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Kentucky Transportation Cabinet Project Manager
Louisville Southern Indiana Ohio River Bridges Project

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From: Tim Sorenson, P.E.

Subject: **Louisville Southern Indiana Ohio River Bridges Project**
Financial Feasibility Revenue Estimates for the FEIS Selected Alternative

The Louisville-Southern Indiana Ohio River Bridges (LSIORB) project is a construction/reconstruction project being undertaken jointly by the Kentucky Transportation Cabinet (KYTC) and the Indiana Department of Transportation (INDOT). The purpose of the project is to address long-term cross-river transportation needs in the Louisville metropolitan area.

The LSIORB project is undertaking a Supplemental Environmental Impact Statement (SEIS) to address changes in the project including a modified design and the inclusion of tolling. As part of this process, Wilbur Smith Associates (WSA) was asked to provide a planning level revenue estimate and indicative financial capacity at a maximum level to assess whether tolls can cover the funding gap between traditional funds reasonably expected to be available according to the Metropolitan Planning Organization's (MPO) Metropolitan Transportation Plan (MTP) and the cost of the FEIS Selected Alternative. This indicative financial capacity uses a net present value analysis to estimate the potential level of funding that can be contributed to this project based on the use of bonds supported by toll revenues.

In a previous memo, revenues and indicative financial capacity were evaluated for the SEIS modified selected alternative. This alternative assumes a \$1.50 (2010 dollars) toll for passenger cars on the new East End Bridge once it opens to traffic in 2017. The new I-65 northbound Bridge and the rehabilitated southbound I-65 Bridge would both be tolled beginning in 2020 at a toll for passenger cars of \$1.50 as well.

In order to develop a high revenue scenario alternative, toll rates were tested to determine the toll rates that had the greatest revenue potential given a specific time of day and direction of travel on the two bridges. These rates were then used to generate a potential revenue stream for use in the indicative financial capacity analysis.

METHODOLOGY

This analysis was designed to develop a planning level, high revenue for the FEIS Selected Alternative. The analysis of toll rates and the development of the traffic estimate were developed based on the LSIORB Time-of-Day Travel Demand Model as discussed in the LSIORB Travel Demand Model Phase 1 (September, 2011) and Phase 2 (October, 2011) reports. In order to determine the revenue maximizing toll rates, numerous model runs were completed using varying toll rates by time of day and by direction. By reviewing these model runs, the potential toll rates which would provide the greatest revenue regardless of potential impacts associated with change in travel patterns were determined.

The analysis of differing toll rates by time of day and direction results in the passenger car toll rates shown in **Table 1**. These rates reflect those that generate the highest revenue in 2030. Because these toll rates are so high, they likely would not generate the desired traffic in the early years to generate the highest revenue because congestion would not have reached 2030 levels and people would not be as accepting of the high toll rates in the early years when congestion is lower. To address this concern, the toll rates for the high revenue scenario were set as follows:

- Start with lower tolls to accommodate East End only tolling
- Between 2020 and 2030 toll rates rise quickly to 2030 levels to reach the revenue optimizing tolls
- After 2030 continue to grow tolls but not as quickly as the previous decade.
- Truck toll rates would be two times (light trucks) and four times (heavy trucks) car toll rates.

Table 1 – SEIS Modified High Revenue Car Toll Rates (2010\$)

	AM SB	AM NB	MD SB	MD NB	PM SB	PM NB	NT SB	NT NB
EE Only 2017-2020 (I-65 No Toll)	\$1.75	\$2.00	\$1.00	\$1.00	\$2.00	\$1.75	\$1.00	\$1.00
2021-2029	Each bridge and period rises linearly from 2021 to 2030 rates							
2030 (Both Bridges)	\$9.00	\$3.00	\$5.00	\$4.00	\$5.00	\$10.00	\$3.00	\$5.00
2031-2049	Each bridge and period rises linearly from 2031 to 2050 rates							
2050 and beyond	\$11.00	\$3.00	\$9.00	\$6.00	\$9.00	\$12.00	\$3.00	\$9.00

