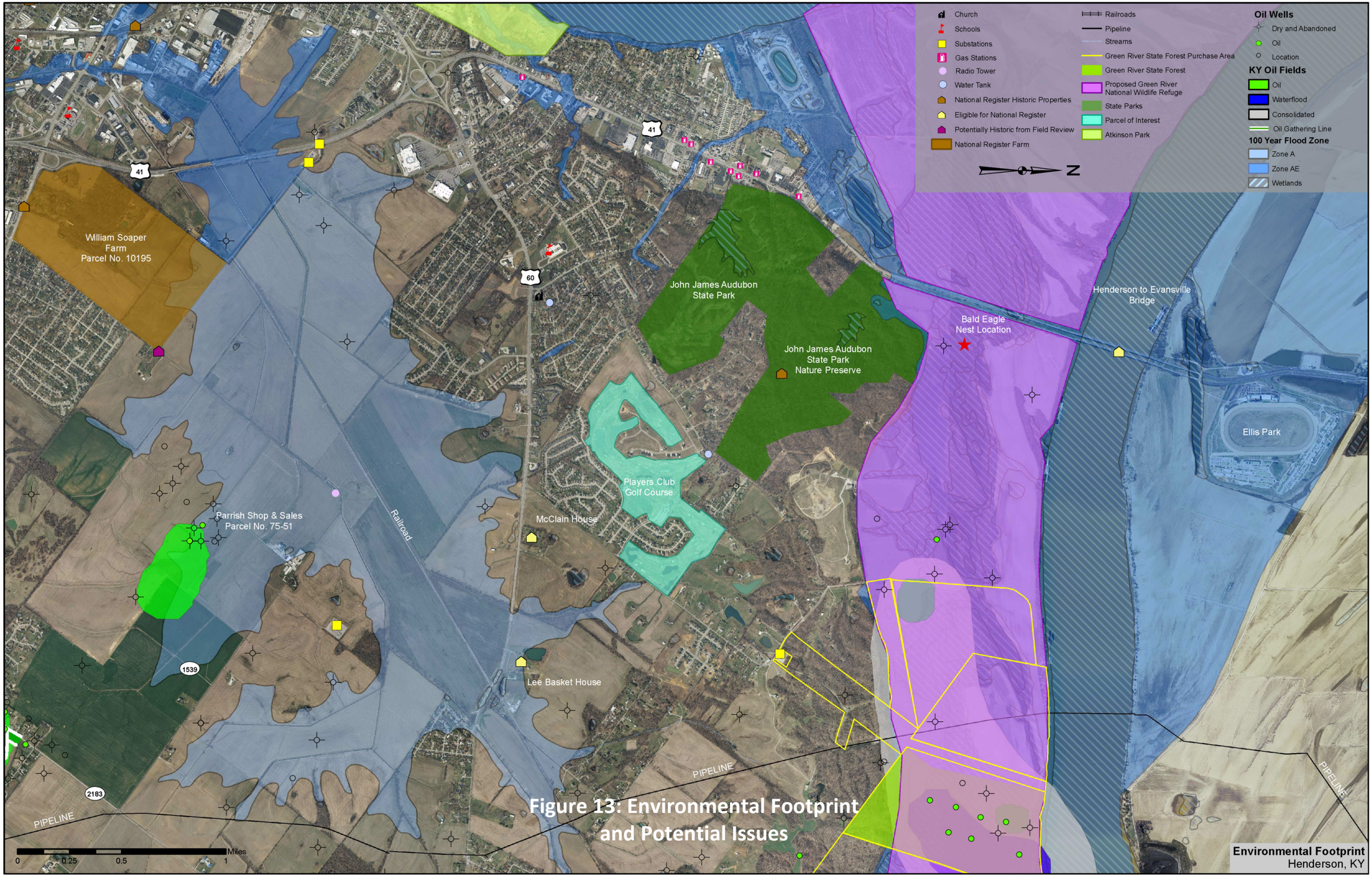

Figure 13: Environmental Footprint and Potential Issues

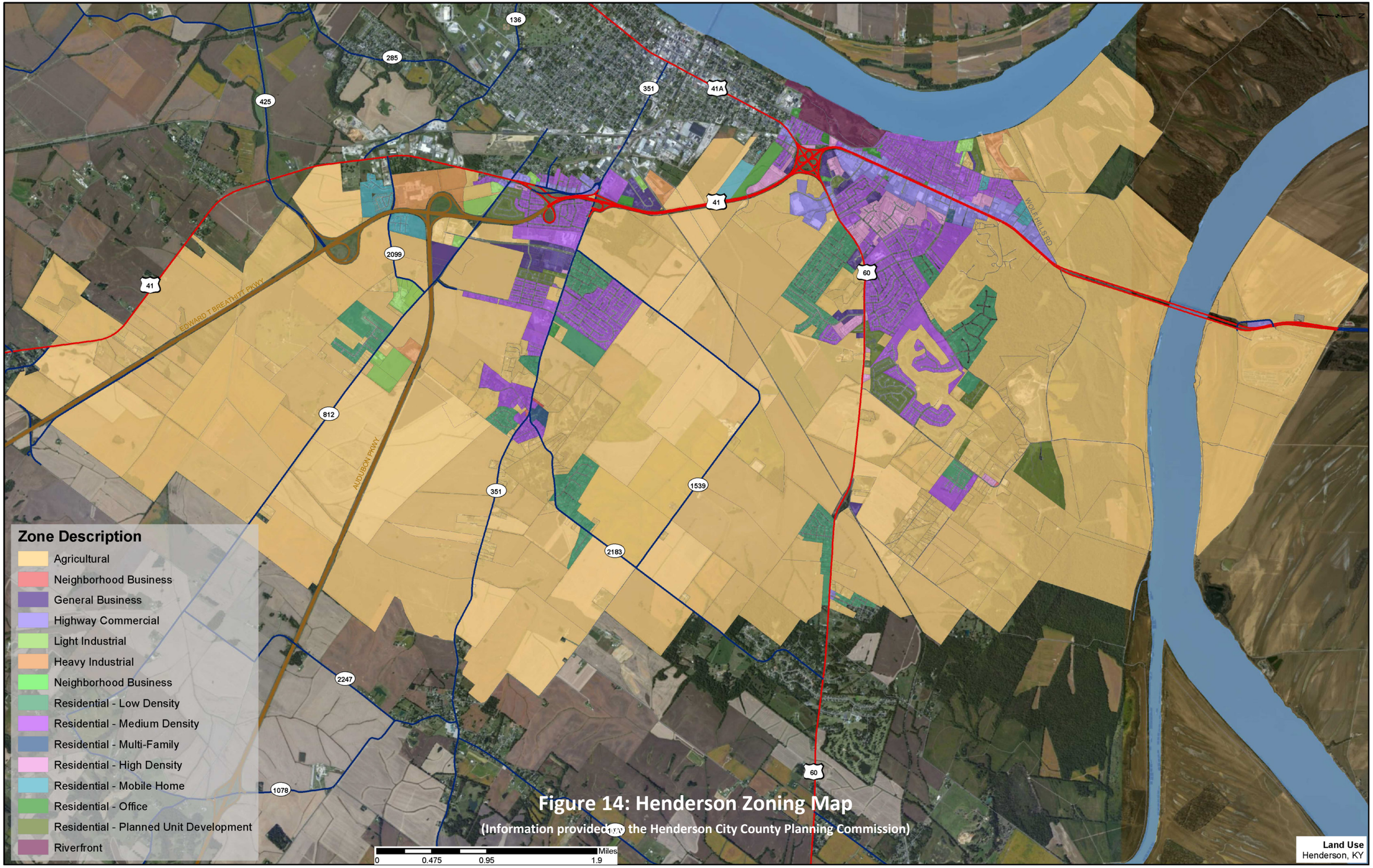

Figure 14: Henderson Zoning Map

(Information provided by the Henderson City County Planning Commission)

6.1 Concept Design Level

Each concept would provide a fully controlled access facility. The concept plans were developed on existing project mapping and aerial photography. The plans show number of lanes, approximate weave/merge distance, location of bridges, and approximate ramp radii. A decision matrix is provided showing the comparative impacts of the items listed above for each of the concepts.

Two general corridors were considered:

- *Eastern Corridor (Section 6.1.1)* — An eastern corridor that would be on new alignment and cross the Ohio River at approximately the same location as DEIS Preferred Alternative 2. Unlike the DEIS Alternative 2, this corridor would use approximately 6.0 additional miles of the Breathitt Parkway (EB 9004) before turning east onto new alignment.
- *US 41 Corridor (Section 6.1.2)* — A corridor that would begin at the existing US 60/US 41/Breathitt Parkway interchange and continue north parallel to, or reconstructing in place, the existing US 41 through Henderson to the Ohio River near the existing US 41 twin bridges.

Another consideration for each corridor and subsequent alternatives is the existing right-of-way along US 41 from US 60 north to the Ohio River. The existing US 41 right-of-way width ranges from 160 feet near the US 60/US 41 interchange to approximately 100 feet north of Watson Lane, then expanding to 250 feet near the existing US 41 twin bridges. The minimum required right-of-way for a six-lane interstate through this area would be 150 feet.

6.1.1 Eastern Corridor

Alternative 1 — This corridor begins just north of the KY 351/US 41 interchange, provides a new trumpet interchange to connect back to US 41, and continues northeast to crossing the Ohio River near the same location as the DEIS Preferred Alternative 2. This alternative, on new alignment, would have a new interchange with US 60, and require the extension and reconstruction of and a new interchange with Wolf Hills Road to provide access to the north side of the developed part of Henderson (US 41). This alternative would close the aging US 41 twin bridges across the Ohio River. This alternative is 8.5 miles in length and is estimated to cost $226M *(see Figure 15, p. 31).* This alternative is approximately $91 million less than the Kentucky approach for the DEIS Alternative 2 ($226M vs. $317M) because it would use more of the existing Breathitt Parkway.

Alternative 1a — This alternative is the same as Alternative 1, except it would not include the reconstruction/extension of and interchange with KY 414. In addition it would keep in place the existing US 41 twin bridges to provide local access into Henderson from the north. This alternative is 6.2 miles in length and is estimated to cost $181M *(see Figure 16, p. 32).*

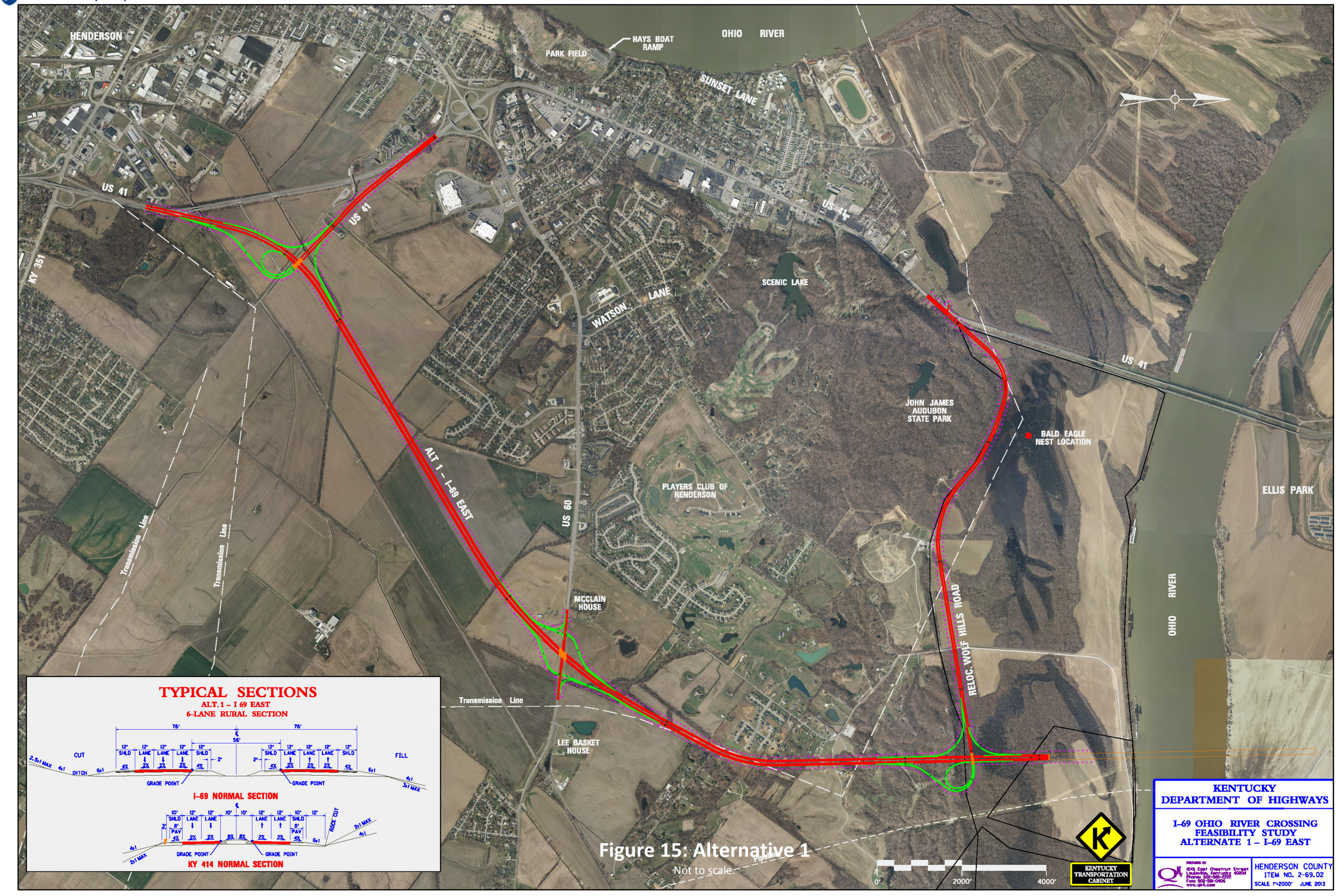

Figure 15: Alternative 1

Not to scale.

