

BRENT SPENCE BRIDGE

TRAFFIC AND CONCEPT ANALYSIS

MAY 2020



Project Goals

In 2019, KYTC and ODOT developed goals for advancing the Brent Spence Bridge (BSB) Project:

- Provide concurrence on the BSB traffic baseline and forecasts.
- Develop additional design concepts that meet the BSB corridor goals and provide potential construction cost savings.
- Perform traffic microsimulation using TransModeler and evaluate practical design concepts.

Project History

August 2012 - FHWA Finding of No Significant Impact (**FONSI**) identifies Alternative I as Preferred Alternative for Brent Spence Bridge (BSB) project.

Since 2013 – New traffic counts and Ohio-Kentucky-Indiana Regional Council of Governments (OKI) travel demand model used to forecast traffic in 2040:

- 2013 to 2015 - *Brent Spence Bridge Corridor Study (**BSBC Study**)* continued development of the BSB project incorporating the potential for tolling.
- 2017 - *Brent Spence Strategic Corridor Study (**Strategic Corridor Study**)* evaluated BSB bypass concepts, including proposed Cincinnati Eastern Bypass.

Project Development

Project	Date	Purpose
Traffic Counts, Modeling and Forecast	<ul style="list-style-type: none"> December 2019 	<ul style="list-style-type: none"> Review of traffic counts, travel demand models, and forecasts completed since 2013 for the Brent Spence Bridge. Recommend baseline and 2040 traffic volumes.
Concept Development Workshop	<ul style="list-style-type: none"> December 2019 	<ul style="list-style-type: none"> Apply performance-based practical design philosophy to identify new concepts for the BSB corridor to reduce the overall cost of the project.
TransModeler Calibration and Results	<ul style="list-style-type: none"> May 2020 	<ul style="list-style-type: none"> Utilize TransModeler to evaluate travel time, speeds, and capacity along the mainline, ramps, and local streets for concepts developed at the Workshop.
Analysis of Design Concepts	<ul style="list-style-type: none"> May 2020 	<ul style="list-style-type: none"> Refine the horizontal and vertical design of concepts for integration into the traffic models, and compare refined designs to Alternative I to determine cost savings.

TRAFFIC COUNTS, MODELING AND FORECAST



Purpose of Study

Review traffic counts, travel demand models, and forecasts completed since 2013 for the BSB and establish baseline and 2040 traffic volumes.

Prior to 2013:

- The BSB opened in 1963 and was designed to carry 80,000 vehicles per day (VPD). It now carries over 160,000 VPD.
- The 2012 **FONSI** traffic counts for the BSB were 160,000 VPD with projections of 233,000 VPD in 2035 with no tolling.

BSB Traffic Counts and Forecasts since 2013

- The **BSBC Study** traffic counts for the BSB were 152,000 VPD in 2013 and 170,600 VPD in 2014. These were used for 2015 ODOT Certified Traffic and Tolling Studies.
- The **BSBC Study** used Alternative I design in Kentucky and Ohio for projections of 228,000 VPD in 2040 with no tolling.
- The **Strategic Corridor Study** traffic counts for the BSB were 163,000 VPD in 2017.
- The **Strategic Corridor Study** used Alternative I design for the bridge and I-75 corridor in Ohio, *with existing conditions in the I-71/I-75 corridor in Kentucky*, for projections of 174,200 VPD with no tolling.
- The OKI traffic counts for the BSB were 159,000 VPD in 2019.

Traffic and Forecast Results

KYTC and ODOT established the following criteria for this BSB project:

- Baseline traffic for the BSB of 160,000 VPD will be used in any near-term studies.
- 2040 Toll Free traffic for the BSB of 227,900 VPD will be used in any near-term design and traffic studies.
- OKI is updating the regional model for year 2050, which will be incorporated into the traffic forecasts when complete, with forecasts extended to 2050.

CONCEPT DEVELOPMENT WORKSHOP



Purpose and Results of Workshop

- Apply performance-based practical design principles to identify new concepts to reduce overall project cost.
- Review design goals for Alternative I, recognizing updated standards since 2012 and less strict adherence to previous design goals.
- Resulted in key design decisions and development of three concepts for further analysis – Concept M, Concept W and Concept S.