AM = 6 am to 9 am, MD = 9 am to 3 pm, PM = 3 pm to 6 pm, NT = 6 pm to 6 am

SB = Southbound (travelling from Indiana to Kentucky across the bridges)

NB = Northbound (travelling from Kentucky to Indiana across the bridges)

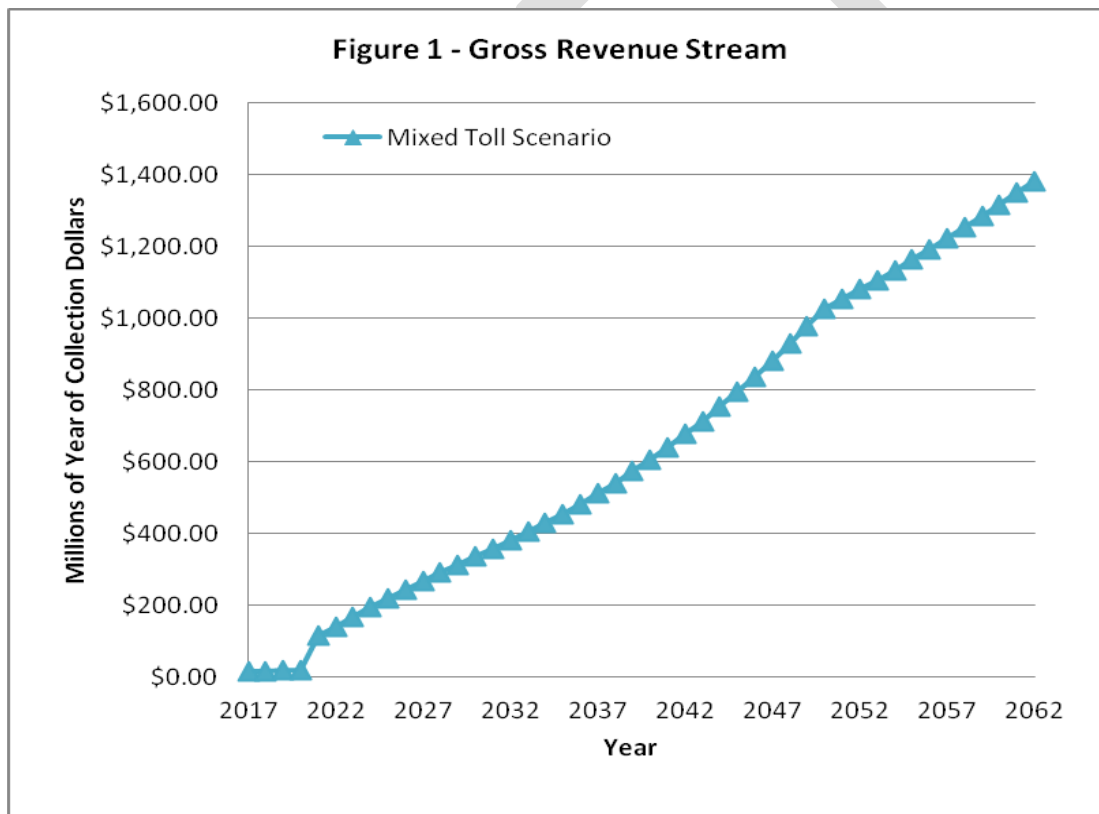
Using the tolling assumptions in Table 1, specific travel demand model runs were made to reflect key modeling years of 2017, 2020, and 2030. These interim years were then calculated using interpolation and extrapolation. A yearly gross revenue stream was produced based on the yearly traffic volumes and assumed toll rates. Toll operations and maintenance costs and roadway maintenance costs were estimated and subtracted from the gross toll revenue stream to obtain an estimated net revenue stream.

GROSS TOLLING REVENUES

A set of basic assumptions was developed to generate gross revenues based on the forecast traffic volumes.

