

### BRENT SPENCE BRIDGE CORRIDOR PROJECT

### **DESIGN SUMMARY REPORT**

AUGUST 23, 2022





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BRENT SPENCE



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### **FIGURES**

Figure 1: Comparison of Designs



### **1. INTRODUCTION**

### 1.1 Project History

On October 14, 2004, The Kentucky Transportation Cabinet (KYTC) and the Ohio Department of Transportation (ODOT) recognized the need to improve the Brent Spence Bridge (BSB) corridor and formally entered into an agreement to jointly develop and deliver a project to replace the existing BSB over the Ohio River. The BSB project goals are to improve the operational characteristics in the BSB corridor for both local and through traffic by improving traffic flow and level of service, improving safety, correcting geometric deficiencies, and maintaining connections to key regional and national transportation corridors.

In August 2012, the Federal Highway Administration (FHWA) issued a Finding of No Significant Impact (FONSI) identifying the selected alternative for the BSB project, referred to as Alternative I. This preferred Alternative I was further evaluated:

- In October 2012, a Value Engineering Workshop was held to generate technical ideas to improve the design and constructability.
- In 2015, a modification to travel on the existing and companion bridges in Alternative I was developed to separate interstate traffic from local ramp connections, referred to as the Whiz Bang Concept.
- In 2019, a Performance-Based Design Workshop was held to review the project using practical design principles, updated design standards, updated traffic counts, and traffic analysis to determine potential cost savings. Two value engineering concepts were developed with different lane configurations for the existing and companion bridges – Concept I-W (Whiz Bang) and Concept I-M.

In May 2020, the development of these two concepts was documented in the *Analysis of Design Concepts* report with recommendations for moving forward based on operation, design, and cost. Concept I-W and Concept I-M were both considered viable options for the BSB corridor and recommended for further study.

### 1.2 2021-2022 Project Tasks

KYTC and ODOT recognized the need to move the BSB project forward from these previous studies and approved the following tasks in October 2021:

- 1. Project Summary Report
- 2. Project Governing Structure Review
- 3. Project Financial Update
- 4. Traffic Analysis and Modeling
- 5. Design Concept Development and Refinement
- 6. Project Outreach and Communication



This report is a summary of Task 5 – Design Concept Development and Refinement which is influenced by the work performed in Task 4 – Traffic Analysis and Modeling. It includes a design refinement and evaluation of Alternative I, Concept I-W, and Concept I-M. This analysis and design refinement allowed for the comparison of characteristics specific to Alternative I, Concept I-W, and Concept I-W, and Concept I-M, such as operations, local connectivity, design exceptions, work limits, and cost estimates.

### 1.3 Purpose of Report

The purpose of this Brent Spence Bridge Project - Design Summary Report is to summarize recent work efforts related to the review of the 2012 Value Engineering Workshop, refinement and analysis of two value engineering concepts (Concept I-W and Concept I-M) from the 2019 Performance Based Design Workshop, and an updated analysis and evaluation of Alternative I. This report includes the following items:

- Summary of operational analysis based on updated traffic modelling
- Comparison of connectivity
- Refinement of design and scope of work
  - o Physical work limits and impacts
  - o Potential design exceptions
  - o Updated cost estimates
  - o Constructability
- Comparison of design characteristics
- Recommendations

### **2. VALUE ENGINEERING**

### 2.1 Value Engineering Workshop

Since the approval of the FONSI and selection of the preferred Alternative I, additional design reviews and studies have been conducted by KYTC and ODOT, including the Value Engineering Workshop held in 2012. The purpose of the Workshop was to generate technical ideas for delivering the BSB project quickly, economically, and safely. Nearly 100 ideas were identified for improvements to Alternative I.

Prior to a final report for the 2012 Workshop, the project was put on hold and no final decisions were made relative to the developed value engineering concepts and ideas. On June 2, 2022, a meeting was held with ODOT, KYTC and FHWA from both states to discuss these value engineering ideas and those developed during the 2019 performance-based design workshop to determine which items would be recommended for further consideration. These recommendations are summarized in the **Brent Spence Bridge Value Engineering Matrix** in **Appendix A**.



### 2.2 Performance-Based Design Workshop

In December 2019, a Performance-Based Design Workshop was held with members of ODOT, KYTC, and FHWA from both states. Alternative I was further evaluated to apply practical design principles which included an update to design standards, updated traffic counts, and traffic analysis to determine potential cost savings. As a result of this effort, two value engineering concepts were developed with different lane configurations for the existing and companion bridges across the Ohio River. Concept I-W (the Whiz Bang option from 2015) and Concept I-M were both considered viable options for the BSB corridor that could provide cost savings with respect to Alternative I:

- Concept I-W This design has a similar mainline and ramp layout through the corridor as Alternative I. However, all interstate traffic for I-71 and I-75 is carried on the companion bridge, and all local connectivity is accommodated on the existing BSB.
- Concept I-M This design keeps many of the same traffic movements and local connections on the existing BSB as they are today, including both directions of I-71. The companion bridge carries only I-75 and connections to and from the local street system along the west side of downtown Cincinnati.

These concepts did not change the access points provided in Alternative I nor did they change the concept of creating a collector-distributor system that separates the interstate through traffic from the local street connections. Initial evaluation of both concepts showed that they remain within the footprint of the original NEPA document.

### 2.3 Description of Designs

A description of each of the three designs are provided below:

### 2.3.1 Alternative I

Alternative I, which was identified as the preferred alternative in the Preferred Alternative Verification Report (March 2011), utilizes the existing I-71/I-75 alignment from the southern project limits at the Dixie Highway Interchange north to the Kyles Lane Interchange. The Dixie Highway and Kyles Lane interchanges will be modified slightly to accommodate a C-D roadway, which will be constructed along both sides of I-71/I-75 between the two interchanges. North of the Kyles Lane Interchange, the alignment shifts to the west to accommodate additional I-71/I-75 travel lanes. Between Kyles Lane and KY 12th Street, six lanes will be provided in each direction for a total of 12 travel lanes. Near KY 12th Street, the alignment separates into three routes for I-71, I-75, and a local C-D roadway in the NB direction.

A companion bridge (with a width of 172 feet) will be built just west of the existing BSB to carry NB and SB I-75 traffic with three lanes in each direction. Two additional lanes will be provided for SB I-71 traffic and three other lanes will carry SB local traffic as part of the C-D roadway system. The existing BSB will be rehabilitated to carry two lanes for NB I-71 traffic and three lanes for NB local traffic as part of the C-D roadway system.



Alternative I reconfigures I-75 through the I-71/I-75/US 50 Interchange and eliminates access to and from I-75 NB between KY 12th Street and the US 50/ OH 6th Street overpass in the NB direction. Alternative I also eliminates access to and from I-75 SB between the Freeman Avenue exit and KY 12th Street exit.

### 2.3.2 Concept I-W

Concept I-W uses the Alternative I design for the I-71/I-75 alignment from the Dixie Highway Interchange north to KY 12th Street; north of Freeman Avenue in Ohio; and includes the local C-D along both sides of I-75 in Ohio.

In Concept I-W, a companion bridge (with a width of 107 feet) will be built just west of the existing BSB with all I-71 and I-75 traffic on the new bridge and all C-D local traffic on the existing BSB. The new bridge will carry five lanes of SB I-71 and I-75 traffic on the lower deck and five lanes of NB I-71 and I-75 traffic on the upper deck. The existing BSB will be rehabilitated to carry three lanes for NB local traffic on the lower deck and three lanes for SB local traffic on the upper deck, as part of the C-D roadway system. See **Appendix B** for the **BSB Concept I-W Plan**.

### 2.3.3 Concept I-M

Concept I-M uses the Alternative I design for the I-71/I-75 alignment from the Dixie Highway Interchange north to KY 12th Street; north of Freeman Avenue in Ohio; and includes the local C-D along both sides of I-75 in Ohio.

In Concept I-M, a companion bridge (with a width of 133 feet) will be built just west of the existing BSB with all I-71 traffic on the existing BSB (as it is today), and all I-75 traffic on the new bridge. Local traffic connectivity will be distributed to both bridges, with many connections to the existing bridge remaining.

The new bridge will carry three lanes of SB I-75 traffic on the lower deck and three lanes of NB I-75 traffic on the upper deck. Two additional lanes will be provided on each deck of the new bridge to carry local traffic as part of the C-D roadway system. The existing BSB will be rehabilitated to carry two lanes for NB I-71 traffic on the lower deck and two lanes for SB I-71 traffic on the upper deck. One additional lane will be provided on each deck to carry local traffic as part of the C-D roadway system, specifically existing connections at 4th and 5th Streets in Covington and 2nd and 3rd Streets in Cincinnati. See **Appendix C** for the **BSB Concept I-M Plan.** 

### 3. EVALUATION OF ALTERNATIVE I, VE CONCEPT I-W AND VE CONCEPT I-M

### 3.1 Traffic Operations

The traffic analysis effort was built upon previous work completed by the Brent Spence Bridge Corridor project (2013-2022), Brent Spence Strategic Corridor Study (2017), and the ODOT Connected Autonomous Vehicle study (2020-2021). This latest analysis developed refined alternative traffic forecasts and operational analysis

using TransModeler for two value engineering concepts (Concept I-W and Concept I-M) with a comparison to the preferred Alternative I from the Environmental Assessment (EA) in 2012.

This traffic study, *Traffic Operations Report* dated June 2022, includes the review of available traffic counts, OKI travel demand modeling, existing (2019) TransModeler validation, development of refined alternative traffic forecasts, and TransModeler scenario analysis of 2050 build concepts.

TransModeler was used to refine Concept I-W and I-M designs to optimize the traffic performance in the corridor. The models include freeway mainline, ramps, ramp terminals, and adjacent intersections. The future modeling assumptions removed external capacity constraints from the corridor and conserved the existing traffic temporal distributions. These inputs maximized traffic demand on the concept design elements, which provided valuable insight into areas of concern for each concept. Design enhancements were made for each Concept based on the traffic analysis.

The TransModeler analysis showed that Concept I-W has acceptable traffic operations. There are segments of the I-71/I-75 corridor that have periods of poor traffic operations, but all segments fully recover within the model period. This was not the case with Concept I-M, which experiences severe queuing on I-71/I-75 NB in the AM period. Below is a summary of traffic operations results for each design option.

### 3.1.1 Alternative I

The TransModeler analysis was completed using the 2050 Base forecasts. Overall, Alternative I has acceptable traffic operations. The two areas of mainline freeway delays occur in the peak direction of travel: NB I-71/I-75 in the AM peak and SB I-71/I-75 in the PM peak. The travel delays are comparable to travel delays also identified for the value engineering concepts.

SB I-71/I-75 has a +5% grade between 12<sup>th</sup> Street and Kyles Lane. The steep grade along with high PM period traffic volumes result in travel delays on the roadway section between 9<sup>th</sup> Street and Kyles Lane in Kentucky. All three concepts experience similar travel delays in this section, but they are contained between Kyles Lane and 9<sup>th</sup> Street and do not impact the companion bridge.

### 3.1.2 Concept I-W

Overall, Concept I-W has acceptable traffic operations, very similar to Alternative I. The off-peak directions continue to operate acceptably as they do in the other concepts. The AM period has a travel delay for NB I-71 similar to Alternative I. In the PM period, SB I-71/I-75 has travel delays similar to other build scenarios.

Concept I-W was refined during the design modification phase of the project to address some operational concerns. The design changes include:

- 1. Modification of the lane alignment for the NB I-75 CD road from the existing Brent Spence Bridge through the US-50 exit.
- 2. The addition of an eastbound through lane at the 5th Street intersection with Central Avenue in Ohio.



- 3. Right-sizing of the Kentucky frontage road system to have acceptable operations and minimize right-ofway acquisition
- 4. Extension of the merge area between NB I-71 and the NB I-71/I-75 CD prior to entering Fort Washington Way.

### 3.1.3 Concept I-M

Concept I-M has acceptable operations for the off-peak directions, but experiences major operational concerns for NB I-71 in the AM period and minor operational concerns for SB I-71/I-75 in the PM period. The major operational issues for NB I-71 in the AM period make Concept I-M an unacceptable value engineering concept.

Concept I-M was refined during the design modification phase of the project to address some operational concerns. The design changes include:

- 1. The addition of an eastbound through lane at the 5th Street intersection with Central Avenue in Ohio.
- 2. Right-sizing of the Kentucky frontage road system to have acceptable operations and minimize right-ofway acquisition.
- 3. A new NB ramp between 12th Street and I-71 to provide interstate access consistent with the existing conditions and the other build scenarios.

### 3.2 Connectivity

Maintaining or improving local connections to the interstate and improving regional mobility are the goals of the Brent Spence Project. The value engineering concepts provide access as provided in Alternative I and use a collector-distributor (C-D) system to separate the interstate through traffic from the local street connections as in Alternative I. However, the local connectivity for Alternative I, Concept I-W and Concept I-M varies slightly due to the differences in the proposed use of the two bridges for local and interstate traffic. Each option was reviewed to evaluate specific items relative to travel:

- Local access to the Interstate
- Access to Covington from the Interstate
- Access to Downtown Cincinnati from the Interstate
- Separation of Local and Regional Traffic

A chart showing the results for each design option is included in **Appendix D** titled **Brent Spence Bridge Local Connectivity**.

### 3.3 Design Exceptions

The potential design exceptions for Concepts I-W and I-M have been summarized in tables and referenced to corresponding graphics that show the locations. The tables for each of these concepts also list the deficiencies from Alternative I for comparison. Overall, Concept I-W has fewer potential design exceptions than Alternative I



and Concept I-M. See **Appendix E** for the **BSB Potential Design Exceptions** with a separate map (E-1) and a table (E-2) for Concept I-W and two maps (Kentucky E-3 and Ohio E-4) and a table (E-5) for Concept I-M.

### 3.4 Work Limits

Work limits were approved for Alternative I as part of the Environmental Documentation in 2012. These limits were used as part of the development of the value engineering concepts with the requirement that any proposal would not expand beyond those approved for Alternative I. These requirements were met.

