

Brent Spence Strategic Corridor Study - Cincy Eastern Bypass Cost Review and Comparison

Description	Unit	Unit Cost	Concept 1			
			Total		Cincy Eastern Bypass Suggested Revisions	
			QUANTITY	COST	Unit Cost	Alt Units
Earthwork						
Roadway Excavation	CUYD	\$5	57,901,345	\$289,506,800	\$9.70	\$214,234,978
Pavement						
Crushed Stone Base	TON	\$30	3,458,185	\$103,745,600		\$103,745,600
Drainage Blanket - Type II - Asph	TON	\$50	586,652	\$29,332,600		\$29,332,700
CL4 Asph Base 1.50D PG64-22	TON	\$80	1,422,323	\$113,785,900		\$113,785,900
CL4 Asph Base 1.00D PG76-22	TON	\$80	661,314	\$52,905,200		\$52,905,300
CL4 Asph Surf 0.38A PG76-22	TON	\$85	332,849	\$28,292,200		\$28,292,300
Crushed Aggregate (For Rock Roadbed)	CUYD	\$30	4,710,104	\$141,303,200		\$141,303,300
Asphalt Seal Coat	TON	\$750	1,363	\$1,022,300		\$1,022,400
Asphalt Seal Aggregate	TON	\$70	13,855	\$969,900		\$970,000
Roadway						
Guardrail - Steel W Beam-S Face	LF	\$20	331,100	\$6,622,000		\$6,622,000
Guardrail Connector to Bridge End	EACH	\$2,500	334	\$835,000		\$835,000
Guardrail End Treatment	EACH	\$900	420	\$378,000		\$378,000
Concrete Median Barrier	LF	\$200	0	\$0		\$0
Crash Cushion	EACH	\$10,000	128	\$1,280,000		\$1,280,000
Delineators	EACH	\$10	3,311	\$33,200		\$33,200
Perforated Pipe	LF	\$15	2,132,072	\$31,981,100		\$31,981,200
Perforated Pipe Headwall	EACH	\$500	1,354	\$677,000		\$677,000
Crushed Aggregate Size No. 2	TON	\$25	1,354	\$33,900		\$34,000
Concrete Median Barrier Box Inlets	EACH	\$7,000	0	\$0		\$0
Median Drainage	LF	\$100	0	\$0		\$0
Median Box Outlet Pipe	LF	\$75	0	\$0		\$0
Cross Drains	LF	\$100	69,500	\$6,950,000		\$6,950,000
Culvert Pipe Headwalls	EACH	\$3,000	596	\$1,788,000		\$1,788,000
Clearing and Grubbing	ACRE	\$3,500	5,398	\$18,893,000	3,384	\$11,844,000
Erosion Control	ACRE	\$10,000	5,398	\$53,980,000	3,384	\$33,840,000
Water	MGAL	\$3	68,000	\$204,000		\$204,000
Seeding and Protection	SQ.YD	\$0.35	20,120,000	\$7,042,000		\$7,042,000
Initial Fertilizer	TON	\$900	626	\$563,400		\$563,400
Agricultural Limestone	TON	\$70	12,486	\$874,100		\$874,100
20-10-10 Fertilizer	TON	\$900	1,043	\$938,700		\$938,700
Fence - Woven Wire	LF	\$5	906,005	\$4,530,100		\$4,530,100
Shoulder Rumble Strips - Sawed	LF	\$0.25	2,132,072	\$533,100		\$533,100
