TDOT Department of Transportation

ARDOT ARKANSAS DEPARTMENT OF TRANSPORTATION

Targeted Approach for Crossing the Mississippi River

Interstate 55 (US 64) (SR 61)

Final Report

October 2023

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1. Executive Summary

The Tennessee Department of Transportation (TDOT), in coordination with the Arkansas Department of Transportation (ARDOT), requested that Kimley-Horn and Associates, Inc. assist in the preparation of a Targeted Approach for Crossing the Mississippi River study for Interstate 55 (I-55) / US Highway 64 (US-64) / State Route (SR 61), in Shelby County, Tennessee.

The purpose of this Targeted Approach for Crossing the Mississippi River Study is to update the environmental screening, including development of a preliminary purpose and need statement and identification of the likely National Environmental Policy Act (NEPA) Class of Action. As part of this study, a high-level traffic analysis and cost estimates were prepared for the four design options included in the *Mississippi River Crossing Feasibility and Location Study* (2006), prepared by Wilbur Smith and Associates for TDOT, as well as information contained in the *Southern Gateway Study Cost Benefit Analysis* (2014), prepared by Kimley-Horn and Associates for TDOT.

This final report includes this Executive Summary and a chapter outlining Recommendations and Next Steps. The Technical Memorandums prepared in support of this final report are included as appendices:

Appendix A: Review of Previous Work Technical Memorandum

Appendix B: Conceptual Roadway and Bridge Evaluation Criteria Technical Memorandum

Appendix C: Roadway and Bridge Feasibility and Cost Analysis Technical Memorandum

Appendix D: Travel Demand Model Base Year Validation Technical Memorandum

Appendix E: Future Year Travel Demand Forecast Technical Memorandum

Appendix F: Benefit Cost Analysis Technical Memorandum

Appendix G: Purpose and Need / Likely NEPA Class of Action Technical Memorandum

Based on the findings of the Targeted Approach for Crossing the Mississippi River a replacement of the existing I-55 bridge was found to be the option that is most cost-effective, resilient, and provides the most vehicle and freight travel benefits to the local, regional, and national network due to its proximity to the core area of the region. The cost-benefit analysis further demonstrates the long-term safety, economic competitiveness, and environmental sustainability benefits of the project and favorable[1] Benefit Cost Ratio (BCR) for Corridors 5A (1.44) and 5B (1.03), the two bridge replacement options.

Further, based on the results of the preliminary screening utilizing available desktop resources only, Corridor 5A and Corridor 5B appear to be the least environmentally impactful when compared to the other corridors under consideration. Although detailed field investigations including but not limited to a relocation analysis, socioeconomic analysis, and public involvement activities will be required to formally agree with these preliminary determinations, for Corridors 5A and 5B, it is recommended that an Environmental Assessment would likely need to be pursued[2]. Under current federal regulations, an Environmental Assessment must be prepared in one year[3] and be 75 pages or less[4] (not including appendices). A comparison of the five corridors in included in Table 1.

[1] *A project is considered cost-effective when the BCR is 1.0 or greater.*
[2] *It should be noted that these NEPA Class of Action documentation level recommendations are preliminary in nature and are based on a desktop review/analysis only.*
[3] https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10
[4] https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.5

Table 1: Corridor Comparison Summary

	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
Length (miles)	14.7	13.0	1.5	1.7	11
Benefits	• Provides additional capacity. • Adds reliability and resiliency. • Requires the replacement of the existing I-55 bridge.	• Provides additional capacity. • Adds reliability and resiliency. • Requires the replacement of the existing I-55 bridge.	• Provides additional capacity. • Adds reliability and resiliency. • Lower upfront cost. • Minimized regional life-cycle costs.	• Provides additional capacity. • Adds reliability and resiliency. • Lower upfront cost. • Minimized regional life-cycle costs.	• Provides additional capacity. • Adds reliability and resiliency. • Requires the replacement of the existing I-55 bridge.
Drawbacks	• Higher upfront cost. • Additional regional life-cycle costs.	• Higher upfront cost. • Additional regional life-cycle costs.	• Does not add a river crossing outside downtown Memphis.	• Does not add a river crossing outside downtown Memphis.	• Higher upfront cost. • Additional regional life-cycle costs.
Total Primary Bridge Length (feet)	14,850	14,850	6,405	8,100	12,450
Total Design, Right-of-Way, and Construction Cost	$1,635,000,000	$1,578,000,000	$530,000,000	$752,000,000	$1,415,000,000
Total Additional Costs	$62,500,000	$62,500,000	$10,000,000	$10,000,000	$62,500,000
Existing I-55 Bridge Replacement	$540,000,000	$540,000,000	-	-	$540,000,000
Total Cost	$2,237,500,000	$2,180,500,000	$540,000,000	$762,000,000	$2,017,500,000
Benefit Cost Ratio[1]	0.79	0.73	1.44	1.03	0.01
Likely NEPA Class of Action[2]	Environmental Impact Statement	Environmental Impact Statement	Environmental Assessment	Environmental Assessment	Environmental Impact Statement
NEPA Timeframe	Two Years[3]	Two Years[3]	One Year[4]	One Year[4]	Two Years[3]

[1] A project is considered cost-effective when the BCR is 1.0 or greater. The total costs used for the benefit-cost analysis for Corridors 2, 4, and 6 do not include the replacement costs for the existing I-55 bridge.

[2] It should be noted that this NEPA Class of Action documentation level recommendation are preliminary in nature and are based on a desktop review/analysis only. No public involvement activities or project scoping occurred as part of this preliminary environmental screening. Additional information gained in the project development process can affect environmental document level determinations (including detailed field investigations as well as public opinion/level of controversy). Also, coordination with FHWA and other resource agencies like the U.S. Army Corps of Engineers and the U.S. Coast Guard is necessary before any further environmental work proceeds. Ultimately, FHWA determines the information and level of documentation needed for a particular project.

[3] To ensure timely decision making, agencies shall complete: Environmental impact statements within two years unless a senior agency official of the lead agency approves a longer period in writing and establishes a new time limit. Two years is measured from the date of the issuance of the notice of intent to the date a record of decision is signed. (Source: https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10)

[4] To ensure timely decision making, agencies shall complete: Environmental assessments within one year unless a senior agency official of the lead agency approves a longer period in writing and establishes a new time limit. One year is measured from the date of agency decision to prepare an environmental assessment to the publication of an environmental assessment or a finding of no significant impact. (Source: https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10)

Due to the high cost and the local, regional, and national significance of the project, it is recommended that TDOT and ARDOT work proactively with the Memphis community to request Community Project Funding / Congressionally Directed Spending and/or prepare and submit an application for a United States Department of Transportation (USDOT) competitive grant to fund the next phase of the project. TDOT and ARDOT are further encouraged to engage the public and conduct agency coordination as part of the next phase of the project should funding for the project be identified.

Additional information about Community Project Funding / Congressionally Directed Spending and/or applicable USDOT competitive grant funding programs is outlined in Chapter 2.

1.1. Memphis Area Mississippi River Crossings

Built in the late 1880s and early 1890s, the first bridge to span the Mississippi River at Memphis was a railroad bridge, the Frisco Bridge. The second was the Harahan Bridge, completed in 1916 and built for both rail and vehicles. However, the Harahan Bridge proved inadequate for post-World War II (WWII) needs, and a third bridge (Memphis-Arkansas Bridge) was financed as an interstate Federal-aid project and was constructed as soon as materials became available after WWII. The I-55 bridge (Memphis-Arkansas Bridge) was opened to traffic in December 1949 and was followed by the completion of the I-40 bridge (Hernando De Soto Bridge), or “new bridge” which opened to traffic in 1973. The next closest vehicular crossings of the Mississippi River are located approximately 71 miles north (I-155 bridge between Missouri and Dyer County, Tennessee) and approximately 54 miles south (US 49 bridge between Helena, Arkansas, and Mississippi).

The following provides additional background and information about each of the four existing Mississippi River bridges.

1.1.1. The Frisco Bridge

Opened in 1892, the 4,887-foot-long Frisco Bridge carries one rail line across the Mississippi River and was the first railroad bridge built south of St. Louis, Missouri when it opened. The United States (US) Army insisted on a 770-foot clear span for river navigation and at least 75 feet of vertical clearance under the bridge. As a result, at the time of construction, the Frisco Bridge had the longest span of any bridge in the U.S. In addition, Memphis officials insisted that in addition to trains, the bridge should carry pedestrian and buggy traffic. As a result, the deck of the Frisco Bridge was built wider than what would have been required for a single railroad track and two-way buggy traffic was periodically allowed. The bridge is still in use today and is owned and operated by BNSF Railway. The west approach to the bridge, which was made up of 52 spans, was replaced by a new 27-span bridge as part of a project completed in 2017. The bridge was designated as a National Historic Civil Engineering Landmark in 1987.

1.1.2. The Harahan Bridge

Completed in 1916, the 4,973-foot-long Harahan Bridge carries two rail lines across the Mississippi River. Considered structurally advanced for its time, the bridge was built with roadways cantilevered off the sides of the main bridge structure. Cars and trucks were allowed to use the bridge, single file, driving on a narrow, one-way wooden roadway that was suspended on the outside of the bridge. After the opening of the I-55 bridge (Memphis-Arkansas Bridge) in 1949, some farm vehicles continued to use the Harahan Bridge until 1954 when all the old, cantilevered roadway lanes were removed. In 2016, the cantilevered lanes were reconstructed and transformed into the "Big River Crossing", the longest pedestrian/bicycle bridge across the Mississippi River and second longest pedestrian/bicycle bridge in the United States. The bridge is owned and operated by the Union Pacific Railroad.

1.1.3. Memphis and Arkansas Bridge (I-55)

The I-55 bridge (Memphis-Arkansas Bridge) was opened to traffic in December 1949. Originally part of the US-40 corridor, the bridge replaced the narrow traffic lanes that were attached to each side of the Harahan Bridge, the upstream railroad/vehicular bridge that was completed in 1916. Because the I-55 bridge pre-dated the Interstate Highway System, the span was not built to Interstate standards and originally lacked a concrete barrier between the east- and west-bound traffic (added later) and included sidewalks[5] on either side of the roadway (now separated from the traffic lanes by concrete barriers). Due to the age and type of construction of the bridge, seismic retrofit operations have been determined by TDOT to be in the range of $250-$500M, classifying the bridge as a non-candidate for seismic retrofitting. The I-55 bridge is one of only two Mississippi River crossings in the Memphis area and serves as a vital connection between Tennessee and Arkansas, with an average traffic count of over 38,000 vehicles (18,088 cars and 20,397 trucks) each day. For comparison, the I-40 bridge has an average traffic count of over 42,000 vehicles (29,116 cars and 13,701 trucks) each day.[6]

1.1.4. Hernando De Soto Bridge (I-40)

The six-lane (three lanes in each direction) I-40 bridge (Hernando De Soto Bridge) opened in 1973 and is a steel-tied arch structure carrying interstate traffic across the Mississippi River between West Memphis, Arkansas, and Memphis, Tennessee. The I-40 bridge provides for much of the nation's east-west interstate truck traffic and is considered a vital transportation, commerce, and defense link, being one of only two crossings of the Mississippi River in the Memphis area (the other being the I-55 bridge). The I-40 bridge has an average traffic count of over 42,000 vehicles (29,116 cars and 13,701 trucks) each day.

The Memphis area is situated at the southeastern edge of the New Madrid Seismic Zone, where three of the largest earthquakes in the Central United States occurred in the early 1800s. Considering the potential for another major earthquake, TDOT partnered with ARDOT in the early 1990s to begin the seismic retrofit of the I-40 bridge. The seismic retrofit project addressed areas of the bridge vulnerable to seismic events by strengthening foundations and other elements. The seismic retrofit allows the bridge to withstand a 7.7 magnitude earthquake and to provide a "post-earthquake" lifeline link for emergency vehicles and the general public.

On May 11, 2021, a mechanical fracture was discovered during a routine inspection of the I-40 bridge. The fracture, or crack, was in a steel support beam critical to the structure of the bridge. Upon discovery of the fracture, the bridge was shut down to all traffic above and below the structure to ensure the safety of the motoring public along the interstate, as well as vessels traveling along the Mississippi River. After an extensive investigation into the cause and extent of the damage, repair of the bridge was completed and the eastbound lanes reopened to traffic on July 31, 2021 and the westbound lanes reopened to traffic on August 2, 2021.

Although the closure of the bridge lasted only 83 days, the impact of the I-40 Bridge closure on local, regional, and national travel and freight patterns renewed interest in a new or replacement bridge option for crossing the Mississippi River.

1.2. Previous Studies

Two previous studies, the *Mississippi River Crossing Feasibility and Location Study* (2006), prepared by Wilbur Smith and Associates for TDOT and the *Southern Gateway Study Cost Benefit Analysis* (2014), prepared by Kimley-Horn for TDOT were the starting point for the analysis undertaken in this effort. Both studies are reviewed and summarized in the Review of Previous Work Technical Memorandum (Appendix A). As part of the review of previous work, Table 2 was created to understand and document how the options evaluated in each study evolved over time into the corridors identified for evaluation in this *Targeted Approach for Crossing the Mississippi River* study.