### 3.4.1 Concept I-W

The changes in Concept I-W with respect to Alternative I are between the 12<sup>th</sup> Street interchange in Kentucky to Linn Street in Ohio. In Covington, the northbound work limits between 12<sup>th</sup> and 9<sup>th</sup> Streets were reduced by the narrowing of lanes on Simon Kenton Way (formerly Jillian's Way) and narrowing the interstate corridor. The northbound work limits between 9<sup>th</sup> and 5<sup>th</sup> Streets match Alternative I along Goebel Park, which does require new right-of-way. The southbound work limits in Kentucky decrease by 60 feet from the Ohio River to 3<sup>rd</sup> Street and continue to decrease up to 106 feet between 3<sup>rd</sup> and 4<sup>th</sup> Streets. Concept I-W avoids work limits through the River Center Collision property that are needed in Alternative I. Additional design updates were made along Bullock Street/SB CD exit to 9<sup>th</sup> Street to reduce impacts to Crescent Avenue.

The work limits across the Ohio River on the west side of the project decrease by 60 feet. In Ohio, the work limits are consistent with Alternative I except on the west side of the segment between the Ohio River and the railroad track just south of 3<sup>rd</sup> Street. The work limits for Concept I-W decrease in this section by 60 feet including along Longworth Hall. The northbound ramp to 2<sup>nd</sup> Street from the existing BSB was revised to allow more horizontal distance between the Duke Gas utility and the ramp.

### 3.4.2 Concept I-M

The changes in Concept I-M with respect to Alternative I are between the 12<sup>th</sup> Street interchange in Kentucky to Linn Street in Ohio. In Covington, the northbound work limits between 12<sup>th</sup> and 9<sup>th</sup> Streets were reduced by the narrowing of lanes on Simon Kenton Way (formerly Jillian's Way) and the need for a narrower interstate corridor. The northbound work limits between 9<sup>th</sup> and 5<sup>th</sup> Street match Alternative I along Goebel Park, which does require new right-of-way. Design updates were made along Bullock St/SB CD exit to 9<sup>th</sup> Street to reduce impacts to Crescent Avenue.

In Ohio, the work limits are consistent with Alternative I except on the west side of the segment between the Ohio River and the railroad track just south of 3<sup>rd</sup> Street. The work limits for Concept I-M decrease in this section by 30 feet including along Longworth Hall. The northbound ramp to 2<sup>nd</sup> Street from the existing BSB was revised to allow more horizontal distance between the Duke Gas utility and the ramp.

### 3.5 Construction Cost Estimate

The updated Alternative I, Concept I-W and Concept I-M cost estimates are based on the Alternative I original 2010 cost estimate and project segments, with assumptions developed by KYTC and ODOT:



- Quantities
  - o Used quantities from the Alternative I original 2010 estimate
  - Used quantities for the entire BSB corridor from Dixie to north of the WHV to generate unit prices
  - Changed quantities for I-W and I-M based on differences with Alternative I only if there was a significant cost difference:
    - Retaining walls, Bridge structures and Pavement for I-W
    - Retaining walls, Bridge structures and Structure removal for I-M
- Inflation, Unit Prices
  - Design Contingency 25% of construction cost
  - o Refreshed all unit prices based on updated estimator guidelines
  - o Revised inflation rate to 6.2% based on guidelines
  - o CY22-26 Business Plan Inflation Calculator Revision dated 01-26-2022 was used
  - o Inflation calculator start date updated to January 2022
  - Reviewed recent bid history and updated unit prices
  - o Updated material and inflation costs for steel for various structures
  - Used ODOT unit prices from January 2022.
- Construction Dates
  - Dixie to Linn start date 10/2023 5 years construction
  - Linn to Findlay start date Q3 of 2023 4 years construction
  - Findlay to north of the WHV start date 4/2028 4 years construction

ROW costs were provided by ODOT and KYTC. Some utilities have already been relocated. ODOT provided the utility and actual cost for relocation. The estimate continues to utilize the 2012 estimated utility costs in Kentucky and has applied an inflation factor. Since the project is moving forward with Concept I-W, future updates for the cost will only be done for Concept I-W.

### 3.5.1 Alternative I

The construction cost estimate for Alternative I was last updated on April 22, 2022 to \$3,218,584,751 (\$3.22B)

### 3.5.2 Concept I-W

The construction cost estimate for Concept I-W was last updated on April 22, 2022 to \$2,961,113,906 (\$2.96B)

Concept I-W is \$257M or 8.0 percent less than Alternative I.



### 3.5.3 Concept I-M

The construction cost estimate for Concept I-M was last updated on April 22, 2022 to \$2,933,980,214 (\$2.93B)

Concept I-M is \$284M or 8.9 percent less than Alternative I

### 3.6 Constructability

A high level review was performed for constructability. The Alternative I construction staging plan was utilized as a base to evaluate the constructability of Concept I-W and the associated changes. This review revealed no fatal flaws in constructing Concept I-W. The conceptual construction staging for Concept I-W is being submitted under a separate document. The detailed construction staging and TMP plans will be developed by the Design Build Team once they are selected.

### 3.7 Concept I-W Conceptual Signing Plan

The 2012 Alternative I signing plan was reviewed to determine if there were any fatal flaws in the conceptual signing plan in transitioning from Alternative I to Concept I-W and to reflect the changes (if any) required on the Alternative I signing plan to accommodate Concept I-W. No fatal flaws were found for signing of Concept I-W. However, while considering the Concept I-W signing, it was recognized that potential revisions could be made to the Alternative I signing plan to simplify and clarify the layout and configuration to improve driver understanding and operation. To keep the review focused on updates to accommodate Concept I-W, a high-level overview was provided without detailed redesign of the signing. Comments received from both states are addressed on plan sheets included in **Appendix F**.

The next phase of design will include additional traffic analysis to verify any new design ideas but will also evaluate the C-D and associated signalized intersection operation. The verification of lane assignments for the highway lane use seems reasonable to include so that the appropriate pavement marking and signing needs for Concept I-W can be determined. This will also coordinate well with the design of the freeway management/ITS and destination signing.

### 4. COMPARISON OF DESIGNS

The following Matrix graphically summarizes the different topics of evaluation discussed above.



COMPARISON OF DESIGNS							
Topics of Evaluation	Alternative I	Concept I-W	Concept I-M				
Traffic Operation							
Connectivity							
Geometric Design							
Work Limits & Impacts							
Cost							
Constructability							
Good							
Better							
Best							



### **5. RECOMMENDATIONS**

Various design factors and traffic operational analyses were refined for Alternative I, Concept I-W and Concept I-M for the BSB project. The purpose of this effort was to gain an understanding of the differences in each factor and to compare these for the three design options.

Traffic operations analysis using TransModeler and refined alternative traffic forecasts developed from the OKI travel demand model were completed for the BSB corridor representing a 2050 condition. The modeling indicates operational deficiencies for the preferred Alternative I, especially for NB I-71/I-75 in the AM peak period and SB I-71/I-75 in the PM peak period. The two value engineering concepts were evaluated and compared to Alternative I. The operations analysis indicates Concept I-W has acceptable traffic operations with similar deficiencies to Alternative I, while Concept I-M experiences excessive traffic queues for NB I-71/I-75 in the AM peak period.

Other design factors were evaluated including connectivity, geometric design, work limits, cost estimates and constructability. Based on the comparison of these factors and the traffic operations, as shown in the Design Comparison Matrix in Figure 1 above, the majority of the evaluation factors favor concept I-W. Therefore, it is recommended that Concept I-W be carried forward as a value engineering concept to Alternative I, and Concept I-M should be excluded from further consideration.

The project is currently planned to be delivered as a Progressive Design Build procurement. The two northern projects (PID # 113361 and PID # 114161) are being procured as a Design-Bid-Build. The value engineering concepts shown as accepted in Appendix A will be included in the design build RFP. Those shown as pending



will not be excluded from consideration if recommended by a design build team. The results of these recommendations do not preclude or eliminate consideration of additional concepts and ideas if developed by a design build team as part of the RFI/Alternative Technical Concept process. Value Engineering Concept I-W will be included as the base concept in the design build RFP. This concept separates local and interstate traffic and provides significantly better traffic flow than Concept I-M.