Pavement Markers	EACH	\$50	13,326	\$666,300		\$666,300
Striping	LF	\$0.50	2,326,899	\$1,163,500		\$1,163,600
Signing - System Interchanges	EACH	\$300,000	4	\$1,200,000		\$1,200,000
Signing - Service Interchanges	EACH	\$100,000	18	\$1,800,000		\$1,800,000
ITS	EACH	\$500,000	16	\$8,000,000		\$8,000,000
Signals (per intersection)	EACH	\$150,000	36	\$5,400,000		\$5,400,000
Lighting - System Interchanges	EACH	\$960,000	4	\$3,840,000		\$3,840,000
Lighting - Service Interchanges	EACH	\$640,000	18	\$11,520,000		\$11,520,000
Maintenance of Traffic (System Interchange)	EACH	\$500,000	4	\$2,000,000		\$2,000,000
Maintenance of Traffic (Service Interchange)	EACH	\$200,000	18	\$3,600,000		\$3,600,000
Maintenance of Traffic (Grade Separation)	EACH	\$100,000	28	\$2,800,000		\$2,800,000
Staking	MILE	\$100,000	97	\$9,700,000		\$9,700,000
Stream Restoration and/or In Lieu Fees	FT	\$600	50,622	\$30,373,200		\$30,373,200
Wetland Mitigation	ACRE	\$60,000	94	\$5,640,000		\$5,640,000
Retaining Walls	SF	\$100	82,750	\$8,275,000		\$8,275,000
Fuel Adjustment	DOLL	---	27,110,078	\$27,110,100		\$27,110,200
Asphalt Adjustment	DOLL	---	9,447,493	\$9,447,500		\$9,447,700
Bridges						
Ohio River Bridge (main span)	SF	\$750	327,080	\$245,310,000	\$470	\$276,000
Major Structures	SF	\$300	1,640,101	\$492,030,300	\$182	\$960,000
Railroad Overpass Bridges	SF	\$250	255,040	\$63,760,000		\$63,760,000
Minor Bridges	SF	\$200	2,800,404	\$560,080,800	\$182	\$1,438,980
Major Drainage						
8'x8' RCBC	LF	\$1,600	17,419	\$27,870,400		\$27,870,400
12'x8' RCBC	LF	\$2,300	4,562	\$10,492,600		\$10,492,600
14'x10' RCBC	LF	\$3,000	1,431	\$4,293,000		\$4,293,000
16'x12' RCBC	LF	\$3,300	3,605	\$11,896,500		\$11,896,500
Miscellaneous						
Mobilization	LS	3%	1	\$73,418,100		\$48,411,700
Demobilization	LS	1.5%	1	\$36,709,100		\$24,205,900
Miscellaneous Construction Items	LS	15%	0	\$367,090,500		\$242,058,500
Engineering during Construction	LS	10%	0	\$244,727,000	8%	\$161,372,400
Environmental Studies and Permitting	LS	3%	0	\$73,418,100		\$48,411,700
Final Design Engineering	LS	8%	0	\$195,781,600	3%	\$48,411,700
Right-of-Way	ACRE	19,742	5,398	\$106,570,000		\$66,808,611
Utility Relocation	LS	---	0	\$83,590,000		\$83,590,000
Total Cost			\$3,628,573,900			\$2,336,993,649