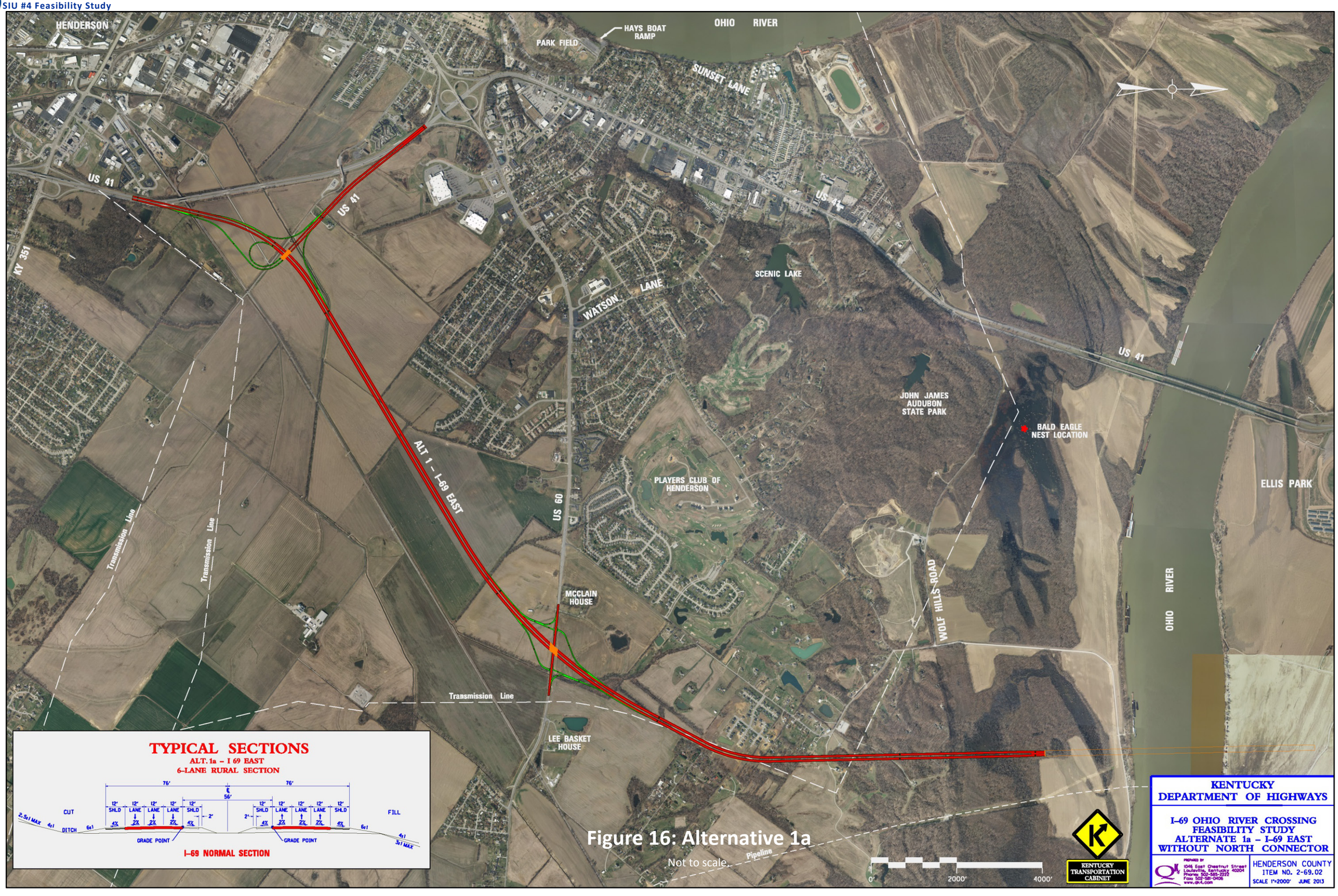

Figure 16: Alternative 1a

Not to scale.

6.1.2 US 41 Corridor

The US 41 Corridor includes Alternatives 2 through 7 with variations. Alternatives 2, 2a, and 3 are west of US 41, while Alternatives 4, 4a, 4b, 4c, 5 and 6 are within the same footprint as US 41.

Each of these alternatives proposes to reconstruct the existing US 60/US 41 Interchange (*see Figure 17*) by removing loop ramps and providing an urban-type diamond design. However, two loop ramps would be provided because of the heavy left-turn volumes from US 60 to I-69 southbound and from US 41A eastbound to I-69 northbound, as shown in Figure 18. To assess whether an urban interchange configuration would operate efficiently, preliminary traffic projections for the ramp volumes were developed and a capacity analysis was performed. The proposed configuration and the projected traffic volumes are shown in Figures 18 and 19. With these volumes, this configuration will operate as presented.

Figure 17: Existing US 41/US 41A/US 60 Interchange

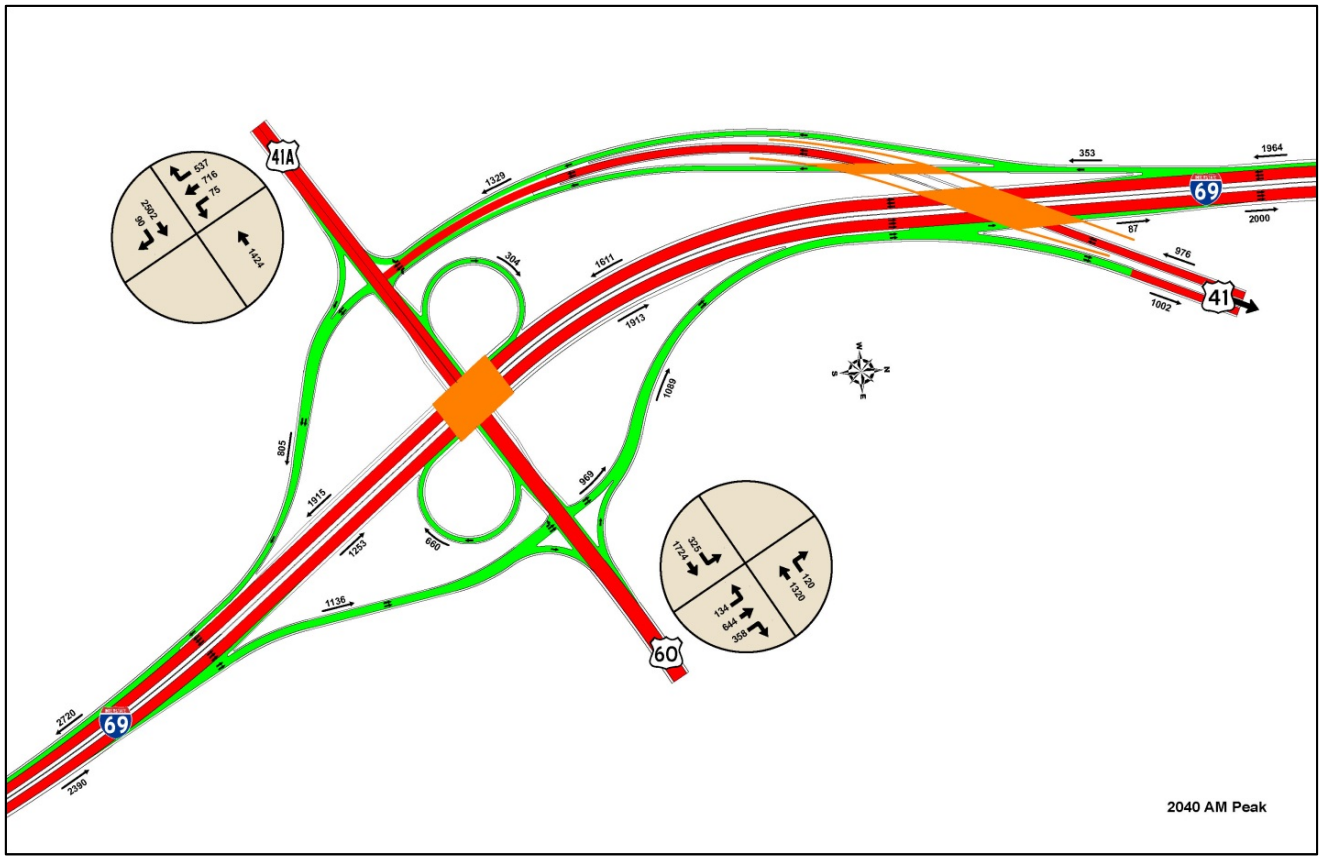

Figure 18: US 41 (I-69)/US 60 Interchange 2040 AM Peak

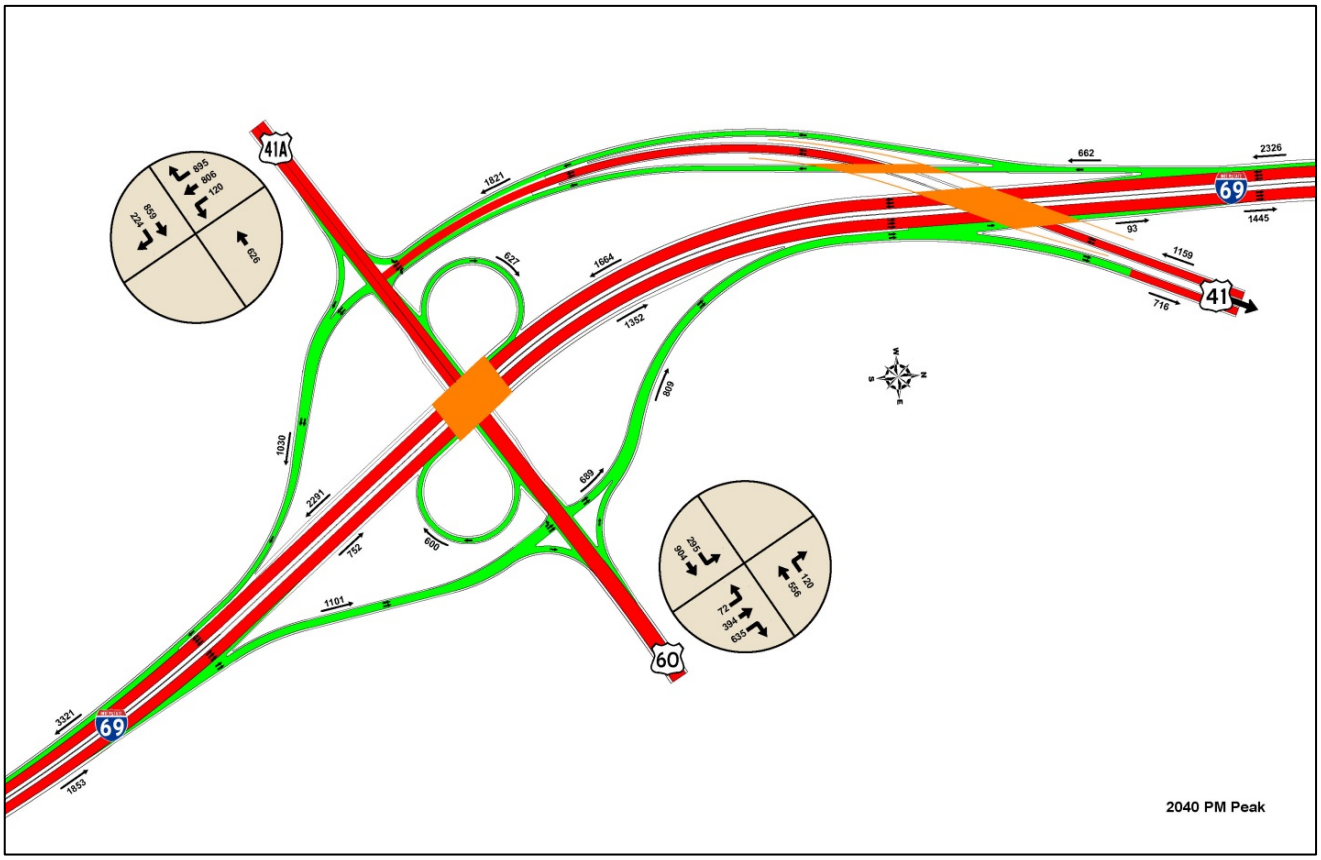

Figure 19: US 41 (I-69)/US 60 Interchange 2040 PM Peak

West of Existing US 41

Alternative 2 — This alternative begins with a reconstructed US 41/US 60 interchange, as shown above, and then heads west of US 41. Alternative 2 parallels US 41 and would cross the Ohio River west of the existing US 41 bridges. The northern terminus includes an interchange with US 41 to provide local access on the northern end of this corridor. This alternative is 3.7 miles in length and is estimated to cost $217M *(see Figure 21, p. 37).*

Alternative 2a — This alternative follows Alternative 2 but provides an access point to US 41 midway through the corridor via an interchange at Watson Lane. It also provides for widening of Watson Lane to US 41. The alternative would impact Park Field and Hays Boat Ramp, a Section 4(f) protected resource. This alternative is 3.7 miles in length and is estimated to cost $261M *(see Figure 22, p. 38).*

Alternative 3 — This alternative is the same as Alternative 2a, but shifts the southern terminus to avoid Park Field and Hays Boat Ramp, a Section 4(f) protected resource. This alternative is 3.7 miles in length and is estimated to cost $255M *(see Figure 23, p. 39).*

Figure 20: Similar to Alternative 4 in Louisville, Kentucky

Elevate I-69 Over Existing US 41

Alternative 4 — This alternative is elevated over existing US 41 from the US 60/US 41A interchange north to a new bridge over the Ohio River (similar to that as shown in Figure 20). US 41 would be the local road under the new I-69. This alternative reconstructs the US 60/US 41 interchange to an urban diamond and provides for a one-way Collector Distributor (C/D) system between US 60 and the new Ohio River bridge. This alternative does not provide access to Watson Lane. (Alternatives 4a, 4b, and 4c do provide such access.) Alternative 4 is 3.8 miles in length and is estimated to cost $770M *(see Figure 24, p. 40).*

Alternative 4a — This alternative is the same as Alternative 4 but it also provides for a new interchange at Watson Lane and US 41, and widening Watson Lane west to Sunset Lane and east 1,000 feet. This interchange would include a weaving option from US 41 to the new I-69 off and on ramps. This alternative includes a C/D system. Alternative 4a is 3.8 miles in length and is estimated to cost $820M *(see Figure 25, p. 41).*

Alternative 4b — Alternative 4b the same as Alternative 4a but with a roundabout option under the I-69 mainline at the Watson Lane interchange. This alternative includes a C/D system. Alternative 4b is 3.8 miles in length and is estimated to cost $807M *(see Figure 26, p. 42).*

Alternative 4c — This alternative includes an interchange at Watson Lane, but does not include a C/D system. Because this alternative does not include C/D lanes, it provides for a traditional intersection at the ramp termini. Alternative 4c is estimated to cost $523M (*see Figure 27, p. 43*).