Key Design Decisions

- A 55 MPH (posted speed limit) design speed is acceptable for Interstate 71 and 75 (Alternative I used a 60 MPH design speed).
- Ramps with approved design exceptions from Fort Washington Way Project are not required to be modified to meet current standards as part of the BSB project.
- System-to-system connections of I-71, I-75 and US 50 can be from the left lane.
- System-to-system connections should not be made on the C-D roadways.
- C-D roadways can have speeds less than 55 mph if the system-to-system connections are removed, but must not queue onto the Interstate.

Three Concepts Developed

Concept M:

- Both directions of I-75 use the new bridge and both directions of I-71 stay on the existing BSB, with some local connections on each bridge.

Concept W:

- Both directions of I-75 and I-71 use the new bridge, with all local connections on the existing bridge.

Concept S:

- Interstate and local traffic similar to those in Concept W, with the design of the local roadway networks in Ohio and Kentucky as “super streets”.

TRANSMODELER CALIBRATION AND RESULTS



Microsimulation of Concepts

- The purpose of this project was to analyze the traffic operations of the concepts developed at the Workshop to ensure that they met or exceeded those of Alternative I.
- The TransModeler was utilized to evaluate travel time, speeds, and capacity along the mainline, ramps, and local streets for Concepts M, W and S.
- This high level analysis was used to identify fatal flaws in traffic flow based on the planning level design.

TransModeler Results

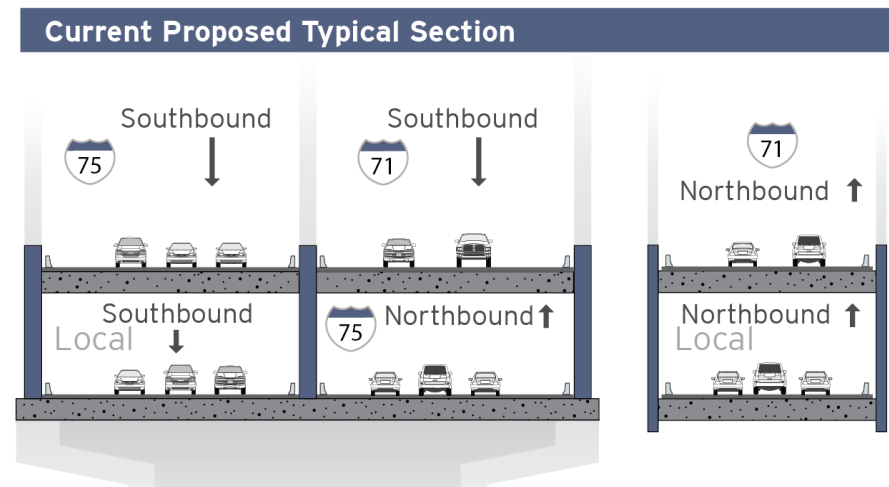
- Concept M and Concept W performed well and met operational requirements. Both are viable options for further study.
- Concept S was found not to be viable due to the proximity of each exit/entrance and high volume of weaving on the super street in Ohio. The resulting unsafe operation was deemed a fatal flaw.
- Concept WS, with a super street in Kentucky only, was also found not to be viable due to inadequate capacity for traffic moving through the super street and intersecting local roads. The resulting queuing and unsafe conditions proved to be a fatal flaw.