- Tolls will be collected electronically, by transponder account or through video identification. Toll rates will not vary by the collection method used.
- Truck tolls are two and four times the car rates, for light and heavy trucks respectively. As the SEIS and tolling models contain only a single truck trip table, a separate estimate of light versus heavy truck volumes was made. Trucks were assumed to make up 6.5% light trucks and 10.5% heavy trucks of the total traffic on each of the tolled facilities, based on counts of existing bridge traffic.
- The toll rates in the analysis are in 2010 dollars. Toll rates are assumed to be increased annually according to the Consumer Price Index (CPI), assumed at 2.5% annual growth for this analysis.

Gross revenues were generated for the scenario as shown in Figure 1.



LSIORB PROPOSED TOLL COLLECTION SYSTEM

An all electronic tolling system is assumed (where motorists are charged through an in-vehicle transponder or traced to an account by a video image of their license plate). For the purposes of this exercise, it is estimated that the cost to process each transaction and maintain the toll collection system would be \$0.38 when the East End Bridge is open and \$0.285 when both bridges are open (2010 dollars). The cost per transaction goes down

as the number of transactions increases because of economies of scale. The cost per transaction does not include the initial cost of construction and installation of the toll collection system.

ROADWAY OPERATIONS AND MAINTENANCE

The gross revenue stream less the annual cost of toll collection operations and maintenance and the annual cost of roadway operations and maintenance yields a net revenue stream. The roadway operations and maintenance cost reflects the need to keep the roadway in operating condition and preserve the investment in new infrastructure. These costs do not include major repairs or replacement during the years in which revenue is used to support bonding (40 or 50 years). For this analysis, an annual cost of \$4,500/lane-mile (2010 dollars) was used and inflated by 2.5% per year. Based on information provided by KYTC, 63 lane miles would be operational by 2017 and 140 lanes miles by 2020 for the entire LSIORB project. These are total project lane-miles, representing an increase of 3 to 60 lane-miles compared to existing conditions.

NET REVENUE STREAMS

The gross revenue streams less the annual cost of toll collections operations and maintenance and the roadway operations and maintenance yield a net revenue stream. Results are presented through year 2062 in **Table 2**

Table 2 –Net Revenue Streams
In millions of year of collection dollars

SEIS Modified High Revenue				
Year	Gross Revenue	Tolling O&M	Roadway O&M	Net Revenue
2017	\$17.09	\$3.80	\$0.34	\$12.95
2018	\$17.79	\$3.95	\$0.35	\$13.50
2019	\$18.52	\$4.10	\$0.35	\$14.07
2020	\$19.28	\$4.26	\$0.36	\$14.66
2021	\$114.40	\$13.29	\$0.83	\$100.28
2022	\$141.26	\$13.19	\$0.85	\$127.22
2023	\$167.74	\$13.07	\$0.87	\$153.80
2024	\$193.76	\$12.94	\$0.89	\$179.93
2025	\$219.24	\$12.79	\$0.91	\$205.54
2026	\$244.10	\$12.63	\$0.94	\$230.53
2027	\$268.24	\$12.45	\$0.96	\$254.83
2028	\$291.56	\$12.25	\$0.98	\$278.32
2029	\$313.96	\$12.04	\$1.01	\$300.91
2030	\$335.34	\$11.81	\$1.03	\$322.50
2031	\$357.16	\$12.30	\$1.06	\$343.80
2032	\$380.03	\$12.81	\$1.08	\$366.14
2033	\$403.98	\$13.33	\$1.11	\$389.54
2034	\$429.07	\$13.87	\$1.14	\$414.06
2035	\$455.33	\$14.43	\$1.17	\$439.73
2036	\$482.82	\$15.01	\$1.20	\$466.61
2037	\$511.59	\$15.62	\$1.23	\$494.74
2038	\$541.68	\$16.24	\$1.26	\$524.18
2039	\$573.15	\$16.88	\$1.29	\$554.98