Appendix A: BSB Value Engineering Matrix



### Brent Spence Bridge Value Engineering Matrix

Innovation	Proposed Design Innovation	Advantages	Disadvantages				Meeting Notes 6-2-22
Number			Requires geometric and signing modifications to implement effectively; likely to increase	Accepted	Rejected	Pending	Notes
1	Truck Climbing Lanes on SB in KY	Increases safety and traffic flow on SB by keeping trucks in their own lane	cost. May have additional impacts to section 4(f), 6(f), and historic resources that would		х		Adding truck lanes would incirese project imacts and require re-visiting the FONSI. Updated and current traffic modeling shows this section workin without the addition of truck lanes
			require more time to for coordination to revise the MOAs and re-evaluation of the environmental document				without the addition of truck lanes
2	Reduce Number of Lanes over River	Reduces construction costs and long term bridge maintenance.	Potentially reduces level of service		X		Traffic supports current number of lanes. Companion bridge narrowed through reconfiguration of movements without impacting LOS.
3	Reduce Number of Lanes in KY	Reduces construction costs and ROW impacts Under a P3 concession procurement, this allows improvements to be phased in based on need, not	Potentially reduces level of service		X		Traffic supports current number of lanes on highway system.
4	Phased Implementation	predetermined scope and schedule.	Extends implementation over a longer period.		Х		Phasing of the project is underway and potential for more phasing based on funding.
5	MAP 21 - Reconfirgure so maximimum number of lanes are tollable	Most revenue potential; potential of new BSB; adding shoulders back in could reestablish the amount of free lanes	Political acceptance		х		NA. Tolling not considered as part of the project.
		Earlier decision point for drivers (thru versus local) improves traffic flow. Easier to sign. Allows for	Elimination of direct connections may require improvements on local intersections to handle				
6	Existing Bridge Service Local / New Bridge serve thru Traffic or vise versa	dynamic tolling on thru facility. Reduces cost of direct ramp connections on Ohio side with I-75/I-71.	capacity.	X			Concept I-W has been developed to reconfiguration local roads to existing BSB and interstate traffic to the companion bridge.
7	Consider Managed Lanes (Reversible, HOT, HOV)	Increases level of service on general purpose lanes by removing thru traffic. Allows for dynamic tolling.	Likely will not be effective without a wider range managed lane system		х		Sections north and south of this project have been reconstructed recently without managed lanes. This project is not long enough for a managed
8	Toll Local Lanes @ reduced cost	Additional revenue; political compromise; minimize evasion and impacts to existing system	MAP-21 authority; political acceptance; implementation plan		Х		Iane option. NA. Tolling not considered as part of the project.
9	(Toll Local Zip codes) Toll All Lanes, including locals	Revenue maximization; ease of implementation; eliminates connectivity of partially tolled plans	Political acceptance; diversion potential affecting existing network		Х		NA. Tolling not considered as part of the project.
10	Toll all bridges in town	Can maximize revenue; can create most efficient traffic flows; can minimize diversion (traffic and cost benefits); can result in lowest BSB toll rates; enhances social justice by tolling all; creates a network;	MAP 21; political acceptance; increases toll technology capital and ops costs		х		NA. Tolling not considered as part of the project.
		mitigates					
11	Salvage more exist structures on OH side	Saves cost by reusing existing bridges that are in good condition.	Will require design exceptions due to clearances and geometrics;		х		Concept I-M was developed to reuse exisiting structures on ramps and connections. Increase in design exceptions, traffic impacts and cost savings comparison to Concept I-W eliminated this option.
12	Reduce / Consolidate X-St Bridges in OH	Reduces construction impacts to traffic on mainline. Reduces number of bridges and retaining walls and	Reduces east-west connectivity. May require improvements on local intersections to handle capacity. Potential for oppostion from city of Cincinatti and increase in time to get		x		The current value engineering concept I-W provides the best operation while minimizing impacts
		future maintenance costs. Increases ROW for development opportunities.	stakeholder acceptance.		^		The current value engineering concept r-w provides the best operation while minimizing impacts
13	Move 75 Thru lanes/bridge further west (similar to Queensgate option)	See #85	See #85 Capital costs to modify connectivity of "other" bridges; other bridges have limited connectivity		Х		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
14	Use "Other" River Bridges to equalize movements and reduce some ramp movements in interchange	Could reduce the needed capacity of BSB, thereby reducing cost; reduces cost of ramps;	and access		х		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
15 16	Remove some system to system interstate moves @ core of I/C - Force them to use C/Ds to make moves Keep existing system entirely intact for local connections, only add new req'd thru lanes	Reduces cost by eliminating approach structures and pavement while simplifying MOT Reduces number of thru lanes. Conducive for tolling options as it separates thru from local.	Eliminates movements. Design exceptions for existing infrastructure		X		Reduced costs with Concept I-W without moving this movement to the CD Have seperated local and regional traffic through concept I-W
17	Tear down Dunn-Humby building to optimize Interchange geometrics and reduce cost	Optimizes geometrics. Helps minimize design exceptions. Increases safety.	Loss of valuable property.	х	^		Dunn-Humby building has already been removed. Geometrics for Concept I-W utilize this new area.
18	One new bridge on each side of Brent Spence to optimize connectors in Interchange and reduce cost	Built in the clear	Cost, Gas line, Geometrics		X		This was rejected initially due to the concept not being in alignment and outside the project scope of work
19 20	Create Truck Only Lanes and toll them Move SB merge points further south in KY past the Cut in the Hill	See #6	See #6 Adds scope, changes project limits		X		See 1. Tolling not considered as part of the project. This was rejected initialy due to the concept not being in alignment and outside the project scope of work
21	Regrade Cut in the Hill for flatter grades and make Express	Increases safety	Cost		Х		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
22	Put new Bridge East of Brent Spence in line with I-75 to salvage existing local street	Saves existing infrastructure on OH side. Avoids Duke Energy substation. Avoids Longworth Hall.	Need to verify geometry will work. Potential design exceptions. ROW impacts. Potential new environmental impacts		х		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
23	Remove Existing BSB Superstructures truss and build new bridge on exist foundations	See #29	See #29		Х		Given long life cycle of existing bridge more cost effective to rehab and keep
24	Developer control assests that generate revunue. If BSB is not replaced and is non-tolled, exclude from the P3	P3 bidders will add significant O&M or replacement costs for existing BSB; allows bidders to only be responsible for the facilities it is operating; cleanest for P3 arrangement; allows for the continued use of	Public owners retain risk of existing BSB;		х		P3 procurement is not considered as part of this project.
		BSB; allows for free local tolling on existing					
25	Reassess traffic projections & assignment, optimize the number of lanes for each movement and consider phasing and tolling	Saves near-term capital costs by only constructing required lanes	Requires additional buildout in future; phased approach could complicate P3 construct		х		Tolling no longer being considered. Given the length of the corridor and the changes required at the River Bridge the project does not fit a phased approach
26	Evaluate cost benefit of reconstructing/replacing the BSB (additinional revenue potential of tolling all lanes and O&M	Maximizes revenue potential; could save costs of O&M minimizes risk of existing BSB condemnation	Replaces BSB while some life is left on bridge		х		P3 procurement is not considered as part of this project.
27	savings) Build New River Crossing Bridge near Airport @ Mineola - Connect to US 50 for alternate route downtown	Everything is offline - significant reduction in congestion at spaghetti bowl	Re-opens FONSI		X		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
28	Replace the lower level deck/floorbeams with shallower sections (seated lower on the truss chords)	Greatly improves driver visibility for NB traffic on existing bridge.	Greatly increases cost for existing bridge rehabilitation.		X		Minimized number of lanes and increased shoulder width on existing bridge. Mainline traffic no longer on existing bridge.
29 30	Replace Existing Super Structure Only (verify fdns ok maybe widening) Replace Existing in entirety (1 or 2 new)	Reduced Life Cycle Cost - likely reduction in bid in P3 environment Everything is built in the clear, no question about condition of substructure	Higher First Cost Substructure is in good condition		X		Existing bridge does not need replacement. Will be rehabilitated. Given long life cycle of existing bridge more cost effective to rehab and keep
31	Build new Bridge offline and close exist for rehab (detour 71). The conceptual MOT plan already investigated this	MOT - very little disruption to traffic	expense of cross-overs			x	MOT being investigated. DB team will have options for MOT.
0.	idea. New Bridge type - tied arch: Build offline and float in. Minimize length of "complex bridge" (no backspans). Existing					~	
32	bridge is 830' mainspan for 800 nav channel. No sidechannel requirements. Ht of arch restricts offline to adjacent	Saves significant dollars, aesthetically pleasing. Form meets function				х	Current approved documents have Tied Arch and Cable Stayed bridge as options. Specifics for bridge will be determined by DB team.
	pools (new & exist)		All the disadvantages of a double decker intesified: Longer approach bridges, signage is				
33	Triple decker on exist foundations (elim fdns in river?)	Eliminates need to build new substructure in river, tighter footprint	complicated. Poor Aesthetics.		х		More cost effective and less impacful concepts were developed
34	Twin new arch supers (830' spans): 8 lanes each - facilitates cost and schedule considerations (verify capacity/condition of exist fdns)	Saves significant dollars, aesthetically pleasing. Form meets function			х		16 lanes wide would extend beyond existing project limits and require reopening of the FOSNI.
35	Triple deck on new alignment with demo of existing				х		See 33
36	Approach bridge - PC or Stl Girders Approach Bridge - Stretch spans eliminate piers					X	Option for DB team. Option for DB team.
38	Approach bridge - Rehab vs replace (stack alt)				Х		New superstructure not being considered on existing BSB.
39	Keep CS on lower level of exist & decommission top level, put I-71 NB on new single level bridgetoll new bridge w "free" CDs on exist brw/ new CD bridge in future				х		Tolling no longer being considered. Concept I-W is similar
40	Keep CD & Interstate on separate facilities/separate procurements	Cleaner to have a smaller P3 procurement for just tolled facility; allows public flexibility to allow free or	Smaller transaction	x	х		Concept I-W separates interstate and CD traffic, but only 1 procurement for entire project.
-	Consider procurement method that takes adavantage of "best value" vs "lowest cost" to allow for Design-Build Team	higher connectivity				v	DB Procurement approach has not been finalized.
41	to get credit for valuable alternative.					х	Best value vs. lowest cost will be considered during the procurement phase.
42	Tolling policy> differential rates to control leakage	Charging non-transponder customers a higher rate encourages transponder penetration thereby reducing transaction costs and leakage			х		Tolling no longer being considered.
43	Queensgate alt looks best from bridge perspective / ops> FONSI issue?				Х		This was rejected initially due to the concept not being in alignment and outside the project scope of work
44 45	Dbl deck Alts to consider castellated trusses for longitudinal frames Land bridges: Segmental Plate girdgers, PC girders, Stl tubs (tight radius curves)	great idea, but there is not much benefit to studying it Cost - when worked in conjunction with roadway geometry			X	х	This was rejected initially due to the concept not being in alignment and outside the project scope of work Option for DB team.
46	Reconfig required if reuse mainspan from Alt I				Х		Concept I-W being considered as preferred option.
47	Reduce connectivity at spaghetti bowl	Reduces construction impacts to traffic on mainline. Reduces number of bridges and retaining walls and future maintenance costs	Reduces east-west connectivity. Eliminates direct connections from mainline to local. May require improvements on local intersections to handle capacity. Potential for local		х		Connectivity has been updated to improve traffic flow and minimize costs Concept I-W
		future maintenance costs	opposition. May take additional time to gain stakeholder acceptance.				
	Westernhills viaduct access ramp: Eliminate or Develop alts Run CD lanes thru end spans rather than replace existing bridges at both Dixie & Kyles	Saves initial cost by maintaining bridge in place.	May increase future maintenance costs by keeping older bridge in service.	X		х	Effort as part of ODOT PID 114161. Allow DB teams option for this innovation which is to keep the existing bridge.
51	Use Single level bridge vs. double deck	single level options have the benefit of reducing number of shoulders, length of approach bridges, a safer	Larger footprint, potential for additional ROW		х		See 34
	less wide shoulders, less pavement, less sq ft bridge, less ret walls. Need further policy discussion with ODOT prior	system and improved aesthetics This is practical design - best value. MoDOT has had significant success in stretching their budgets with			~		
52	to advancing this idea.	this approach	violates standards				Shoulder widths will be designed and built in accordance with current standards.
53 54	Piles instead of shafts Relocate the gas line (2x12")	good idea Not worth studying			х	X	Option for DB team VE related to Innovation 123, which is not being considered due to potential environmental impacts
	Widen Exist pier (see sketch)	works in conjunction with replacing the superstructure - need to study to get cost			x		This was rejected initially due to the concept not being in alignment and outside the project scope of work
56	Arches: Use Networked cables, I-shaped Rib, Use lifiting towers on barges, float in low, FB and stringers, strings (framed in) / Composite tie, Basket handles (Aesthetoics +10%), 2-60' wide arches + Existing, 3x75' arches -> 15	works in conjunction with replacing the superstructure - need to study to get cost				×	Final design for the companion bridge to be performed by the DB team in conformance with RFP and approved NEPA decision.
	lanes						
57	Arches: Grid Deck, Lt Wt Concrete, HPC, Weathering Steel, Knuckle Detailing, (Blennerhassett, Champlain), Arch Rib (Conc Filled Pipe)	good idea Not worth studying				х	Final design for the companion bridge to be performed by the DB team in conformance with RFP and approved NEPA decision.
58	Flat Slab Cable Stayed: 3 x 70 Bridges, CIP on Backspan, Traveller main span, semi fan cables, hollow towers,	Should study to get a cost				х	Final design for the companion bridge to be performed by the DB team in conformance with RFP and approved NEPA decision.
	stress from deck, no saddles in tower Cable Stay - Semi Fan, Match E.G Depth to F.B., long. PT only in Tension Regions, Saddles/Keep Cables Vert.,					~	
59	Vertical Pylons, Avoid Ballast by "pushing in" end piers - Use approach spans, Hollow Pylons, Drilled Shafts (Cap) -	good idea Not worth studying				х	Final design for the companion bridge to be performed by the DB team in conformance with RFP and approved NEPA decision.
	River Pier Fntn, Multi Column Bent @ Rest Pier Segmental - Uniformity of X-section>clean un geomoetry, Gantry - Mainline, Ream/Winch>Elyovers/Ramps						
60	Segmental - Uniformity of X-section>clean up geomoetry, Gantry - Mainline, Beam/Winch> Flyovers/Ramps, Overlay the segments	worth moderate study to price				х	Final design for the companion bridge to be performed by the DB team in conformance with RFP and approved NEPA decision.
61	Pier spacing on Approaches w/ Tied Arch Gentle Curves>P/C & Steel work	works in conjunction with replacing the superstructure - need to study to get cost				X	Final design for the companion bridge to be performed by the DB team in conformance with RFP and approved NEPA decision.
62 63	Twin - One Level Arches\$800/ft> CS or Arch, Dbl Deck=200 ft, single deck = 160 ft, \$250 Approachs COST	works in conjunction with spaghetti bowls improvements - should study Need to Determine more accurate cost				x	DB teams can consider changes to the alignment with no impacts to the FONSI.
63	SAVINGS: \$320 - \$170 = \$150M New Super on Existing Sub (Main River Unit)	Need to Determine more accurate cost covered above			x	~	See 34 Given long life cycle of existing bridge more cost effective to rehab and keep
65	Rehab Aproaches vs Replace Approaches w DBL Decks = Saves \$40M	works in conjunction with replacing the superstructure - need to study to get cost			X		New superstructure not being considered on existing BSB.
66	P3: Legislation to Toll: - KY - Ability and Enforcement (leakage)	Tolling legislation necessary for procurement; enforcement critical to maintain revenue and bankability;	Political acceptance. Not a State DOT policy		х		Currently not legally feasible and/or within State DOT's policy
67	P3: Prefer the entire project - Has to be large	allows for procurement acceleration; reduces public subsidy Larger project is the most attractive to bidders	Makes phasing difficult; larger cost so larger public subsidy. Not a State DOT policy		Х		Currently not legally feasible and/or within State DOT's policy
69		50 years is the sweet spot for concessions	Present valuee calculation doesn't provide much value over 50 years. Not a State DOT policy		х		Currently not legally feasible and/or within State DOT's policy
70	P3: Tolling> Meters for local/thru traffic		KY doesn't want it. Not a State DOT policy		X		Currently not legally feasible and/or within State DOT's policy
				-	-		