[5] *Pedestrian and bicycle traffic is now prohibited on the bridge.*
[6] *Mississippi River Bridge Traffic Base Year Validation Technical Memorandum, Kimley-Horn, January 2023.*

Table 2: Options/Alignment Comparison

2006 Wilbur Smith and Associates Initial Highway Corridor Alternatives	2006 Wilbur Smith and Associates Highway Corridor Alternatives	2006 Wilbur Smith and Associates Alternatives for Further Study	2014 Kimley-Horn and Associates Southern Gateway Benefit Cost Analysis	2022 Kimley-Horn and Associates Targeted Approach for Crossing the Mississippi River
No-Build	No-Build	No-Build	No-Build	No-Build
Option 1	Eliminated from Consideration.		Eliminated from Consideration. Alignment 1 virtually the same as Options 1 and 2. Eliminated due to high cost, lower traffic volumes, and less benefits.	
Option 2	Option 2 and Option 3 combined and redesignated as Bridge Crossing A.	Eliminated from Consideration. Option 2 found not to meet purpose and need and estimated to have higher costs.		
Option 3		Eliminated from Consideration. However, the 2006 WSA Report stated the following and carried Bridge Crossing A forward: *"The corridor alternatives at Bridge A should not be carried into the next phase for the current Mississippi River Crossing Feasibility and Location Study project, but it should be considered for the future. Although it did not meet the draft purpose and need for this proposed project, a new river crossing at this location may help stimulate economic development at some future time.* *Therefore, a new "economic development" project in the Bridge A Corridor should be defined to serve as a "West Connector" near the future US 61 interchange with the proposed I-69. This proposed project should be considered in future updates to the Memphis and West Memphis MPOs' long-range transportation plans, as well as to TDOT's long-range Statewide Transportation Plan."*	Eliminated from Consideration. Alignment 1 virtually the same as Option 3. Eliminated from consideration due to high cost, lower traffic volumes, and less benefits.	
Option 4	Options 4, 5, 6, 7, 8 identified to be within same corridor and combined into Bridge Crossing B.	Found to have major environmental impacts and was estimated to have higher costs. However, the following was noted in the 2006 WSA Report: *"At Bridge B, the previously identified highway corridor alternatives were dismissed primarily because of potential major environmental impacts that could occur, due in part to the direct connections to surface streets and highways in densely populated areas with sensitive resources. However, many of Bridge B corridor alternatives were generally the most effective in meeting some of the purpose and need statements for the project. Therefore, two slightly revised corridor alternatives are recommended to be carried into the next phase of this project:* • *First, a revised version of Corridor Alternative 8 east of the river at Bridge B, designated as Corridor Alternative 8A, is proposed to be carried forward into the next phase. Corridor 8A would tie more directly into I-55 to the north and, thus, avoid connections to the surface streets to (1) better avoid the sensitive resources located in this corridor and (2) provide better connectivity to the major highway network.* • *Second, a revised version of Corridor Alternative 3 east of the river, designated as Corridor Alternative 3A, which would extend this alternative south and east to (1) improve access in Hernando and Nesbitt, Mississippi, and (2) tie into I-55 near Hernando."*	Eliminated from Consideration. Alignment 1 virtually the same as Options 4, 5, and 6. Eliminated due to high cost, lower traffic volumes, and less benefits.	
Option 5				
Option 6				
Option 7			Alignment 2 carried forward for additional study. Alignment 2 very similar to Option 7.	Corridor 2 carried forward for additional study.
Option 8			Alignment 4 carried forward for additional study. Alignment 4 very similar to Option 8.	Corridor 4 carried forward for additional study.
Option 9	Not discussed further and no documentation included in report why this option was dismissed.		Alignment 4 carried forward for additional study. Alignment 4 very similar to Option 9.	
Option 10	Eliminated from Consideration. Could potentially cause major disruptions in the Memphis area.		Alignment 5 carried forward for additional study. Alignment 5 is on same alignment as Option 10, but Alignment 5 is longer.	Corridor 5 carried forward for additional study.
Option 11	Eliminated from Consideration. Could potentially cause major disruptions in the Memphis area.			
Option 12	Option 12 carried forward. Separated into three Bridge Crossing Locations C, D, E.	Bridge Options C and D carried forward. Bridge Option E not mentioned further. The 2006 WSA Report stated the following: *"All highway corridor alternatives should be combined and carried forward into the next phase as a single corridor, with the multiple corridor alternatives considered as alternative alignments in that corridor."*	Alignment 6 carried forward for additional study. Alignment 6 is similar to Option 12.	Corridor 6 carried forward for additional study.
Option 13	Option 13 carried forward. Separated into three Bridge Crossing Locations C, D, E.		Alignment 6 carried forward for additional study. Alignment 6 is similar to Option 12.	
13 Options	**5 Options**	**4 Options** (with one additional option identified as a future project not associated with the project in question)	**5 Alignments** (four alignments, plus a bridge replacement alignment)	**4 Corridors** (plus the No Build Condition*)

1.3. Study Corridors

Based on the *Southern Gateway Study Cost Benefit Analysis* (2014), four corridor alignments were developed as part of this feasibility study (Figure 1). Each corridor has unique benefits and impacts; however, all alignments have been determined to be feasible at a planning level. Corridors 2, 4, and 6 represent options that would provide an additional crossing of the Mississippi River, while Corridors 5A and 5B represent options that would replace the existing I-55 bridge but would not provide an additional crossing of the Mississippi River because the existing I-55 bridge would be demolished upon completion of the new bridge. It should be noted that TDOT has determined, based on the age, structural and functional deficiencies, inability to withstand an earthquake (non-candidate for a seismic retrofit), and ongoing maintenance and repair costs of the existing I-55 bridge, that if Corridors 2, 4, or 6 were selected, the existing I-55 bridge would need to be replaced, in addition to the construction of a new bridge. The benefits and drawbacks of each of these approaches is summarized in Table 3.

Table 3: Bridge Addition versus Replacement

Corridors	Bridge Type	Benefits	Drawbacks
Corridors 2, 4, and 6	New	• Provides additional capacity. • Adds reliability and resiliency.	• Higher upfront cost. • Additional regional life-cycle costs. • Requires the replacement of the existing I-55 bridge.
Corridors 5A and 5B	Replacement	• Provides additional capacity. • Adds reliability and resiliency. • Lower upfront cost. • Minimized regional life-cycle costs.	• Does not add a river crossing outside downtown Memphis.

A general description of each corridor is provided below. The total number of additional bridge structures and interchanges for each corridor is also presented. For consistency on all corridors, crossings for railroads and drainage structures were assumed to be interstate overpasses. For local roadways, it was assumed that the local roadway would be elevated over the interstate.

1.3.1. Corridor 2

Corridor 2 is the longest alignment considered at just under 15 miles in total length (Figure 2). The western terminus is I-40, at a new interchange approximately two miles west of the I-40/College Boulevard Interchange in West Memphis, Arkansas. The alignment proceeds generally south for five miles before turning southeast to cross the Mississippi River, entering into Tennessee just south of the Frank C. Pidgeon Industrial Park. The corridor continues to the east, terminating at US-61 just north of the Tennessee-Mississippi state line. Corridor 2 was shortened greatly for the purposes of the *Targeted Approach for Crossing the Mississippi* analysis. The alignment for Corridor 2, as included in the *Southern Gateway Study Cost Benefit Analysis* (2014), extended generally along the Tennessee / Mississippi state line until it intersected with US 78 / I-22.

Interchanges

Two interchanges are anticipated for this alignment at the following locations:

- I-40 Western Terminus (System interchange)
- US-61 Eastern Terminus (Non-System interchange)

Additional Bridge Structures

In addition to the Mississippi River Bridge and its approach structures, Corridor 2 would require bridge structures at four local road crossings, ten minor drainage crossings, four railroad crossings, and levees on both sides of the Mississippi River.

1.3.2. Corridor 4

Corridor 4 is just over 13 miles in length (Figure 3). The western terminus is I-40, at a new interchange approximately two miles west of the I-40/College Boulevard Interchange in West Memphis, Arkansas.

The alignment proceeds generally south for three miles before turning southeast to cross the Mississippi River, entering into Tennessee on President's Island and proceeding north of Harbor Avenue. Past the intersection of Harbor Avenue and Channel Avenue, the corridor crosses over Jack Carley Causeway and ties to the existing I-55 / East Parkway interchange.

Interchanges

Three interchanges are anticipated for this alignment at the following locations:

- I-40 Western Terminus (System interchange)
- President's Island (Non-System interchange)
- I-55 Eastern Terminus (Non-System interchange)

Additional Bridge Structures

In addition to the Mississippi River Bridge and its approach structures, Corridor 4 would require bridge structures at six local road crossings, three minor drainage crossings, and one railroad crossing.

1.3.3. Corridor 5A

Corridor 5A is just over 1.5 miles in length (Figure 4) and is the only non-cable-stayed corridor (the curvature of the roadway on the western end of the bridge does not allow for a traditional cable-stayed bridge which also adheres to the navigational clearance requirements. The western terminus is the existing I-55 alignment, just east of Bridgeport Road in Arkansas. The alignment generally parallels the existing I-55 alignment and existing I-55 Mississippi River Bridge. The proposed centerline is located 200 feet south of the outside southern edge of the existing bridge. Crossing into Tennessee, the alignment crosses through E.H. Crump Park and ties into existing I-55 just north of the French Fort neighborhood and west of the proposed Crump Interchange which is currently under construction.

More detailed information about the navigational clearance requirements is included in the Conceptual Roadway and Bridge Evaluation Criteria Technical Memorandum (Appendix B).

Interchanges

No interchanges are anticipated for this alignment. The corridor ties to existing roadways on either end.

Additional Bridge Structures

No additional bridge structures are required for Corridor 5A other than the Mississippi River Bridge and its approach structures.

1.3.4. Corridor 5B

Corridor 5B is approximately 1.7 miles in length (Figure 5). Corridor 5B was developed as a cable-stayed corridor to Corridor 5A. The western terminus is the existing I-55 alignment, just east of Bridgeport Road in Arkansas. The alignment immediately turns to the southeast for approximately two-thirds of a mile before turning east to cross the Mississippi River. Entering Tennessee, the alignment crosses through E.H. Crump Park and ties into existing I-55 just north of the French Fort neighborhood and west of the proposed Crump Interchange which is currently under construction.

Interchanges

No interchanges are anticipated for this alignment. The corridor ties to existing roadway on either end.

Additional Bridge Structures

No additional bridge structures are required for Corridor 5B other than the Mississippi River Bridge and its approach structures.

Corridor 5 Extension

Corridor 5A and Corridor 5B both begin at the eastern end of the ramps for the Bridgeport Road interchange with I-55. In order to maintain lane continuity, an option of widening I-55 to three lanes in each direction between the existing I-40/I-55 system interchange and the Bridgeport Road interchange (in Arkansas) was evaluated. This widening (approximately 6.5 miles in length) would include interchange modifications at South Loop Road and Bridgeport Road. The estimated cost for the widening, including Design, Right-of-Way, Utilities, Construction, and all other factors considered in the other corridor estimates was $82,800,000.

1.3.5. Corridor 6

Corridor 6 is just over 11 miles in length (Figure 6). The western terminus is I-40, at a new interchange approximately one-mile east of the existing I-40/I-55 system interchange in West Memphis, Arkansas. The alignment proceeds generally north for two miles before turning to the northeast for five miles to cross the Mississippi River. After entering into Tennessee, the alignment continues in a northeasterly direction for 1.5 miles and then turns to the southeast, terminating at a new interchange with US-51.

Interchanges

Three interchanges are anticipated for this alignment at the following locations:

- I-40 Western Terminus (System interchange)
- Future I-69 Location (System interchange)
- US-51 Eastern Terminus (Non-System interchange)

Additional Bridge Structures

In addition to the Mississippi River Bridge and its approach structures, Corridor 6 would require bridge structures at six local road crossings, two minor drainage crossings, a crossing over the Loosahatchie River, and two railroad crossings.

1.4. Travel Demand Model Base Year Validation

Kimley-Horn developed base year 2019 traffic forecasts to estimate the traffic impacts of the No-Build and four corridors (Figure 1 provides an overview of all five corridors and Figures 2-6 shows each individual corridor). Origin and destination (OD) data and travel time data from probe data analytics were collected to validate a base year travel demand model. In addition, the latest version (Version 4) of the Tennessee Statewide Travel Demand Model (the Statewide Model) was provided by TDOT and used by Kimley-Horn as the primary source of data for truck model calibration and validation. In addition to traffic counts data provided by TDOT and ARDOT, supplemental traffic counts at two existing bridges crossing the river were conducted to compared counts from TDOT and ARDOT.

Kimley-Horn used the Memphis Urban Area Metropolitan Planning Organization (MPO)'s regional travel demand model (the Model) as the base. The focus of the model calibration and validation effort was to compare river crossing travel patterns for auto and trucks with probe data and the Statewide Model and to enhance the model with a high level of confidence replicating river crossing traffic volumes and travel patterns. The recalibrated travel model was then used to forecast build year and design year traffic for the baseline and four new bridge options.