Construct I-69 At Grade Within or Near US 41 Corridor

Alternative 5 — Because Alternative 5 replaces US 41 with I-69, it provides one-way frontage roads to access local developments and connecting roads. This alternative would be at grade except at the following three local roads where it would bridge over and provide grade-separated interchanges: Marywood Drive, Watson Lane, and John James Audubon State Park. Alternative 5 is 3.8 miles in length and is estimated to cost $309M. *(see Figure 28, p. 44).*

Alternative 6 — Alternative 6 is similar to Alternative 5, however would be shifted slightly west of US 41 to minimize business impacts. Alternative 6 is 3.9 miles in length and is estimated to cost $320M *(see Figure 29, p. 45).* Alternative 6 was advanced from a planning level Concept Design to a Schematic Design and is therefore described in detail in Section 6.2, herein.

Alternative 7 — Alternative 7 is west of Alternative 6 (but east of Alternatives 2, 2a, and 3). This alignment takes advantage of an existing frontage road to minimize major business impacts, and leaves US 41 in place for local access. This alternative has an interchange with Watson Lane and underpasses at Canary Lane and Race Track Road (Figure 30, p. 46). Alternative 7 is 3.6 miles in length and is estimated to cost $252M. Alternative 7 was advanced from a planning level Concept Design to a Schematic Design and is therefore described in detail in Section 6.2, herein.

Alternatives 2 through 7 are illustrated on Figures 21–30 followed by an environmental footprint showing Concept Alternatives 1 through 7 on Figure 31 (p. 47).

Figure 21: Alternate 2

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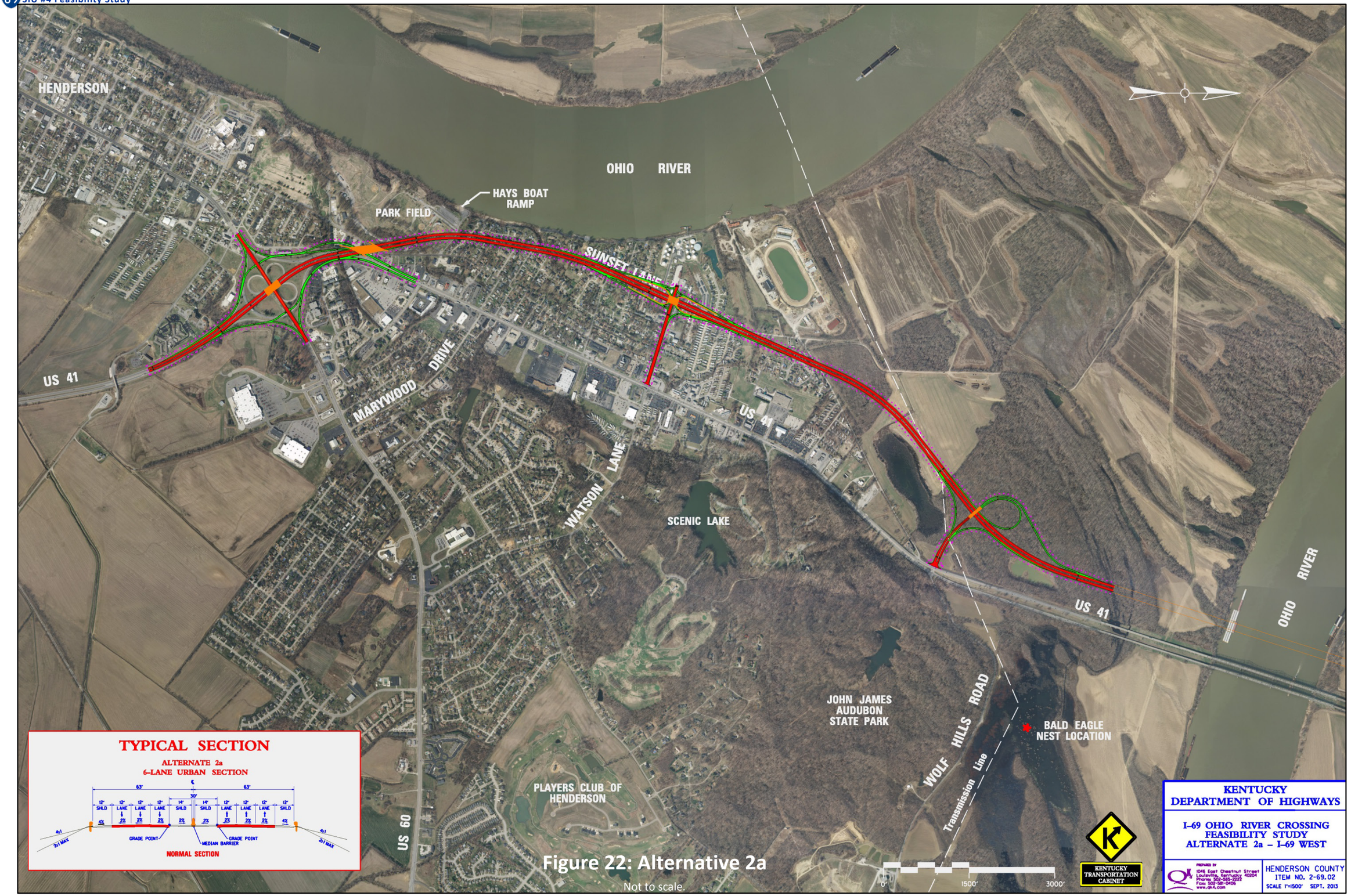

Figure 22: Alternative 2a

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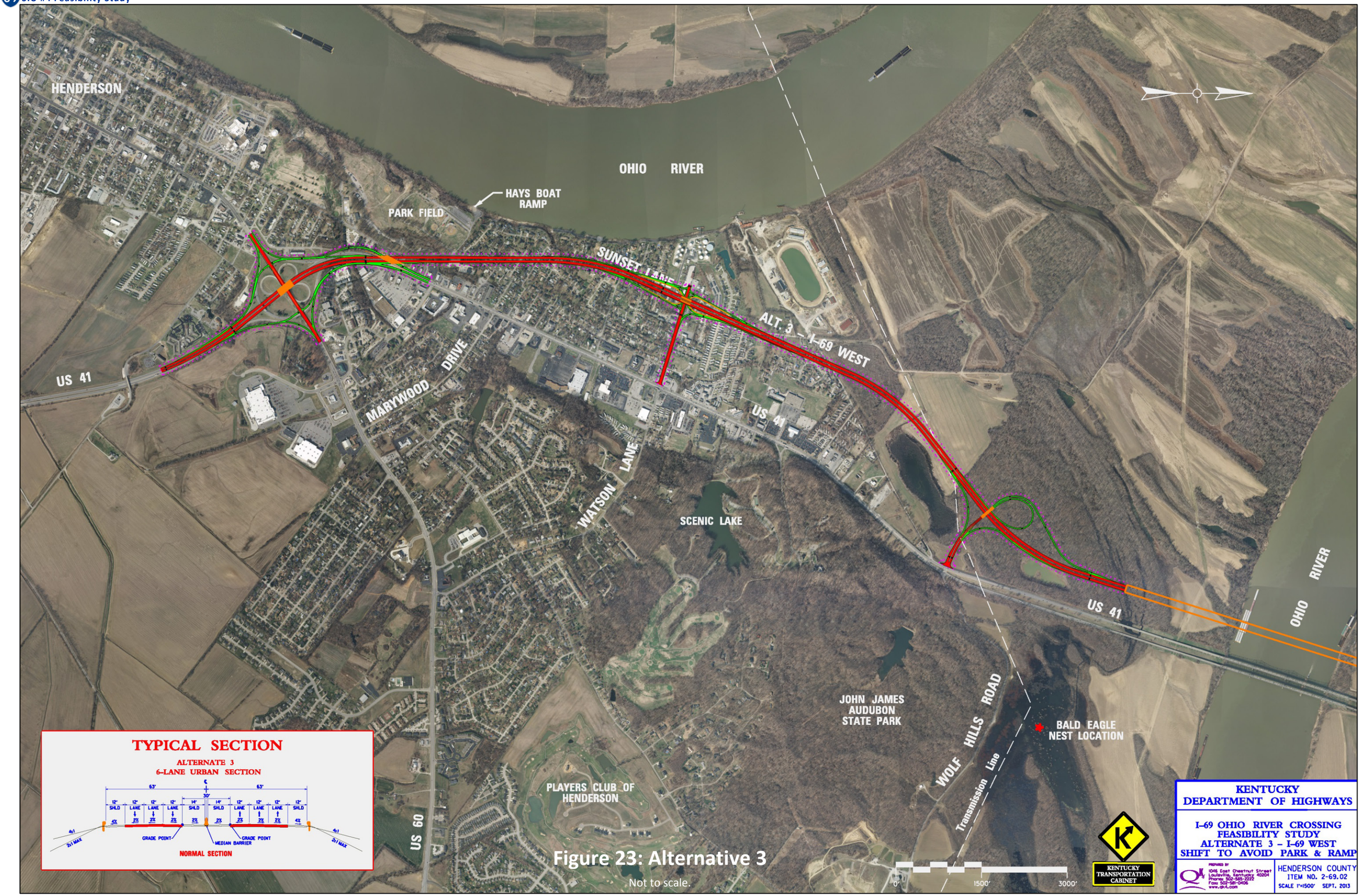

Figure 23: Alternative 3

Not to scale.

Figure 24: Alternative 4

Not to scale.

Figure 25: Alternative 4a

Not to scale.