### Brent Spence Bridge Value Engineering Matrix

Innovation	Proposed Design Innovation	Advantages	Disadvantages		<b>D</b> .1 · · ·		Meeting Notes 6-2-22
Number 71	DB: Non - Prescriptive Perfomance Spec = \$\$\$	Flexibility increases value; cost savings can be outweigh original scope	Limits control of public agencies	Accepted	Rejected X	Pending	Specific requirements will be defined.
	DB: Give Credit for Deleting BSB (\$100M)				Х		BSB will not be removed.
73	DB: Reward Aeisthetics> Advisory Committee (KCIcon) DB: Fixed Price/Flexible Scope				Х	×	Specific Aethetics requirements to be used on this project. Currently weighing the best D/B approach. Focus is currently on traditional and progressive D/B
	DB: One on One Meetings			х		^	One on one meetings will occur during procurement phase.
76	DB with more Control Ideas: Dynamic DB (70% dwgs), ATCS, DBB w/ATCs, One Step, Reward for removing Dbl					x	Currently weighing the best D/B approach. Focus is currently on traditional and progressive D/B
	Deck (Safety) DBB: Segment Project: KY - OH - River Bridge (Separate River Bridges)				X		
	DBB: DBB w/ATCs				X		DBB not being considered as part of this project. DBB not being considered as part of this project.
79	DBB: Lane Rentals				Х		DBB not being considered as part of this project.
80	DBB: Tolls> Work through a segment that is "Tollable"	Reduces construction impacts to traffic on mainline and crossroads. Utilizes the life of the existing			X		DBB not being considered as part of this project.
81	Modify C/D system @ Dixie & Kytes (Save Existing Bridges) - move CD ramps outside and either over/under, Frontage Road/Split Diamond, Braided Ramps (see onion skin)	bridges. Level of Service on mainline will not be impacted. Depending on the option, can save construction cost and time.	Depending on option, may require modifications to the IJR, less direct access, and additional bridges to maintain.		x		This was rejected initially due to the concept not being in alignment and outside the project scope of work
	Widen Existing Pavement in KY (no full depth reconstruction) Eliminate Lanes north of Kyles to 12th St based on Traffic Volumes	Reduces construction costs by salvaging existing pavement.			Х	¥	Profile grades changes north of 12st Street does not allow for only widening. Number of lanes matches revised traffic data.
84	Reduce 5% grade on KY side with Profile Adjustment and/or split grades (truck impact)(repeat)	Increases safety	Cost		Х	^	5% profile grade is approximately 4500'. Significant MOT challenges would occur with reducing grade.
85	Shift new Alignment west for I-75 traffic, maintain I-71 traffic in place - Shift I/C North, West and use existing road corridor. Reconstruct I/C with 50, tie system connection between 75 and 71 using 50 corridor.	Significant cost savings could be achieved along with significant economic development opportunities for the city of Cincinatti. Although on a skew, using a flat tied arch bridge maybe cheaper than the double- decker proposed in the preferred alternative due to the reduction in total number of lanes, shoulder widths, and having a single deck versus a double deck. Many existing I-71 interchange elements can be rehabilitated instead of replaced. Significantly reduces new infastructure within congested construction area immediately downtown - reduces construction cost as a result. Improved geometrics, improved safety. Potential phased construction opostnutily with I-71 and I-75 corridors developed separately. Separates complicated/confusing system movements - will be easier for drivers to navigate, I-75 corridor and bridge crossing would be constructed offline, lessening the construction drivers, businesses, civic events. The NS corridor on the OH side of the river would carry fewer lanes, making it a less divisive element of the downtown infastructure. The cross connection structures would be shorter and less expensive.	Skewed river crossing increases the length. Potential impacts to businesses along I-75 corridor. This alignment is an improved variation of an alignment that was previously studied and rejected by the City. Potential for local opposition, difficulty acquiring stakeholder acceptance, and additional impacts to section 4(f), 6(f), and historic resources		×		This concept would increase section 106 impacts and is outside the project scope of work
86	Flip I-75 and I-71 alignments				X		Alignments have been modified in Concept I-W.
8/	Utilitize the CWB Bridge as the C/D Bridge, widen and shirft new alignment to the east (repeat) Reduce/Eliminate low-volume connections on Ohio side - Combine bridges, eliminate 4th to NB ramp (see onion	Reduces construction impacts to traffic on mainline. Reduces number of bridges and retaining walls and	Reduces east-west connectivity. Eliminates direct connections from 4th to NB. May require		~		This was rejected initially due to the concept not being in alignment and outside the project scope of work
88	skin)	future maintenance costs. Increases ROW for development opportunities.	improvements on local intersections to handle capacity.		х		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
89	use fill plugs to eliminate bridge spans					X	DB team not precluded from using this approach.
90	Western Hills Viaduct - Roundabout - CD System (see onion skin) Build one new bridge, tear down old, consider life cycle costs				X		This was rejected initialy due to the concept not being in alignment and outside the project scope of work Given long life cycle of existing bridge more cost effective to rehab and keep
92	Build river crossing new airport, connect to US 50 to reduce truck volumes				X		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
93	Break out Kyles lane I/C and south as DBB (\$200M) Add Tolled F/M Connections (existing connection to west side of situ surrontly only conved by Western Hills Viedust	Look for additional revenue ontione, if additive to the system of talling new mercements. More talling the				Х	Project could be broken out based on funding.
94	Add Tolled E/W Connections (existing connection to west side of city currently only served by Western Hills Viaduct 8th Street Viaduct, Hopple Street Viaduct, & US 50)	Cincinatti fund replacement of Western Hills Viaduct.	new revenue must outweigh the cost; political ability of new tolling; connectivity abilities		х		Tolling not being considered as part of this project.
95	Retro Actively introduce managed lanes farther north (say to I-275)	Ability to generate additional revenue; tolling for new interstate capacity is allowed	Requires additional tolling approval; additional tolling along the corridor in additional to the bridge		х		Tolling not being considered as part of this project.
96	Utilize toll credits for Federal Match Phase Implimentation of modified queensgate option to allow completion of ES w/o delaying start	Allows states to meet local match if this is a problem			X		Tolling not being considered as part of this project. This was rejected initialy due to the concept not being in alignment and outside the project scope of work
98	Defer from Linn St to the north (\$170M)	Saves initial construction cost	Complete project need not being met.		X		Design for Linn St to the north being completed as separate contract.
99	Use Design Speed = Posted Speed			Х			Practical design workshop set this standard.
100	Take Advantage of Criteria reduction w/switch from interstate to local Flip shoulders on ramps to reduce width/improve HSSD			х		X	Practical design performed and some concepts were implemented. Practice has been utilized in Ohio and Kentucky.
102	Tie Barrier Size/Type to design speed			A		Х	Design parameters to be set for DB team at procurement phase.
103	Reduce Pavement thickness based on actual utilization				Х		Pavement thickness to be determined for DB teams.
104	Keep local traffic on existing bridge w/ thru traffic on new	Earlier decision point for drivers (thru versus local) improves traffic flow. Easier to sign. Allows for dynamic tolling on thru facility. Reduces cost of direct ramp connections on Ohio side with I-75/I-71.	Elimination of direct connections may require improvements on local intersections to handle capacity.	х			Similar to Concept I-W
105 106	Optimize construction phasing for revenue/lower construction cost Utilize other state standards	Full funding not required upfront; build additional bridge/lanes as needed; test tolling elasticity and revenue potential on a smaller scale; allows time to pursue other enviro approvals	Difficult to include future build scenarios in one P3; large bundled project is attractive to bidders;potentially lose economies of scale;		x		P3 process not considered as part of this project. ODOT and KYTC standards to be used.
107	Use minimum vertical underclearance. In Ohio, the minimum vertical underclearance for most locations is 15' 6" and can be less than this over some local streets.				~		Desirable clearances used where applicable to allow DB teams room for innovation.
108	Forget tolling existing bridge> Garner public support for the "New" tolled bridge, maybe managed lane, Bus Lane:	s Could potentially allow KY legislature to approve faster this February if some local tolling is free	Reduces revenue; reduces ultimate control over project		х		Tolling not being considered as part of this project.
109	Design Speed = Post Speed			Х			Practical design workshop set this standard.
110	Performance Based - Design to LOS not # of lanes	Saves near-term capital costs by only constructing required lanes	Requires additional buildout in future; phased approach could complicate P3 construct		Х		Designed number of lanes to be based on future traffic.
111	Staged pavement construction, Bid Alt Pavement Designs, Bid years of Life Include Maintenance Plan in Evaluation Criteria				×	X	Procurement documents to be developed. Maintence plan refers to P3 process that is not consider as part of this project.
113	Design /Build to Budget (phased per funding) (include min perf rqmts)				X		Traditional design build being utilized.
	Order of Events> Segmented Contracts, Who do you toll first?, Commuters=Biggest Bang \$\$\$ Bus on Shoulder, other transit options				X		Tolling not being considered as part of this project.
	HOV/Managed Lanes				X		Bus on shoulder not required as part of this project. HOV/Managed lanes not considered as part of this project. Segments south and north of project limits do not have HOV/managed lanes.
	Commuters get a break if they car pool	Could reduce the number of lanes required; allows some free movements for carpools; discount only for	Reduces a small amount of revenue		х		Tolling not being considered as part of this project.
118	Think in terms of moving people not cars, more modern approach	registered carpoolers can help overall revenue collection if everyone else is tolled			×		
119	Consolidate the crossings - local streets (repeat)	Reduces construction impacts to traffic on mainline. Reduces number of bridges and retaining walls and future maintenance costs	Reduces east-west connectivity. May require improvements on local intersections to handle capacity. Potential for oppositon from city of Cincinatti and increase in time to get stakeholder acceptance.		x		Numerous value concepts were considered including a superstreet concept. Concept I-W provides best support of local street system
120	Eliminate the C-D system and use Frontage Concept (repeat)	Consolidates access points to/from downtown from the corridor. Simplifies the local access points, making the I/C easier to navigate.	Reduces east-west connectivity. Many local intersection required. Potential for oppositon from city of Cincinatti and increase in time to get stakeholder acceptance.		x		C-D system best supports purposed and need of the project.
121	Allow Concession to include Land rights for "Freed" property. Most of the L/A R/W is under easement from the city of Cincinnati.	Similar to Ft Washington Way concept - familiar facility.			x		
123	of Cincinnati. Express lanes: Build new 4 Iane bridge on west side, build new 3 Iane bridge east side, Rehab Exist to be 3 top/3 bottom for locals (Bill & Dales' Idea) see onion skin	Allows for utilization of existing connections in Ohio or other innovations to reduce cosntruction impacts and cost. Allows for effective implementation of truck climbing lanes on inside lane of SB on Kentucky side for improved safety and traffic flow. Allows for reduction of lanes over the River for reduced construction cost and long term bridge maintenance. Allows for utilizing existing bridge substructure to build new bridge in place.	Need to verify geometry on Kentucky side will work. East side bridge may result in additional ROW and new environmental impacts. Elimination of direct connections may require improvements on local intersections to handle capacity.		x		This was rejected initialy due to the concept not being in alignment and outside the project scope of work
124	Frontage road system on OH spaghetti bowl rather than C-D. Fits into City grid. Eliminates numerous overpass crossing structures. (see onion skin)	Feduces construction impacts to traffic on mainline. Reduces number of bridges and retaining walls and future maintenance costs	Reduces east-west connectivity. Eliminates direct connections from mainline to local. May require improvements on local intersections to handle capacity. Potential for opposition from city of Cincinati and increase in time to get stakeholer acceptance.		х		CD road has been updated to fit in city grid
125	Proposed pavement on mainline interstate and C-D system to use aspahlt instead of concrete in Ohio.	Reduction in construction costs, easier to repair.	Concrete pavement can last longer and is better for high truck traffic.				Two DBB sections have been identified as ashpalt. The DB pavement selection will follow the ODOT pavement selection process.
126	Proposed pavement on mainline interstate and C-D system to use aspahlt instead of concrete in Kentucky.	Reduction in construction costs, easier to repair.	Concrete pavement can last longer and is better for high truck traffic.+ Existing bridges will need repair sooner than new structures. Traffic level of service below			X	Follow KYTC Pavement selection process.
127	Concept I-M - reusing existing bridge in Ohio with I-71 traffic on existing BSB and I-75 traffic on companion bridge.		that of Alternative I or Concept I-W.		Х		Concept I-M traffic does not operate as well as Concept I-W. The additional cost savings does not out weigh the operational issues.
128	Concept I-W - use existing BSB for local road traffic and companion bridge for interstate traffic only. Reduction in outside/inside shoulder width along mainline in Ohio.	Reduction in width for companion bridge. Reudced construction costs. Reduction in construction costs, meets revised design standards.	Maintenance of traffic is more complex. Potential impact for MOT in the future.	X			Concept I-W is preferred option of KYTC/ODOT. Design to current standards in Ohio and Kentucky. Standards revised to eliminate excess width at piers.
		Reduction in construction costs, meets revised design standards. Reduction in construction costs, meets revised design standards.		X			Design to current standards in Onio and Nentucky. Standards revised to eliminate excess width at piers. Revised design standards have allowed for reduced shoulder widths. Potential to save \$15-20M by reducing inside and outside shoulder widths.
130	Reduction in outside/inside shoulder width along mainline in Kentucky.		Potential impact for MOT in the future.	X			
131	Reduce number of frontage road lanes in Ketucky.	Reduce/eliminate ROW impacts in Kentucky. Allows for quick separation of ramps in downtown Cincinnati to achieve vertical clearance between	Traffic level of service decreased.	X			Traffic data supports reduced number of travel lanes on frontage roads in Kentucky that will save on potential ROW impacts.
132	Utilize practice design, mainline design speed 55 MPH and C-D design speed 45 MPH.	movements.	Vehicles will most likely travel higher than design speed.	X			Reduction in design speeds will eliminate design exceptions and allower higher vertical clearances to be achieved.
133	Reduce main span length from 1000' to 870' as approved by USCG.	Reduction in construction cost.		Х			Get final concurrance from USCG.

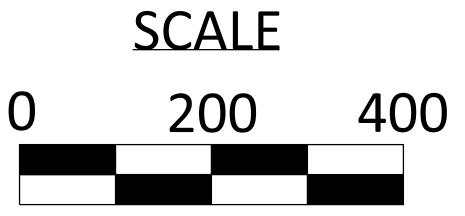
### Appendix B: BSB Concept I-W Plan

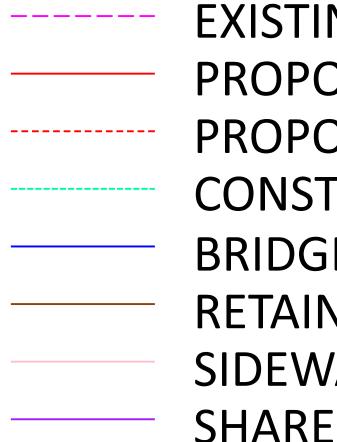




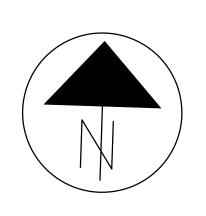
# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-W ODOT PID 116649 & KYTC KENTON COUNTY 6-17

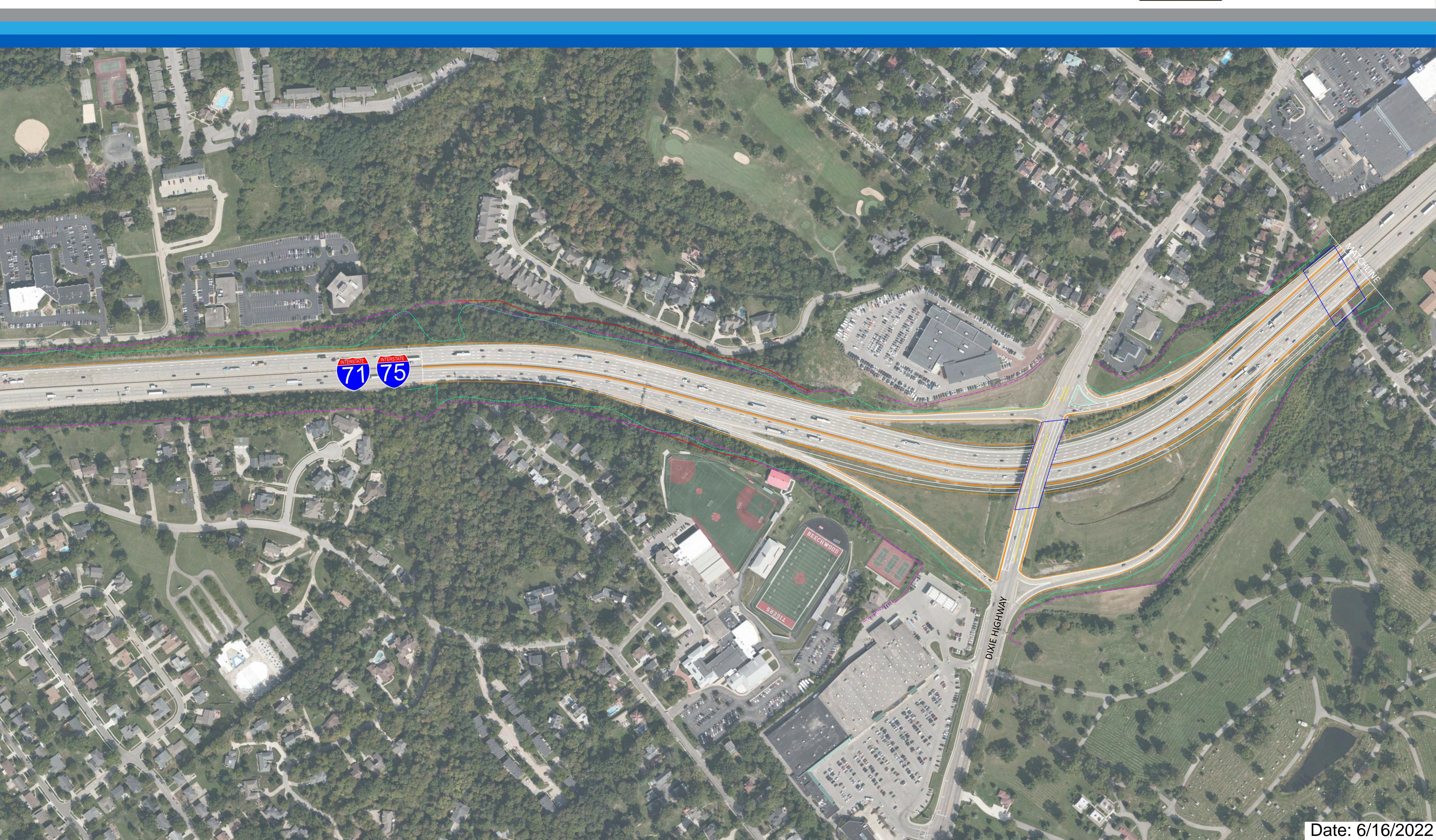






EXISTING R/W PROPOSED R/W PROPOSED R/W EASEMENT CONSTRUCTION LIMITS BRIDGE OUTLINE **RETAINING WALL** SIDEWALK SHARED USE PATH