Traffic counts data (2019) were collected from TDOT's TN-TIMES and eTRIMS, ARDOT, and from local projects for the MPO and local municipalities. These counts were coded in the highway network as the basis for validating the model at the mode wide and project study area levels.

There are some discrepancies in Average Daily Traffic (ADT) numbers between TDOT and ARDOT. Kimley-Horn conducted supplemental traffic counts at both Mississippi River bridges to verify the accuracy of traffic volume. Table 4 below summarized the differences between different count data sources.

Table 4: Traffic Counts at I-40 and I-55 Bridges (Average Daily Traffic)

Source and Year	Location	Auto	Truck	Total	Truck %
Kimley-Horn (2022)	I-40 Bridge	29,116	13,701	42,817	32%
	I-55 Bridge	18,088	20,397	38,485	53%
	Total Crossings	47,204	34,098	81,302	42%
TDOT (2019)	I-40 Bridge	25,235	8,867	34,102	26%
	I-55 Bridge	39,076	27,154	66,230	41%
	Total Crossings	64,311	36,021	100,332	36%
ARDOT (2019)	I-40 Bridge	N/A	N/A	41,000	N/A
	I-55 Bridge	N/A	N/A	41,000	N/A
	Total Crossings	N/A	N/A	82,000	N/A

Note: TDOT truck percentage data at the I-55 bridge is from year 2011 and data at the I-40 bridge is from 2009.

Figure 1: ***Targeted Approach for Crossing the Mississippi River*** **Study Corridors**