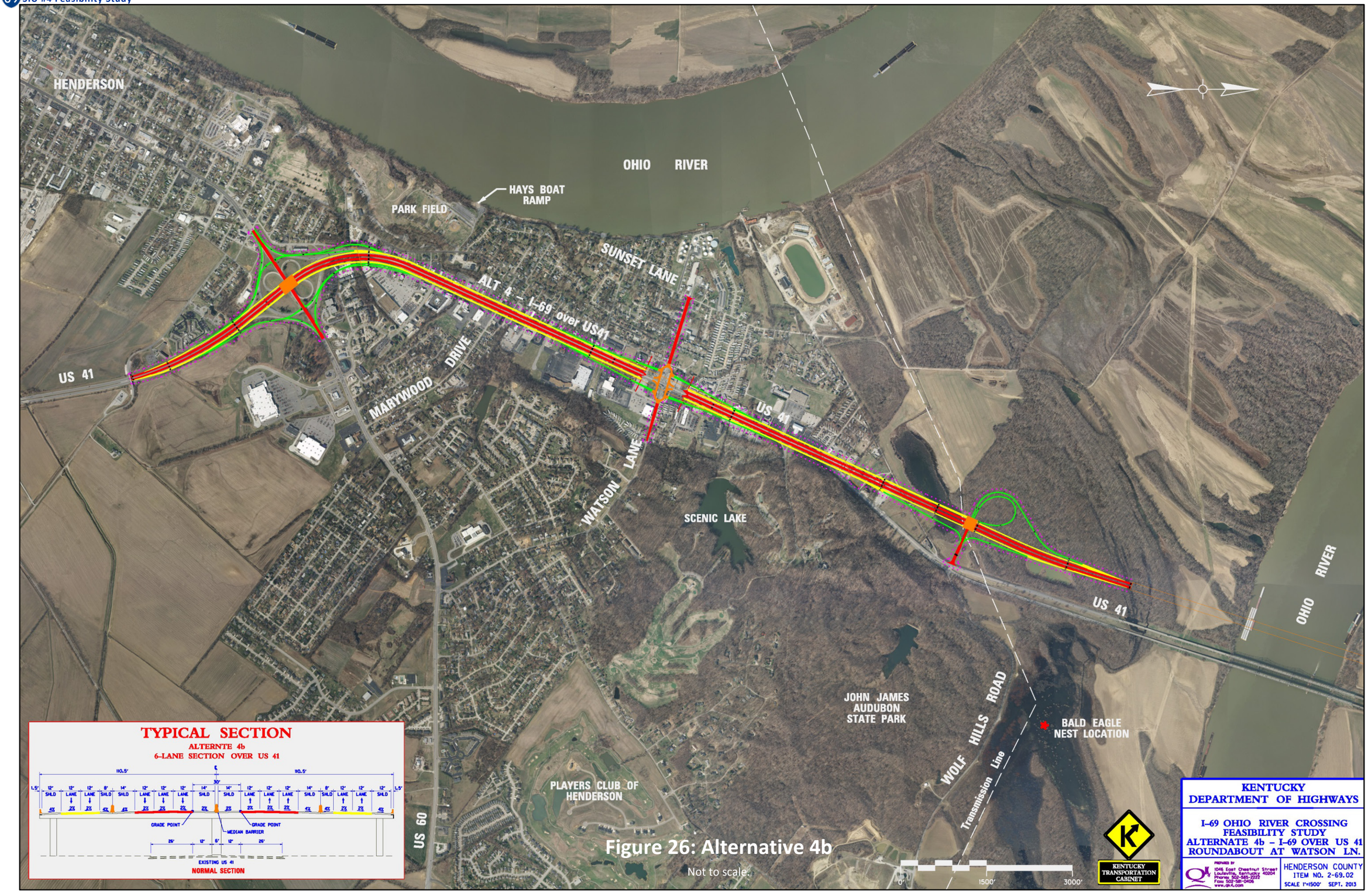

Figure 26: Alternative 4b

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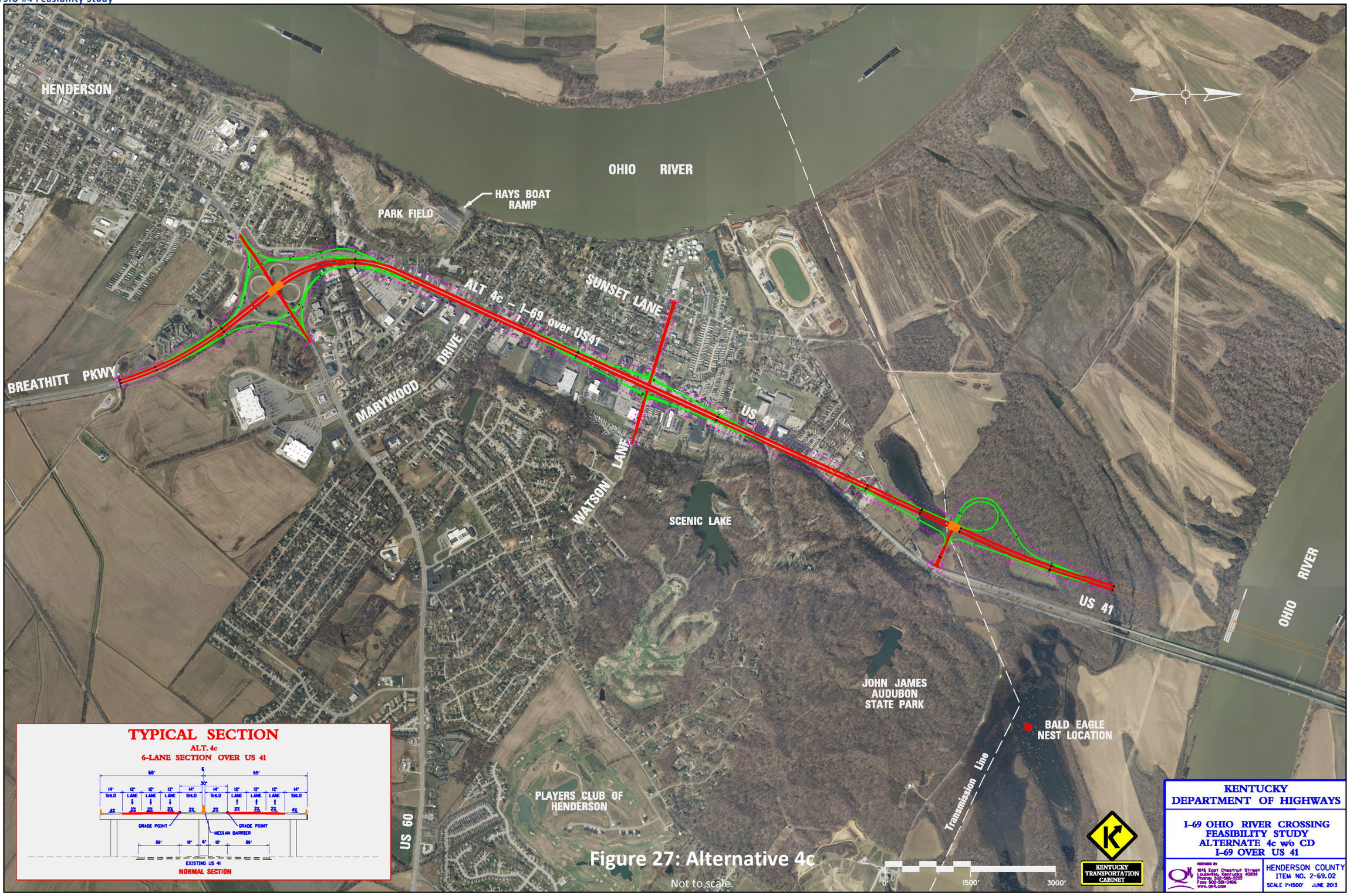

Figure 27: Alternative 4c

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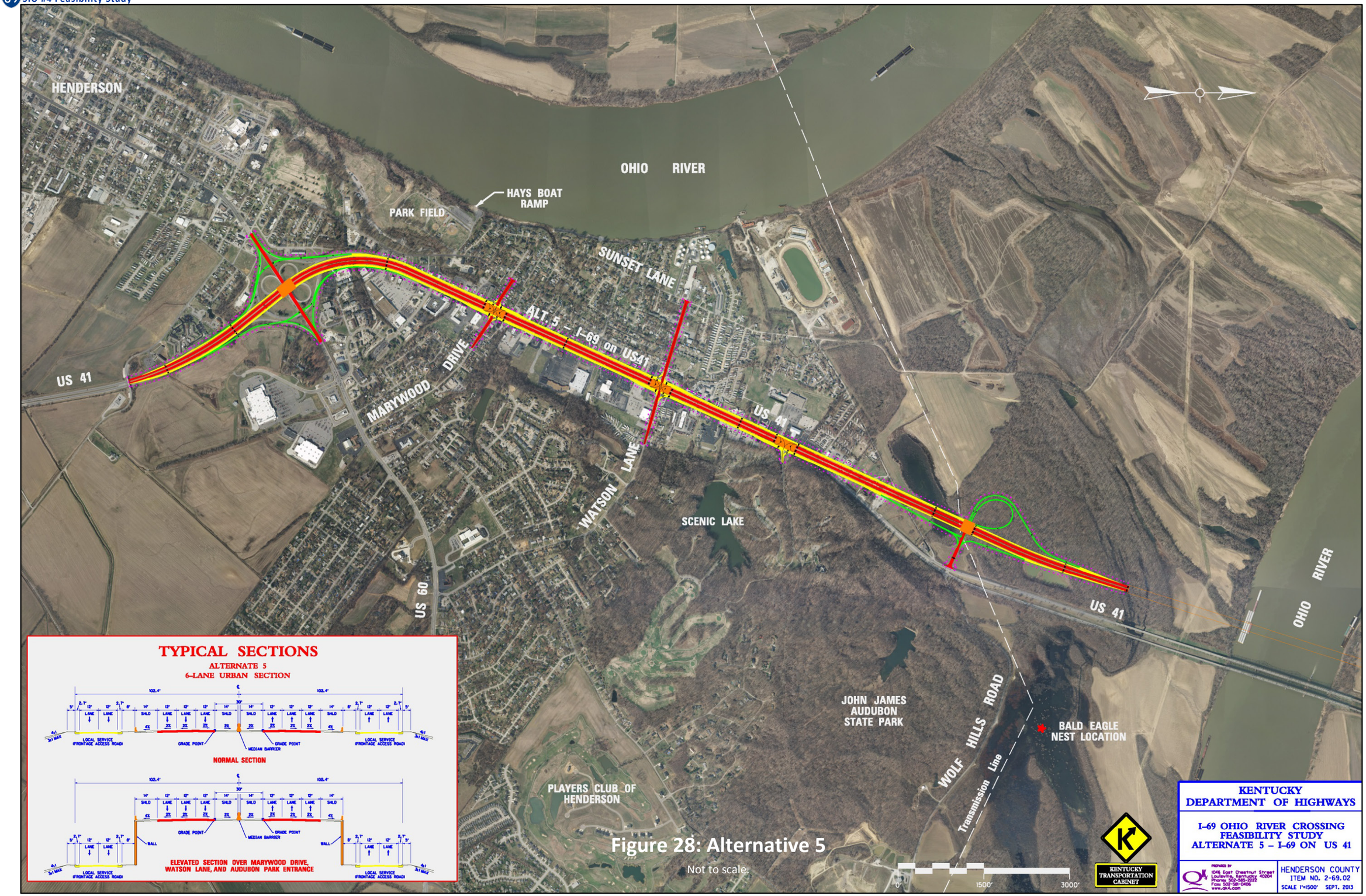

Figure 28: Alternative 5

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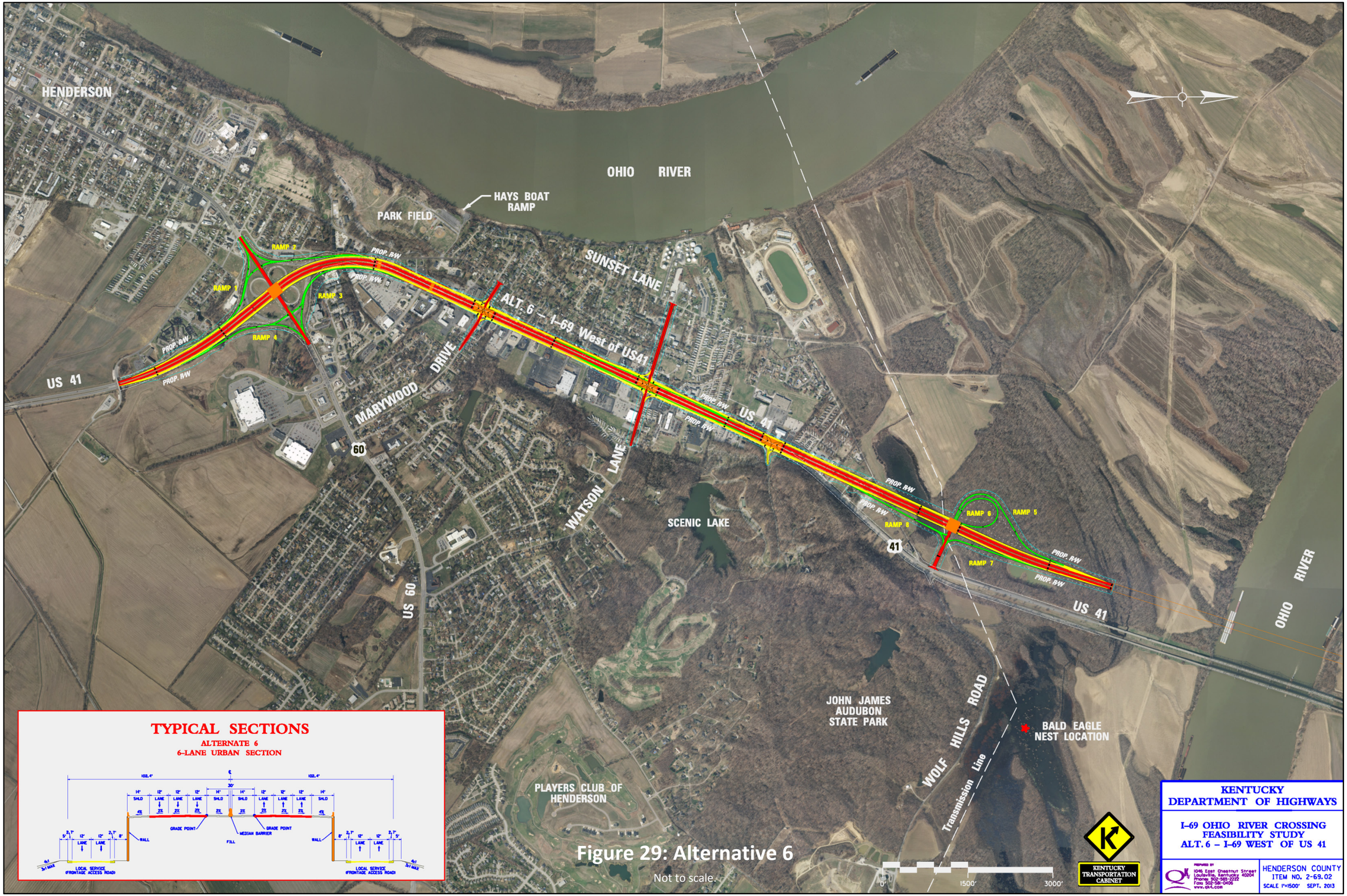

Figure 29: Alternative 6

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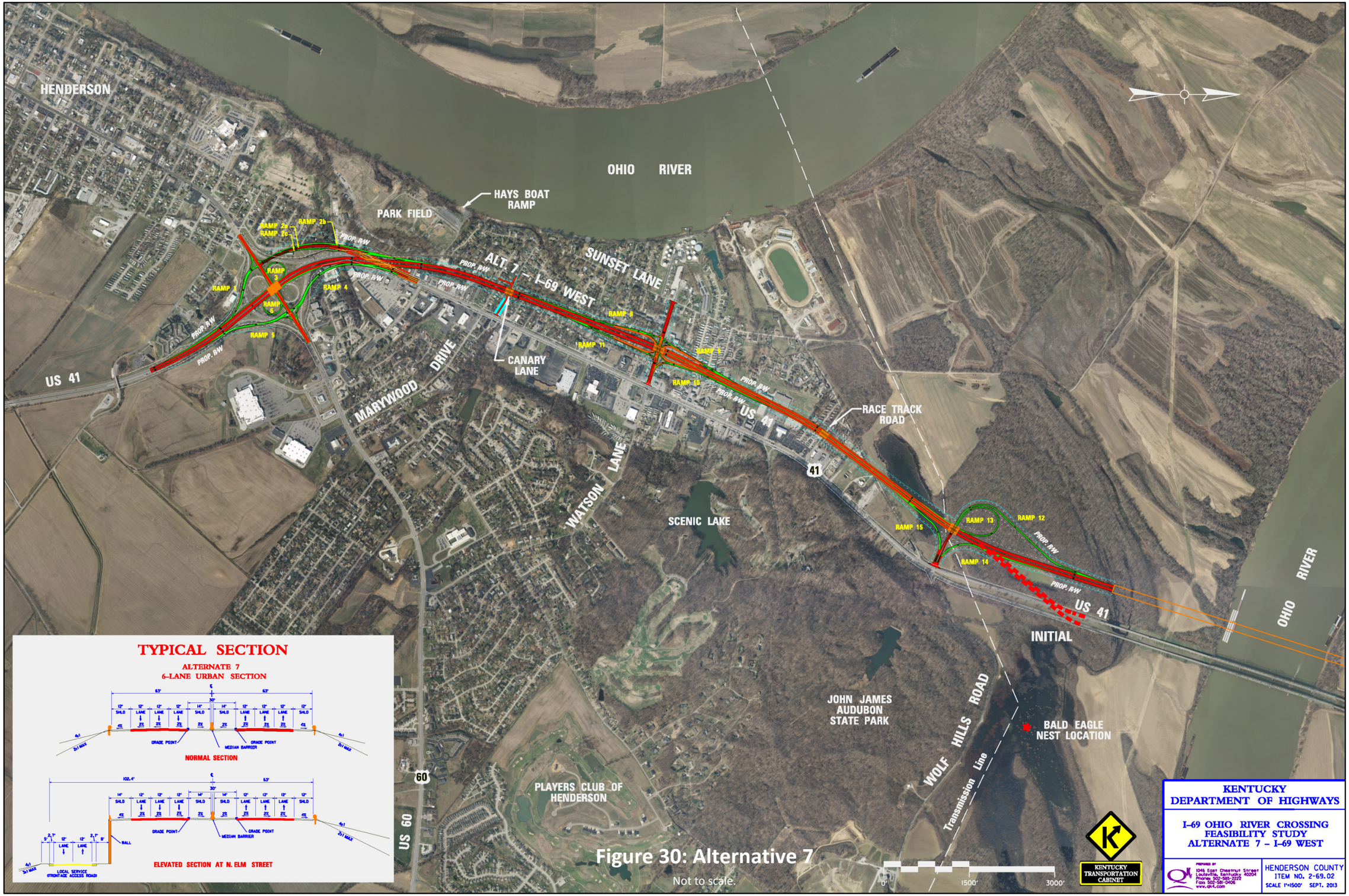