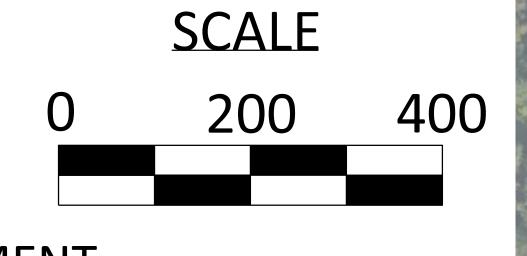




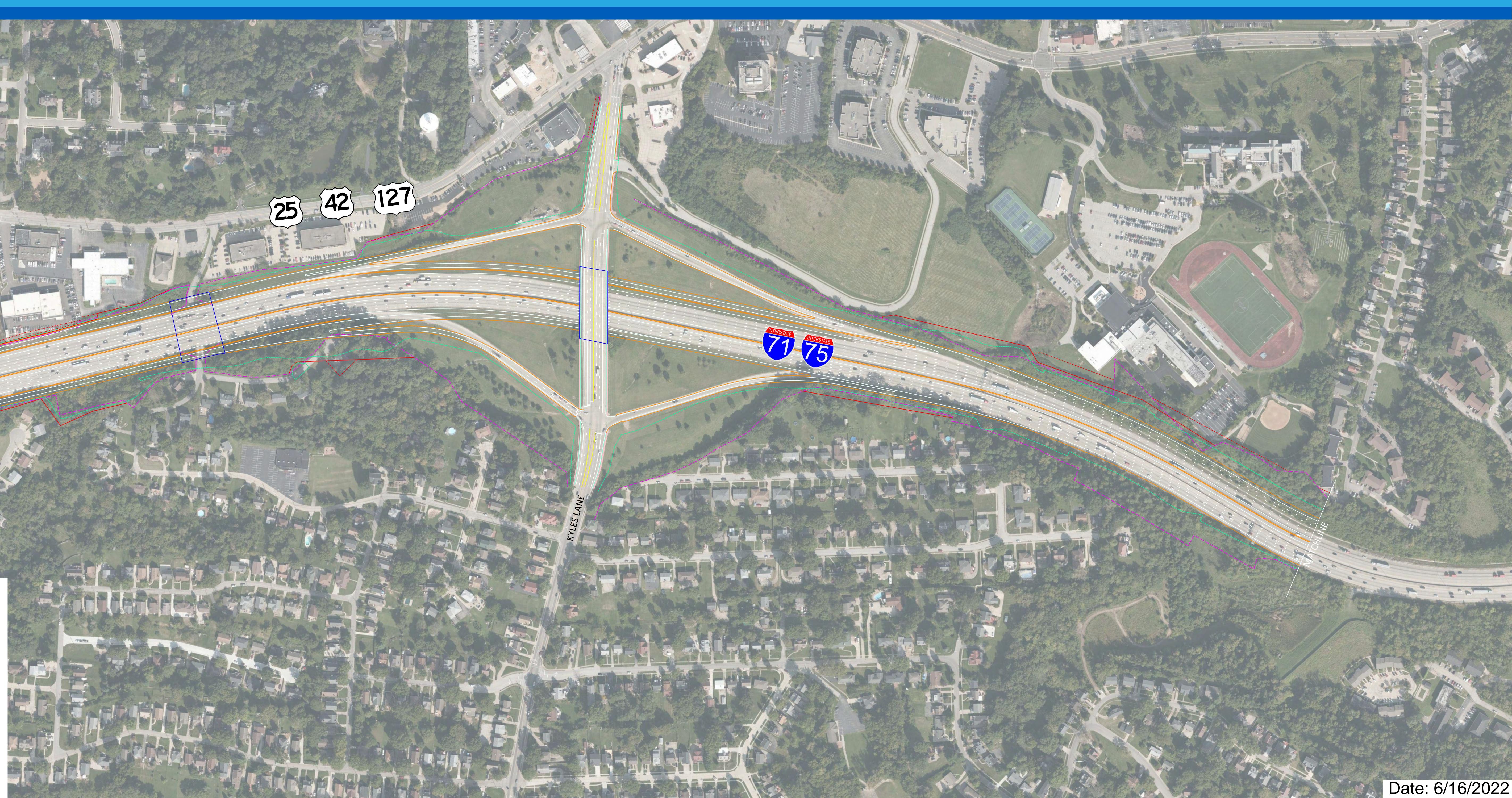


# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-W odot pid 116649 & Kytc Kenton County 6-17





 EXISTING R/W
 PROPOSED R/W
 PROPOSED R/W EASEMENT
 CONSTRUCTION LIMITS
 BRIDGE OUTLINE
 RETAINING WALL
 SIDEWALK
 SHARED USE PATH

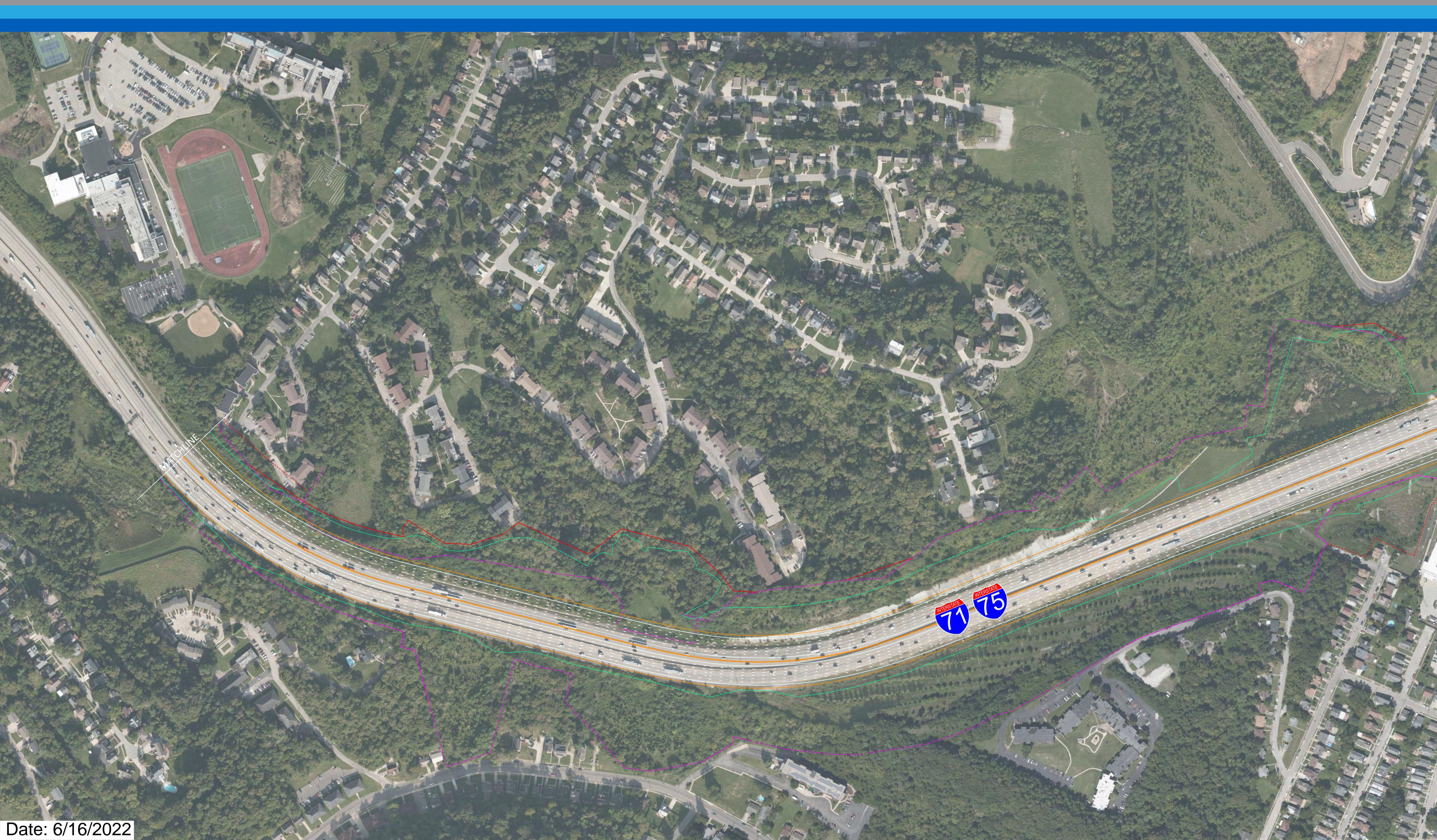








# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-W odot pid 116649 & Kytc Kenton County 6-17







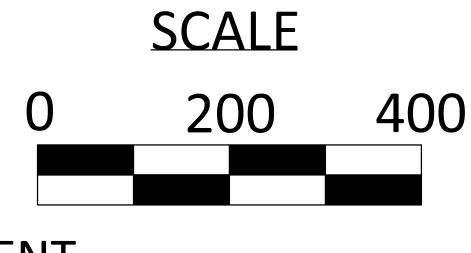
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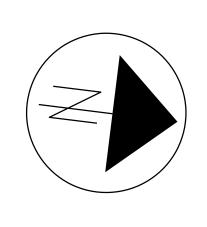
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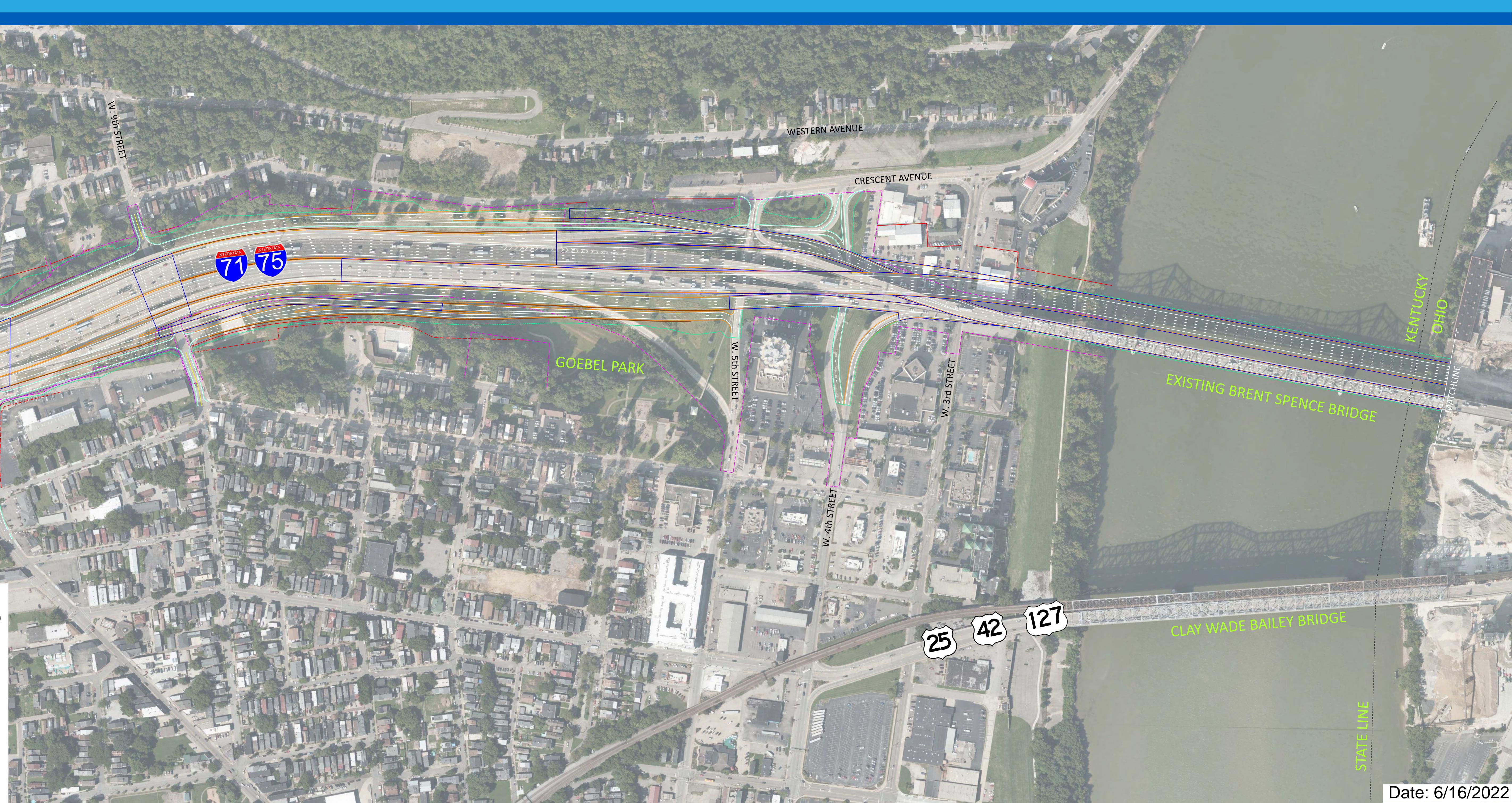
# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-W odot pid 116649 & Kytc Kenton County 6-17





 EXISTING R/W
 PROPOSED R/W
 PROPOSED R/W EASEMENT
 CONSTRUCTION LIMITS
 BRIDGE OUTLINE
 RETAINING WALL
 SIDEWALK
 SHARED USE PATH