Roadway Excavation Unit Cost From KYTC Bid Tab 16-1286 - \$3.70 per CUyd
 R/W acres was determined through grading plan analysis - Clearing limits + R/W +100' = 3,384 acres
 Bridge classification and quantities were quantified from grading plans
 Ohio River Bridge Bridge costs were derived from William Harsha (Maysville) Ohio River Bridge = \$470 per sqft
 Remaining bridge costs were derived from FHA Bridge Replacement Cost Study 2016 = \$182
 Engineering Cost Percentages were from Midwest Policy Institute - 11%
 Other miscellaneous costs changed due to change in construction costs previously mentioned.

The Citizens for the Cincy Eastern Bypass appreciates the money and effort involved in putting this study together. Thanks for the leadership of Governor Bevin for putting these resources in place. Through the study, the Bypass has been recognized as a valid project for its transportation and economic benefits. We'd like to take this opportunity to identify some challenges from the study as well as some opportunities for next steps.

The first and biggest challenge from the study is timing. We will miss the opportunity to build a bypass as critical right of way will not be available in Warren County as Dayton and Cincinnati continue to merge. We simply cannot wait until 2029.

The Bypass costs are overstated in the study. Reevaluating six unit costs and four quantities using actual job costs and preliminary engineering plans, \$1.3 Billion Dollars in cost savings can quickly be identified. With those adjustments, the cost for the Bypass is under \$2.4B. There have been multiple similar scale projects that have been built for \$10M per mile with inflationary adjustments. How can projects like TN-840 and the Butler County Veterans Highway be built for a third of the cost per mile as the study cost projections for the Bypass after adjusting for inflation?

The impact of the Bypass on the Brent Spence Bridge is significantly underestimated. The study fails to consider the impact of trucks in the Brent Spence Corridor. I-75 is consistently identified as a freight corridor. 25,000 trucks a day cross the Brent Spence Bridge. Each truck has the impact of at least 3 cars. Most of the trucks are not stopping in our region. In trucks alone, the Bypass could cut 30,000+ passenger car equivalents from the Brent Spence Bridge and make the conditions tremendously safer. Furthermore, there is disparity in the regional through traffic estimates on the bridge from the three sources cited. The StreetLight data is the most accurate source by far as it measures GPS Data along the entire route continuously for more than 3 years. Streetlight estimates up to 25% of the bridge traffic is regional through traffic including more than half of the trucks. The study chose to use the OKI modeled data from 1996 which is 10% lighter in its estimation of regional through traffic. It is also likely that most through traffic will divert if there is any traffic at all. Most will divert in peak hour conditions, which is when the impact is most critical. The study chose to look at every day, all day conditions, instead of the most critical peak hour conditions.

	Northbound BSB	Southbound BSB
Rush Hour Weekday	17%	25%
Avg. Day All Day	25%	25%

Year	Area	Jobs	Property Value
2017	I-275 (per mile)	3,540	\$549,178,758
2017	Bypass Area (per mile)	482	\$142,995,979
Cincy Eastern Bypass Future Economic Benefit		207,908	\$27,620,428,969

In summary, it is exciting to have the Bypass recommended for further study in the 2018 KYTC Budget Proposal, even with some of the challenges listed above. We are confident that the value of the project will become even clearer with more information. Seldom do we have an opportunity in the region to add this much transportation and economic value with one project.