Figure 30: Alternate 7

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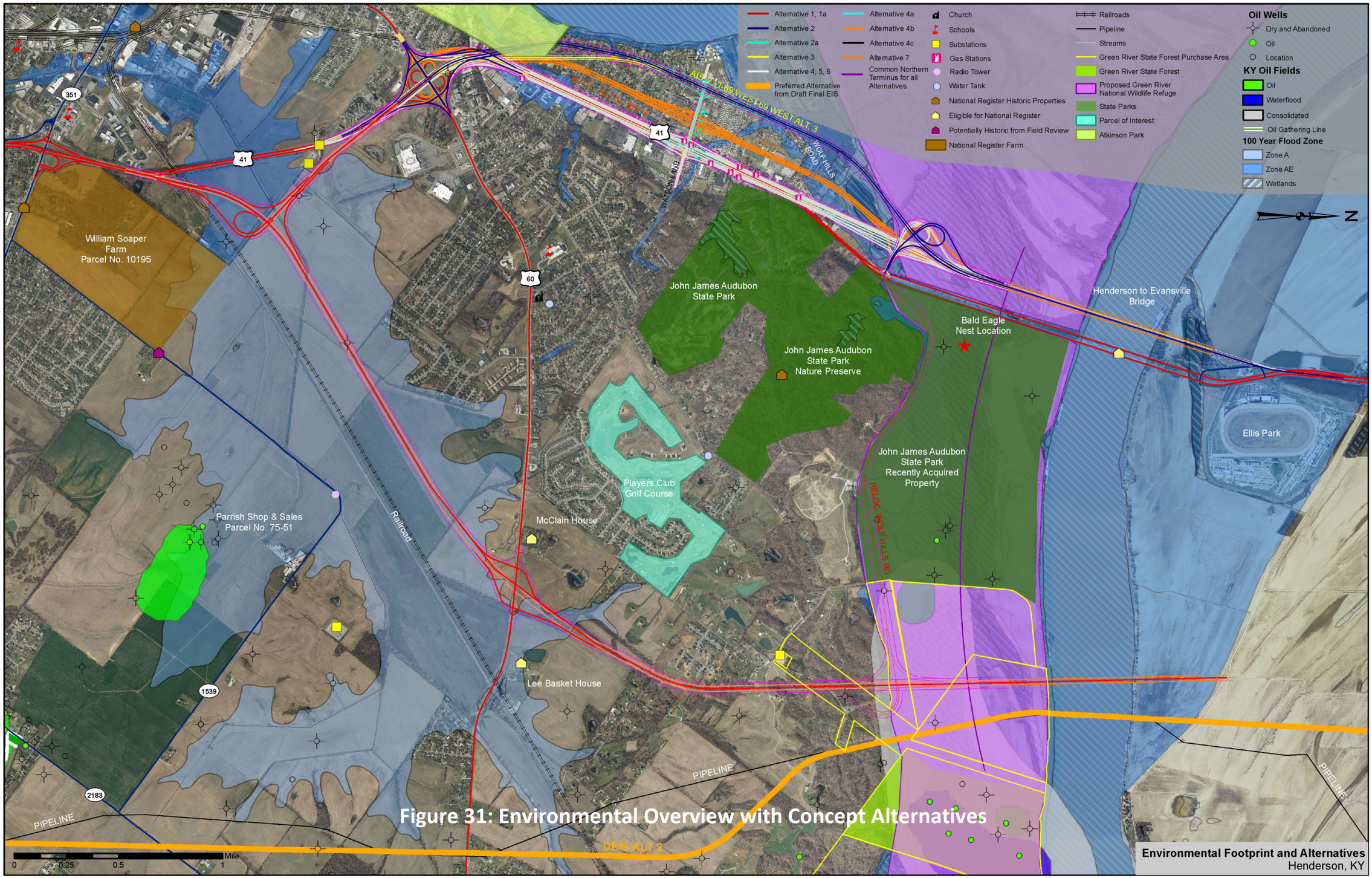


Figure 31: Environmental Overview with Concept Alternatives

6.1.3 Cost Estimates

To develop comparable cost estimates for the concept phase, information contained in the DEIS (2004) and the conceptual financing plan (2008) were used. The cost estimates in these previous studies were used to develop a 2013 base year estimate with which to compare the concept alternatives.

The DEIS Preferred Alternative 2 cost estimates showed $652 million in 2003 dollars, the 2008 conceptual financing plan showed $1.4 billion in year 2020 dollars, both adjusted to a 2013 total estimated cost of approximately $1.1 billion from the Breathitt Parkway to I-64. It's important to note all cost estimates include a 25% contingency, and approximately $500 million of the cost is for the river crossing. Table 10 provides a comparison of these costs.

Table 10: I-69 SIU #4 Historical Cost Information

	2003 Const Year DEIS Cost adjusted to Year 2013				2008 Financial Plan Cost Extracted and Adjusted for Year 2013	
	2003			2013		2013
Design		$46,910,000		$76,415,452		$79,038,117.00
Right of Way		$5,890,000		$9,594,692		$16,288,946.00
Utilities		$8,940,000		$14,563,081		$17,198,822.00
Construction						
MOT		$2,210,000		$3,600,046		
Drainage		$13,230,000		$21,551,405		
Earthwork						
Cut (CY)		$1,950,000		$3,176,511		
Fill (CY)		$17,720,000		$28,865,526		$67,559,816.00
Roadway		$37,720,000		$61,445,126		$62,841,511.00
Structures		$263,470,000		$429,187,361		$421,789,228.00
Main River Crossing	$137,501,187		$223,986,684		* $150,319, 884	
Flood Plain Crossing	$125,970,000		$205,202,611		* $248,868, 759	
Interchanges						$231,241,437.00
Service (S-S)	2	$15,200,000		$24,760,496		
System (F-F)	3	$105,000,000		$171,042,900		
ITS		$3,620,000		$5,896,908		$6,949,176.00
Subtotal		$521,860,000		$850,099,503		$902,907,053.00
Contingency 25%		$130,465,000		$212,524,876		$225,726,763
TOTAL		**$652,325,000**		**$1,062,624,379**		**$1,128,633,816**

* 2007 cost in Appendix A of 2008 Financial Plan - adjusted to 2013 by Financial Plan Appendix A inflation table

To compare the estimated costs for the Concept Alternatives 1 through 7 in this Feasibility Study to the cost estimates in the 2004 DEIS, the same line items from the DEIS were used in this study. The 2004 DEIS Preferred Alternative included 13.2 miles of new roadway (from I-164 in Indiana to the Breathitt Parkway in Kentucky). These 13.2 miles did not include the 4.0 miles of structures crossing the Ohio River and the approach bridges that traverse the adjacent floodplains.

For this Feasibility Study, a line was drawn south of the Ohio River to establish a basis for comparing the cost estimates of the concept alternatives to the 2004 DEIS cost for the Kentucky portion of the project, only. From this line to the DEIS Preferred Alternative terminus at the Breathitt Parkway is approximately 9.8 miles. Using a 9.8 to 13.2 ratio and eliminating the Ohio River structures and one freeway-to-freeway Interchange at I-164 in Indiana, the adjusted total cost for this 9.8-mile segment of the DEIS preferred alternative in 2003 dollars, is $195 million. To convert to 2013 dollars, the KYTC Construction Cost Index was used to 2012 and then multiplied by 1.04 (4% inflation rate) to 2013. The resulting total cost for the base 9.8 miles in 2013 dollars, is $317 million for the Kentucky portion only.

Costs for Concept Alternatives 1 through 7 were estimated by using the ratio of alternative lengths to the 9.8 base length with adjustments made for the number of interchanges. For the urban Alternatives 4 through 6, additions were made for estimated quantities for noise walls ($50/sf), retaining walls ($70/sf), and bridges ($150/sf).

Right-of-way estimates for Concept Alternatives 1 through 7 were developed using property tax information from the Henderson County, Kentucky Property Valuation Administrator records. At this concept stage, it was assumed if the proposed alternative touched the property with its footprint, then it would be a total acquisition. Parcels that exceeded $800,000 in total tax value were reviewed and adjusted when only a small percentage of the land was being affected. This affected 43 out of 1,042 parcels for all alternatives. The total tax value was multiplied by 1.5 to obtain total right-of-way costs.

Upgrading of the Breathitt Parkway from the Wendell Ford Parkway in central Kentucky north to the interchange of the DEIS Perferred Alternative (approximately MP 73.4) is currently in the KYTC Six Year Highway Plan. For each alternative a cost was included for extension of the upgrade to the southern terminus of the specific alternative. Table 11 (*p.50*) describes the estimated cost for each concept alternative.

6.1.4 Evaluation Matrix

An alternative matrix was developed (*Table 12, p. 51*) comparing Alternatives 1 through 7 as they relate to traffic, environmental, right-of-way, utility relocation, life expectancy, and future maintenance costs of bridges, local access, and cost.

Table 11: Concept Alternatives 1 through 7 Cost Estimates

		ALTERNATE										Adjusted ALTERNATE 2 from DEIS	Adjusted ALTERNATE 2 from DEIS	ALSO CONSIDERED ALTERNATE	
		1	1a	2	2a	3	4	4a	4b	5	6			4c w/o CD	7
Length (miles)		8.5	6.2	3.7	3.7	3.6	3.8	3.8	3.8	3.8	3.9	9.8	9.8	3.8	3.6
												2003 Costs	2013 Costs*		
Design	10%	$14,866,528	$11,960,343	$11,666,556	$12,983,452	$12,909,601	$45,761,872	$47,738,482	$47,922,325	$14,040,420	$16,061,848	$13,505,726	$22,000,547	$31,184,260	$14,059,553
Right of Way		$14,329,500	$10,810,500	$42,811,500	$63,118,500	$59,494,500	$103,621,500	$121,207,500	$108,934,500	$89,689,500	$75,855,000	$4,372,879	$7,320,911	$69,081,000	$44,286,000
Utilities	2.0%	$2,973,306	$2,392,069	$2,333,311	$2,596,690	$2,581,920	$9,152,374	$9,547,696	$9,584,465	$2,808,084	$3,212,370	$2,701,145	$4,400,109	$6,236,852	$2,811,911
Construction		$148,665,279	$119,603,425	$116,665,557	$129,834,521	$129,096,006	$457,618,718	$477,384,815	$479,223,255	$140,404,204	$160,618,479	$135,057,260	$220,005,467	$311,842,597	$140,595,529
MOT	0.5%	$718,190	$577,794	$563,602	$627,220	$623,652	$2,210,718	$2,306,207	$2,315,088	$678,281	$775,935	$652,451	$1,062,828	$1,506,486	$679,205
Drainage	3.0%	$4,309,139	$3,466,766	$3,381,610	$3,763,319	$3,741,913	$13,264,311	$13,837,241	$13,890,529	$4,069,687	$4,655,608	$3,914,703	$6,376,970	$9,038,916	$4,075,233
Earthwork															
Cut (CY)	$4 cy	$1,254,394	$914,970	$546,030	$546,030	$531,273	$560,788	$560,788	$560,788	$560,788	$575,545	$1,446,242	$1,446,242	$560,788	$531,273
Fill (CY)	$6.5 cy	$14,829,602	$10,816,886	$6,455,239	$6,455,239	$6,280,773	$6,182,746	$6,182,746	$6,182,746	$6,629,705	$6,804,170	$13,152,045	$17,097,659	$4,365,394	$6,280,773
Roadway		$40,664,399	$29,661,091	$17,700,974	$17,700,974	$17,222,569	$20,394,640	$23,108,167	$21,929,437	$18,179,378	$18,657,783	$28,004,242	$46,883,660	$14,735,112	$17,222,569
Structures												-	-		
Ret Walls	$70 sf						$1,211,700	$1,883,700	$1,883,700	$8,954,400	$20,643,560	-	-	$1,047,900	
Bridges	$150 sf						$325,729,800	$328,718,315	$328,718,315	$20,767,950	$27,895,950	-	-	$194,800,350	$11,110,650
Noise Wall	$50 sf			$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	$7,500,000	$7,500,000				$15,000,000
Roundabout									$2,955,000						
ITS		$2,846,584	$2,846,584	$1,698,768	$1,698,768	$1,652,855	$1,744,681	$1,744,681	$1,744,681	$1,744,681	$1,790,593	$2,687,576	$4,499,439	$1,744,681	$1,652,855
Interchanges															
Service (S-S)		$25,447,274	$12,723,637	$12,723,637	$25,447,274	$25,447,274	$12,723,637	$25,447,274	$25,447,274	$12,723,637	$12,723,637	$15,200,000	$25,447,274	$25,447,274	$25,447,274
System (F-F)		$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$58,595,697	$70,000,000	$117,191,394	$58,595,697	$58,595,697
Subtotal		**$180,834,612**	**$144,766,336**	**$173,476,923**	**$208,533,163**	**$204,082,027**	**$616,154,464**	**$655,878,493**	**$645,664,545**	**$246,942,208**	**$255,747,696**	**$155,637,010**	**$253,727,034**	**$418,344,708**	**$201,752,992**
Contingency 25%		$45,208,653	$36,191,584	$43,369,231	$52,133,291	$51,020,507	$154,038,616	$163,969,623	$161,416,136	$61,735,552	$63,936,924	$38,909,252	$63,431,759	$104,586,177	$50,438,248
ET Breathitt Upgrade		$3,915,000	$3,915,000	$4,445,000	$4,445,000	$4,445,000	$4,385,000	$4,385,000	$4,385,000	$4,385,000	$4,385,000			$4,385,000	$4,385,000
TOTAL		**$226,043,265**	**$180,957,921**	**$216,846,154**	**$260,666,454**	**$255,102,534**	**$770,193,080**	**$819,848,116**	**$807,080,682**	**$308,677,760**	**$319,684,620**	**$194,546,262**	**$317,158,793**	**$522,930,885**	**$252,191,240**