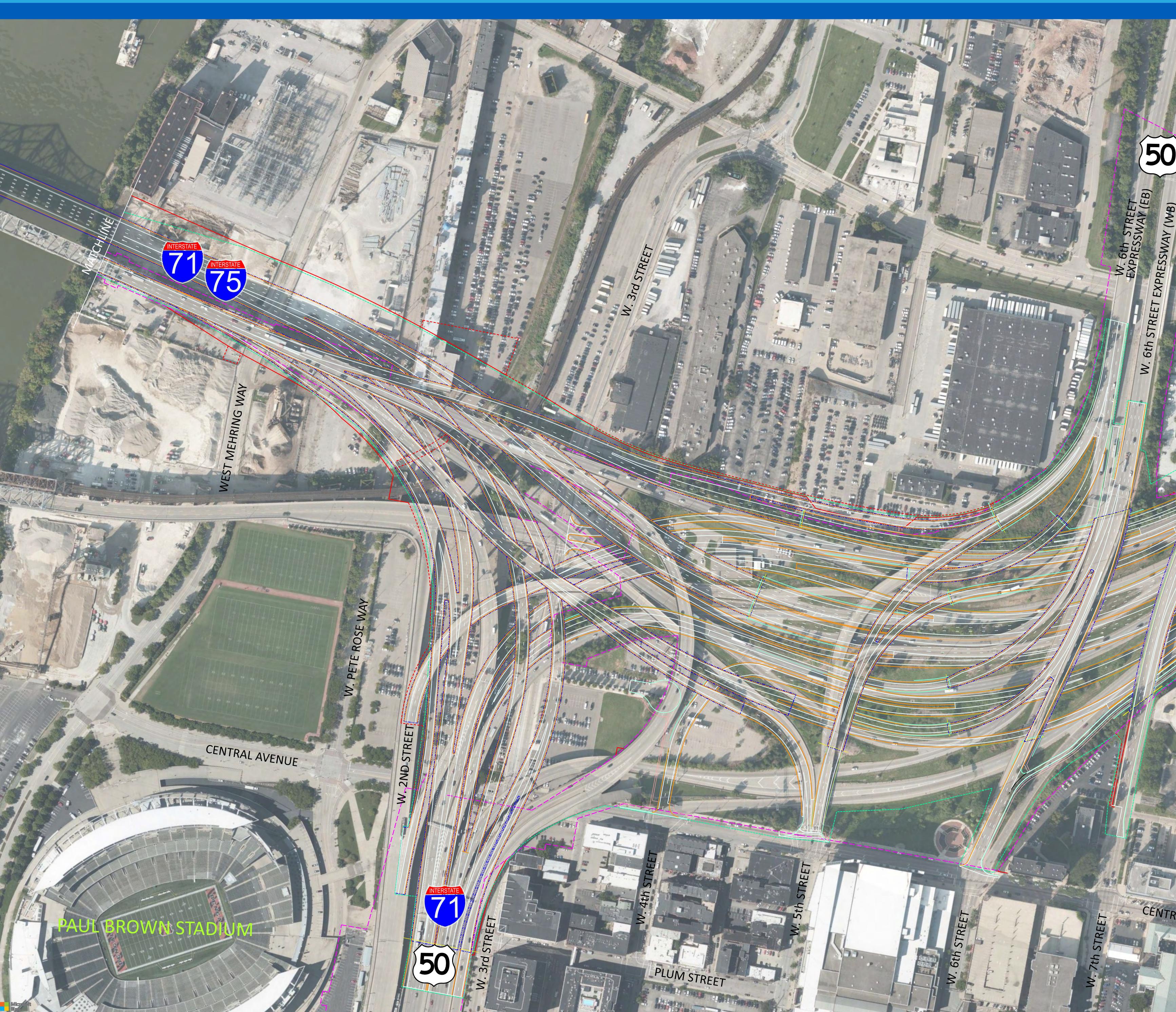








# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-W odot pid 116649 & Kytc Kenton County 6-17







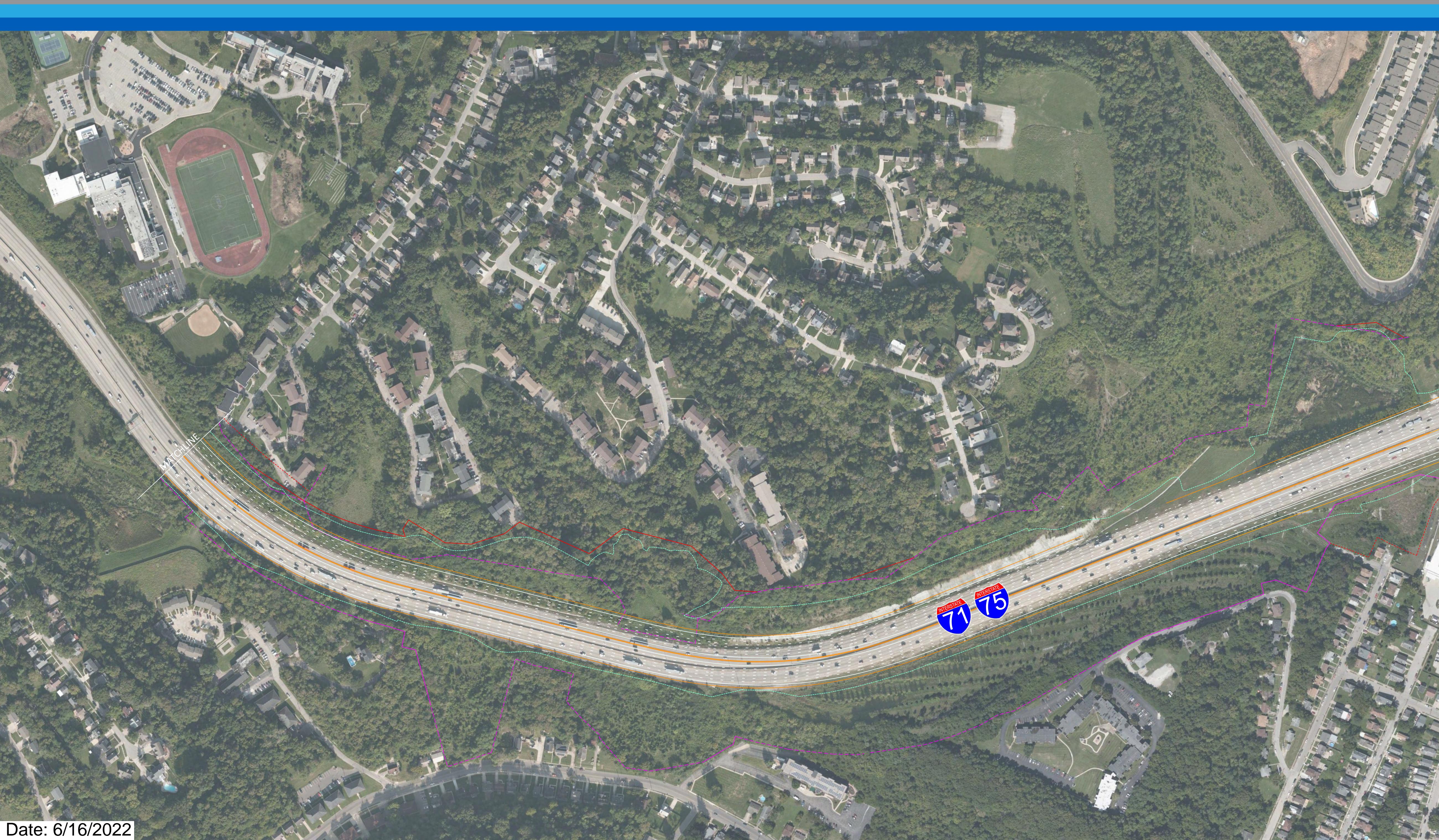


### Appendix C: BSB Concept I-M Plan





# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-M Odot pid 116649 & Kytc Kenton County 6-17







	CONSTR BRIDGE RETAININ SIDEWAI	ED R/W EAS UCTION LIM OUTLINE NG WALL	<section-header></section-header>	



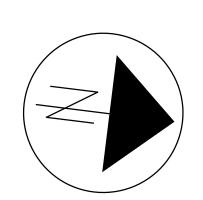
121

25

# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-M odot pid 116649 & Kytc Kenton County 6-17



EXISTING R/W
PROPOSED R/W
PROPOSED R/W EASEMENT
CONSTRUCTION LIMITS
BRIDGE OUTLINE
RETAINING WALL
SIDEWALK
SHARED USE PATH



SCALE

200

400

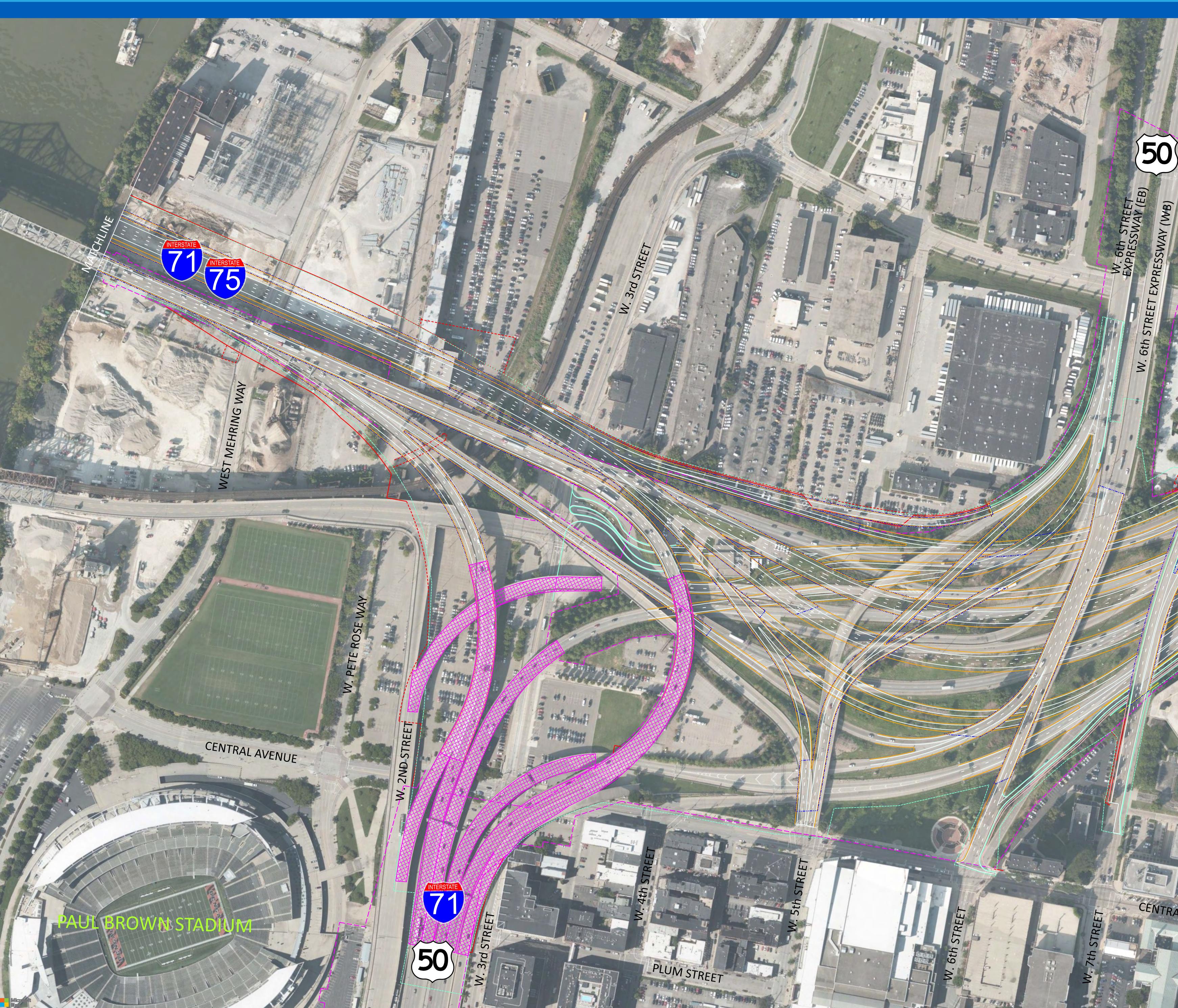








# BRENT SPENCE BRIDGE CORRIDOR DESIGN BUILD PROJECT - CONCEPT I-M Odot Pid 116649 & Kytc Kenton County 6-17







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### Appendix D: BSB Local Connectivity