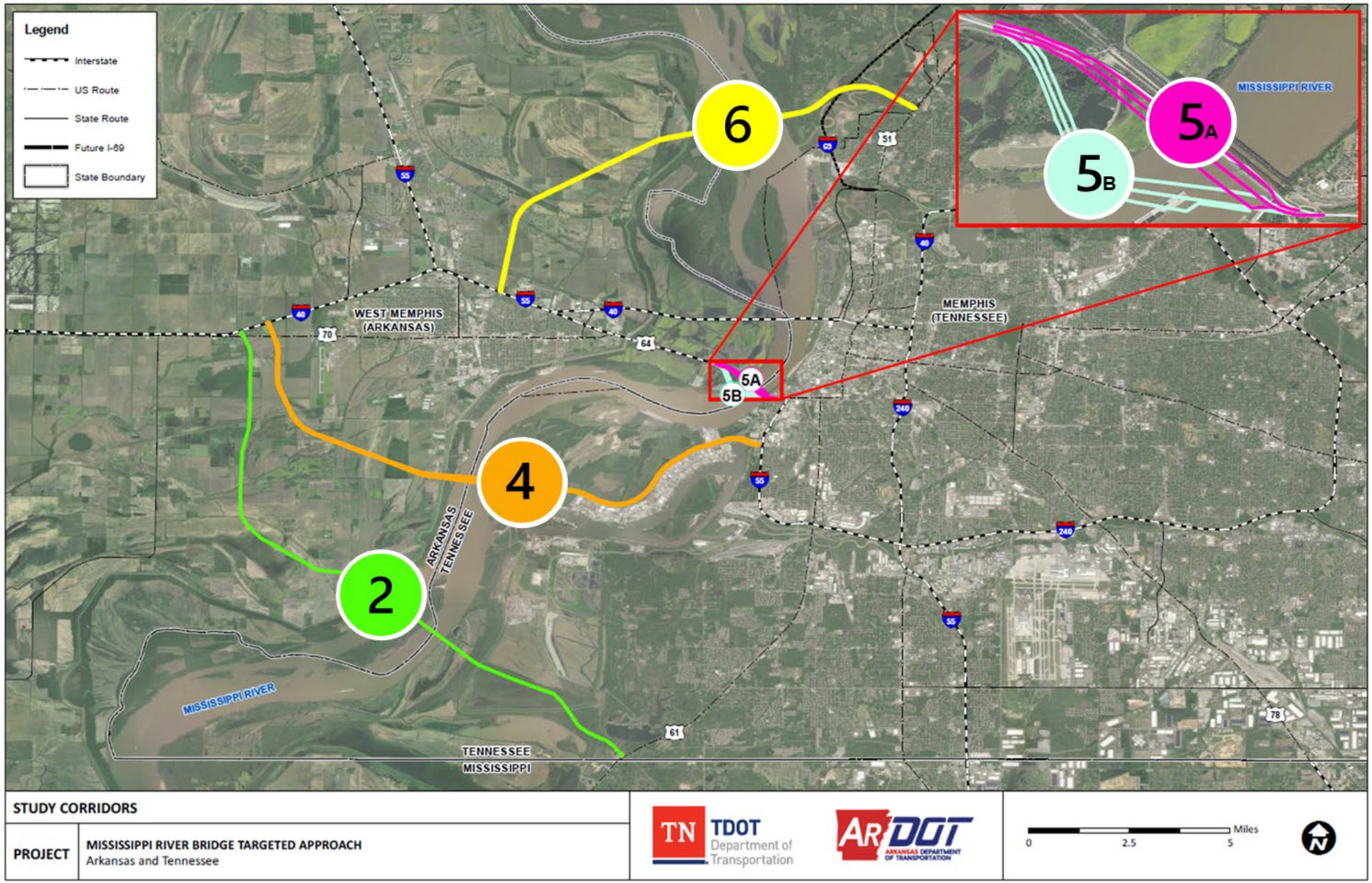


Figure 2: Corridor 2

Figure 3: Corridor 4

Figure 4: Corridor 5A

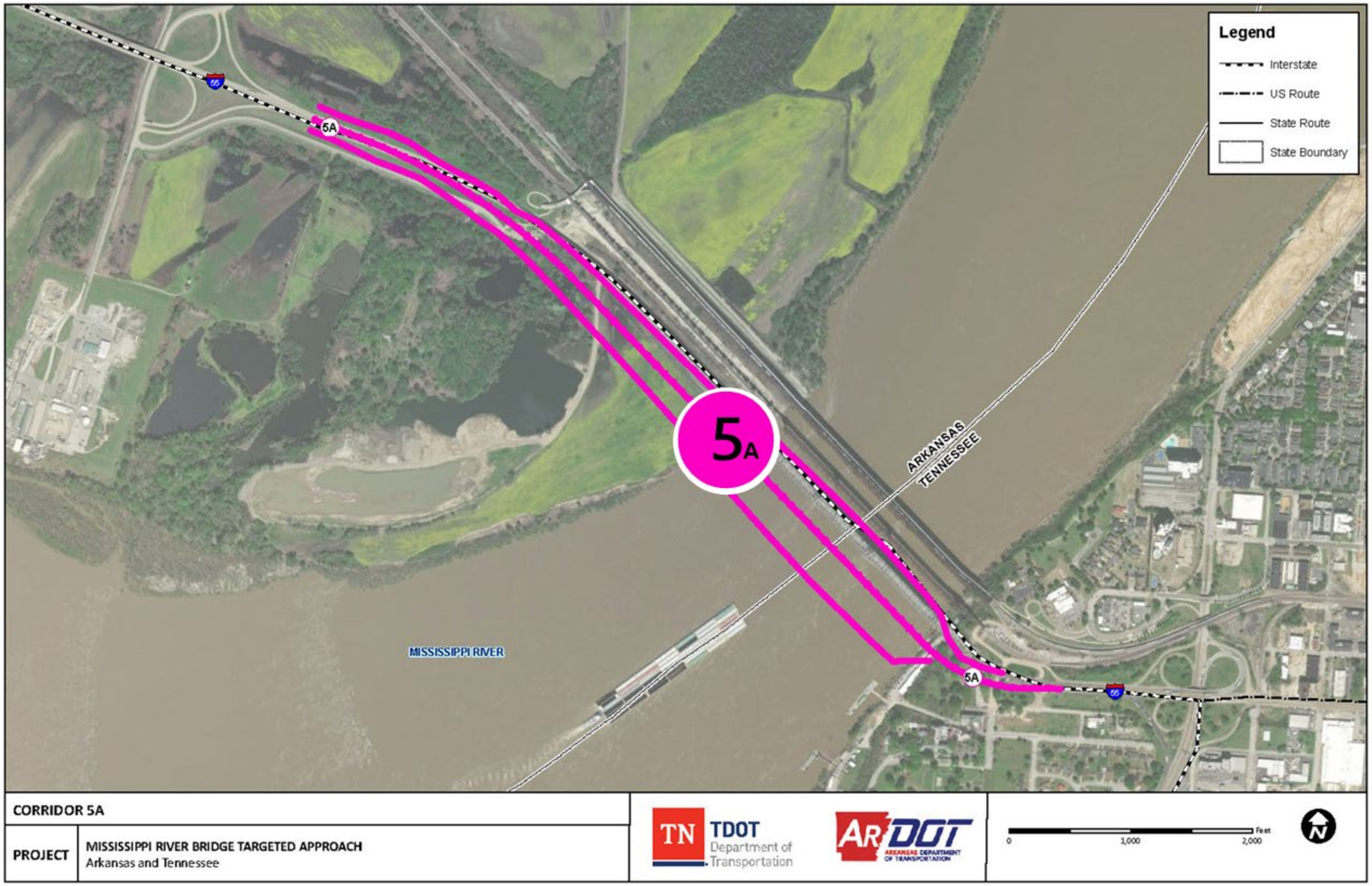


Figure 5: Corridor 5B

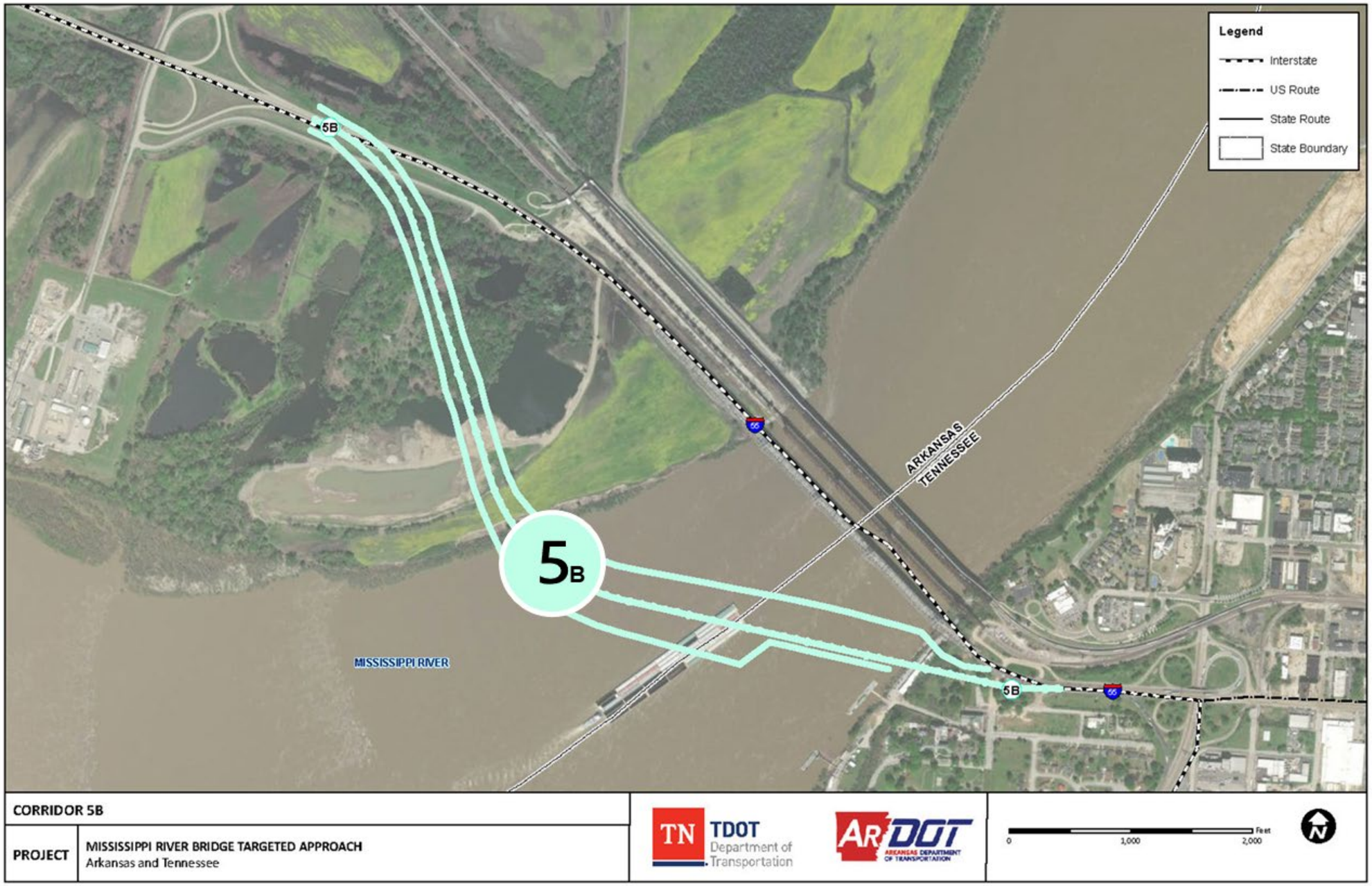
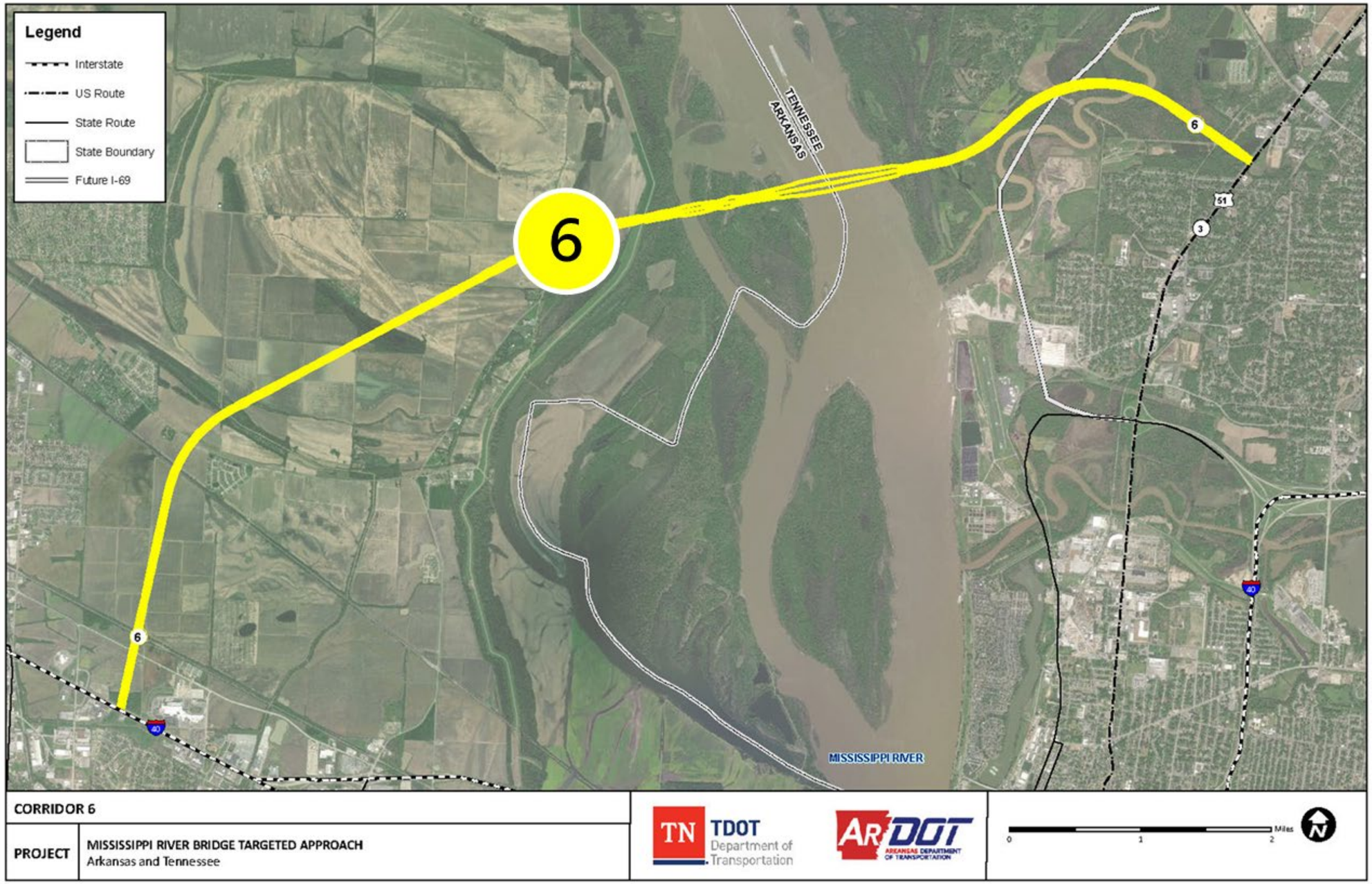


Figure 6: Corridor 6



The greatest difference is the ADT at the I-55 bridge. TDOT traffic history data showed volume above 60,000 from 2015 to 2019, and in the range of 49,000 to 55,000 from 2010 to 2014. ARDOT traffic history data showed volume in the range of 39,000 to 46,000 from 2015 to 2019, and in the range of 37,000 to 39,000 from 2010 to 2014. A middle ground ADT number of 50,000 and truck percent of 41% were used for model validation purposes.

TDOT provided access to the SmartWay radar detection system (RDS) data. The system provides total daily count information from each active RDS unit along the interstate system in the region. Daily count information from the system was evaluated, but not used in the study as it was inconsistent with the other data sources. Table 5 shows the crossing volumes used for model validation.

Table 5: 2019 Model Validation Targets (Average Daily Traffic)

Location	Auto	Truck	Total	Truck %
I-40 Bridge	29,116	13,701	42,817	32%
I-55 Bridge	29,500	20,500	50,000	41%
Total	**58,616**	**34,201**	**92,817**	**37%**

1.5. Conceptual Roadway and Bridge Evaluation Criteria

Kimley-Horn developed conceptual roadway and bridge evaluation criteria for the new Mississippi River bridge and approaches based on TDOT requirements and the applicable American Association of State Highway and Transportation Officials (AASHTO) codes.

The following criteria used for the *Targeted Approach for Crossing the Mississippi* analysis were reviewed and approved by TDOT and ARDOT:

- U.S. Army Corps of Engineers (USACE) and U.S. Coast Guard (USCG) Navigational Clearances
- Federal Aviation Administration (FAA) Height Restrictions
- Right-of-Way Considerations
- Multimodal Opportunities
- Constructability
- Total Bridge Length
- Economic and Financial Evaluation (Cost)
- Travel Demand and Roadway Connectivity
- Roadway and Bridge Aesthetics

A more complete summary of the evaluation criteria and an evaluation of each corridor is included in the Roadway and Bridge Feasibility and Cost Analysis Technical Memorandum (Appendix C).

1.6. Economic and Financial Evaluation (Cost)

The total design, right-of-way, and construction costs for each corridor was calculated using the TDOT Strategic Transportation Investments Division (STID) Cost Estimate Tool (2022). Although this estimate tool takes into account recent increases in construction costs, it should be noted that the Federal Highway Administration (FHWA) recently released the National Highway Construction Cost Index (NHCCI) for the July-September 2022 quarter which shows that highway construction costs have increased 50 percent since December 2020[7].

[7] https://www.fhwa.dot.gov/policy/otps/nhcci/

Although the selection of recommended structure types for the Mississippi River crossing study is beyond the scope of this feasibility report, assumptions must be made for typical span arrangements and main-span structure types to allow for accurate cost comparisons between the various corridors. The overall estimated total (roadway and main span bridge) costs for each corridor are shown in Table 6.

Table 6: Total Design, Right-of-Way, and Construction Costs per Corridor

Description		Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
Item	%					
Construction Items		**$1,476,000,000**	**$1,360,000,000**	**$509,000,000**	**$724,000,000**	**$1,226,000,000**
Removal Items		-	-	-	-	-
Asphalt Paving		$117,000,000	$104,000,000	$12,200,000	$13,300,000	$87,900,000
Concrete Pavement		-	-	-	-	-
Drainage		$15,000,000	$13,300,000	$1,570,000	$1,710,000	$11,300,000
Appurtenances		$10,500,000	$9,290,000	$1,100,000	$1,190,000	$7,860,000
Structures		$893,000,000	$823,000,000	$358,880,000	$517,880,000	$751,600,000
Fencing		-	-	-	-	-
Signalization & Lighting		-	$250,000	-	-	$250,000
Railroad Crossing		-	-	-	-	-
Earthwork		$20,000,000	$17,700,000	$2,170,000	$2,350,000	$15,000,000
Clearing and Grubbing		$1,030,000	$2,080,000	$107,000	$267,000	$1,760,000
Seeding & Sodding		$559,000	$496,000	$58,500	$63,700	$420,000
Rip-Rap or Slope Protection		$670,000	$502,000	-	-	$586,000
Guardrail		$1,200,000	$1,010,000	$84,800	$92,400	$948,000
Signing		$1,060,000	$972,000	$376,000	$537,000	$878,000
Pavement Markings		$578,000	$513,000	$60,500	$65,900	$434,000
Maintenance of Traffic		$8,500,000	$7,810,000	$3,020,000	$4,270,000	$7,050,000
Mobilization	5%	$53,500,000	$49,100,000	$19,000,000	$27,100,000	$44,300,000
Other Items and Annual Inflation	10%	$112,000,000	$103,000,000	$39,900,000	$56,900,000	$93,000,000
Construction Contingency	30%	$102,000,000	$93,000,000	$23,900,000	$32,400,000	$81,500,000
Construction Engineering & Inspection	10%	$139,000,000	$134,000,000	$46,200,000	$65,800,000	$121,000,000
Interchanges & Unique Intersections		**$55,000,000**	**$115,000,000**	-	-	**$105,000,000**
Roundabouts		-	-	-	-	-
Interchanges		$55,000,000	$115,000,000	-	-	$105,000,000
Right-of-Way & Utilities		**$58,000,000**	**$58,600,000**	**$6,090,000**	**$6,600,000**	**$43,990,000**
Right-of-Way		$46,400,000	$41,200,000	$4,860,000	$5,290,000	$34,900,000
Utilities		$11,600,000	$17,400,000	$1,230,000	$1,310,000	$9,090,000
Preliminary Engineering		**$45,900,000**	**$44,300,000**	**$15,300,000**	**$21,700,000**	**$35,000,000**
Preliminary Engineering	3%	$45,900,000	$ 44,300,000	$15,300,000	$21,700,000	$39,800,000
Cost[1]		**$1,635,000,000**	**$1,578,000,000**	**$530,000,000**	**$752,000,000**	**$1,415,000,000**

[1]*The costs in this table reflect traditional bid letting costs. If an alternative delivery method is selected for the project, these costs could likely increase by 35-40%.*

1.6.1. Additional Costs

TDOT provided the additional costs (Table 7) that would be required to maintain (Corridors 2, 4, and 6), demolish (Corridors 5A and 5B), and/or paint (Corridors 2, 4, and 6) the existing I-55 bridge.

Table 7: Additional Costs

	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
I-55 Bridge Maintenance Cost (10 Year Recurring Cost)	$12,500,000	$12,500,000	$0	$0	$12,500,000
I-55 Bridge Demolition Cost	$0	$0	$10,000,000	$10,000,000	$0
Existing I-55 Bridge Structure Repainting Cost	$50,000,000	$50,000,000	$0	$0	$50,000,000
Total	**$62,500,000**	**$62,500,000**	**$10,000,000**	**$10,000,000**	**$62,500,000**

1.6.2. Corridor Comparison

Each of the four corridor alignments evaluated in this technical memorandum have unique benefits and impacts; however, all alignments have been determined to be feasible at a planning level. It should be noted that TDOT has determined, based on the age, structural and functional deficiencies, inability to withstand an earthquake (non-candidate for a seismic retrofit), and ongoing maintenance and repair costs of the existing I-55 bridge, that if Corridors 2, 4, or 6 were selected, the existing I-55 bridge would need to be replaced, in addition to the construction of a new bridge. The costs for the existing I-55 bridge replacement are included for Corridors 2, 4, and 6 in Table 8 which provides a comparison of each corridor.

Additional cost information is included in the Roadway and Bridge Feasibility and Cost Analysis Technical Memorandum (Appendix C).

1.7. Traffic Analysis

Using the No-Build Condition, four Build network scenarios and the future socio-economic growth assumptions, as described in Section 2 and Section 3 (respectively) of the Traffic Analysis Technical Memorandum (Appendix D), traffic forecasts were established for project opening year 2030 and design year 2050. The following performance measures were collected and analyzed for each corridor:

- Overall bridge utilization compared under the No-Build Condition
- Bridge utilization by truck traffic
- Bridge utilization by pass-through and non-through traffic
- District level river crossing demand using desire lines
- Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) changes within the study area
- Effectiveness of congestion relief on freeways within the study area
- Effectiveness of congestion relief on arterial and collector streets within the study area

Table 8: Corridor Comparison

	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
Length (miles)	14.7	13.0	1.5	1.7	11
Interchanges	1 System 1 Standard	1 System 2 Standard	-	-	2 System 1 Standard
Additional Bridge Structures	4 Local Roadway 10 Drainage 4 Railroad	6 Local Roadway 3 Drainage 1 Railroad	-	-	6 Local Roadway 3 Drainage 2 Railroad
FAA Height Restrictions	-	-	-	-	-
Right-of-Way Considerations	Farmland and Undeveloped land	Farmland and Undeveloped land, some industrial land	Western terminus passes through E.H. Crump Park	Western terminus passes through E.H. Crump Park	Farmland and Undeveloped land
Multimodal Opportunities	Shared-use path on proposed bridge connection with Big River Trail system	Shared-use path on proposed bridge connection with Big River Trail system	Shared-use path on proposed bridge connection with Big River Crossing; Memphis Riverwalk; Big River Trail system	Shared-use path on proposed bridge connection with Big River Crossing; Memphis Riverwalk; Big River Trail system	Shared-use path on proposed bridge connection with Big River Trail system
Constructability	No major construction challenges	No major construction challenges	No major construction challenges	No major construction challenges	No major construction challenges
Total Primary Bridge Length (feet)	14,850	14,850	6,405	8,100	12,450
Total Design, Right-of-Way, and Construction Cost	$1,635,000,000	$1,578,000,000	$530,000,000	$752,000,000	$1,415,000,000
Total Additional Costs	$62,500,000	$62,500,000	$10,000,000	$10,000,000	$62,500,000
Existing I-55 Bridge Replacement	$540,000,000	$540,000,000	-	-	$540,000,000
Total Cost	**$2,237,500,000**	**$2,180,500,000**	**$540,000,000**	**$762,000,000**	**$2,017,500,000**

1.7.1. Traffic Conclusions

Using approved future socio-economic growth assumptions, traffic forecasts were conducted for project opening year 2030 and design year 2050 for the No-Build and Four Build Corridor scenarios (Table 9 and Table 10).

