

Louisville-Southern Indiana Ohio River Bridges Project

SEIS Purpose and Need White Paper

Updated for the SFEIS

On February 15, 2011, a Notice of Intent to prepare a Supplemental Environmental Impact Statement (SEIS) for the Louisville-Southern Indiana Ohio River Bridges Project was published in the *Federal Register*. The SEIS is being prepared as result of proposed design changes to the Selected Two Bridges/Highway Alternative that was presented in the 2003 Final Environmental Impact Statement (FEIS) and Record of Decision (ROD). As part of the SEIS process and due to the passage of time since the FEIS and ROD were completed, the original Purpose and Need of the project is being reevaluated and updated, as needed, in order to confirm whether or not it is still applicable for the SEIS.

The following is the original Purpose and Need of the project as presented in the FEIS and ROD.

“The purpose of this proposed action is to improve cross-river mobility between Jefferson County, Kentucky and Clark County, Indiana. Several specific factors demonstrate the need for action, including:

- Inefficient mobility for existing and planned growth in population and employment in the Downtown area and in eastern Jefferson and southeastern Clark Counties;
- Traffic congestion on the Kennedy Bridge and within the Kennedy Interchange;
- Traffic safety problems within the Kennedy Interchange and on the Kennedy Bridge and its approach roadways;
- Inadequate cross-river transportation system linkage and freeway rerouting opportunities in the Eastern portion of the LMPA; and
- Locally adopted transportation plans that call for two new bridges across the Ohio River and the reconstruction of the Kennedy Interchange.”

This White Paper presents the methods and results of updating the information associated with these five specific factors listed to determine if these factors are still applicable.

1. Inefficient mobility for existing and planned growth in population and employment in the Downtown area and in eastern Jefferson and southeastern Clark Counties

This project need was defined in the FEIS based on the determination of Vehicle Miles of Travel (VMT), Vehicle Hours of Travel (VHT), and Vehicle Hours of Delay (VHD) within the Louisville Metropolitan Area (LMA) for the years 1990 and 2025 using the Louisville Metropolitan Planning Organization (MPO) travel demand computer model. The projects that were incorporated into the model were based on MPO’s 2025 Metropolitan Transportation Plan titled *Horizon 2025*. See Table 2.2-1 and Figure 2.2-1 in the FEIS for the results of this original analysis.

In addition, cross-river traffic volumes and capacity were also evaluated for the three existing bridges within the Louisville Metropolitan Planning Areas (LMPA): Sherman Minton Bridge (I-64), Clark Memorial Bridge (U.S. 31), and Kennedy Memorial Bridge (I-65). (See Table 2.2-2 in the FEIS)

As part of the reevaluation of this project need, the aforementioned FEIS traffic information has been updated based on the most recent Louisville MPO 2030 Metropolitan Transportation Plan (i.e., *Horizon 2030*) and project time of day (TOD) travel demand model. The time of day travel demand model was developed for the project to provide more detailed traffic forecasts which includes the MPO's 2030 population and employment projections (See Tables 1 thru 3, and Figure 1). The updated traffic data in these tables confirms that significant percent increases in Daily Trips, VMTs, VHTs, and especially VHDs are still projected within the LMPA by the year 2030. The same is true for cross-river trips, VMTs, and VHTs between eastern Clark County and eastern Jefferson/Oldham Counties.

TABLE 1
UPDATED WEEKDAY TRAVEL SUMMARIES

	2007**	2030 No-Action Alternative	Percent Change 2007 to 2030
Daily Trips	2,832,000	3,393,000	20%
Vehicle Miles of Travel	25,890,000	33,081,000	28%
Vehicle Hours of Travel	692,000	1,098,000	59%
Vehicle Hours of Delay*	140,000	405,000	189%

* Additional hours of travel time caused by traffic congestion

** The year 2007 is used as the base year for this forecast because it is the base year in the Louisville MPO model

Source: SEIS TOD Model

TABLE 2
UPDATED DAILY OHIO RIVER CROSSINGS WEEKDAY TRAFFIC VOLUMES

Bridge	2010 (Actual Traffic Counts)	2030 No-Action Alternative	Percent Change 2010 to 2030
Sherman Minton Bridge (I-64)	82,000	112,000	37%
Clark Memorial Bridge (U.S. 31)	21,900	25,000	14%
Kennedy Memorial Bridge (I-65)	122,300	155,000	27%
Total Daily Ohio River Crossings	226,000	292,000	29%