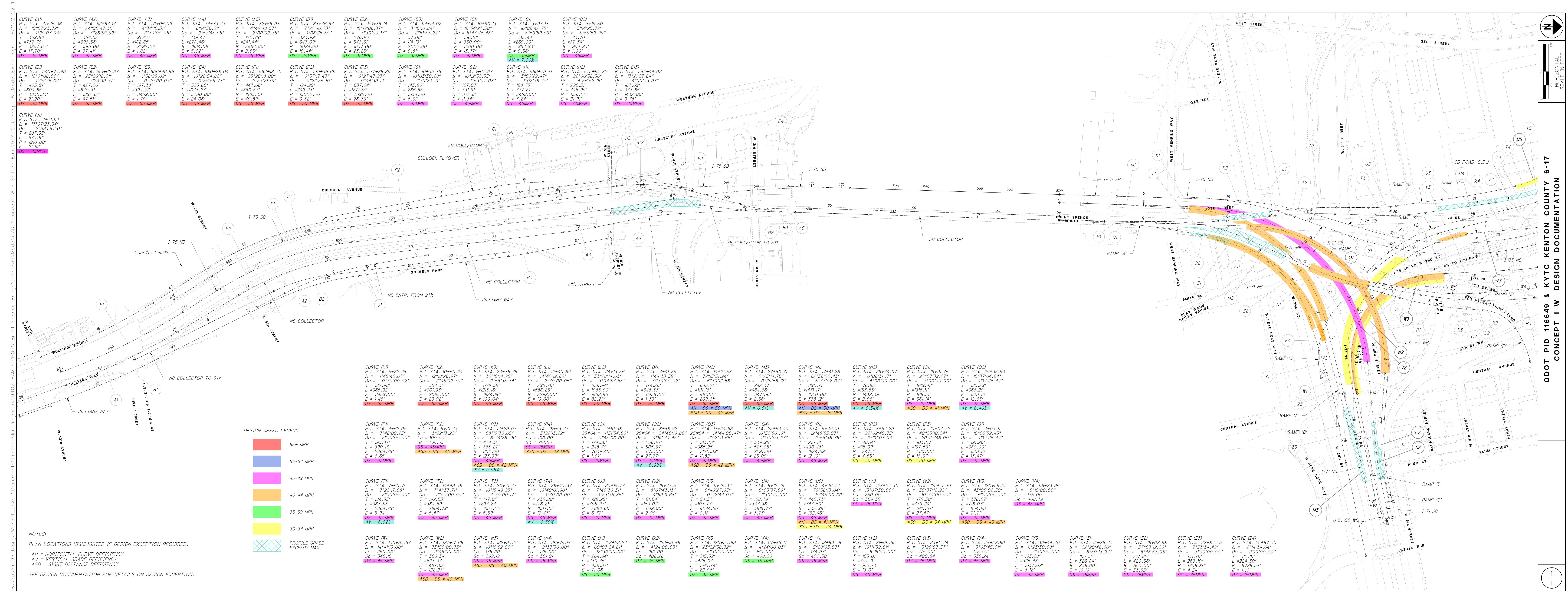
	APPENDIX D – BRENT SPENCE BRIDGE LOCAL CONNECTIVITY								
Feature	Alternative I	Concept I-W	Concept I-M						
Description of Alternative/ Concept	Alternative I utilizes the existing I-71/I-75 alignment from the southern project limits at the Dixie Highway Interchange north to the Kyles Lane Interchange. A C-D roadway will be constructed along both sides of I-71/I-75 between the two interchanges. C-D roadways will be constructed along both sides of the interstate from KY 12 <sup>th</sup> in Kentucky to Ezzard	Concept I-W uses the Alternative I design for the I-71/I-75 alignment from the Dixie Highway Interchange north to KY 12th St and north of Freeman in Ohio; and also constructs C-D roadways along both sides of the interstate from KY 12 <sup>th</sup> in Kentucky to Ezzard Charles in Ohio.	Concept I-M uses the Alternative I design for the I-71/I-75 alignment from the Dixie Highway Interchange north to KY 12th St and north of Freeman in Ohio; and also constructs C-D roadways along both sides of the interstate from KY 12 <sup>th</sup> in Kentucky to Ezzard Charles in Ohio.						
	Charles in Ohio. A companion bridge will be built just west of the existing Brent Spence Bridge (BSB) to carry I-71 SB, I-75 NB and SB, and SB local traffic. The existing BSB will be rehabilitated to carry I-71 NB and NB local traffic.	A companion bridge will be built just west of the existing BSB and will carry I-71/I-75 NB and SB traffic only. The existing BSB will be rehabilitated to carry NB and SB local traffic only.	A companion bridge will be built just west of the existing BSB and will carry I-75 NB and SB traffic and the local C-D traffic along the west side of downtown Cincinnati. The existing BSB will be rehabilitated to carry I-71 NB and SB traffic and local traffic using existing ramps (NB from KY 4th St and to OH 2nd St and US-50W, and SB from OH 3rd St and to KY 5th St).						
Local access to Interstate	<ul> <li>Provides indirect access to NB and SB interstates by C-D roadways between KY 12th St and Ezzard Charles Dr, but provides direct access:</li> <li>To I-71/I-75 SB from KY 12th St</li> <li>To I-75 NB from OH 3rd St &amp; CWB bridge</li> <li>To I-75 NB from Freeman Ave</li> <li>To I-71 NB from KY Pike St</li> </ul>	<ul> <li>Same as Alternative I, except:</li> <li>To I-71 NB from KY Pike/Ninth St uses the Local C-D route on the existing bridge</li> </ul>	<ul> <li>Provides indirect access to NB and SB interstates by C-D roadways between KY 12th St and Ezzard Charles Dr, but provides direct access:</li> <li>To I-71/I-75 SB from KY 12th St</li> <li>To I-75 NB from Freeman Ave</li> <li>To I-75 NB from KY 9th St</li> <li>To I-71 NB from KY 4th St</li> <li>To I-71 SB from OH 3rd St</li> </ul>						
Access to Covington from Interstate	<ul> <li>Provides access to Covington from</li> <li>I-71/I-75 by C-D roadways:</li> <li>From I-71/I-75 SB to KY 5th St and KY 9th St</li> <li>From I-75 SB to OH 3rd St &amp; CWB bridge</li> <li>From I-71/I-75 NB to KY 12th St and KY 5<sup>th</sup> St</li> </ul>	Same as Alternative I	<ul> <li>Provides access to Covington from</li> <li>I-71/I-75 by C-D roadways:</li> <li>From I-75 SB to OH 3rd St &amp; CWB bridge</li> <li>From I-71/I-75 NB to KY 12th St</li> <li>Provides direct access:</li> <li>From I-71 SB to KY 5th St</li> <li>From I-75 SB to KY 9th St</li> <li>From I-71 NB to KY 5th St</li> </ul>						

Feature	Alternative I	Concept I-W	Concept I-M
Access to Downtown Cincinnati from Interstate	<ul> <li>Provides indirect access to Cincinnati from I-71/I-75 by C-D roadways:</li> <li>Maintains access from I-75 SB to OH 7<sup>th</sup> St, OH 5<sup>th</sup> St, and OH 2nd St</li> <li>Adds I-75 SB access to OH 3rd St &amp; CWB bridge</li> <li>Adds I-75 NB access to Ezzard Charles Dr via OH local C-D roadway</li> <li>Maintains access from I-71/I-75 NB to OH</li> </ul>	Same as Alternative I	Same as Alternative I, except: • Maintains direct access to OH 2nd St from I-71 NB
Separation of Local and Regional Traffic	2nd St and OH 5th St Local traffic will be separated from regional traffic by C-D roadways and associated barriers as needed, specifically on the companion bridge where I-75 NB and local SB traffic share the lower deck	Local traffic will be separated from regional traffic by C-D roadways and associated barriers as needed, but with no separation barriers on the bridges.	Local traffic will be separated from regional traffic by C-D roadways and associated barriers as needed, specifically on the companion bridge where I-75 SB and local SB traffic share the lower deck. There will be no separation of local and regional traffic on the existing bridge (I-71 NB and SB) or the companion bridge upper deck (I-75 NB).

### Appendix E: BSB Potential Design Exceptions

- E-1: Concept I-W Design Documentation Map
- E-2: Concept I-W Design Documentation Table
- E-3: Concept I-M Design Documentation KY Map
- E-4: Concept I-M Design Documentation OH Map
- E-5: Concept I-M Design Documentation Table





	Concept I-W DESIGN DOCUMENTATION									
Plan Location	Movement	Design Parameter	Design Criteria	Existing BSB	Alternative I	Concept I-W	Additional Notes			
D1	KY - 5th St SB Exit	Profile Grade	6% - KYTC - HD-904	7.21%	6.37%	7.80%	Profile Grade on Concept I-W for ~500' (downhill), exit off of CD system. Existing BSB work limits dictate where exit ramp geometry can begin. Minimum distances used to reduce grade as much as possible.			
L1	OH - I-75 SB	Profile Grade	4% - ODOT F203-1 (Rolling Terrain)	3.06%	6.00%	3.99%	I-71 SB moved to lower deck in Concept I-W. I-71 SB on upper deck in Alternative I			
M2	OH - I-71 NB	Horizontal Geometry Sight Distance	DS 55 MPH - 5'30"	7'22" Dc meets 45 MPH HSSD meets 40 MPH	6'30" Dc meets 50 MPH HSSD meets 44 MPH	6'30" Dc meets 50 MPH HSSD meets 42 MPH	Alt 1. and Concept I-W will need design exceptions for HSSD and curve radius for a 55 MPH design speed. Flatter curve or wider shoulder would require steeper than 7% uphill grade on OH - N8 CD to Local/I-75 to meet vertical clearance requirements. Companion bridge location chosen to minimum impacts on each side of the river.			
M3	OH - I-71 NB	Profile Grade	4% - ODOT F203-1 (Rolling Terrain)	6.00%	6.03%	6.51%	Both profile grades exceed standards (downhill). Higher profile graded need to tie into existing geometry based on elevation of vertical clearance and geometry of surrounding movements.			
N1	OH - I-71 SB	Horizontal Geometry Sight Distance	DS 55 MPH - 5'30"	11'36" Dc meets 35 MPH HSSD meets 35 MPH	6'30" Dc meets 50 MPH HSSD meets 42 MPH	5'37" Dc meets 50 MPH HSSD meets 45 MPH	Alt L and Concept I-W will need design exceptions for HSSD and curve radius for a SS MPH design speed. Flatter curve or wider shoulders would require steeper grades to meet vertical clearance over US 50 ramps. Companion bridge location chosen to minimum impacts on each side of the river.			
N2	OH - I-71 SB	Profile Grade	4% - ODOT F203-1 (Rolling Terrain)	6.00%	6.10%	6.50%	Both profile grades exceed standards (uphill)			
01	OH - I-71 SB to SB CD	Horizontal Geometry Sight Distance	DS 45 MPH - 9'00"	N/A	14'30" Dc Meets 35 MPH HSSD meets 31 MPH	7'0" Dc meets 45 MPH HSSD meets 41 MPH	Degree of curve meets 45 MPH on Concept I-W design, degree of curve meets 35 MPH on Alt. I, HSSD substandard on both. Flatter curve or wider shoulders would require steeper grades to meet vertical clearance over I-71 SB movement.			
02	OH - I-71 SB CD	Profile Grade	5% - ODOT Table 503-1	6.00%	6.10%	6.40%	Both profile grades exceed standards (uphill)			
P3	OH - NB CD to I-71 NB	Profile Grade	5% - ODOT Table 503-1	N/A	5.58%	5.58%	Concept I-W design matches Alternative I design.			
P2-4	OH - NB CD to I-71 NB	Sight Distance	ODOT F203-3/F203-6 (SSD) 45 MPH - 360'	N/A	325' Meets 42 MPH	325' Meets 42 MPH	Profile geometry meets DS 40 MPH for Concept I-W and Alternative I. Flatter curves would extend construction limits outside current project limits.			
Q2	OH - NB CD to Local/I-75	Profile Grade	5% - ODOT Table 503-1	3.52%	5.15%	6.99%	Profile Grade on Concept I-W for ~800', needed to clear I-71/NB/SB/Local, reduced from 7.90%			
Q3	OH - NB CD to Local/I-75	Sight Distance	ODOT F203-3/F203-6 (SSD) 45 MPH - 360'	440' Meets 51 MPH	425' Meets 50 MPH	325' Meets 42 MPH	Concept I-W meets 40 MPH design speed needed to cross above I-71 lanes. Widening shoulder or flattening curve would cause vertical clearance issues with I-71 SB and I-71 SB CD.			
T1 / T4	OH - SB CD from I-75	Profile Grade	5% - ODOT Table 503-1	N/A	3.57% / 6.5%	6.02% / 6.5%	Both profile grades exceed standards (uphill) - Concept I-W also has 6.02% grade downhill on this alignment			
U5	OH- US 50E to SB CD	Horizontal Geometry Sight Distance	DS 45 MPH - 9'00"	N/A	10'45" Dc meets 41 MPH HSSD meets 34 MPH	10'45" Dc meets 41 MPH HSSD meets 34 MPH	Concept I-W design matches Alternative I design. Increasing radius would extend construction limits outside project work limits and require more right of way.			
V2	OH - I-75 SB to I- 71 NB	Sight Distance	DS - 45 MPH - HSSD	33 MPH	34 MPH	34 MPH	Concept I-W design matches Alternative I design.			
V3	OH - I-75 SB to I- 71 NB	Sight Distance	DS - 45 MPH - HSSD	N/A	43 MPH	43 MPH	Concept I-W design matches Alternative I design.			
W2 / W3	OH - US 50 WB	Sight Distance	DS - 50 MPH - HSSD	35 MPH	40 MPH	40 MPH	Concept I-W design matches Alternative I design.			