Corridor 2

Corridor 2 is ranked second place among Corridors 2, 4, and 6 in terms of overall service utilization. Similar to Corridor 6, this corridor is not very attractive for trucks and pass-through trips with the existing I-55 and I-40 bridges in place. It is the most effective option for VHT reduction and congestion relief for surface streets.

Corridor 4

Corridor 4 is expected to serve the most auto and truck traffic. The overall ADT is 40 to 50 percent higher than Corridor 2, and truck traffic is 4 to 5 times higher than Corridors 2 and 6. Corridor 4 is attractive for both pass-through trips and non-through trips, especially for trucks. Corridor 4 is also expected to be the most effective option in congestion relief on freeways.

Table 9: Bridge Utilization

Scenario	ADT (2030)			Traffic Using New Bridge	
	I-40 Bridge	I-55 Bridge	New Bridge	Total	Percent
No-Build	53,247	58,089	-	111,336	-
Alternative 2	51,703	53,504	10,051	115,258	9%
Alternative 4	51,208	45,777	19,998	116,983	17%
Alternative 5	52,443	-	59,619	112,062	53%
Alternative 6	49,133	57,816	8,733	115,682	8%

Scenario	ADT (2050)			Traffic Using New Bridge	
	I-40 Bridge	I-55 Bridge	New Bridge	Total	Percent
No-Build	62,322	66,921	-	129,243	-
Alternative 2	60,550	60,646	17,238	138,434	12%
Alternative 4	58,639	51,805	29,157	139,601	21%
Alternative 5	61,547	-	69,124	130,671	53%
Alternative 6	56,133	66,129	15,440	137,702	11%

Table 10: Congestion Relief on Freeways

Scenario	Miles of Freeways with LOS E or LOS F (2030)					
	LOS E	% Change from No-Build	LOS F	% Change from No-Build	LOS E and F Combined	% Change from No-Build
No-Build	74.1	-	38.7	-	151.5	-
Alternative 2	78.4	5.8%	28.7	-25.8%	135.8	-10.4%
Alternative 4	68.6	-7.4%	33.9	-12.4%	136.4	-10.0%
Alternative 5	74.1	0.0%	37.4	-3.4%	148.9	-1.7%
Alternative 6	77.1	4.0%	35.1	-9.3%	147.3	-2.8%

Scenario	Miles of Freeways with LOS E or LOS F (2050)					
	LOS E	% Change from No-Build	LOS F	% Change from No-Build	LOS E and F Combined	% Change from No-Build
No-Build	67.0	-	88.3	-	243.6	-
Alternative 2	72.9	8.8%	79.8	-9.6%	232.5	-4.6%
Alternative 4	68.3	1.9%	79.0	-10.5%	226.3	-7.1%
Alternative 5	68.4	2.1%	83.3	-5.7%	235.0	-3.5%
Alternative 6	70.1	4.6%	84.2	-4.6%	238.5	-2.1%

Corridor 5

As a replacement corridor, traffic on Corridor 5 is not expected to differ largely compared to the existing I-55 bridge, as it replaces the No-Build Condition. This corridor is attractive to both auto and truck traffic, external or internal, due to its proximity to the core area of the region. Widening of I-55 from the I-55/I-40 split to the west end of the bridge would eliminate the four-lane bottle neck and further improve the effectiveness of congestion relief for this corridor. However, the major drawback for Corridor 5 remains that it would not provide an additional bridge crossing to serve as an effective alternative route in case emergency shut down is needed on either the I-40 or the I-55 bridges.

Corridor 6

Corridor 6 is the least favorable option in terms of traffic diversion from existing bridge, truck and through traffic utilization, travel time savings, and congestion relief in the study area.

Additional traffic analysis information is included in the Traffic Analysis Technical Memorandum (Appendix D).

1.8. Benefit-Cost Analysis

Kimley-Horn conducted a Benefit-Cost Analysis (BCA) for the project. This BCA evaluates the No-Build Condition and the four Build corridors. The benefit-cost analysis was conducted in accordance with the US Department of Transportation (USDOT) "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", January 2023[8].

The Benefit-Cost Analysis (BCA) conducted for this project includes the monetized benefits and costs measured using USDOT guidance for the project study area, as well as the quantitative merits of the project. A BCA provides estimates of the anticipated benefits that are expected to accrue from a project over a specified period and compares them to the anticipated costs of the project. Costs include both the resources required to develop the project and the costs of maintaining the new or improved asset over time. Estimated benefits are based on the projected impacts of the project on both users and non-users of the facility, valued in monetary terms.

The BCA provides a useful benchmark to evaluate and compare potential transportation investments. The project specific methodology was developed using the BCA guidance from USDOT and is consistent with the discretionary grant program guidelines. In particular, the methodology involves:

- Establishing existing and future conditions under the build and no-build scenarios;
- Measuring benefits in dollar terms and expressing benefits and costs in a common unit of measurement;
- Using DOT guidance for the valuation of travel time savings, safety benefits and reductions in air emissions;
- Discounting future benefits and costs with the real discount rates recommended by the DOT[9]; and
- Conducting a sensitivity analysis to assess the impacts of changes in key estimating assumptions.

[8] *https://www.transportation.gov/sites/dot.gov/files/2023-01/Benefit%20Cost%20Analysis%20Guidance%202023%20Update.pdf*
[9] *In accordance with OMB Circular A-94, applicants to USDOT discretionary grant programs should use a real discount rate (the appropriate discount rate to use on monetized values expressed in real terms, with the effects of inflation removed) of 7 percent per year to discount streams of benefits and costs to their present value in their BCA.*

The BCA converts potential gains (benefits) and losses (costs) from a project into monetary units and compares them. The following common benefit-cost evaluation measures are included in the *Targeted Approach for Crossing the Mississippi River* BCA:

- **Net Present Value (NPV)**: NPV compares the net benefits (benefits minus costs) after being discounted to present values using the real discount rate assumption. The NPV provides a perspective on the overall dollar magnitude of cash flows over time in today's dollar terms.
- **Internal Rate of Return (IRR)**: The IRR is the discount rate which makes the NPV from the project equal to zero. In other words, it is the discount rate at which the project breaks even. Generally, the greater the IRR, the more desirable the project.
- **Benefit / Cost Ratio (BCR)**: The evaluation also estimates the benefit-cost ratio; the present value of incremental benefits is divided by the present value of incremental costs to yield the benefit-cost ratio. The BCR expresses the relation of discounted benefits to discounted costs as a measure of the extent to which a project's benefits either exceed or fall short of the costs.

The BCA findings are summarized in Table 11. Annual costs and benefits were computed over the lifecycle of the project (30 years). Construction is expected to be completed by 2034. Benefits accrue during the operation of the proposed project, beginning in 2035.

Table 11: Overall Results of the Benefit-Cost Analysis, in 2021 Dollars

Corridors		Total Benefits	Total Costs	Net Present Value	Internal Rate of Return	Benefit / Cost Ratio
Corridor 2	Cumulative Total	$4,575,845,253	$1,533,407,213	-	-	-
	Discounted at 7%	$597,227,561	$760,703,813	($163,476,252)	**6%**	**0.79**
Corridor 4	Cumulative Total	$4,221,006,149	$1,479,531,805	-	-	-
	Discounted at 7%	$532,062,341	$733,635,785	($201,573,444)	**5%**	**0.73**
Corridor 5A	Cumulative Total	$2,954,703,266	$495,327,103	-	-	-
	Discounted at 7%	$351,568,854	$244,888,780	$106,680,074	**9%**	**1.44**
Corridor 5B	Cumulative Total	$3,039,616,484	$702,803,738	-	-	-
	Discounted at 7%	$356,197,701	$345,457,641	$10,740,061	**7%**	**1.03**
Corridor 6	Cumulative Total	$530,131,178	$1,326,462,774	-	-	-
	Discounted at 7%	$6,897,827	$653,694,436	($646,796,609)	**-3%**	**0.01**

Considering all monetized benefits and costs, Corridor 5A has the highest BCR of 1.44. The estimated internal rate of return of Corridor 5A is nine percent. With a seven percent real discount rate, the $3 billion investment would result in $107 million in Net Present Value. Corridors 5A and 5B are bridge replacement options that do not provide an alternative bridge crossing the Mississippi River in the region.

Among Corridors 2, 4, and 6 that provide a third bridge crossing the river, Corridor 2 has the highest benefit cost ratio of 0.79. Corridor 4 is the second highest with a 0.73 benefit cost ratio. Corridor 6 has a negative internal rate

of return. The benefit estimates by Long-Term Outcome (Discounted at seven percent) for each corridor are summarized in Table 12.

The total costs used for the benefit-cost analysis for Corridors 2, 4, and 6 do not include the replacement costs for the existing I-55 bridge. If the bridge replacement costs were included, it would result in a lower benefit-cost ratio for each of these options.

Table 12: Benefit Estimates by Long-Term Outcome (Discounted at 7%)

Long-Term Outcomes	Benefit or Impact Categories	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
Safety	Accident reduction	$182,228,587	$178,287,606	$30,198,517	$30,198,517	($39,975,485)
Economic Competitiveness	Travel time savings (Recurring Congestion)	$336,434,313	$225,338,297	$190,152,571	$190,152,571	$68,559,148
	Travel time savings (Non-recurring Congestion)	$157,001,277	$259,657,108	$68,356,954	$68,356,954	$72,634,816
	Vehicle operating cost savings	($94,381,601)	($139,562,940)	$45,651,718	$45,651,718	($105,567,507)
Environmental Sustainability	Emissions reductions	($10,052,252)	($15,625,842)	$6,761,291	$6,761,291	($10,633,910)
Residual Value		$25,997,237	$23,968,113	$10,447,803	$15,076,651	$21,880,765

Additional BCA information is included in the Benefit-Cost Analysis Technical Memorandum (Appendix E).

1.9. Environmental Screening

Kimley-Horn performed a high-level, desktop environmental screening of available geographic information systems (GIS) data and online database sources. The purpose of this preliminary environmental screening was to evaluate the potential for environmental constraints/fatal flaws that would preclude a corridor option from moving forward as a build alternative through a formal decision-making process like a National Environmental Policy Act (NEPA) environmental review. Like the NEPA process, a No-Build Option was also given consideration in this preliminary environmental screening. The No-Build Option provides a baseline for comparison against other corridor options. It is important to note that for each of the four build corridor options, the study area, did not extend beyond the right-of-way limits of the corridor under consideration. The results of the environmental screening are summarized in Table 13 (Environmental Considerations) and Table 14 (Social Considerations), as well as shown in Figure 7.

More detailed environmental screening information is included in the *Environmental Screening, Preliminary Purpose and Need, and Identification of the Likely NEPA Class of Action Technical Memorandum* (Appendix G).

1.10. Preliminary Purpose and Need

A purpose and need statement is designed to help evaluate the alternatives to be considered and creates a framework for the development of evaluation criteria later used for screening of the alternatives. A purpose and need statement should clearly state what the project should accomplish and why it is necessary but should not predetermine an outcome.

Based on available data and for the purposes of this technical memorandum, a preliminary purpose and need statement has been prepared and is outlined below. This preliminary purpose and need statement would need to be refined as more detailed information becomes available.

1.10.1. Preliminary Needs

The preliminary needs have been identified as the following:

High Cost of Maintaining the Existing I-55 Bridge

Tennessee and Arkansas share responsibility for maintaining the existing I-55 bridge. Because of the importance of the I-55 bridge to intrastate and interstate mobility, both states share maintenance costs. Over the past ten years, TDOT and ARDOT have carried out maintenance operations via two approaches:

- Contracted Maintenance – Contracted maintenance, or primary repair costs, are evenly cost-shared between TDOT and ARDOT and have a projected ten-year recurring cost of $12.0M.
- Annual Bridge Maintenance – Annual bridge maintenance operations and applicable repairs are carried out by TDOT and ARDOT. In-house expenses for annual maintenance have been approximately $50,000 and are expected to continue at that level for the foreseeable future based on TDOT and ARDOT records.