* Calculated using KYTC Construction Cost INDEXED to 2012 x 1.04% to 2013

ALT 1 – 8.5 miles - East I-69 from US 41 just north of KY 351 north to proposed bridge over Ohio River. South IC connector to south US 41. North IC connector via relocated Wolf Hills Road to north US 41. IC at US 60.
ALT 1a – 6.2 miles - Alt 1 without the North IC & US 41 connector via relocated KY 414 (Wolf Hills Road).
ALT 2 – 3.7 miles – West I-69 from US 41 north to proposed bridge over Ohio River. Revised IC at US 60 with I-69 over US 60. Elevated alignment with SB US 41 to US 60 connector under I-69.
Alignment impacts Park Field and Hays Boat Ramp on Ohio River. New northern IC at US 41 and KY 414 (Wolf Hills Road) intersection.
ALT 2a – 3.7 miles -Alternate 2 with new IC at Watson Lane and widened Watson Lane east to US 41.
ALT 3 – 3.6 miles – Same as Alternate 2 with alignment shift to the east north of US 60 to avoid Park Field and Hays Boat Ramp.
ALT 4 – 3.8 miles – I-69 and CD system elevated over existing US 41 from north of US 60 to approximately 0.25 miles north of existing Audubon Park entrance. US 41 is local road under I-69/CD. Revised IC at US 60 with I-69 over US 60.
NB CD begins south of US 60 and terminates north of new IC at US 41 and KY 414 intersection. SB CD begins at new Ohio River bridge end and terminates south of US 60.
ALT 4a – Alternate 4 with Weaving option at I-69/Watson Lane IC from US 41 to new CD off/on ramps.
ALT 4b – Alternate 4 with Roundabout option at I-69/Watson Lane IC.
ALT 4c - Alternate 4 without CD system
ALT 5 – 3.8 miles – I-69 with one-way frontage roads on US 41 at grade with elevated section over Marywood Drive, Watson Lane, and Audubon Park entrance. Separate U-Turn Movement between frontage roads and said elevated sections.
ALT 6 – 3.9 miles – Same as Alt 5 but shifted west along US 41 and elevated with retaining walls. Underpasses every 800-1000 feet.
ALT 7 - 3.6 miles - I-69 West from US 41 north to proposed bridge over Ohio River. Revised IC at US 60 with I-69 over US 60. New IC at Watson Lane. Underpasses at Canary Lane and Race Track Road.

Table 12: Evaluation Matrix for Concept Alternatives

ALTERNATIVES	1	1a	2	2a	3	4	4a	4b	4c	5	6	7
CRITERIA												
TRAFFIC												
DECREASE CONGESTION												
I-69	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C
US 41	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B	LOS B
US 41 BRIDGES		LOS B										
I-69 BRIDGE	LOS B	LOS B	LOS C	LOS C	LOS B	LOS B	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C
TRAFFIC (2040)												
I-69	44495	50290	44495	44495	44495	44495	44495	44495	44495	44495	44495	44495
US 41	23960	22580	23960	23960	23960	23960	23960	23960	23960	23960	23960	23960
US 41 BRIDGE		22580										
I-69 BRIDGE	68455	50290	68455	68455	68455	68455	68455	68455	68455	68455	68455	68455
ENVIRONMENTAL												
TOTAL FLOODPLAINS CROSSED (MILES)	7.7	5.8	4.8	4.8	4.6	2.7	2.75	2.7	2.7	3.6	3.6	2
4(F) PROPERTY IMPACTS TOTALS (ACRES)	188	58	59	59	53	51	51	51	51	50	50	35
FOREST PURCHASED AREAS (ACRES)	63	32	0	0	0	0	0	0	0	0	0	0
AUDUBON STATE PARK (ACRES)	80	0	0	0	0	0.9	0.9	0.9	0.9	0.6	0	0
WILDLIFE REFUGE (ACRES)	45	26	52	52	52	50	50	50	50	50	50	35
ATKINSON PARK (ACRES)	0	0	7.7	7.7	0	0	0	0	0	0	0	0
ENVIRONMENTAL JUSTICE	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
POVERTY												
RACE												
STREAMS CROSSED	10	18	7	8	7	7	8	7	7	7	6	5
WETLANDS (IN ACRES)	33	16	67	67	67	64	64	64	64	64	58	47
RIGHT OF WAY												
BUSINESS RELOCATIONS	40	76	53	74	113	131	152	140	77.1	127	133	80
TOTAL HOMES/ APARTMENT UNITS	12	22	103	170	59	36	37	38	21.2	34	39	20
UTILITY RELOCATION												
MAJOR KNOWN UTILITY IMPACTS TRANSMISSION LINES (FEET)	5240	3657	1272	1272	1249	576	576	576	576	553	630	654
RADIO TOWERS	0	0	0	0	0	2	0	0	0	0	0	0
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF BRIDGES												
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF EXISTING and/or New OHIO RIVER BRIDGES	18.8M	$83.8M	$18.8M	18.8M	18.8M	18.8M	18.8M	18.8M	18.8M	18.8M	18.8M	18.8M
LOCAL ACCESS												
US 41 BUSINESS ACCESS (US 60 TO AUDUBON STATE PARK)	YES-3	YES-2	YES-2	YES-3	YES-3	YES–2	YES-3	YES-3	YES-3	YES-2	YES-2	YES-3
COST												
ESTIMATED COST (MILLIONS)	$226M	$181.00	$216.80	$260.70	$255.10	$770.20	$819.90	$807.10	$522.90	$308.70	$319.70	$252.20

6.1.5 Project Team Meeting #1 – Concept Designs

Project Team Meeting #1 was held on July 10, 2013, to present the concept alternatives, costs, and impacts discussed in the aforementioned pages of this report. The meeting minutes are located in Appendix G and presentation materials in Appendix H. The following is a summary of that meeting.

- *It was noted that, with Alt 1, the road referred to as Wolf Hills Road connector is no longer a state route; it is a city street. The proposed connector to US 41 from Alt 1 may affect property (Green River State Forest Purchase Area) that has been purchased by a special interest group. This property may be considered 4(f), and the project could have significant impacts.*

- *Alt 1 appears feasible as a shortened alternative to the DEIS Preferred Alternative 2 and provides a connection to US 41 if the existing US 41 Ohio River bridges are abandoned. No additional work refinement of Alt 1 is necessary for this alternative in the schematic phase of this Feasibility Study.*

- *Alt 4c is the least costly of the Alt 4 concepts (I-69 over existing US 41); however, these Alt 4 concepts are so costly compared to the DEIS Preferred Alternative 2 or the other Feasibility Study concepts presented. No additional work refining these concepts is necessary.*

- *Alt 5 would be down the center of US 41, walled, with access roads on either side. Alt 6 is similar to 5, but all the business impacts are along the west side. The Project Team agreed the preference would be to hold one side of the edge of pavement to minimize business impacts; therefore, Alt 6 with an interchange with Watson Lane will move forward to the Schematic Design of the Feasibility Study.*

- *The Project Team felt that, among Concept Alternatives 2, 2a, 3, and 7 to the west of US41, Alt 7 presented the best alternative to minimize business and residential impacts, and obtain one single crossing. Therefore, Alt 7 will move forward to the schematic phase of the Feasibility Study.*

- *Alt 7 is parallel to US 41 along the west side and would have notable relocation impacts (possibly more than in the matrix); however, it is an estimated $252 million and achieves one Ohio River crossing. Therefore, this alternative will also move forward. There may be an opportunity to use a frontage road that motorists are using today to avoid congestion on US 41, as part of Alternative 7.*

- *To adequately address cross-river costs, operation and maintenance expenses need to be taken into consideration. If the project were to become financially feasible, a Value for Money analysis would be performed to determine the appropriate financial delivery model. Values for Money studies utilize a life-cycle cost evaluation. Life cycle costs for the existing bridge, the future I-69 bridge, and the DEIS preferred alternative will be added in order to have all future maintenance costs to assist KYTC in the project's financial feasibility and future funding decisions.*

At the conclusion of the meeting, the Project Team determined that (1) two concepts that attempt to minimize impacts (Alternatives 6 and 7) should advance to the Schematic Design phase of this Feasibility Study, and (2) quantity-based cost estimates should be developed and compared to updated cost estimates. The purpose of this refinement is only to present information as to the feasibility of more affordable concepts that combine cross river traffic onto one crossing. Alternatives 1, 1a, 2, 3, 4, 4a, 4b, 4c, and 5 are not eliminated from consideration, and remain viable for this Feasibility Study.

6.2 Schematic Design

Schematic Designs have been developed to approximate alignments and grades for Alternatives 6 and 7. Lane layouts and ramp tapers are shown with merge and weave distances where appropriate, and approximate right-of-way limits are also shown. Bridges were developed based on crossing profiles. Cost estimates were based on calculated quantities rather than a ratio of length, as shown in Table 13. A evaluation matrix (*Table 14, p.58*) was provided to the KYTC Project Team showing the comparative impacts for each of the two layouts. Appendix I, *Schematic Design Detail for Alternatives 6 and 7,* provides plan views and profiles, and cost estimate data prepared for this study.

6.2.1 Refinement of Alternatives 6 and 7

At the conclusion of the project team meeting (PTM) #1 two concepts (Alternatives 6 and 7) quantity-based cost estimates were developed that would attempt to minimize impacts and be compared to a refined DEIS Preferred Alternative 2 as a baseline. The 2004 DEIS cost breakout(s) were used for like comparison of the estimated costs for Concept Alternatives 1 through 7 presented in PTM #1. The purpose of this refinement is to present information as to the feasibility of more affordable concepts that combines cross river traffic onto one crossing. There was no additional work required on Alternatives 1 through 5.

Alternative 6 is 3.7 miles in length and its goal is to hold the east right-of-way line of US 41, as much as possible, by shifting the proposed I-69 roadway to the west north of the US 60/US 41 interchange. The southern terminus begins at the Kimsey Lane bridge over US 41 with a 4-lane to 6-lane transition south of US 60. I-69 bridges over US 60 with a re-designed interchange. Traveling north, I-69 then parallels existing US 41 but shifts westward to avoid any impact with parcels along the east side of US 41. This alternative would have new northbound (NB) and southbound (SB) frontage roads paralleling I-69 which would provide local access to US 60, Watson Lane, Marywood Drive, and residences and businesses along US 41. The typical section for I-69 shows an elevated I-69 with retaining walls between I-69 and the at-grade frontage roads below. Access between the NB and SB frontage roads is provided with several underpasses spaced 800–1,000 feet apart. I-69 spans Marywood Drive, Watson Lane, and the main entrance to Audubon Park. A single point urban interchange with retaining walls is proposed at Watson Lane to provide access to and from I-69. An interchange is proposed at US 41 and Wolf Hills Road. A Noise Barrier Wall is proposed along the west side of I-69 from the SB off ramp at US 60 to just north of Race Track Road. Alternative 6 has an estimated cost of $269M. Alternative 6 is shown in Figure 32 *(p.55).*

Alternative 7 is 3.6 miles in length and its goal is to leave existing US 41 for local business access, and shift I-69 west taking some advantage of a frontage road corridor (N. Elm Street) that is being utilized today to avoid congestion on US 41. Alternative 7 begins north of the Kimsey Lane bridge over US 41 with a 4-lane to 6-lane transition south of US 60. I-69 bridges over US 60 with a re-designed interchange. I-69 then bridges over US 41 while avoiding Atkinson Park to the west and swings northward 600–700 feet west of US 41. To provide connectivity from east and west of I-69, overpasses are proposed over Canary Lane and Race Track Road with an interchange at Watson Lane. Watson Lane will be widened to 4 lanes between US 41 and Sunset Lane. Local access will be maintained with a proposed retaining wall along N. Elm Street and a proposed N. Elm Street connection to Canary Lane. An interchange is proposed at US 41 and Wolf Hills Road. To access US 41 from NB I-69, drivers must exit the NB Ramp 5 to US 60 and travel across US 60 via Ramp 4 to US 41. Eastbound US 60 drivers also use Ramp 4 to access US 41 but must use the rebuilt loop Ramp 6 to access NB I-69. Likewise, the SB US 41 drivers that want to travel SB I-69 must use Ramp 2a and cross US 60 to Ramp 1. WB US 60 drivers must use rebuilt loop Ramp 3 to access SB I-69. SB I-69 drivers that desire to enter US 60 must exit on Ramp 2 and then use either Ramp 2b to go west on US 60 or Ramp 2C to go east. Alternative 7 has an estimated cost of $205M. Alternative 7 is shown in Figure 33 *(p. 56).*

Both Alternatives 6 and 7s' goals are to avoid impacts to the existing known Audubon State Park and Atkinson Park and provide for one Ohio River crossing. Cost estimates were presented and compared to the DEIS Preferred Alternative 2. As shown in the *Evaluation Matrix for Schematic Design Alternative*s in Table 14 *(p. 58),* Alternative 7 was the least expensive; however, had more total business and residential impacts as compared to Alternative 6. Alternative 6 was more expensive with more business impacts than Alternative 7; and, Alternative 7 has more residential impacts and less business impacts than Alternative 6.

Right-of-way impacts were reviewed in greater detail for the schematic phase; however, the PVA information was still utilized.

Figure 34 *(p. 59)* illustrates a typical section view from Alternative 7 as the proposed I-69 spans US 41 near Atkinson Park.