Note: The year 2010 is used as the base year for this forecast because it represents actual traffic count volumes

Source: SEIS TOD Model

TABLE 3
UPDATED CROSS-RIVER DAILY VEHICLE TRAVEL BETWEEN EASTERN CLARK
COUNTY AND EASTERN JEFFERSON/OLDHAM COUNTIES

	2007*	2030 No-Action Alternative	Percent Change (2007 to 2030)
Daily Trips	33,000	41,000	24%
Vehicle Miles of Travel	799,000	1,051,000	32%
Vehicle Hours of Travel	17,000	27,000	59%

* Louisville MPO base year model
Source: SEIS TOD Model

As part of the 2003 FEIS, Ohio River daily bridge crossing demand as percent of bridge capacity was computed. The demand as percent of capacity was computed by dividing the daily traffic forecast by the daily capacity used within the FEIS Daily Model. In standard traffic engineering practice, roadway capacity is estimated on an hourly basis. Typically, in order to generate a theoretical daily capacity within a daily travel demand model, the hourly capacity is divided by the percent of daily traffic in the peak hour (e.g., 10% or 0.1). This was the approach used with the FEIS Daily Model. As a result, the daily capacities from the FEIS Daily Model do not equal (and are less than) the hourly roadway capacity (vehicles per hour) times 24 (hours per day). Table 4 presents Ohio River crossing demand as percent of capacity for the year 2010 and the SEIS 2030 No-Action Alternative. To provide a comparison between the 2003 FEIS traffic forecasts and the 2030 SEIS traffic forecasts, all of the percents in Table 4 were calculated using the theoretical daily capacities from the FEIS Daily Model. Percents greater than 100 were highlighted as problematic in the 2003 FEIS.

TABLE 4
UPDATED DAILY OHIO RIVER CROSSING DEMAND AS PERCENT OF CAPACITY
(FEIS DAILY MODEL)

	2010	2030 No-Action Alternative
Sherman Minton Bridge (I-64)	76%	104%
Clark Memorial Bridge (U.S. 31)	73%	83%
Kennedy Memorial Bridge (I-65) Bridge	97%	123%
Total Daily Ohio River Crossings	86%	111%

Note: These percentages are computed using the daily capacities from the FEIS Daily Model for comparison purposes.
Source: SEIS TOD Model volumes.



DAILY VEHICLE TRAVEL SUMMARY BETWEEN
EASTERN CLARK COUNTY AND EASTERN JEFFERSON/OLDHAM COUNTY

DAILY TRAVEL	YEAR		% Change
	2007	2030	
Vehicle Trips	33,000	41,000	24%
Vehicle Miles of Travel	799,000	1,051,000	32%
Vehicle Hours of Travel	17,000	27,000	59%

SEIS TOD Model Output



LEGEND
 EASTERN CLARK COUNTY
 EASTERN JEFFERSON / OLDHAM COUNTY

Figure 1
 CROSS-RIVER VEHICLE TRAVEL
 BETWEEN EASTERN CLARK COUNTY
 AND EASTERN JEFFERSON COUNTY

With the development of the SEIS TOD Model, a different approach was used to develop the roadway capacities used within the model. The hourly roadway capacities were used for each of the hourly periods (i.e., 6AM–7AM, 7AM–8AM, 8AM–9AM, 3PM–4PM, 4PM–5PM, and 5PM–6PM). Off-peak period capacities were developed for the Midday period (9AM–3PM) and the Overnight period (6PM–6AM). The off-peak period capacities were developed by multiplying the hourly capacity by the ratio of the percentage of traffic occurring during the off-peak period to the percentage of traffic occurring during the peak hour within the off-peak period. For the SEIS TOD Model, the theoretical daily capacity is calculated by aggregating the capacities from each of the periods. Similar to the FEIS Daily Model, the daily capacities from the SEIS TOD Model do not equal (and are less than) the hourly roadway capacity (vehicles per hour) times 24 (hours per day). The theoretical daily capacities derived from the SEIS TOD Model are greater than the theoretical daily capacities from the SEIS TOD Model. Table 5 presents Ohio River crossing daily demand as percent of capacity for the year 2010 and the SEIS 2030 No-Action Alternative. This table also presents Ohio River crossing period demand as percent of capacity for the SEIS 2030 No-Action Alternative.

