

APPENDIX B
TRUCK DIVERSION STUDY

Brent Spence Truck Diversion Technical Memorandum Travel Forecasting

The Brent Spence Truck Diversion study analyzes the impacts of diverting truck trips off the Brent Spence Bridge onto alternate routes. The Ohio Kentucky Indiana (OKI) Regional Council of Governments' 2030 transportation model and the ITS Deployment Analysis System (IDAS) software are utilized to complete this task.

In 2030, the Brent Spence Bridge carries 197,000 vehicle trips per day. Truck trips account for 22% of this total. In the Cincinnati area there are 77,000 truck trips traveling across the Ohio River on a daily basis with the Brent Spence Bridge accounting for 43,000 of them. This is 56% of the total number of truck trips going across the Ohio River. The table below describes the number of vehicle trips crossing the Ohio River in the Cincinnati area for auto and truck classes.

	Auto Volume	% Of Total Auto Trips crossing OH River	Truck Volume	% Of Total Truck Trips crossing OH River
I-275 West Bridge	48,000	10.3%	12,000	15.6%
Brent Spence Bridge	154,000	33.1%	43,000	55.8%
Clay Wade Bailey Bridge	24,000	5.2%	2,000	2.6%
Roebing Bridge	20,000	4.3%	2,000	2.6%
Taylor Southgate Bridge	22,000	4.7%	1,000	1.3%
I-471	96,000	20.6%	8,000	10.4%
Combs-Hehl Bridge	103,000	22.2%	9,000	11.7%
Total number of trips on OH River bridges	465,000	NA	77,000	NA

** Number of trips has been rounded to the nearest 1,000.

Originally, the model is set so that trucks are prohibited from using the Brent Spence Bridge to cross the Ohio River. The modeling team noticed that trucks trips transfer to the nearest bridge, the Clay Wade Bailey. This truck trip behavior is not representative of realistic expectations and, to compensate, truck trips are ultimately prohibited from using the Brent Spence Bridge, the Clay Wade Bailey Bridge, and the Roebing Bridge, as well as the 4th/5th Street and 12th Street bridges in Kentucky. This diverts the majority of truck trips to the downtown I-471 Bridge while the Taylor Southgate, Combs-Hehl, and I-275 west bridges also collected a smaller percentage of the total. Listed below are the volumes of vehicle trips after the trucks are diverted. In the final truck trip diversion scenario, the Brent Spence, Roebing, Taylor Southgate, 4th/5th Street, and 12th Street bridges all show an increase in the number auto trips.

	Auto Volume	% Of Total Auto Trips crossing OH River	Truck Volume	% Of Total Truck Trips crossing OH River
I-275 West Bridge	46,000	10.0%	15,000	19.7%
Brent Spence Bridge	166,000	36.0%	0	0.0%
Clay Wade Bailey Bridge	16,000	3.5%	0	0.0%
Roebing Bridge	25,000	5.4%	0	0.0%
Taylor Southgate Bridge	23,000	5.0%	6,000	7.9%
I-471	86,000	18.7%	40,000	52.6%
Combs-Hehl Bridge	99,000	21.5%	15,000	19.7%
Total number of trips on OH River bridges	461,000	NA	76,000	NA

** Number of trips has been rounded to the nearest 1,000.

The truck diversion creates a 0.38% increase in total number of regional Vehicle Miles Traveled (VMT), a 0.34% increase in total Vehicle Hours Traveled (VHT), and a 0.78% increase in total Vehicle Hours of Delay (VHD). Evaluating just the truck trips, VMT increases by 0.97%, the VHT by 2.4%, and VHD by 0.63%. More detailed information concerning the increases in VMT, VHT, and VHD can be found in the table on the following page.