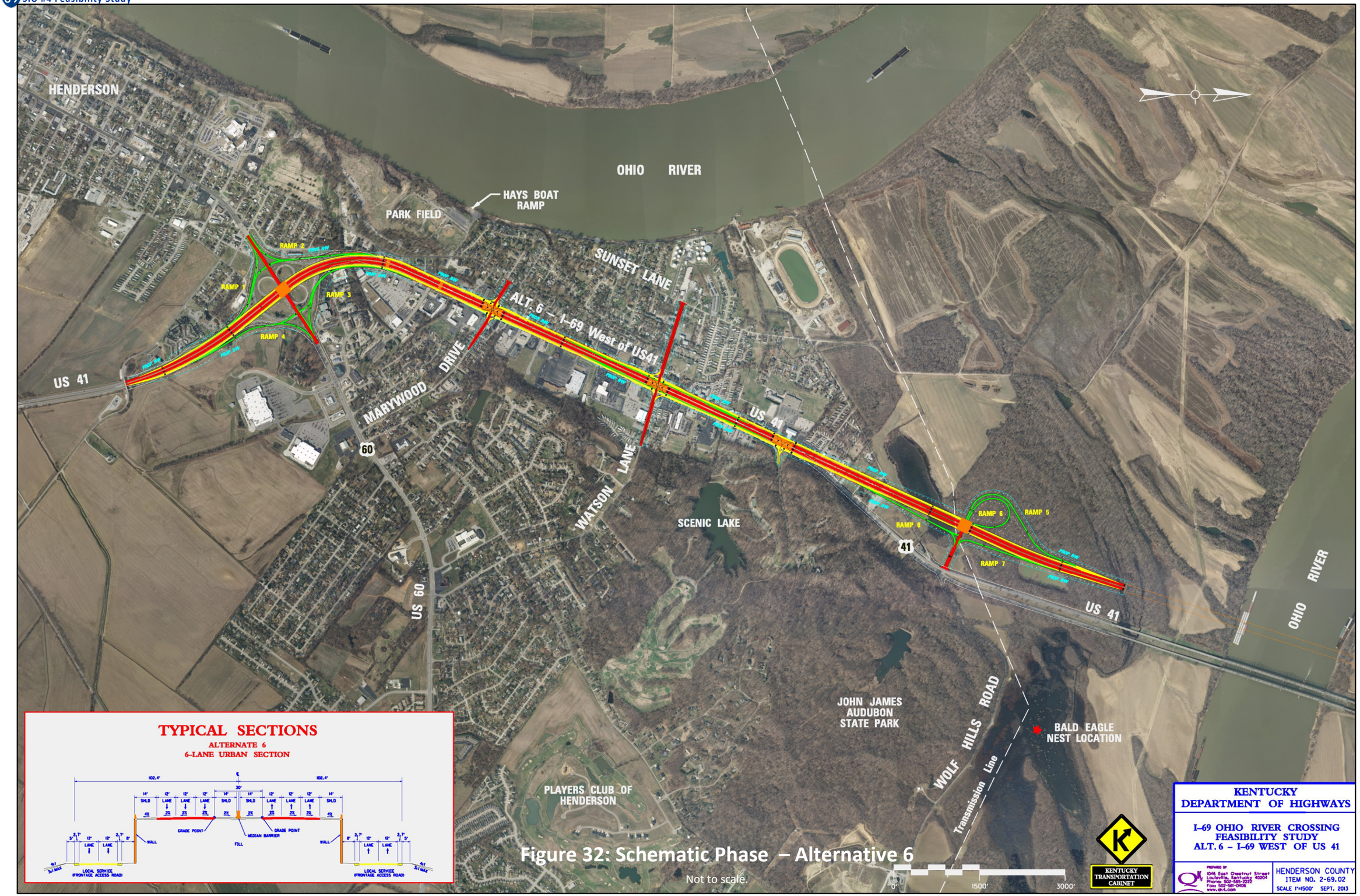


Figure 32: Schematic Phase – Alternative 6

Not to scale.

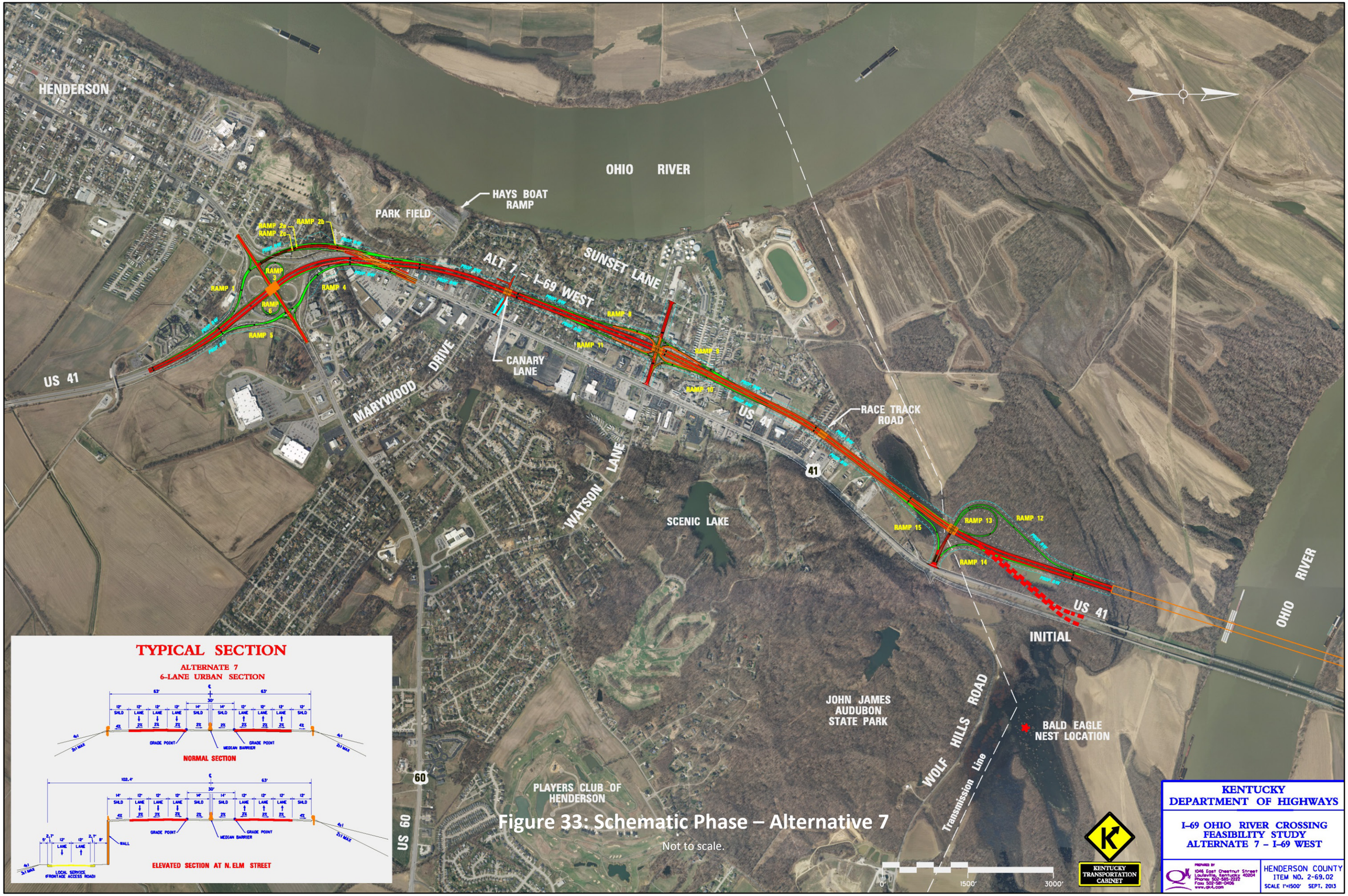


Figure 33: Schematic Phase – Alternative 7

Not to scale.

Table 13: Schematic Design Phase Cost Estimates for Alternatives 6 and 7

Mainline Length (miles)			ALTERNATE 6		ALTERNATE 7		Adjusted ALTERNATE 2 from FDEIS		** ET Breathitt Sections 2 & 3
			3.7		3.6		9.2		5.8
	Unit	Unit Cost	Quantity	Cost	Quantity	Cost	Quantity	2013 Costs*	2013 Costs
Design		10%		$13,620,008		$9,885,496		$10,695,488	$12,640,657
Right of Way				$59,436,900		$49,825,350		$9,860,819	$6,259,476
Utilities		2%		$2,724,002		$1,977,099		$2,139,098	$2,528,131
Construction				$136,200,077		$98,854,958		$106,954,881	$126,406,570
MOT		0.5%		$657,971		$477,560		$516,690	
Drainage		3.0%		$3,947,828		$2,865,361		$3,100,141	
Earthwork									
Cut (CY)	CY	$4	356,546	$1,426,184	514,757	$2,059,027	487,000	$1,948,000	
Fill (CY)	CY	$7	3,561,222	$24,928,554	3,083,523	$21,584,663	3,543,000	$24,801,000	
Roadway	SY	$70	518,558	$36,299,052	375,914	$22,554,847	672,423	$47,069,610	
Structures								-	
Bridges	SF	$150	244,403	$36,660,450	166,680	$25,002,000	150,800	$22,620,000	
Retaining Wall	SF	$70	353,864	$24,770,480	107,155	$7,500,850	0	$0	
Noise Wall	SF	$50	114,000	$5,700,000	301,000	$15,050,000	48,000	$2,400,000	
ITS				$1,809,557		$1,760,650		$4,499,439	
Subtotal				**$211,980,986**		**$160,542,904**		**$129,650,285**	**$147,834,835**
Contingency 25%				$52,995,247		$40,135,726		$32,412,571	
ET Breathitt/US 41 Upgrade (5.77 miles, 3 IC's)				$4,385,000		$4,385,000			
TOTAL				**$269,361,233**		**$205,063,629**		**$162,062,857**	**$147,834,835**

* Calculated using FDEIS Alt 2 quantities, URS Feasibility Study Structures Cost Estimate, estimated roadway quantities, and projected R/W x Unit Cost.

ALT 6 – 3.7 miles – I-69 with one-way frontage roads shifted west of US 41. Frontage Roads at grade with elevated section over Marywood Drive, Watson Lane, and Audubon Park entrance.
ALT 7 - 3.6 miles - I-69 West from US 41 north to proposed bridge over Ohio River. Revised IC at US 60 with I-69 over US 60. New IC at Watson Lane. Underpasses at Canary

Table 14: Evaluation Matrix for Schematic Design Alternatives

EVALUATION MATRIX FOR SCHEMATIC ALTERNATIVES			
ALTERNATIVES	**DFEIS Preferred Alternative 2 from DFEIS in KY**	**6**	**7**
CRITERIA			
TRAFFIC			
DECREASE CONGESTION ON			
I-69	LOS C	LOS C	LOS C
US 41	LOS B	LOS B	LOS B
US 41 BRIDGES	LOS B		
I-69 BRIDGE	LOS B	LOS C	LOS C
TRAFFIC (2040)			
I-69	50290	47400	47400
US 41	22580	25500	25500
US 41 BRIDGE	22580		
I-69 BRIDGE	50290	72900	72900
ENVIRONMENTAL			
TOTAL FLOODPLAINS CROSSED (MILES)	2.40	3.6	2.0
4(F) PROPERTY IMPACTS TOTALS (ACRES)	132.1+	49.66	35.06
FOREST PURCHASE AREAS (ACRES)	46.3+	0	0
AUDUBON STATE PARK (ACRES)	0	0	0
PROPOSED WILDLIFE REFUGE (ACRES)	85.8+	49.7	35
ATKINSON PARK (ACRES)	0	0	0.07
HISTORIC	4 (VISUAL) HISTORIC NO SIGN. ARCH SITES	1 KNOWN US 41 BRIDGE	1 KNOWN US 41 BRIDGE
ENVIRONMENTAL JUSTICE	NO	YES	YES
POVERTY			
RACE			
STREAMS CROSSED	21.9	6	5
WETLANDS (IN ACRES)	9.4 (jurisdictional) 64 total	58.3	47.0
RIGHT OF WAY			
COMMERCIAL RELOCATIONS / IMPACTS	0 says will shift 515 commercial jobs away from the US 41 corridor	85 IMPACTED[1] 64 RELOC.	50 IMPACTED[2] 35 RELOC.
TOTAL HOMES / RESIDENTIAL IMPACTS	6 1 RELOC.	56 IMPACTED 51 RELOC.	148 IMPACTED 140 RELOC.
EXEMPT, EXEMPT OTHER, EXEMPT CITY/COUNTY	NOT KNOWN	8 IMPACTED 5 RELOC.	6 IMPACTED 3 RELOC.
FARM	1 IMPACTED (INCLUDED IN TOP TOTAL RESIDENTIAL IMPACTS) 573.3 (496.1 prime + unique) acres	4 IMPACTED 62 acres	3 IMPACTED 53.4 acres
UTILITY RELOCATION			
MAJOR KNOWN UTILITY IMPACTS TRANSMISSION LINES (FEET)	Not available in DFEIS	630	655
RADIO TOWERS		0	0
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF BRIDGES to 2040 in (2013 dollars)			
LIFE EXPECTANCY AND FUTURE MAINTENANCE COSTS OF EXISTING AND FUTURE OHIO RIVER BRIDGES	$83.8M (US 41)* $18.8M (I-69)**	18.8M*	18.8M*
LOCAL ACCESS			
US 41 BUSINESS ACCESS (US 60 TO AUDUBON STATE PARK)	NO	YES-2	YES-3
COST IN KENTUCKY			
ESTIMATED 2013 COST (MILLIONS)	$162.10	$269.40	$205.10

[1]Approximately 5 trailers in 1 commercial class properties that are not in the total # of parcels impacted, nor in the total commercial properties affected.

[2]Approximately 50 trailers in 6 commercial class properties that are not in the total # of parcels impacted, nor in the total commercial properties affected.

*From KYTC projected to year 2040 using 4% interest and brought to 2013 dollars.