TABLE 5
OHIO RIVER CROSSING DEMAND AS PERCENT OF CAPACITY¹ (2010 and 2030)
(SEIS TIME OF DAY MODEL)

Bridge	Daily		2030 No-Action Alternative							
			AM (6AM – 9AM)		Midday (9AM – 3PM)		PM (3PM – 6PM)		Night (6PM – 6AM)	
	2010	2030	NB	SB	NB	SB	NB	SB	NB	SB
Kennedy Bridge (I-65)	74%	94%	63%	139%	76%	108%	120%	113%	77%	90%
Sherman Minton Bridge (I-64)	58%	79%	60%	119%	75%	79%	126%	81%	66%	53%
Clark Memorial Bridge (U.S. 31)	58%	66%	25%	94%	44%	84%	117%	81%	66%	38%
Total Daily Ohio River Crossings	66%	85%	58%	125%	72%	92%	122%	95%	72%	59%

Note: These percentages are computed using the capacities from the SEIS TOD model.

Source: SEIS TOD Model.

While the daily demands as percent of capacity indicate that there is some excess capacity on the bridges during the 24-hour period, this does not mean that there is available capacity during the peak travel periods. Evaluation of the daily demand as percent of capacity was useful in the 2003 FEIS because no more detailed data was available. However, the development of the SEIS TOD Model now allows for an analysis by period where focus can be placed on the times of the day where traffic congestion is an issue. Ultimately, the period demand as percent of capacity forecasts provide for a more meaningful analysis of the efficiency of cross-river mobility. Therefore, the remainder of this discussion will focus on the period demand as percent of capacity.

¹ As part of the FEIS Daily Model development process, the bridge capacities were reevaluated and more appropriate values for a time-of-day model were used in the updated model.

As shown in Table 5, by 2030, the AM southbound, Midday southbound, PM southbound, and PM northbound traffic volumes on the Kennedy Bridge are projected to be 139%, 108%, 113%, and 120% of capacity, respectively. Traffic during the AM southbound and PM northbound periods on the Sherman Minton Bridge in 2030 are projected to be at 119% and 126% of capacity, respectively. These period analyses clearly show that the demand exceeds capacity (i.e., is well over 100%) in the peak directions of the peak periods. Thus, the existing Ohio River bridges alone cannot effectively address the cross-river mobility needs for the area during key travel periods (especially the AM southbound and PM northbound periods/directions). Based on the aforementioned information, this project need remains applicable for the SEIS.

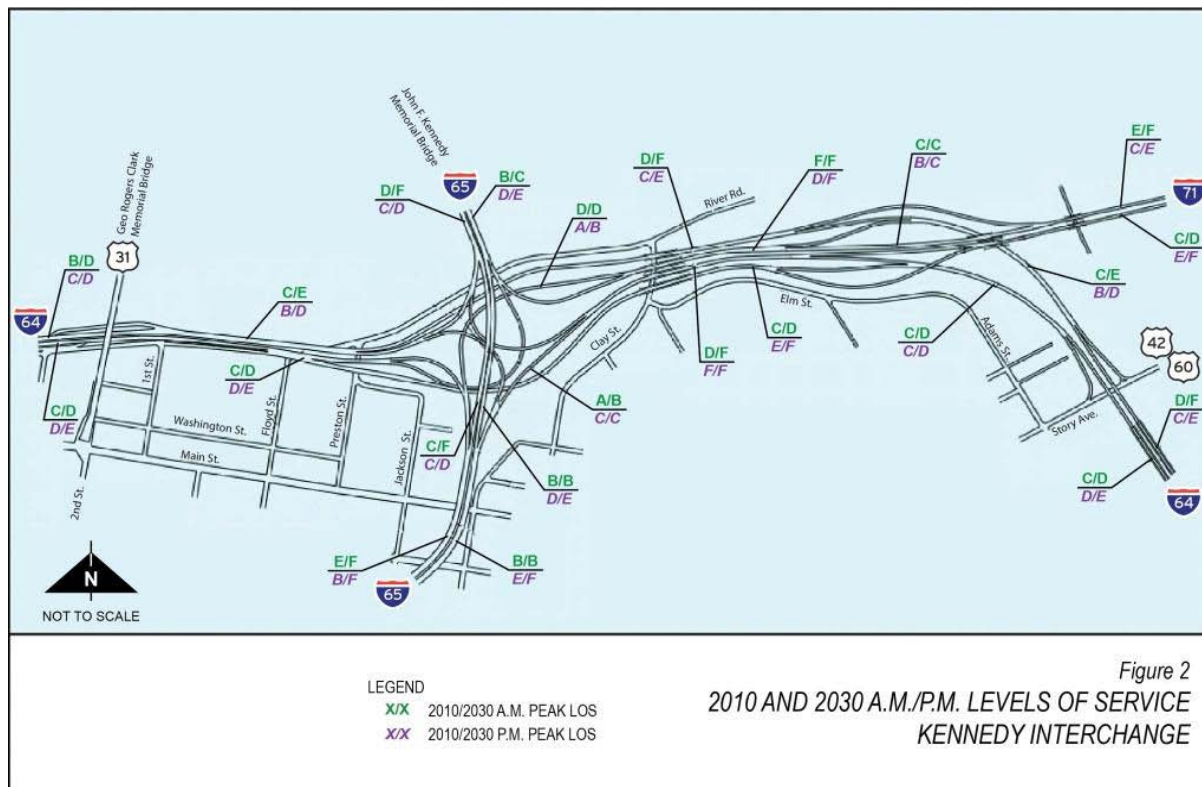
2. Traffic congestion on the Kennedy Bridge and within the Kennedy Interchange