# CONCEPT I-M - KENTUCKY DESIGN DOCUMENTATION



### CONCEPT I-M - OHIO DES

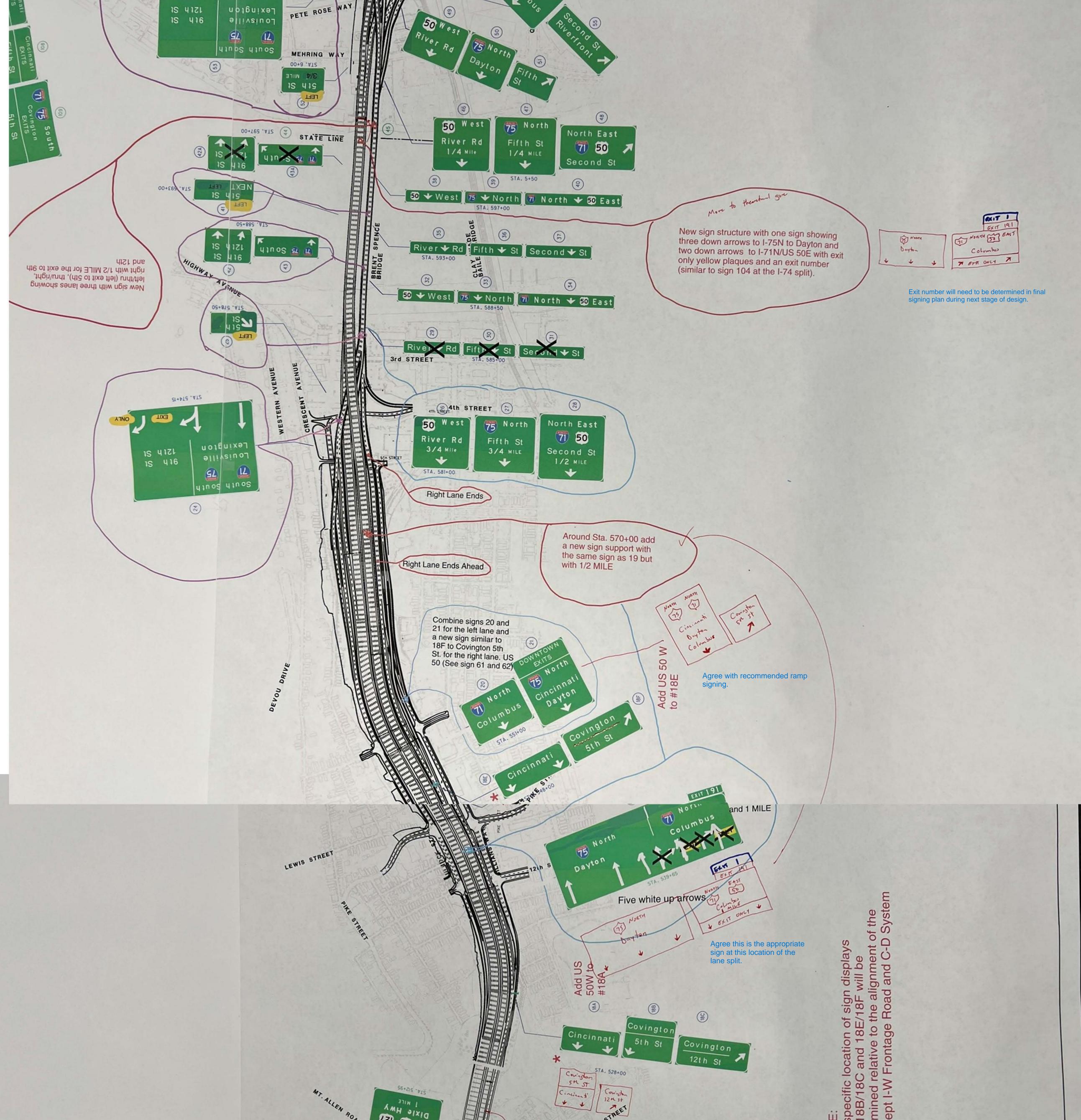


# TE: 6/15/2022


	Concept I-M DESIGN DOCUMENTATION								
Key	Location	Design Parameter	Design Criteria	Alternative I	Concept I-M	Additional Notes			
А	OH - I-71 SB	Horizontal Geometry	55 mph	HSSD meets 42 mph	Match Exist	Existing Posted Speed 35 mph. Meeting required width would add cost and eliminate benefit of reusing existing structure.			
В	OH - I-71 NB	Horizontal Geometry	55 mph	HSSD meets 44 mph	Match Exist	Existing Posted Speed 40 mph. Meeting required width would add cost and eliminate benefit of reusing existing structure.			
С	OH - I-75 SB	Profile Grade	4.00%	6.00%	5.51%	Grade exceeds allowable - Concept M grade less steep than Alt. I			
D	OH - I-75 NB	Profile Grade	4.00%	5.19%	6.30%	Grade exceeds allowable - Concept M grade steeper than Alt. I			
E	OH - I-71 SB	Profile Grade	4.00%	6.10%	Match Exist	Existing grade - 5.88% (grade for existing taken from spot elevations on structure)			
F	OH - I-71 NB	Profile Grade	4.00%	6.00%	Match Exist	Existing grade - 4.98% (grade for existing taken from spot elevations on structure)			
G	OH - I-75 NB	Horizontal Geometry	55 mph	HSSD meets 51 mph	HSSD meets 47 mph	No median barrier is present, bridge barrier present for small portion of curve, potential to see over barrier depending on profile			
н	OH - I-75 SB	Horizontal Geometry	55 mph	HSSD meets 51 mph	HSSD meets 49 mph	No median barrier is present, bridge barrier present for small portion of curve, potential to see over barrier depending on profile			
T	OH - NB CD Road	Horizontal Geometry	45 mph	HSSD meets 41 mph	HSSD meets 37 mph	Roadside barrier impedes line of sight, space available to increase shoulder width at cost of taller wall			
J	OH - I-75 SB to SB CD Road	Profile Grade	5.00%	6.50%	5.99%	Max grade of 5.0%, Concept M does not SB CD Road from I-75 doesn not merge with SB CD from I-71			
к	OH - I-75 SB to I-71 NB	Horizontal Geometry	45 mph	Dc meets 40 mph	Match Exist	Existing Dc meets 40 mph			
L	OH - I-75 SB to I-71 NB	Horizontal Geometry	45 mph	HSSD meets 34 mph	Match Exist	Existing HSSD meets 33 mph. Meeting required width would add cost and eliminate benefit of reusing existing structure.			
М	OH - I-71 SB to SB CD Road	Horizontal Geometry	45 mph	HSSD meets 31 mph	Match Exist	Existing Posted Speed 35 mph. Meeting required width would add cost and eliminate benefit of reusing existing structure.			
N	OH - I-71 SB to SB CD Road	Horizontal Geometry	45 mph	Dc meets 31 mph	Match Exist	Existing Posted Speed 35 mph			
0	OH - I-71 SB/US 50 WB to NB CD Road	Horizontal Geometry	45 mph	HSSD meets 40 mph	Match Exist	Existing Posted Speed 35 mph. Meeting required width would add cost and eliminate benefit of reusing existing structure.			
Р	OH - I-71 SB/US 50 WB to NB CD Road	Horizontal Geometry	45 mph	Dc meets 33 mph	Match Exist	Existing Posted Speed 35 mph			
Q	NB CD Road to US 50 WB	Horizontal Geometry	45 mph	HSSD meets 44 mph	Match Exist	Existing Posted Speed 30 mph. Meeting required width would add cost and eliminate benefit of reusing existing structure.			
R	NB CD Road to US 50 WB	Horizontal Geometry	45 mph	Dc meets 40 mph	Match Exist	Existing Posted Speed 30 mph			
S	NB CD Road to US 50 WB	Horizontal Geometry	45 mph	HSSD meets 33 mph	Match Exist	Existing Posted Speed 30 mph. Meeting required width would add cost and eliminate benefit of reusing existing structure.			
т	NB CD Road to I-71 NB	Profile Grade	5.00%	6.69%	Match Exist	Existing grade - 4.98% (grade for existing taken from spot elevations on structure)			
U	SB CD Road to 5th Street	Profile Grade	7.00%	7.50%	7.00%	Concept M meets max allowable grade			
v	KY - SB CD to 9th	Horizontal Geometry	45 mph	HSSD meets 45 mph	HSSD meets 42 MPH	Insufficient shoulder width to meet HSSD. Flattening curve/widening shoulders would require vertical clearance over 5th street and create superelevation transition issues.			
w	KY - SB CD	Horizontal Geometry	45 mph	HSSD meets 45 mph	HSSD meets 42 MPH	Insufficient shoulder width to meet HSSD. Flattening curve would cause profile grades at gore points.			

Appendix F: Concept I-W Conceptual Signing Plan









HNTB Review 5/25/2022		5/6/2022 GROKE
A draft signing plan is included with this review as a general idea for sign configuration with all Cincinnati downtown and Riverfront, and Covington traffic in the right three lanes at Ezzard Charles, and the left of those lanes dividing into	I EXIT ONLY 7 PENT ONLY 71	
Seventh and Fifth south of Ezzard Charles. See attachment.	THEY LANGS 71 SOUTH TO LONSVILLE LONSVILLE LONGTON J	llymin
	EXITED EXITION EVENTILIST FIFTLIST THINGST CONNECTING I/Z MILE VIENTONEY VENTONEY VENTONEY	Yumi.
	THEV LANG 71 SUTH 21 JS Lougnice UXINCION	1/4 mi.
	EXIT 13 Servite St FIELS St Think St Shore St 17th 1 MILE WILLE	1/4 mr
Image: Second State       State	THIZ WAVES 71 SOUTH COUISVILLE LEXINGTON J J J	1/4 mi

# This sign support will likely be included in the WHV portion of the I-75 project. Will need to coordinate naming of exits for overall projects. Will have to insure that Western Ave has

19 24 9 18 19

Good points this will be addressed in

signing design in later phases.

FOR the 71/75 lane

Lane or NEXT EXIT 4

MILES.\_\_\_\_



July 18, 2022

### **BRENT SPENCE BRIDGE HIGHWAY SIGNING REVIEW FOR CONCEPT I-W**

**PURPOSE:** The purpose of this document is to address comments from ODOT and KYTC dated July 6, 2022 in response to the latest review of the potential highway signing plan for Concept I-W. The goal of the signing review is to determine, at a conceptual level, if there are any fatal flaws in the conceptual signing plan in transitioning from Alternative I to Concept I-W and to reflect the changes (if any) required on the Alternative I signage plan to accommodate Concept I-W.

**TIMELINE:** An initial review by HNTB of the 2012 Alternative I signing plan was sent to ODOT and KYTC on March 25, 2022 with a memo and marked plans indicating potential changes to the signing to accommodate Concept I-W interstate and local traffic patterns that are different from Alternative I. The review also addressed two specific areas of concern for lane splits and traffic assignments, one on SB I-75 in Ohio approaching the mainline/CD split near Ezzard Charles and one on NB I-71/I-75 in Kentucky approaching the mainline widening from four lanes to five lanes near Pike.

Comments from both states were received on May 9, 2022 in an email and with comments and recommendations marked on the plan sheets, particularly for the two specific areas of concern. These items were addressed by HNTB in a memo dated June 16, 2022 and with notes on the plan sets. The memo presented potential signing to simplify and clarify the signing layout in Kentucky and Ohio in the two areas of concern based on the comments from each state. It was also noted that no fatal flaws were found for signing of Concept I-W.

**RECENT COMMENTS:** Comments from both states were received on July 6, 2022 in an email, which are included below:

### RE: BSB Concept I-W Conceptual Signage Plan <>> Reply C Reply All -> Forward .... Marc.Grake@dot.ohio.gov To 😳 Charles.Rowe@dot.ohio.gov; 😳 Teri.Scanlon@dot.ohio.gov; 😳 Hans, Stacee D (KYTC-D06); 🕓 Hyatt, Jason S (KYTC) Wed 7/6/2022 4:13 PM Cc Spinosa, Stefan Charlie, For the Ohio signing discussed in their Draft Signing document, I don't see fatal flaws in the ability to sign this concept. I like eliminating the option lane at the C-D exit by combining Seventh and Fifth streets into one exit lane so that we can eliminate the arrow per lane signing concept. This is cleaner and should be simpler for motorists to comprehend the signs and make decisions. The only comment on their document is that adding North 71, East US 50, 471 to the 71/75 pull thru signs may confuse drivers by trying to sign for 2 different exits with 2 different signing concepts at one split (I hope that makes sense.) Plus, I don't think its appropriate to use the overhead arrow per lane concept for the North 71, East US 50, 471 exit because there is no optional lane at that exit. I haven't had time to draw it out but maybe North 71, East US 50, 471 signing is still separate as was previously shown and the South 71/75 pull thru signs utilize down arrows along with their proposal to combine Seventh and Fifth streets? Thank you, Marc Grake, P.E. Traffic Operations Engineer/TSMO Coordinator **ODOT District 8**

ODOT District 8 505 South State Route 741, Lebanon, Ohio, 45036 513-933-6607 transportation.chio.gov





### RE: BSB Concept I-W Conceptual Signage Plan



Hyatt, Jason S (KYTC) < Jason.Hyatt@ky.gov> To ○ Charles.Rowe@dot.ohio.gov; ○ Marc.Grake@dot.ohio.gov; ○ Teri.Scanlon@dot.ohio.gov; ○ Hans, Stacee D (KYTC-D06) Wed 7/6/2022 1:30 PM Cc ○ Spinosa, Stefan

### Charlie,

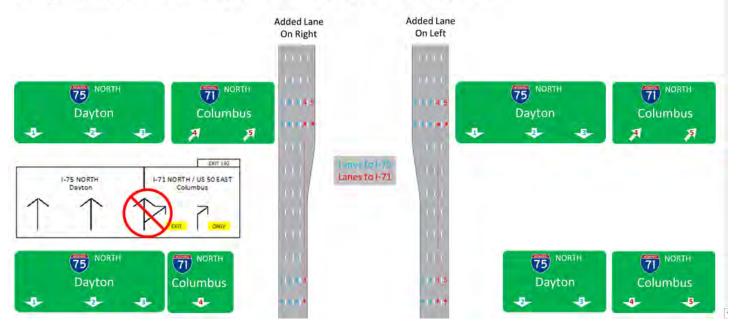
To answer the main question: No, I don't think there are any fatal flaws in Concept I-W. Obviously as we move past conceptual and into more concrete signing plans, there will be some kinks we need to iron out, but all-in-all I think it can be done.

However, regarding the NB lane situation, I maintain that the use of upward facing Arrow-per-Lane signage with an option arrow is not applicable in the area just north of Kyle's Ln. Ignoring the two right lanes that drop at Exit 190, we have 4 "through" lanes at this point. Those 4 lanes become 5 lanes, but its by adding a lane on the far right. So the 3<sup>rd</sup> lane from the left doesn't change at all – if you stay in that lane, you WILL go through to 1-75. It is not an option lane. You have to be in the 4<sup>rh</sup> lane from the left to access 1-71. By being in the 4<sup>rh</sup> lane you can then also get in the 5<sup>rh</sup> lane once it opens up, and either of those two lanes will take you to 1-71 – but not the 3<sup>rd</sup> lane.

If there is concern about directing all of the I-71 traffic into a single lane (before the 5<sup>th</sup> lane gets added), you could change the striping so that the added lane comes in on the left. That would make it to where when you have 4 lanes, it would be 2 lanes for each movement, then the 5<sup>th</sup> lane (added on the left) would make 3 lanes for I-75.

But in neither situation should you use APL signing with an option lane because there is no option lane.

Here is a graphic I put together of both scenarios, depicting the lanes and associated signing to show how Lane 3 never goes to I-71.



**SUMMARY:** The review of the Alternative I signing plans relative to Concept I-W has been an iterative process with recommendations by ODOT, KYTC and HNTB for the need for simplified signing and clarity for drivers. All parties recognize that there are no fatal flaws in the signing of Concept I-W and that specific signing can be designed as part of ongoing project development. This also allows for coordination with the design and placement of freeway management/ITS and destination signing in the corridor.

The ODOT comments recognize that additional thought should be given to the location of and specific sign for the SB exit to NB I-71/US 50E and concur that keeping 5th and 7th together will simplify the signing at the split to the CD. This combination of movements may need further verification in traffic analysis and modeling and specific sign placement will require coordination with the freeway management/ITS and destination signing design.



The KYTC comments point out that the creation of the fifth lane northbound in Kentucky could be an add-lane on either side of the highway. This will require further design to determine the best fit. There may also be a need for verification of lane use/signing with traffic analysis and modeling to determine how best to position the NB I-75 and I-71 traffic in the four lane section (as a 3 and 1 or 2 and 2 configuration) and how far in advance of the add-lane that the mainline movements should be signed separately. These issues can be addressed as part of the next phase of design.

The next phase of design will likely include additional traffic analysis to verify any new design ideas but will also evaluate the C-D and associated signalized intersection operation. The verification of lane assignments for the highway lane use seems reasonable to include so that the remaining pavement marking and signing needs for Concept I-W can be determined. This will also coordinate well with the design of the freeway management/ITS and destination signing.