Table 1. SUMMARY OF KEY TRAFFIC AND COST FINDINGS

I-71/I-75 Segment	Begin MP - End MP	Existing Lanes Total (Mainline)**	Existing		2040 No Build		BSB Corridor Solution			Conservative Bypass Solution		Potential Bypass Solution			
			Daily Traffic (OKI RTDM)***	LOS	Daily Traffic (OKI RTDM)***	LOS	2040 with 6-17		2040 w/Concept 1*		2040 w/Concept 3*		2040 No Build with 20% Less Traffic on I-75		
							No. Lanes Total (Mainline)**	Daily Traffic (OKI RTDM)***	LOS	Daily Traffic (OKI RTDM)***	LOS	Daily Traffic (OKI RTDM)***	LOS	Daily Traffic (OKI RTDM)***	LOS
OH: Harrison Ave. - Western Ave./Liberty St.	2.5-2.1	9(8)	139,800	E	143,500	E	9(8)	149,500	E	134,600	E	138,300	E	114,800	E
OH: Western Ave./Liberty St. - Ezzard Charles St.	2.1-1.8	8	131,600	E	135,500	E	8	144,100	F	120,000	E	123,900	E	108,400	E
OH: Ezzard Charles St. - Freeman Ave.	1.8-1.6	8	116,000	E	120,800	E	8	127,300	E	108,100	E	115,000	E	96,600	D
OH: Freeman Ave. - 7th St.	1.6-0.9	9(8)	112,900	D/E	117,900	E	8	122,800	E	107,100	D	112,200	D/E	94,300	D
OH: 7th St. - I-71 (FWW) /5th St./2nd St.	0.9-0.5	4	95,800	F	113,500	F	4	115,900	E	107,100	F	111,100	F	90,800	F
[OH] I-71 (FWW) /5th St./2nd St. - [KY] 5th St./4th St.	KY (191.2-191.777) OH (0.0-0.5)	8	159,300	F	174,400	F	16	174,200	D	164,700	F	167,800	F	139,500	E/F
KY: 5th St./4th St. - 12th St./Pike St.	190.5-191.2	7	132,000	F	134,300	F	10	151,500	E	139,000	F	142,500	F	107,400	E
KY: 12th St./Pike St. - Kyles Ln.	188.6-190.5	7	131,000	F	152,100	F	10	151,900	E	141,700	F	145,300	F	121,700	E/F
KY: Kyles Ln. - Dixie Hwy.	187.7-188.6	9(7)	115,400	E	136,300	E	9(7)	135,300	E	125,900	E	129,200	E	109,000	D
KY: Dixie Hwy. - Buttermilk Pk.	186.3-187.7	7	99,500	E	121,872	E/F	7	121,000	E/F	110,400	E	114,100	E	97,500	E
KY: Buttermilk Pk. - I-275	184.7-186.3	8(7)	102,900	E	127,900	E	8(7)	127,900	E	116,000	E	119,600	E	102,300	E
KY: I-275 - Donaldson Rd.	183.7-184.7	6	93,000	E	99,100	E	6	118,300	F	104,000	E/F	107,800	F	79,300	E
KY: Donaldson Rd. - Turfway Rd.	182.4-183.7	10 (8)	125,500	D/E	167,900	E	10(8)	166,000	E	150,100	E	152,800	E	134,300	E
KY: Turfway Rd. - Burlington Pk. (KY 18)	181.2-182.4	10 (8)	123,200	D/E	171,600	E	10(8)	169,100	E	154,000	E	156,500	E	137,300	E
KY: Burlington Pk. (KY 18) - Mall Rd. Ramps	180.8-181.2	8	100,900	D/E	147,700	F	8	144,500	F	128,900	E	121,800	E	118,200	E
KY: Mall Rd. Ramps - US 42	180.0-180.8	8	108,400	E	146,900	F	8	146,300	F	132,000	E	134,300	E	117,500	E
KY: US 42 - Mt. Zion Rd. (KY 536)	178.0-180.0	8	103,700	E	140,900	E/F	8	148,100	F	122,300	E	124,500	E	112,700	E
KY: Mt. Zion Rd. (KY 536) - Richwood Rd. (KY 338)	175.4-178.0	8	94,300	D	135,000	E	8	137,000	E	116,600	E	118,900	E	108,000	E
KY: Richwood Rd. (KY 338) - I-71/I-75 Split	172.9-175.4	8	90,300	D	123,200	E	8	124,400	E	105,600	E	114,900	E	98,600	D

* Traffic forecasts include induced traffic from new development in the corridor
 ** Total lanes includes mainline lanes plus auxiliary lanes
 *** Traffic volumes shown are based on OKI Regional Travel Demand Model (RTDM) Assignments

Total # of F's



Looks like a Valid Solution!



Estimated Traffic Impact to Ohio River Crossings

Ohio River Crossing	Bridge Name
I-71/I-75	Brent Spence
I-471	Daniel Carter Beard
I-275 East	Combs Hehl
I-275 West	Carol Cropper
New Crossing	N/A

Daily Crossings of 4 Major Bridges

Existing	2040 No Build
Daily Traffic (OKI RTDM)	Daily Traffic (OKI RTDM)
159,300	174,400
123,389	126,000
56,698	58,700
32,907	40,200
N/A	N/A

16 Lanes for 14,900 more vehicles than today?

2040 with 6-17 (BSB)	
Daily Traffic (OKI RTDM)	% Change**
174,200	-0.1%
127,000	0.8%
58,500	-0.3%
38,800	-3.5%
N/A	N/A
398,500	-0.2%