2040	\$606.05	\$17.54	\$1.32	\$587.19
2041	\$640.44	\$18.23	\$1.35	\$620.86
2042	\$676.39	\$18.94	\$1.39	\$656.06
2043	\$713.95	\$19.68	\$1.42	\$692.85
2044	\$753.18	\$20.43	\$1.46	\$731.28
2045	\$794.15	\$21.22	\$1.50	\$771.43
2046	\$836.93	\$22.03	\$1.53	\$813.36
2047	\$881.59	\$22.87	\$1.57	\$857.15
2048	\$928.20	\$23.74	\$1.61	\$902.85
2049	\$976.84	\$24.63	\$1.65	\$950.56
2050	\$1,027.59	\$25.56	\$1.69	\$1,000.34
2051	\$1,053.28	\$26.20	\$1.73	\$1,025.35
2052	\$1,079.61	\$26.85	\$1.78	\$1,050.98
2053	\$1,106.60	\$27.53	\$1.82	\$1,077.25
2054	\$1,134.27	\$28.21	\$1.87	\$1,104.19
2055	\$1,162.62	\$28.92	\$1.91	\$1,131.79
2056	\$1,191.69	\$29.64	\$1.96	\$1,160.08
2057	\$1,221.48	\$30.38	\$2.01	\$1,189.09
2058	\$1,252.02	\$31.14	\$2.06	\$1,218.81
2059	\$1,283.32	\$31.92	\$2.11	\$1,249.28
2060	\$1,315.40	\$32.72	\$2.17	\$1,280.52
2061	\$1,348.29	\$33.54	\$2.22	\$1,312.53
2062	\$1,381.99	\$34.38	\$2.28	\$1,345.34

POTENTIAL FUNDING FOR CONSTRUCTION

Using the net revenue stream derived from the work above, an analysis can be done to provide an estimated range of potential funding available for construction. A net present value analysis was used to determine the potential financing capacity of the toll revenues. This level of analysis is considered indicative of the potential dollars available to support construction. To help cover a number of options, four sets of assumptions were used and are shown on **Table 3**. These assumptions were based on the following:

- The revenue stream outlined in the previous section
- Project financing beginning in 2013, which means the bonds would be sold in 2013 with proceeds going to construction
- Two different combinations of coverage ratios and discount rates to reflect a more public bond approach (8% discount rate, 1.5 coverage ration) and a more private bond approach (6.5% discount rate, 1.75 coverage ratio)
- Two different lengths of bonding, 40 and 50 years

**Table 3 – Indicative Financial Capacity Based on Coverage Ratio
 SEIS Modified High Revenue Scenario**

Assumptions		Option 1	Option 2	Option 3	Option 4
First Year of Revenue	East End	2017	2017	2017	2017
	Downtown	2021	2021	2021	2021
Toll Rates (in 2010 dollars)	Car	Table 1	Table 1	Table 1	Table 1
	Small Truck	Table 1	Table 1	Table 1	Table 1
	Large Truck	Table 1	Table 1	Table 1	Table 1
Toll Escalation		Table 1	Table 1	Table 1	Table 1
Initial Year of Financing		2013	2013	2013	2013
O&M Tolls Included		YES	YES	YES	YES
O&M Roadway Included		YES	YES	YES	YES
Discount Rate		8.0%	6.5%	8.0%	6.5%
Coverage Ratio		1.50	1.75	1.50	1.75
Years of bonding after bond issue		40	40	50	50
Results (2013 dollars)		Option 1	Option 2	Option 3	Option 4
Net Present Value (millions of dollars)		\$2,199	\$3,076	\$2,566	\$3,766
Indicative Financial Capacity (based on coverage ratio) (millions of dollars)		\$1,466	\$1,758	\$1,711	\$2,152

CONCLUSION

The indicative financing capacity analysis presented here is conceptual-level and is intended only for planning purposes to provide a reasonable range estimate. Based on the analysis summarized above, the net revenue streams shown in **Table 2** can yield a range of possible construction funding. Depending on the type of bonding structure used, an estimated \$1.4 billion to \$2.1 billion could be available to finance construction, as shown in **Table 3**. This analysis indicates that even in the most extreme tolling conditions toll revenue cannot cover the gap identified (\$2.2 billion) for the FEIS Selected Alternative. The required toll rates (as high as \$12 for passenger cars, \$24 for light trucks and \$48 for heavy trucks in 2010 dollars) are unacceptable to the project sponsors and will result in changes in travel patterns that would likely lead to unintended consequences.