In the 2003 FEIS, this project need was determined based on the analysis of existing (1999) and projected (2025) traffic volumes and congestion for the Kennedy Interchange and Bridge that were generated from the Louisville MPO 2025 travel demand model. Using the Highway Capacity Software (HCS), 1999 and 2025 AM and PM Peak Levels of Service (LOS) were generated for the interchange and bridge. As documented in the FEIS, “Currently, levels of service are fair to poor (generally LOS C through F) on most of the roadway segments in the Kennedy Interchange and on its interstate approaches (See Figure 2.2-9 in the FEIS). LOS is especially poor on roadway segments where traffic flows cross (known as “weaving movements”). Without any improvements to cross-river mobility, the LOS is predicted to worsen by the year 2025. For example, most roadway segments on the existing facility that are currently operating at better than LOS F are expected to degrade by at least one LOS “grade level” by 2025.”

As part of the reevaluation of this project need, levels of service within the Kennedy Interchange were generated for 2010 and 2030 AM and PM peak periods based on current traffic information and the updated 2030 traffic forecasts (See Figure 2). In 2010, seven of the roadway segments of the Kennedy Interchange, which includes the interstate approaches and the Kennedy Bridge, were functioning at LOS E or F. Level of service is especially poor on roadway segments where traffic flows cross each other (known as “weaving movements”). One example is the weaving section where traffic from southbound I-71 and westbound I-64 must merge together. This area currently operates at a LOS F in the AM peak hour. By the year 2030, the number of interchange segments functioning at LOS E or F is projected to more than double—from 7 to 18. For comparison, the 2003 FEIS had very similar results with 18 of these same segments projected to operate at LOS E or F by 2025 (see 2003 FEIS page 2-30, Figure 2.2-9).

In addition to the LOS, other measures of traffic congestion within the Kennedy Interchange were also presented in the 2003 FEIS using the FHWA freeway operations computer simulation model, CORSIM (See Table 2.2-3 in the FEIS).

For the SEIS, the existing and future No-Action conditions were reevaluated with the CORSIM model using existing 2010 traffic data and updated 2030 traffic forecasts. The updated results for weekday traffic operation in the Kennedy Interchange are listed in Table 6. The measures presented in this table further demonstrate that traffic congestion in the Kennedy interchange will worsen without improvements to cross-river mobility. Review of the updated level of service and CORSIM analyses indicate this project need remains applicable for the SEIS.



Source: Level of Service results from Highway Capacity Analyses

TABLE 6
KENNEDY INTERCHANGE AREA WEEKDAY OPERATIONS AVERAGE SPEED

Measure		2010	2030 No-Action
Average Peak-Hour Speed:	A.M. Peak Hour	40 mph	38 mph
	P.M. Peak Hour	30 mph	23 mph
Total Vehicle Hours of Delay:	A.M. Peak Hour	313	406
	P.M. Peak Hour	664	1,115
Throughput as Percent of Demand*:	A.M. Peak Hour	93%	84%
	P.M. Peak Hour	91%	80%

*Throughput is the amount of traffic passing through a roadway system. If throughput is less than 100 percent of demand, traffic backups and diversions result. The lower the throughput, as a percent of demand, the worse the congestion and diversion.