In addition to annual maintenance costs, a protective coating or painting of the structure is not included in either of these maintenance options or ten-year recurring costs. The current coating on the bridge is the original coating applied in the field by the contractor during construction of the bridge in the late 1940s. Due to the age of the bridge, removal of the existing paint system would have to account for the presence of a lead-based primer. The removal of this material requires a specialized containment system as well as regulated disposal of the product. During the removal process of the existing coating, it is expected that some of the structural steel may be damaged due to its age, corrosion, and/or section loss of the steel that is caused by corrosion severe enough to physically measure a reduction in the thickness of the structural member. The cost for this is associated by total tonnage of steel and is estimated by TDOT, including contingency, to total $50M (2023 dollars) for the current structure.

In total, anticipated maintenance of the existing I-55 bridge (annual bridge maintenance/contracted maintenance and painting) is anticipated to cost $62.5 million over the next 10 years (Table 15).

Table 13: Environmental Considerations

Category	No-Build	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
	Associated Environmental Effects					
Total Amount of Land Found Within the Limits of Each Corridor	None	488.12 Acres	386.40 Acres	64.90 Acres	64.30 Acres	342.20 Acres
Cultural Resources (Listed National Register of Historic Properties)	None	None	None	I-55 Memphis-Arkansas Bridge	I-55 Memphis-Arkansas Bridge	None
Section 4(f) Resources	None	None	Martin Luther King Jr. Riverside Park & Marina	• Big River Crossing Trail • I-55 Memphis-Arkansas Bridge (Historic) • Crump Park • West Memphis Delta Regional River Park	• I-55 Memphis-Arkansas Bridge (Historic) • Crump Park • West Memphis Delta Regional River Park	Bud Hill Disc Golf Course
Section 6(f) Resources	None	None	None	None	None	None
Hazardous Materials	None	None	None	None	None	None
Air Quality	Shelby County, Tennessee, DeSoto County, Mississippi, and Crittenden County, Arkansas are designated as Attainment/Maintenance regarding National Ambient Air Quality Standards (NAAQs)	Shelby County, Tennessee and Crittenden County, Arkansas are designated as Attainment/Maintenance regarding NAAQs	Shelby County, Tennessee and Crittenden County, Arkansas are designated as Attainment/Maintenance regarding NAAQs	Shelby County, Tennessee and Crittenden County, Arkansas are designated as Attainment/Maintenance regarding NAAQs	Shelby County, Tennessee and Crittenden County, Arkansas are designated as Attainment/Maintenance regarding NAAQs	Shelby County, Tennessee and Crittenden County, Arkansas are designated as Attainment/Maintenance regarding NAAQs
Prime and Unique Farmland	None	369.20 Acres	248.20 Acres	1.40 Acres	2.10 Acres	141.90 Acres
Wetlands	None	191.41 Acres	112.64 Acres	33.13 Acres	35.03 Acres	174.04 Acres
Water Resources (Streams) and Navigable Waters	None	5,998.12 Linear Feet (0.14 Miles) of stream impact Navigable Waters- Mississippi River	5,585.6 Linear Feet (1.02 Miles) of stream impact Navigable Waters- Mississippi River	633.6 Linear Feet (0.12 Miles) of stream impact Navigable Waters- Mississippi River	739.2 Linear Feet (0.14 Miles) of stream impact Navigable Waters- Mississippi River	5,544 Linear Feet (1.05 Miles) of stream impact Navigable Waters- Mississippi River
Floodplains	Present – Zone AE (100-Year Floodplain)	Present – Zone AE (100-Year Floodplain)	Present – Zone AE (100-Year Floodplain)	Present – Zone AE (100-Year Floodplain)	Present – Zone AE (100-Year Floodplain)	Present – Zone AE (100-Year Floodplain)

Category	No-Build	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
	Associated Environmental Effects					
Threatened, Endangered or Candidate Species	None	11 Federally Listed Threatened, Endangered or Candidate Species Identified 1. **Indiana Bat** *(Myotis sodalis)* 2. **Northern Long-eared Bat** *(Myotis septentrionalis)* 3. **Tricolored Bat** *(Perimyotis subflavus)* 4. **Eastern Black Rail** *(Laterallus jamaicensis ssp. jamaicensis)* 5. **Piping Plover** *(Charadrius melodus)* 6. **Red Knot** *(Calidris canutus rufa)* 7. **Alligator Snapping Turtle** *(Macrochelys temminckii)* 8. **Pallid Sturgeon** *(Scaphirhynchus albus)* 9. **Fat Pocketbook** *(Potamilus capax)* 10. **Monarch Butterfly** *(Danaus plexippus)* 11. **Pondberry** *(Lindera melissifolia)*	11 Federally Listed Threatened, Endangered or Candidate Species Identified 1. **Indiana Bat** *(Myotis sodalis)* 2. **Northern Long-eared Bat** *(Myotis septentrionalis)* 3. **Tricolored Bat** *(Perimyotis subflavus)* 4. **Eastern Black Rail** *(Laterallus jamaicensis ssp. jamaicensis)* 5. **Piping Plover** *(Charadrius melodus)* 6. **Red Knot** *(Calidris canutus rufa)* 7. **Alligator Snapping Turtle** *(Macrochelys temminckii)* 8. **Pallid Sturgeon** *(Scaphirhynchus albus)* 9. **Fat Pocketbook** *(Potamilus capax)* 10. **Monarch Butterfly** *(Danaus plexippus)* 11. **Pondberry** *(Lindera melissifolia)*	11 Federally Listed Threatened, Endangered or Candidate Species Identified 1. **Indiana Bat** *(Myotis sodalis)* 2. **Northern Long-eared Bat** *(Myotis septentrionalis)* 3. **Tricolored Bat** *(Perimyotis subflavus)* 4. **Eastern Black Rail** *(Laterallus jamaicensis ssp. jamaicensis)* 5. **Piping Plover** *(Charadrius melodus)* 6. **Red Knot** *(Calidris canutus rufa)* 7. **Alligator Snapping Turtle** *(Macrochelys temminckii)* 8. **Pallid Sturgeon** *(Scaphirhynchus albus)* 9. **Fat Pocketbook** *(Potamilus capax)* 10. **Monarch Butterfly** *(Danaus plexippus)* 11. **Pondberry** *(Lindera melissifolia)*	11 Federally Listed Threatened, Endangered or Candidate Species Identified 1. **Indiana Bat** *(Myotis sodalis)* 2. **Northern Long-eared Bat** *(Myotis septentrionalis)* 3. **Tricolored Bat** *(Perimyotis subflavus)* 4. **Eastern Black Rail** *(Laterallus jamaicensis ssp. jamaicensis)* 5. **Piping Plover** *(Charadrius melodus)* 6. **Red Knot** *(Calidris canutus rufa)* 7. **Alligator Snapping Turtle** *(Macrochelys temminckii)* 8. **Pallid Sturgeon** *(Scaphirhynchus albus)* 9. **Fat Pocketbook** *(Potamilus capax)* 10. **Monarch Butterfly** *(Danaus plexippus)* 11. **Pondberry** *(Lindera melissifolia)*	11 Federally Listed Threatened, Endangered or Candidate Species Identified 1. **Indiana Bat** *(Myotis sodalis)* 2. **Northern Long-eared Bat** *(Myotis septentrionalis)* 3. **Tricolored Bat** *(Perimyotis subflavus)* 4. **Eastern Black Rail** *(Laterallus jamaicensis ssp. jamaicensis)* 5. **Piping Plover** *(Charadrius melodus)* 6. **Red Knot** *(Calidris canutus rufa)* 7. **Alligator Snapping Turtle** *(Macrochelys temminckii)* 8. **Pallid Sturgeon** *(Scaphirhynchus albus)* 9. **Fat Pocketbook** *(Potamilus capax)* 10. **Monarch Butterfly** *(Danaus plexippus)* 11. **Pondberry** *(Lindera melissifolia)*
Critical Habitat Identified for Federally Listed Threatened, Endangered or Candidate Species	None	None	None	None	None	None

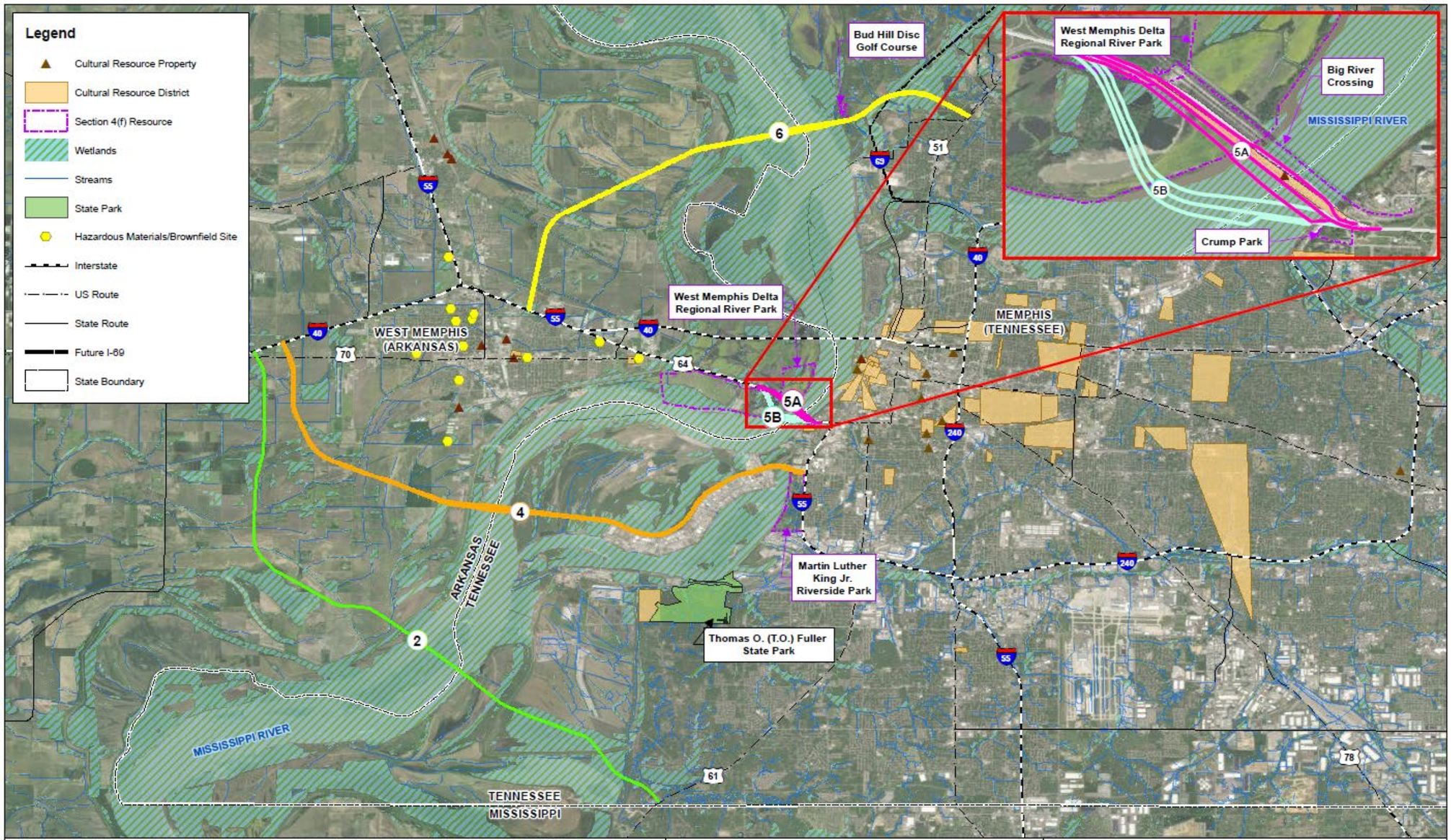
Category	No-Build	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
	Associated Environmental Effects					
Migratory Birds	None	12 Migratory Bird Species Identified 1. **American Golden-plover** (*Pluvialis dominica*) 2. **Bald Eagle** (*Haliaeetus leucocephalus*) 3. **Chimney Swift** (*Chaetura pelagica*) 4. **Kentucky Warbler** *(Oporonis formosus)* 5. **Lesser Yellowlegs** *(Tringa flavipes)* 6. **Little Blue Heron** *(Egretta caerulea)* 7. **Prairie Warbler** *(Denroica discolor)* 8. **Prothonotary Warbler** *(Protonotaria citrea)* 9. **Red-headed Woodpecker** *(Melanerpes erythrocephalus)* 10. **Rusty Blackbird** *(Euphagus carolinus)* 11. **Swallow-tailed Kite** *(Elanoides forficatus)* *12.* **Wood Thrush** *(Hylocichla mustelina)*	14 Migratory Bird Species Identified 1. **American Golden-plover** (*Pluvialis dominica)* 2. **American Kestrel** (*Falco sparverius paulus*) 3. **Bald Eagle** (*Haliaeetus leucocephalus*) 4. **Chimney Swift** (*Chaetura pelagica*) 5. **Kentucky Warbler** (*Oporonis formosus*) 6. **Lesser Yellowlegs** (*Tringa flavipes*) 7. **Little Blue Heron** (*Egretta caerulea*) 8. **Painted Bunting (***Passerina ciris***)** 9. **Prairie Warbler** (*Denroica discolor*) 10. **Prothonotary Warbler** (*Protonotaria citrea*) 11. **Red-headed Woodpecker** (*Melanerpes erythrocephalus*) 12. **Ruddy Turnstone** (*Arenaria interpres morinella*) 13. **Rusty Blackbird** (*Euphagus carolinus*) 14. **Short-billed Dowitcher** (*Limnodromus griseus*)	9 Migratory Bird Species Identified 1. **American Golden-plover** *(Pluvialis dominica)* 2. **Bald Eagle** *(Haliaeetus leucocephalus)* 3. **Chimney Swift** *(Chaetura pelagica)* 4. **Lesser Yellowlegs** *(Tringa flavipes)* 5. **Little Blue Heron** *(Egretta caerulea)* 6. **Prothonotary Warbler** *(Protonotaria citrea)* 7. **Red-headed Woodpecker** *(Melanerpes erythrocephalus)* 8. **Rusty Blackbird** *(Euphagus carolinus)* 9. **Wood Thrush** *(Hylocichla mustelina)*	9 Migratory Bird Species Identified 1. **American Golden-plover** *(Pluvialis dominica)* 2. **Bald Eagle** *(Haliaeetus leucocephalus)* 3. **Chimney Swift** *(Chaetura pelagica)* 4. **Lesser Yellowlegs** *(Tringa flavipes)* 5. **Little Blue Heron** *(Egretta caerulea)* 6. **Prothonotary Warbler** *(Protonotaria citrea)* 7. **Red-headed Woodpecker** *(Melanerpes erythrocephalus)* 8. **Rusty Blackbird** *(Euphagus carolinus)* 9. **Wood Thrush** *(Hylocichla mustelina)*	13 Migratory Bird Species Identified 1. **American Golden-plover** *(Pluvialis dominica)* 2. **American Kestrel** (*Falco sparverius paulus)* 3. **Bald Eagle** *(Haliaeetus leucocephalus)* 4. **Cerulean Warbler** *(Dendrocia cerulea)* 5. **Chimney Swift** *(Chaetura pelagica)* 6. **Kentucky Warbler** *(Oporonis formosus)* 7. **Lesser Yellowlegs** *(Tringa flavipes)* 8. **Little Blue Heron** *(Egretta caerulea)* 9. **Prothonotary Warbler** *(Protonotaria citrea)* 10. **Red-headed Woodpecker** *(Melanerpes erythrocephalus)* 11. **Ruddy Turnstone** *(Arenaria interpres morinella)* 12. **Rusty Blackbird** *(Euphagus carolinus)* 13. **Short-billed Dowitcher** *(Limnodromus griseus)*