2040 w/Concept 1* (Bypass)	
Daily Traffic (OKI RTDM)	% Change**
164,700	-5.6%***
118,300	-6.1%
50,800	-13.5%
40,000	-0.5%
35,900	N/A
409,700	2.6%

2040 w/Concept 3*	
Daily Traffic (OKI RTDM)	% Change**
167,800	-3.8%
119,600	-5.1%
49,900	-15.0%
40,700	1.2%
36,200	N/A
414,200	3.7%

2040 BSB with Tolls	
Daily Traffic (OKI RTDM)	% Change**
94,981	-44.8%
152,021	19.7%
65,368	11.7%
38,800	0.0%
N/A	N/A

* Traffic forecasts include induced traffic from new development in the corridor
 ** Percent change as compared to 2040 No Build
 *** Applying the OKI model results in a range of diversion from 5.6% to 6.9%

Toll the Current Bridge and Save the Money!
 Sarcasm intended

Opinion of Probable Cost

Project	Year Open to Traffic	Cost (2017 Dollars)							Kentucky's share of cost (2017 Dollars)	Downsized Planned Projects in Tandem with the Bypass	Estimated Total Cost based on Year of Expenditure (YOE)	Kentucky's Share of Estimated Total Cost (YOE Dollars)	Long Term Economic Benefit	
		Preliminary Engineering & Environmental	Design	Right-of-Way	Utilities	Construction	CEI	Total Cost					Jobs	Property Value
KYTC Item 6-17 [1]	2024	--	\$106,900,000	\$76,000,000	\$149,700,000	\$1,793,000,000	\$163,700,000	\$2,289,300,000	\$1,018,800,000	\$1,000,000,000	\$2,612,000,000	\$1,162,500,000	?	?
Reconstruction of I-275 Interchange	2030 [3]	\$2,000,000	\$21,200,000	\$25,000,000	\$12,000,000	\$212,000,000	\$17,000,000	\$289,200,000	\$289,200,000	\$100,000,000	\$398,830,000	\$398,830,000	?	?
KYTC Item 6-17 + Reconstruction of I-275 Interchange	2030	\$2,000,000	\$128,100,000	\$101,000,000	\$161,700,000	\$2,005,000,000	\$180,700,000	\$2,578,500,000	\$1,308,000,000	\$1,100,000,000	\$3,010,830,000	\$1,561,330,000	?	?
I-75 additional lane from I-275 to I-71/75 Split [2]	2040	\$15,120,000	\$40,320,000	\$12,600,000	\$100,800,000	\$504,000,000	\$50,400,000	\$723,240,000	\$723,240,000	\$0	\$1,236,070,000	\$1,236,070,000	?	?
I-471 Widening and Bridge Replacement as described in the Shift Plan	2040?							\$2,205,000,000*	\$1,805,000,000	\$0			?	?
Concept 1 (CEB)	2032	\$73,420,000	\$195,790,000	\$106,570,000	\$83,590,000	\$2,924,490,000	\$244,730,000	\$3,628,590,000	\$1,490,349,000	\$3,628,590,000	\$5,313,200,000	\$2,182,300,000	208,000	\$27,000,000,000
Concept 3	2032	\$29,160,000	\$77,740,000	\$68,250,000	\$38,630,000	\$1,161,240,000	\$97,180,000	\$1,472,200,000	\$1,345,165,000	\$1,472,200,000	\$2,150,090,000	\$1,964,600,000	?	?

[1] Source: 2013 Brent Spence Bridge Initial Financial Plan
 [2] High-level construction estimate of \$42 million per mile was used
 [3] The I-275 Interchange should be completed as near as possible to the completion of KYTC Item 6-17

*Assumed \$400M on Ohio Side

BSB/75/471
 \$5.5B
 Bypass
 \$3.6B

Total of \$4.7B
 Saves \$800M plus Economic Benefits

How much could be saved by designing these projects with the Bypass as part of the scope?

Could there possibly be a stronger cost benefit analysis?