Source: CORSIM output

3. Traffic safety problems within the Kennedy Interchange and on the Kennedy Bridge and its approach roadways

This project need was based on crash data from 1996-1998 and the design geometry of the Kennedy Interchange at the time of the FEIS. Due to the age of this crash data, an updated crash analysis was performed to reflect the most recent crash data, which is for the years 2005 through 2009. The crash analysis included the following roadway sections within the project area, referred to as the Kennedy Interchange Corridors.

- I-65 from Broadway to the Indiana side of the Kennedy Bridge
- I-64 from Cochran Tunnel to 9th Street
- I-71 from Zorn Avenue to I-65

For comparison, a crash analysis was also conducted for the following similar adjacent roadway sections, referred to as Adjacent Corridors.

- I-65 from the Indiana side of the Kennedy Bridge to the I-265 interchange
- I-64 from 9th Street to I-265 in Indiana
- I-265 in Indiana from I-64 to I-65

Crash rates were calculated for these corridors based on the number of crashes per 100 million vehicle-miles (100 MVM). The crash analysis for the Kennedy Interchange Corridors found that the total crash rate (230.8 per 100 MVM) was 138% (or nearly 2.4 times) higher than the statewide average rate of 97 crashes per 100 MVM for similar roadway classifications. For general comparison, the total crash rate within the Kennedy Interchange from the FEIS was 261 crashes per 100 MVM which was 172% higher than the statewide average. Regarding the updated fatal and injury crash rates, the Kennedy Interchange Corridor crash rates were 23% (0.49 per 100 MVM) and 113% (40.4 per 100 MVM) higher than the statewide averages of 0.40 and 19 crashes per 100 MVM, respectively. The FEIS did not include fatal and injury crash rates because the information was not readily available.

When compared to the total crash rate (116.4 per 100 MVM), fatal crash rate (0.16 per 100 MVM), and injury crash rate (21.9 per 100 MVM) for the Adjacent Corridors, the Kennedy Interchange Corridors rates were 98%, 206%, and 85% higher, respectively and are listed in Table 7. The Adjacent Corridor I-65 from the Indiana side of the Kennedy Bridge to the I-265 interchange had a total crash rate of 170.7 crashes per 100 MVM. For general comparison, the total crash rate from the FEIS for I-65 north of the Kennedy Bridge was 203 crashes per 100 MVM.

TABLE 7
KENNEDY INTERCHANGE CORRIDORS CRASH RATES COMPARISON TO
TOTAL CRASH RATES FOR ADJACENT CORRIDORS

	Crash Rate Increase
I-65 from Broadway to the Indiana side of the Kennedy Bridge	98%
I-64 from Cochran Tunnel to 9th Street	206%
I-71 from Zorn Avenue to I-65	85%

The geometric deficiencies of the Kennedy Bridge and Interchange that were described in the FEIS remain unchanged. The concerns for the deficiencies are increased by the amount of traffic traveling through the Kennedy Interchange today, which is far greater than was anticipated in the

original design. Many elements of the current interchange design including curve radii, superelevation on the curves, and weaving between ramps do not meet modern-day standards.

Based on the results of the updated crash analysis and the continuing geometric deficiencies of the Kennedy Bridge and Interchange, this project need remains applicable for the SEIS.

4. Inadequate cross-river transportation system linkage and freeway rerouting opportunities in the Eastern portion of the LMA.

Since the FEIS was completed in 2003, there have been no significant changes to the cross-river transportation system in the LMPA. Thus, there continues to be a lack of alternate river crossings upstream from downtown Louisville, making the cross-river transportation system vulnerable to incidents, maintenance, and other activities that may foreclose or impair travel on the existing bridges. Also, as the number of cross-river trips with an eastern orientation increases (see Table 3 above), the inefficiencies associated with the lack of any cross-river system linkage east (upstream) of the downtown area will increase. No projects have been added to Louisville MPO's *Horizon 2030* Metropolitan Transportation Plan that would address this issue other than the Ohio River Bridges Project. As a result, this project need remains applicable for the SEIS.

5. Locally adopted transportation plans that call for two new bridges across the Ohio River and the reconstruction of the Kennedy Interchange.

On October 7, 2010, the Louisville MPO adopted a new Metropolitan Transportation Plan titled *Horizon 2030*. The plan includes the Selected Two Bridges/Highway Alternative identified in the FEIS and ROD, and identifies the need for tolls as an alternative funding source. *Horizon 2030* states that the purpose of the Ohio River Bridges Project is to “provide better access across the Ohio River, improve safety, and reduce congestion.” As a result, this project need remains applicable for the SEIS.