ANALYSIS OF DESIGN CONCEPTS



Preferred Alternative I in 2012

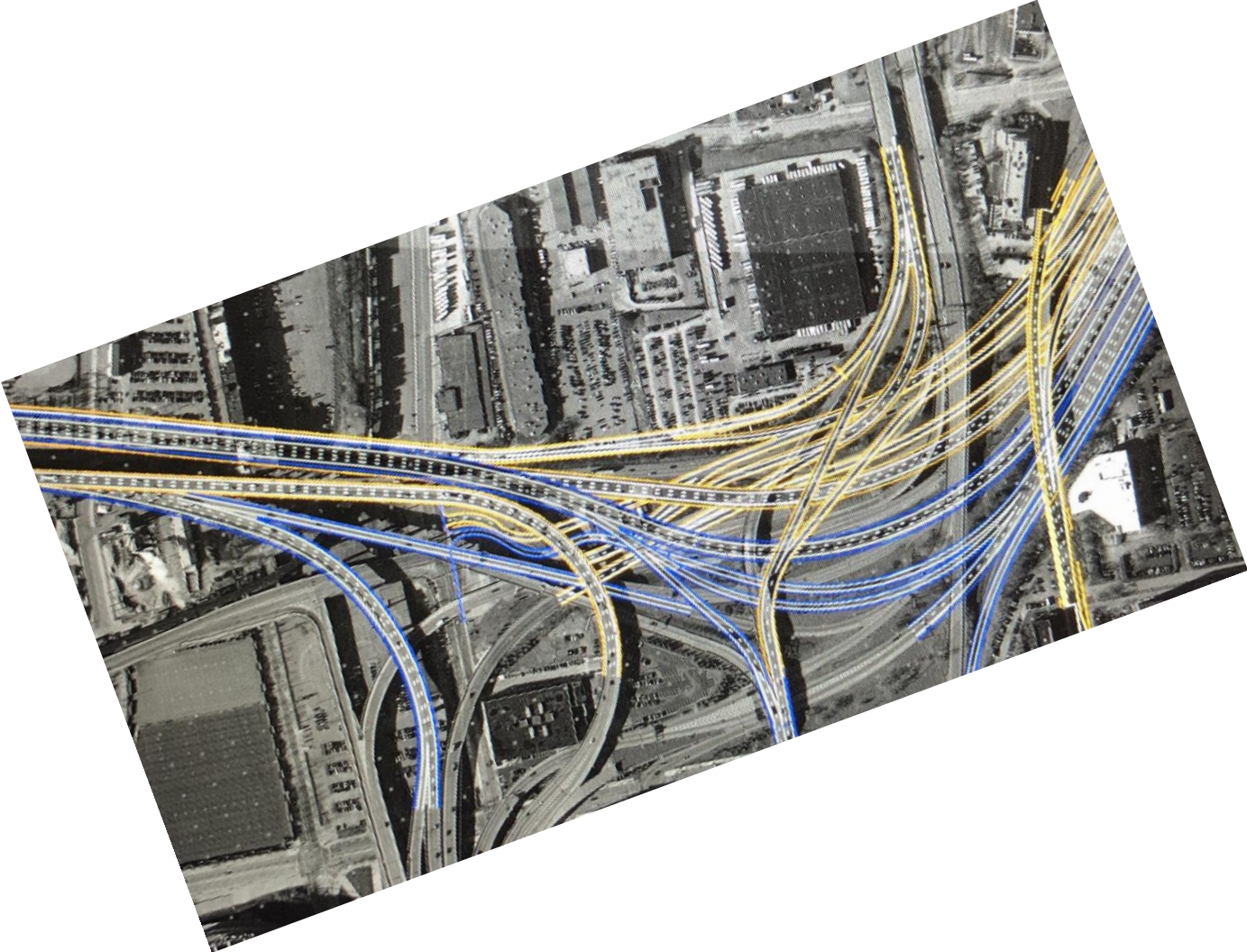
- The new bridge carries NB and SB I-75, SB I-71 and SB local traffic.
- The existing BSB carries NB I-71 and NB local traffic.
- The cost of Alternative I is approximately \$2.3 Billion.



Concept M

- The new bridge carries all of I-75 and connections to and from the local street system along the west side of downtown Cincinnati.
- The existing BSB keeps all of I-71 and carries many of the same local connections as today.
- Maintains the use of several existing ramps and bridges in Ohio, some new with Fort Washington Way in 2005.
- Total savings for Concept M relative to Alternative I is approximately \$384M in 2017 dollars.