Table 14: Social Considerations

Category				No-Build	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
				Associated Environmental Effects					
Environmental Justice	Population[1]			Not Applicable	30,298 persons	4,027 persons	5,241 persons	2,929 persons	5,740 persons
	Low-Income			None	1 out of 5 Block Groups that are found within the corridor are considered Environmental Justice populations	2 out of 4 Block Groups that are found within the corridor are considered Environmental Justice populations	2 out of 4 Block Groups that are found within the corridor are considered Environmental Justice populations	2 out of 4 Block Groups that are found within the corridor are considered Environmental Justice populations	3 out of 7 Block Groups that are found within the corridor are considered Environmental Justice populations
	Minority			None	1 out of 5 Block Groups that are found within the corridor are considered Environmental Justice populations	1 out of 4 Block Groups that are found within the corridor are considered Environmental Justice populations	2 out of 4 Block Groups that are found within the corridor are considered Environmental Justice populations	2 out of 4 Block Groups that are found within the corridor are considered Environmental Justice populations	4 out of 6 Block Groups that are found within the corridor are considered Environmental Justice populations
Socioeconomic	Community Cohesion[2]	Structures Identified within the Limits of the Corridor		None	1 Business	1 Business	None	None	None
		Located Within an Area Where No Existing Bridge Crossing is Present or Located near Existing Bridge Crossing		Not Applicable	Located within an area where no existing bridge crossing is present	Located within an area where no existing bridge crossing is present	Located near existing bridge crossing	Located near existing bridge crossing	Located within an area where no existing bridge crossing is present
	Employment	Labor Force Participation Rate	Crittenden County, Arkansas	None	62.2%	62.2%	62.2%	62.2%	62.2%
			Shelby County, Tennessee	None	64.2%	64.2%	64.2%	64.2%	64.2%
		Unemployment Rate	Crittenden County, Arkansas	None	9.3%	9.3%	9.3%	9.3%	9.3%
			Shelby County, Tennessee	None	7.4%	7.4%	7.4%	7.4%	7.4%

[1]Please note that the population totals have been estimated by totaling the population of each Block Group that is found with the identified corridor and is approximate in nature.
[2]Please note that all community cohesion amounts are considered qualitative and approximate in nature. More detailed studies are required as the project progresses through the transportation development process.

Figure 7: Corridors Under Consideration – *Roadway and Bridge Feasibility Analysis Technical Memorandum* (2022) – Preliminary Environmental Screening



CORRIDORS UNDER CONSIDERATION - ROADWAY AND BRIDGE FEASIBILITY ANALYSIS TECHNICAL MEMORANDUM (2022) - PRELIMINARY ENVIRONMENTAL SCREENING

PROJECT	MISSISSIPPI RIVER BRIDGE TARGETED APPROACH Arkansas and Tennessee

TN TDOT Department of Transportation | ARDOT ARKANSAS DEPARTMENT OF TRANSPORTATION

0 2.5 5 Miles

Table 15: Existing I-55 Anticipated Bridge Maintenance Costs

	Anticipated Cost	Notes
Contracted Maintenance	$12M	Projected ten-year recurring cost
Annual Bridge Maintenance	$50,000	Annual maintenance expenses paid by TDOT and ARDOT
New Bridge Coating	$50M	Original paint coating (1940s)

Source: TDOT, 2023.

Existing Bridge Structural Deficiencies

According to the *Roadway and Bridge Feasibility Analysis Technical Memorandum* (2022), the I-55 bridge (Memphis-Arkansas Bridge) was opened to traffic in December 1949. Originally part of the US-40 corridor, the continuous steel, thru-truss bridge with a cast-in-place concrete deck replaced the narrow traffic lanes that were attached to each side of the Harahan Bridge, the upstream railroad/vehicular bridge that was completed in 1916. Because the I-55 bridge pre-dated the Interstate Highway System, the span was not built to Interstate standards and originally lacked a concrete barrier between the east- and west-bound traffic (added later) and included sidewalks on either side of the roadway (now separated from the traffic lanes by concrete barriers).

Every two years, TDOT performs a comprehensive inspection and subsequent evaluation of all public bridges across the state in order to determine the status of their working condition and operating limits to ensure that they are in accordance with the FHWA National Bridge Inspection Standards (NBIS) (see Appendix G). These inspections are recorded and published in the National Bridge Inventory (NBI) Tennessee Inventory and Appraisal Report.

A component of the NBI are the condition ratings. Condition ratings are used to describe the existing, in-place bridge as compared to the as-built condition. The physical condition of the deck, superstructure, and substructure components of a bridge are evaluated for a condition rating. Condition ratings are assigned codes ranging from zero to nine, with zero being failed condition and nine being excellent condition.

Another component of the NBI are the appraisal ratings. Appraisal ratings are used to evaluate a bridge in relation to the level of service which it provides. The structure is compared to a new structure built to current standards for the particular type of road. Components evaluated and given an appraisal rating include the structural evaluation, deck geometry, the underclearance rating, waterway adequacy, and the approach roadway alignment. Appraisal ratings are also assigned codes ranging from zero to nine with zero being a closed bridge and nine being superior to present desirable criteria.

According to the NBI, Tennessee Inventory and Appraisal Report, published on 03/08/2022, the existing I-55 bridge received the following condition and appraisal ratings:

- Condition Ratings (Zero being failed condition and nine being excellent condition)
  - Deck – 6
  - Superstructure – 5
  - Substructure – 6

- Appraisal Ratings (Zero to nine with zero being a closed bridge and nine being superior to present desirable criteria)
    - Structural Rating – 5
    - Deck Geometry – 2
    - Underwater Clearance – 3
    - Waterway Adequacy – 8
    - Approach Roadway Alignment – 6

Ability to Withstand a Strong Earthquake in order to Provide Route Resiliency

The I-55 bridge is one of two Mississippi River crossings in the Memphis area for vehicular traffic and serves as a vital connection between Tennessee and Arkansas, with an ADT volume of 38,485 vehicles (18,088 cars and 20,397 trucks) in 2022. For comparison, the I-40 bridge had an ADT of 42,817 vehicles (29,116 cars and 13,701 trucks) in 2022.

The existing I-55 bridge was not built to withstand an earthquake.[10] Due to the age and type of construction of the bridge, seismic retrofit operations have been determined by TDOT to be in the range of $250-$500M, classifying the bridge as a non-candidate for seismic retrofitting.

1.10.2. Secondary Goals

Increase Capacity and Improve Operations for Traffic

Based on traffic projections contained in the *Traffic Analysis Technical Memorandum* (2023), under the No-Build condition, the ADT is 53,247 on the I-40 bridge and 58,089 on the I-55 bridge in 2030. This represents an annual growth rate of 5.3 percent for the I-55 bridge and an annual growth rate of 2.8 percent for the I-40 bridge from 2022 to 2030. The annual growth rate for the combined river crossing volumes on the I-55 bridge and the I-40 bridge from 2030 to 2050 with the No-Build condition is 1.5 percent, with a total ADT of 129,243 in 2050 (Table 16).

Table 16: Existing I-55 and I-40 Bridge Average Daily Traffic and Percent Increase

	2022 Average Daily Traffic (ADT)	No-Build (2030) ADT	2022-2030 Percent Increase	2030-2050 Combined ADT (Percent Increase)
I-55 Bridge	38,485	58,089	5.3%	129,243 (1.5%)
I-40 Bridge	42,817	53,247	2.8%	

Source: Traffic Analysis Technical Memorandum, Kimley-Horn, 2023.

[10] *The U.S. Geologic Survey defines a strong earthquake as a magnitude of 6.3 on the Richter Magnitude Scale (See https://pubs.usgs.gov/gip/earthq4/severitygip.html for additional information). TDOT typically design bridges to withstand a magnitude of seven (7) on the Richter Magnitude Scale.*

Improve Movement of Freight on Roadways

According to the *Mid-South Freight Flows and Industry Analysis* (WSP, February 2023)[11], the Memphis region is home to the Memphis International Airport which is the largest air cargo airport in the world in terms of tonnage (as of 2022). Memphis is also one of only four U.S. cities served by five or more Class 1 railroads, allowing businesses to ship by rail directly to any destination in North America.

The Port of Memphis and Port of West Memphis are also important logistics assets, providing access to the most important inland waterway system in the country, the Mississippi River.

And finally, the Mid-South (Memphis) region is home to a highway system that links these logistic assets, and provides connectivity throughout the U.S., with I-55 running from Chicago to the Gulf of Mexico, the planned I-69 corridor connecting to population centers in Canada, I-40 running coast-to-coast, and I-22 connecting to the rest of the Southeast.

A truck leaving Memphis can reach approximately 35 percent of the U.S. population overnight and 68 percent in just two days. Business Facilities magazine ranked Memphis as being the top ranked logistics hub in the U.S. and globally, in their 17th Annual Rankings Report, for its ability to "*move anything anywhere in the world efficiently*."

In terms of total tonnage, according to the *Mid-South Freight Flows and Industry Analysis* (WSP, February 2023)[12], truck freight represented 42 percent of the total tons in the Mid-South (Memphis) Region in 2019 and is forecasted to increase to 48 percent in 2050. Total truck tons are forecasted to increase an average of 2.4 percent by 2050.

Based on the *Traffic Analysis Technical Memorandum* (2023), existing truck traffic makes up over 40 percent of the total crossings on the I-55 bridge. The number of trucks crossings the river on I-55 is anticipated to increase from 20,400 per day in 2022 to 23,400 in 2050. This represents a 14.7 percent increase over the next 28 years in truck crossings utilizing the I-55 bridge.

1.10.3. Preliminary Purpose

- Identify a financially feasible alternative that takes into account on-going operation and maintenance costs, construction costs, and anticipated funding available.
- Improve structural deficiencies to meet current TDOT design standards.
- Develop a solution to that is capable of withstanding a strong earthquake[13] in order to provide route resiliency.

1.10.4. Secondary Goals

- Provide capacity relief and improve traffic operational efficiency for bridge crossings at I-40 and I-55.
- Enhance local and regional freight movement, including traffic generated by the airport, rail yards, and riverports.

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[11] Page 10 of the PDF: https://memphismpo.org/sites/default/files/documents/plans/multi-modals/freight/Mid-South%20Freight%20Flows%20and%20Industry%20Analysis%20-%20Final%20Report%20with%20Resolution.pdf
[12] Page 115 of the PDF: https://memphismpo.org/sites/default/files/documents/plans/multi-modals/freight/Mid-South%20Freight%20Flows%20and%20Industry%20Analysis%20-%20Final%20Report%20with%20Resolution.pdf

[13] The U.S. Geologic Survey defines a strong earthquake as a magnitude of 6.3 on the Richter Magnitude Scale (See https://pubs.usgs.gov/gip/earthq4/severitygip.html for additional information). TDOT typically design bridges to withstand a magnitude of 7 on the Richter Magnitude Scale.