	Total			Truck			Auto		
	2030 Base	Truck Diversion	% Change	2030 Base	Truck Diversion	% Change	2030 Base	Truck Diversion	% Change
VMT	85,855,000	86,181,000	0.38%	9,855,000	10,194,000	3.4%	76,000,000	75,987,000	-0.02%
VHT	3,026,000	3,043,000	0.56%	273,000	287,000	5.0%	2,753,000	2,756,000	0.12%
VHD	990,000	997,700	0.76%	75,000	80,000	7.1%	915,000	917,000	0.25%

** Numbers have been rounded to the nearest 1,000

The IDAS software program is used to calculate user benefits/costs. The 2030 base and truck diversion networks are entered into IDAS which produces an estimated annual cost of \$482,700 associated with diverting trucks on to the bridges mentioned previously. These costs are an accumulation of change in In-Vehicle Travel Time, Travel Time Reliability, Fuel Consumption, and an increase in Accidents. IDAS calculates these costs using default values in terms of 1995 dollars. Listed below are the overall costs rounded to the nearest \$100 that are calculated using the IDAS defaults. Tables 1 through 6 in the Appendix show the detailed calculations for each cost.

	2030 Base	2030 Truck Diversion	Benefit with Truck Diversion
In-Vehicle Travel Time	\$30,157,600	\$30,546,100	(\$388,500)
Travel Time Reliability	\$10,400	\$11,000	(\$500)
Fuel	\$7,335,700	\$7,417,400	(\$81,700)
Accident	\$6,818,000	\$6,830,000	(\$12,000)
Total	\$44,321,800	\$44,804,500	(\$482,700)

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TABLE 1 – In-Vehicle Travel Time Costs

Transportation Mode	\$ Per Person Hour	2030 Base		2030 Truck Diversion		Difference
		Person Hours Of Travel	Cost	Person Hours Of Travel	Cost	
Autos	\$8.50	2,968,000	\$25,228,000	2,977,000	\$25,304,500	(\$76,500)
Trucks	\$20.80	237,000	\$4,929,600	252,000	\$5,241,600	(\$312,000)
Total			\$30,157,600		\$30,546,100	(\$388,500)

TABLE 2 – Travel Time Reliability Costs (hours of unexpected delay)

Transportation Mode	\$ Per Person Hour	2030 Base		2030 Truck Diversion		Difference
		Person Hours Of Delay	Cost	Person Hours Of Delay	Cost	
Autos	\$22.50	281.1	\$7,200	289.2	\$7,400	(\$200)
Trucks	\$62.40	52.2	\$3,300	57.0	\$3,600	(\$300)
Total			\$10,500		\$11,000	(\$500)

TABLE 3 – Fuel Costs

Transportation Mode	\$ Per Gallon	2030 Base		2030 Truck Diversion		Difference
		Fuel Consumption (gal)	Cost	Fuel Consumption (gal)	Cost	
Autos	\$1.21	4,540,000	\$5,493,400	4,541,000	\$5,494,610	(\$1,210)
Trucks	\$1.15	1,602,000	\$1,842,300	1,672,000	\$1,922,800	(\$80,500)
Total			\$7,335,700		\$7,417,410	(\$81,710)

TABLE 4 – Fatality Costs

Transportation Mode	Internal Cost	External Cost	2030 Base		2030 Truck Diversion		Difference
			Number of Fatalities	Cost	Number of Fatalities	Cost	
Autos	\$2,317,398.00	\$408,952.00	0.376	\$1,025,000	0.376	\$1,025,000	\$0
Trucks	\$2,317,398.00	\$408,952.00	0.057	\$154,000	0.059	\$160,000	(\$6,000)
Total				\$1,179,000		\$1,185,000	(\$6,000)

TABLE 5 – Injury Costs

Transportation Mode	Internal Cost	External Cost	2030 Base		2030 Truck Diversion		Difference
			Number of Injuries	Cost	Number of Injuries	Cost	
Autos	\$50,760.00	\$8,958.00	74.4	4,443,000	74.1	4,425,000	\$18,000
Trucks	\$50,760.00	\$8,958.00	12.9	770,000	13.3	794,000	(\$24,000)
Total				5,213,000		5,219,000	(\$6,000)

TABLE 6 – Property Damage Only Costs

Transportation Mode	Internal Cost	External Cost	2030 Base		2030 Truck Diversion		Difference
			Number of PDO	Cost	Number of PDO	Cost	
Autos	\$2824.00	\$498.00	110.0	\$365,000	109.0	\$362,000	\$3,000
Trucks	\$2824.00	\$498.00	18.5	\$61,000	19.2	\$64,000	(\$3,000)
Total				\$426,000		\$426,000	\$0