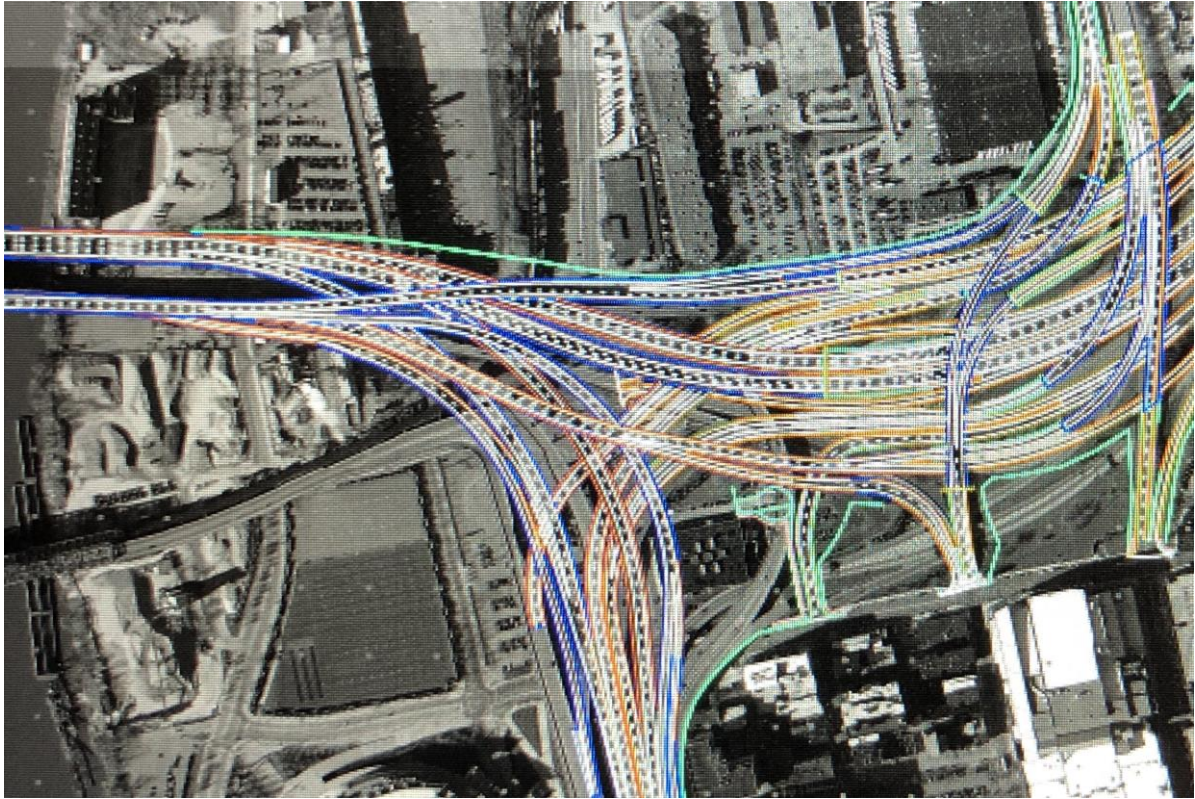
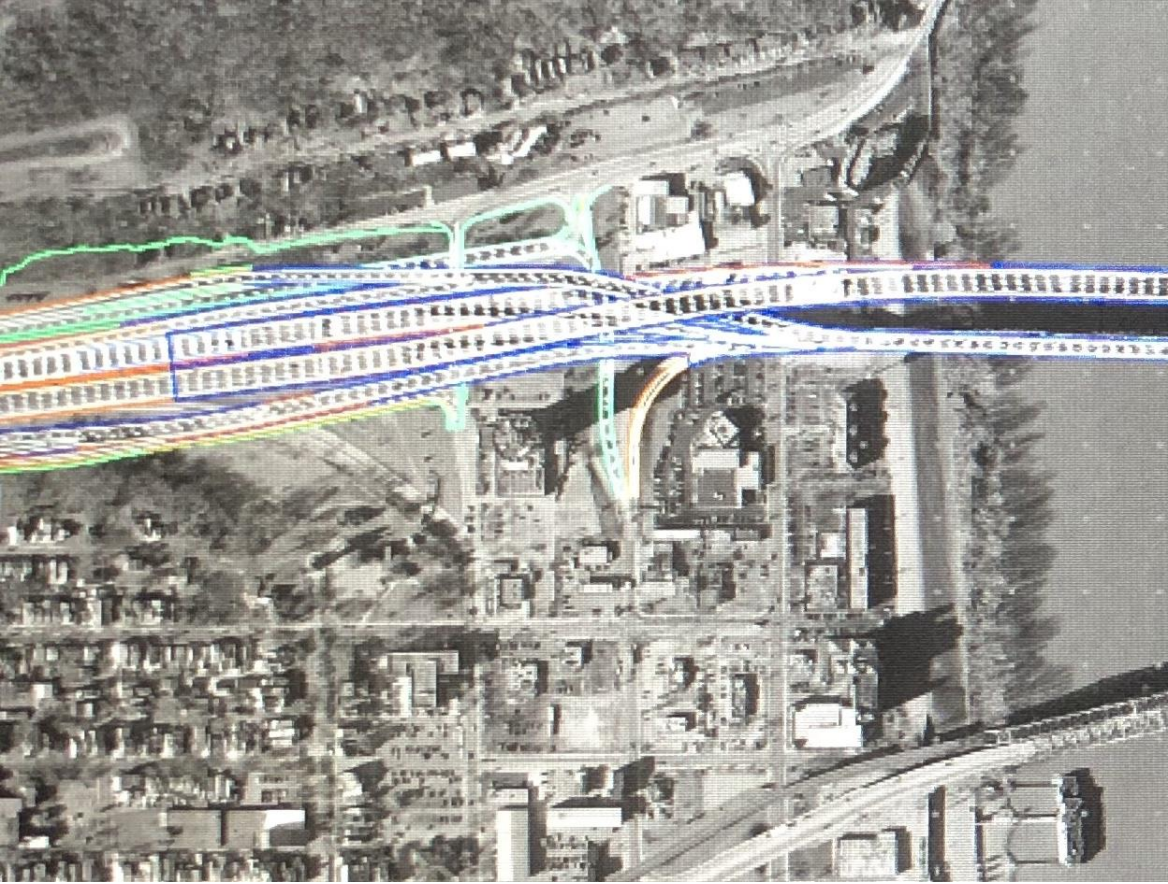
Concept M