**From Conceptual Financing Plan 2007 and LSIORB similar project

+ Measured by QK4

6.2.2 *Project Team Meeting #2 – Schematic Design*

A second Project Team Meeting was held on September 23, 2013, for a presentation and discussion of the Schematic Phase of this Feasibility Study. Alternatives 6 and 7 were presented in detail with quantity-based cost estimates. Profiles were also developed and presented. Meeting minutes are in Appendix G. Cost estimate quantities and profiles are provided in Appendix H. The following were discussion items at the meeting:

- *A question was raised as to the reason why Alternative 6 was shifted to the west holding the east right of way line rather than being shifted to the east. The reasoning was that the Audubon Park is a Section 4(f) resource and needs to be avoided. To shift the alignment to hold the east right of way line would also place a "kink" in the alignment. An alternative that shifted the alignment to the east holding the west right of way line was not studied.*

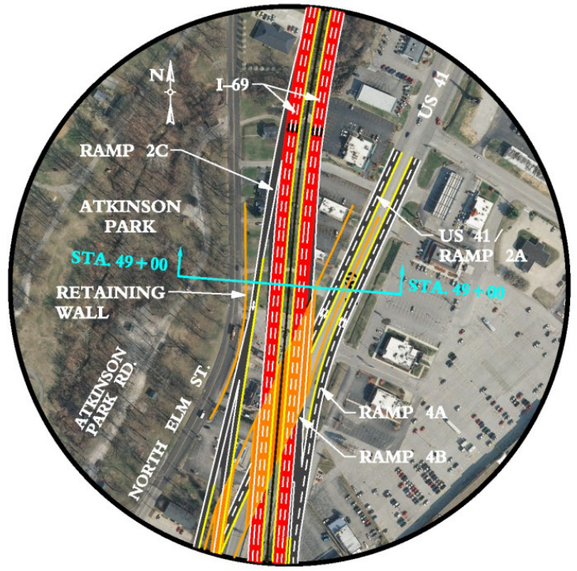
- *Would US 41 south of the existing US 60/US 41 interchange require six lanes in 2040, and if so, where would the requirement stop? If six lanes are required, there should be a discussion as to whether an estimate for six lanes should be included in the cost of applicable alternatives for this study.*

- *Another alternative may exist that would be similar to Alternative 7 but would have the crossroads go over I-69 rather than I-69 go over US 41. This would require steeper grades on the crossroads in order to tie down to intersect with US 41. The Project Team decided not to examine that option.*

- *KYTC stated that parcels near Audubon Park may have been recently purchased by a nonprofit group that intends to sell or donate this property to the Audubon Park. This matter will be investigated further. These properties could affect any improvement to Wolf Hills Road and Alternative 1.*

- *The categories in the matrix when compared to the 2004 DEIS were not always a one-to-one correlation. The DEIS included some impacts for Kentucky, some for both Kentucky and Indiana, and some were not quantified in the same categories. This column is considered a "work in progress" and may change somewhat in the final report.*

TYPICAL SECTION
I–69
ALT. 7 STA. 49 + 00



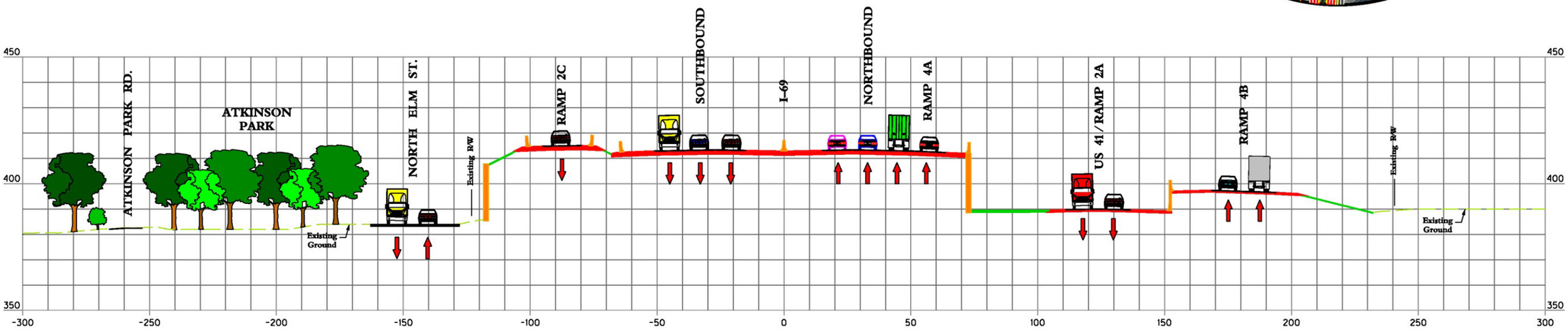


Figure 34: Alternative 7 Typical Section

Value for Money

In an effort to compare all costs associated with the DEIS Preferred Alternative 2, utilizing the information provided by KYTC for the existing US 41 bridge over the Ohio River, O & M costs to year 2030 were projected to year 2040 for Alternatives 6 and 7. That 2040 estimate was then adjusted to 2013 dollars (today's dollars). For the new bridges, O & M costs ($1.3M per year) were used from the Louisville-Southern Indiana Ohio River bridges project because of the similarity in bridge size, and then determined what the expenses would be through 2040. The new bridge O & M costs for Alternatives 6 and 7 would be identical through 2040. Table 15 summarizes the O & M costs for the DEIS Preferred Alternative 2, Alternative 6, and Alternative 7 through 2040. Calculations are located in Appendix J, *Value for Money Supporting Information*.

Table 15: Value for Money

Cost Estimates		Alternative 2 from DEIS	Concept Alternative 6	Concept Alternative 7
CONSTRUCTION COSTS				
Kentucky Roadway[1]		$162,062,857	$269,361,233	$205,063,629
New River Crossing	**Indiana Approach to Ohio River Structure**[2]	$156,353,492	$156,353,492	$156,353,492
	Ohio River Structure[3]	$125,963,658	$125,963,658	$125,963,658
	Kentucky Approach to Ohio River Structure[2]	$52,191,236	$26,547,597	$26,547,597
OPERATING AND MAINTENANCE COSTS (Through 2040)				
New I-69 Bridge [3 and 4]		$18,770,290	$18,776,538	$18,776,538
Existing US 41 Bridges Cost[5]		$83,807,797	$0	$0
Total Cost		**$599,149,330**	**$597,002,517**	**$532,704,914**

[1] *These estimates were developed as a part of this Feasibility Study.*

[2] *These estimates were extracted from the Conceptual Financing Plan for I-69 Corridor Henderson, KY and Evansville, Indiana Technical Memorandum and inflated for the construction index to 2012 and then increased from 2012 to 2013 utilizing 4% interest rate.*

[3] *This DEIS Preferred Alt 2 figure was extracted from the Conceptual Financing Plan for I-69 Corridor Henderson, KY and Evansville, Indiana Technical Memorandum, estimating $1.85M maintenance and operating costs (includes tolls) per year projected to 2040 utilizing a 4% interest rate brought to present year 2013 dollars assuming a 2016 open to traffic date.*

[4] *Concept Alternatives 6 and 7 were estimated from the Louisville Bridges project, estimating $1.3M maintenance and operating costs per year projected to 2040 utilizing 4% interest rate brought to present year 2013 dollars assuming a 2016 open to traffic date.*

[5] *This estimate was projected from the operating and maintenance costs furnished by KYTC, then projected to 2040 by Qk4, and brought to present year 2013 dollars.*

Conclusion and Summary

In this Feasibility Study, seven alternatives and some variations were examined at the concept level. All but one of these alternatives (1a) would close the existing US 41 twin bridges over the Ohio River northeast of Henderson and construct a new bridge. As the study progressed two of the alternatives — Alternatives 6 and 7 — were advanced to the Schematic Design phase to examine in greater detail the potential impacts of abandoning the twin bridges and constructing a new bridge while maintaining connectivity with the commercial areas along US 41 in Henderson. Projections show a new bridge would to carry over 60,000 vpd in Year 2025 and nearly 70,000 vpd in Year 2040. Each of the alternatives is viable; however, each is very expensive, is not without substantial impacts to the project area, and has no funding source.

An additional challenge will have to be considered as this project progresses. Following the second Project Team Meeting, the John James Audubon State Park manager was contacted regarding the possibility of a recent donation of land to the park. KYTC was provided the following exhibit regarding park property adjacent to the existing US 41 bridges to the east *(see Figure 35).* KYTC learned that the following parcels noted in Figure 35 are now all owned by Audubon Park or Kentucky Department Fish and Wildlife Services (KDFWS), which now owns the parcel west of the existing US 41 structures, and land that parallels Wolf Hills Road. Each alternative in some way would impact these Section 4(f) properties shown in Figure 36.

Figure 35: New Audubon Park Property

In addition, the park manager conveyed to KYTC that two additional properties have been purchased by KDFWS. Both the new Audubon Park property and the Fish and Wildlife properties close to the river and adjacent to the existing US 41 bridges are shown below. All of these properties denoted to the Audubon State Park and KDFWS will be Section 4(f) resources. Each alternative affects these properties in some manner as shown below.

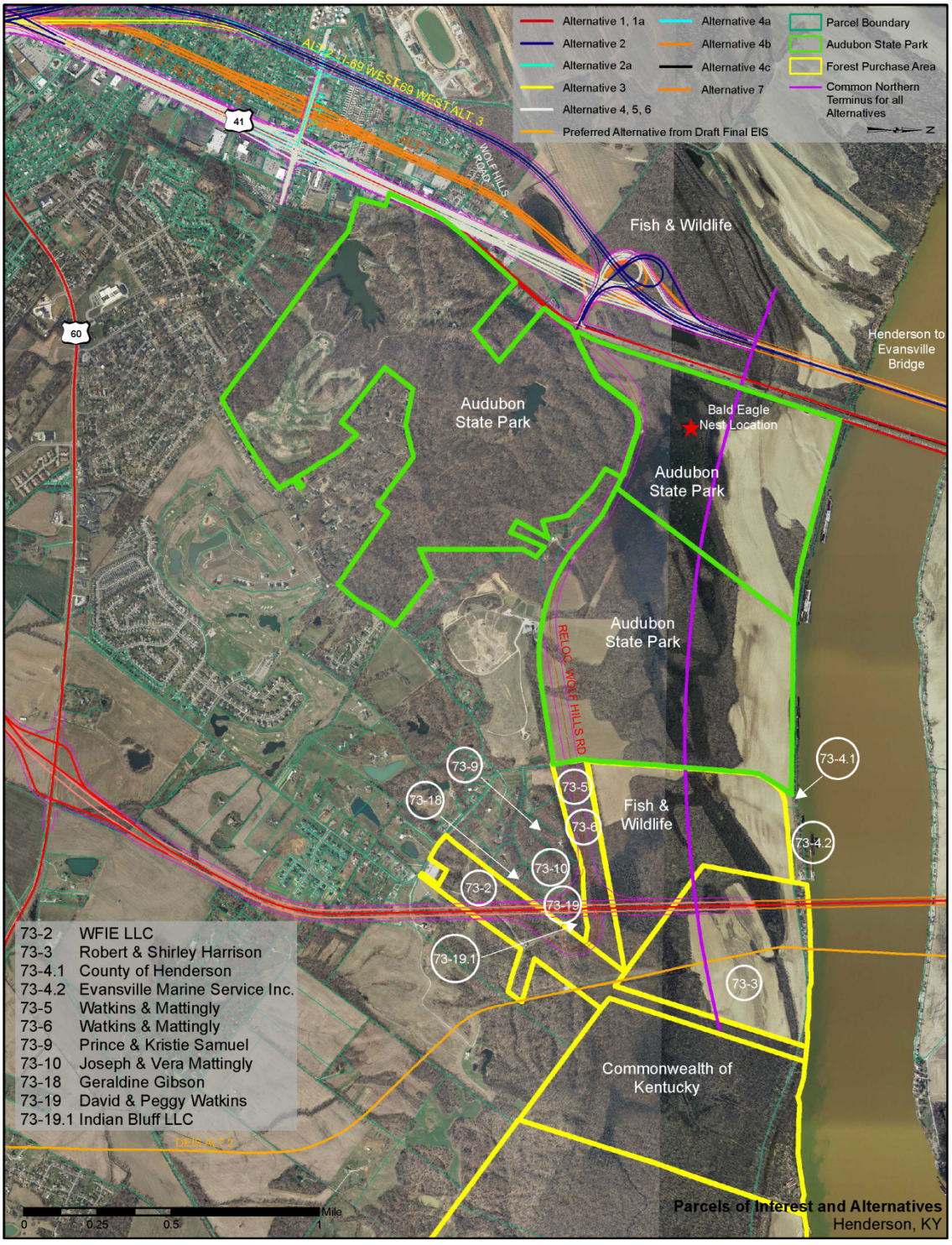


Figure 36: New Audubon Park Property and Fish and Wildlife Property, Potential 4(f)

This Feasibility Study has considered seven alternatives: an alternative to the east of Henderson, similar to the DEIS Preferred Alternative 2, but shorter; and six alternatives (some with variations) parallel to US 41 between US 41 and the Ohio River. Each is very expensive, ranging from $200 million to over $800 million.

Each alternative studied herein would have substantial direct and indirect environmental and/or social impacts. The primary business center for Henderson is along US 41. The DEIS's recommended corridor would bypass the US 41 corridor. Any alternative that would use or be adjacent to this corridor—and thus have the one river crossing in the same location as the existing US 41 twin bridges—would have substantial business, residential, and mostly likely Section 4(f) impacts. Adjacent to the east side of US 41 is the John James Audubon State Park, which is a protected Section 4(f) resource. As recently as September 2013, the State purchased land between the state park property and the Ohio River, adjacent to the existing US 41 crossing. This expands the protected site and will complicate the process to locate I-69 within the downtown corridor.

Although not yet investigated in detail, direct and indirect impacts to the local economy and community, including the Environmental Justice concerns, are also anticipated as a result of providing only one crossing (I-69 bridge) over the Ohio River.

In summary, this study identified the variety of social, environmental, and economic issues with each alternative. With the advancement of I-69 nationwide, and particularly in Kentucky and Indiana, the need to advance SIU #4 remains. Due to the passage of time since the DEIS, the potential environmental constraints, the estimated increased costs, and tolling (should it be considered), the National Environmental Policy Act (NEPA) process would have to be renewed. At that time, the build alternatives presented in this Feasibility Study should be considered for use in identifying an alternative that has the least overall impacts and is financially feasible.