Concept W

- The new bridge carries all interstate traffic for I-71 and I-75.
- The existing BSB carries all local connections.
- This design has a similar mainline and ramp layout through the corridor as Alternative I.
- Total savings for Concept W relative to Alternative I is approximately \$261M in 2017 dollars.

Concept W



Cost Savings with Concept M and Concept W

Cost Comparison: Alternative I with Concept M and Concept W									
		Construction Costs (2017 Dollars)							
Contract #	Segment Description	Alternative I		Concept M		Alternative I		Concept W	
KY-7	I-75 Reconstruction from South Termini of 12th Street Interchange to New Bridge over Ohio River	Retaining Walls	\$30,214,143	Retaining Walls	\$55,096,387	Retaining Walls	\$0	Retaining Walls	\$11,448,699
		New Structures	\$162,557,947	New Structures	\$114,210,940	New Structures	\$100,407,239	New Structures	\$89,510,807
	Kentucky Totals		\$192,772,090		\$169,307,327		\$100,407,239		\$100,959,506
OH-7 (PID 89068)	I-75 Reconstruction from New Bridge over Ohio River to North of Linn Street	Retaining Walls	\$23,209,947	Retaining Walls	\$13,978,846	Retaining Walls	\$0	Retaining Walls	\$0
		New Structures	\$271,680,043	New Structures	\$117,390,822	New Structures	\$189,161,276	New Structures	\$173,691,021
		Remove Structures	\$17,672,641	Remove Structures	\$6,061,563	Remove Structures	\$0	Remove Structures	\$0
	Ohio Totals		\$312,562,632		\$137,431,231		\$189,161,276		\$173,691,021
	New River Crossing	New Bridge	\$555,225,840	New Bridge	\$369,649,988	New Bridge	\$555,225,840	New Bridge	\$308,998,818
	New River Crossing Totals		\$555,225,840		\$369,649,988		\$555,225,840		\$308,998,818
	Combined Totals		\$1,060,560,561		\$676,388,546		\$844,794,355		\$583,649,344
	Total Amount Saved with Concept M	\$384,172,015							
	Total Amount Saved with Concept W					\$261,145,011			

NEXT STEPS



Next Steps

- Advance Concept M and/or Concept W in design to a similar level as Alternative I.
- Analyze traffic operations of all advanced options using TransModeler with updated travel data and calibration.
- Complete re-evaluation of environmental assessment, develop updated construction and delivery costs, determine funding and procurement options, and develop a bi-State approach.

**THANK
YOU**