1.11. Identification of Likely NEPA Class of Action

Environmental planners from the project team reviewed the proposed five corridor options as well as a No-Build option to identify a likely NEPA Class of Action documentation level (Categorical Exclusion, Environmental Assessment, or Environmental Impact Statement).

Table 17 identifies the anticipated environmental impacts, identification of likely NEPA Class of Action and the timing to complete the anticipated NEPA document by corridor.

It should be noted that these NEPA Class of Action documentation level recommendations are preliminary in nature and are based on a desktop review/analysis only. No public involvement activities or project scoping occurred as part of this preliminary environmental screening. Additional information gained in the project development process can affect environmental document level determinations (including detailed field investigations, relocation analysis, socioeconomic analysis as well as public opinion/level of controversy).

Also, coordination with FHWA and other resource agencies like the U.S. Army Corps of Engineers and the U.S. Coast Guard is necessary before any further environmental work proceeds. Ultimately, FHWA determines the information and level of documentation needed for a particular project.

Table 17: Anticipated Likely NEPA Class of Action and Timing by Corridor

Corridor	Anticipated Level of Environmental Impact (Based on Desktop Review Only)[1]	Identification of Likely NEPA Class of Action[1]	Timing to Complete Anticipated NEPA Document
No-Build	Not Applicable. The No-Build Alternative is required by federal regulations to be evaluated in the NEPA document. The No-Build Alternative provides a baseline for comparing against the other project alternatives. The No-Build Alternative would leave the study area surrounding area as it currently exists, other than routine maintenance of the existing roadway system as needed.		
Corridor 2	Location of the corridor is not near an existing bridge crossing; therefore, greater amounts of right-of-way would likely be required and could increase the likelihood of significant environmental impacts. An Environmental Impact Statement is prepared for projects where it is known that the action will have a significant effect on the environment.	Environmental Impact Statement	Two Years[2]
Corridor 4	Location of the corridor is not near an existing bridge crossing; therefore, greater amounts of right-of-way would likely be required and could increase the likelihood of significant environmental impacts. An Environmental Impact Statement is prepared for projects where it is known that the action will have a significant effect on the environment.	Environmental Impact Statement	Two Years[2]
Corridor 5A	Located near an existing bridge crossing; Unknown at this time whether or not the corridor will have significant environmental impacts based on desktop review. An Environmental Assessment is prepared for actions in which the significance of the environmental impact is not clearly established.	Environmental Assessment	One Year[3]
Corridor 5B	Located near an existing bridge crossing; Unknown at this time whether or not the corridor will have significant environmental impacts based on desktop review. An Environmental Assessment is prepared for actions in which the significance of the environmental impact is not clearly established.	Environmental Assessment	One Year[3]
Corridor 6	Location of the corridor is not near an existing bridge crossing; therefore, greater amounts of right-of-way would likely be required and could increase the likelihood of significant environmental impacts. An Environmental Impact Statement is prepared for projects where it is known that the action will have a significant effect on the environment.	Environmental Impact Statement	Two Years[2]

[1] It should be noted that this NEPA Class of Action documentation level recommendation are preliminary in nature and are based on a desktop review/analysis only. No public involvement activities or project scoping occurred as part of this preliminary environmental screening. Additional information gained in the project development process can affect environmental document level determinations (including detailed field investigations as well as public opinion/level of controversy). Also, coordination with FHWA and other resource agencies like the U.S. Army Corps of Engineers and the U.S. Coast Guard is necessary before any further environmental work proceeds. Ultimately, FHWA determines the information and level of documentation needed for a particular project.

[2] To ensure timely decision making, agencies shall complete: Environmental impact statements within two years unless a senior agency official of the lead agency approves a longer period in writing and establishes a new time limit. Two years is measured from the date of the issuance of the notice of intent to the date a record of decision is signed. (Source: https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10)

[3] To ensure timely decision making, agencies shall complete: Environmental assessments within one year unless a senior agency official of the lead agency approves a longer period in writing and establishes a new time limit. One year is measured from the date of agency decision to prepare an environmental assessment to the publication of an environmental assessment or a finding of no significant impact. (Source: https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10)

2. Conclusion and Next Steps

Based on the findings of the Targeted Approach for Crossing the Mississippi River a replacement of the existing I-55 bridge was found to be the option that is most cost-effective, resilient, and provides the most vehicle and freight travel benefits to the local, regional, and national network due to its proximity to the core area of the region. The cost-benefit analysis further demonstrates the long-term safety, economic competitiveness, and environmental sustainability benefits of the project and favorable[14] Benefit Cost Ratio for Corridors 5A (1.44) and 5B (1.03), the two bridge replacement options.

Further, based on the results of the preliminary screening utilizing available desktop resources only, Corridor 5A and Corridor 5B appear to be the least environmentally impactful when compared to the other corridors under consideration. Although detailed field investigations including but not limited to a relocation analysis, socioeconomic analysis, and public involvement activities will be required to formally agree with these preliminary determinations, for Corridors 5A and 5B, it is recommended that an Environmental Assessment would likely need to be pursued[15]. Under current federal regulations, an Environmental Assessment must be prepared in one year[16] and be 75 pages or less[17] (not including appendices). A comparison of the five corridors in summarized in Table 18.

Due to the high cost and the local, regional, and national significance of the project, it is recommended that TDOT and ARDOT work proactively with the Memphis community to request Community Project Funding / Congressionally Directed Spending and/or prepare and submit an application for a United States Department of Transportation (USDOT) competitive grant to fund the next phase of the project. TDOT and ARDOT are further encouraged to engage the public and conduct agency coordination as part of the next phase of the project should funding for the project be identified.

[14] A project is considered cost-effective when the BCR is 1.0 or greater.

[15] It should be noted that these NEPA Class of Action documentation level recommendations are preliminary in nature and are based on a desktop review/analysis only.

[16] https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10

[17] https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.5

Table 18: Corridor Comparison

	Corridor 2	Corridor 4	Corridor 5A	Corridor 5B	Corridor 6
Length (miles)	14.7	13.0	1.5	1.7	11
Benefits	• Higher upfront cost. • Additional regional life-cycle costs. • Requires the replacement of the existing I-55 bridge.	• Higher upfront cost. • Additional regional life-cycle costs. • Requires the replacement of the existing I-55 bridge.	• Provides additional capacity. • Adds reliability and resiliency. • Lower upfront cost. • Minimized regional life-cycle costs.	• Provides additional capacity. • Adds reliability and resiliency. • Lower upfront cost. • Minimized regional life-cycle costs.	• Higher upfront cost. • Additional regional life-cycle costs. • Requires the replacement of the existing I-55 bridge.
Drawbacks	• Higher upfront cost. • Additional regional life-cycle costs.	• Higher upfront cost. • Additional regional life-cycle costs.	• Does not add a river crossing outside downtown Memphis.	• Does not add a river crossing outside downtown Memphis.	• Higher upfront cost. • Additional regional life-cycle costs.
Total Primary Bridge Length (feet)	14,850	14,850	6,405	8,100	12,450
Total Design, Right-of-Way, and Construction Cost	$1,635,000,000	$1,578,000,000	$530,000,000	$752,000,000	$1,415,000,000
Total Additional Costs	$62,500,000	$62,500,000	$10,000,000	$10,000,000	$62,500,000
Existing I-55 Bridge Replacement	$540,000,000	$540,000,000	-	-	$540,000,000
Total Cost	$2,237,500,000	$2,180,500,000	$540,000,000	$762,000,000	$2,017,500,000
Benefit Cost Ratio[1]	0.79	0.73	1.44	1.03	0.01
Likely NEPA Class of Action[2]	Environmental Impact Statement	Environmental Impact Statement	Environmental Assessment	Environmental Assessment	Environmental Impact Statement
NEPA Timeframe	Two Years[3]	Two Years[3]	One Year[4]	One Year[4]	Two Years[3]

[1] A project is considered cost-effective when the BCR is 1.0 or greater. The total costs used for the benefit-cost analysis for Corridors 2, 4, and 6 do not include the replacement costs for the existing I-55 bridge.

[2] It should be noted that this NEPA Class of Action documentation level recommendation are preliminary in nature and are based on a desktop review/analysis only. No public involvement activities or project scoping occurred as part of this preliminary environmental screening. Additional information gained in the project development process can affect environmental document level determinations (including detailed field investigations as well as public opinion/level of controversy). Also, coordination with FHWA and other resource agencies like the U.S Army Corps of Engineers and the U.S. Coast Guard is necessary before any further environmental work proceeds. Ultimately, FHWA determines the information and level of documentation needed for a particular project.

[3] To ensure timely decision making, agencies shall complete: Environmental impact statements within two years unless a senior agency official of the lead agency approves a longer period in writing and establishes a new time limit. Two years is measured from the date of the issuance of the notice of intent to the date a record of decision is signed. (Source: https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10)

[4] To ensure timely decision making, agencies shall complete: Environmental assessments within one year unless a senior agency official of the lead agency approves a longer period in writing and establishes a new time limit. One year is measured from the date of agency decision to prepare an environmental assessment to the publication of an environmental assessment or a finding of no significant impact. (Source: https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A/part-1501/section-1501.10)

2.1. Community Project Funding / Congressionally Directed Spending

Based on recommendations from multiple advocacy organizations, congressional experts, and the House Select Committee on Modernization, Community Project Funding / Congressionally Directed Spending, or "earmarks," were reauthorized in 2021. Earmarks are an opportunity for a local government to apply for short-term, place-based funding outside of normal channels for federal spending. Requests are submitted by the local government to their Members of Congress. The earmark is then recommended by individual Members of Congress in the House of Representatives and Senate to the Appropriations Committee in each chamber. The Appropriations Committee then identifies the final requests to be included in annual federal spending bills (appropriations). The result of this process is that earmarks are identified based on each Member of Congress' understanding their own state's or district's needs, rather than awarded solely based on Federal agency priorities.

2.2. Infrastructure Investment and Jobs Act Discretionary Grants

The Infrastructure Investment and Jobs Act (IIJA) (also known as the Bipartisan Infrastructure Bill or BIL) was signed into law by President Joe Biden on November 15, 2021. The IIJA includes approximately $550 billion in new federal investment in America's aging infrastructure through formula funds and discretionary grants. The following lists the competitive grant programs that are most applicable to a new or replacement bridge crossing of the Mississippi River. Each grant program is summarized in Table 19.

2.2.1. Nationally Significant Multimodal Freight and Highway Projects Program — INFRA (23 U.S.C. 117)

The Nationally Significant Multimodal Freight and Highway Projects Program, or INFRA, awards competitive grants for multimodal freight and highway projects of national or regional significance to improve the safety, efficiency, and reliability of the movement of freight and people in and across rural and urban areas.

2.2.2. National, Regional and Local Assistance Grants (New 23 U.S.C. 6701 and 6702)

The grant program formerly known as Transportation Investment Generating Economic Recovery (TIGER), Better Utilizing Investments to Leverage Development (BUILD), and most recently Rebuilding American Infrastructure with Sustainability and Equity (RAISE) is now codified in federal statute and combined with a new program to fund large projects in need of federal funding assistance under one umbrella program, the National Infrastructure Investments.

2.2.2.1. National Infrastructure Project Assistance — MEGA (New 23 U.S.C. 6701)

The National Infrastructure Project Assistance Program, or MEGA, awards competitive grants for large, complex projects that are difficult to fund by other means and likely to generate national or regional economic, mobility, or safety benefits.

2.2.2.2. Regional and Local Project Assistance — RAISE (New 23 U.S.C. 6702)

The Regional and Local Project Assistance Program, or RAISE, provides a unique opportunity for the DOT to invest in road, rail, transit and port projects that promise to achieve national objectives.

2.2.3. Bridge Investment Program (New 23 U.S.C. 124)

The Bridge Investment Program (BIP) is a competitive, discretionary program that focuses on existing bridges to reduce the overall number of bridges in poor condition, or in fair condition at risk of falling into poor condition.

Table 19: Summary of USDOT Applicable Grant Programs

Grant Program	Implementing Agency	Funding	Period of Availability	Eligible Applicants	Eligible Projects	When is Funding Available?
Nationally Significant Multimodal Freight and Highway Projects Program — INFRA (23 U.S.C. 117)	Office of Multimodal Freight Infrastructure and Policy	• $8 billion • An additional $6 billion is authorized for future appropriations, so the total available funding could reach as much as $14 billion with future appropriations.	(Fiscal Year (FY) 22-FY26)	• State or a group of States • Metropolitan planning organization that serves an urbanized area (as defined by the Bureau of the Census) with a population of more than 200,000 individuals • Unit of local government or a group of local governments • Political subdivision of a State or local government • Special purpose district or public authority with a transportation function, including a port authority • Federal land management agency that applies jointly with a State or group of States • Tribal government or a consortium of Tribal governments • Multistate corridor organization • Multistate or multijurisdictional group of entities	The program seeks to fund projects that generally cost at least $100 million and: • Improve the safety, efficiency, and reliability of the movement of freight and people • Generate national or regional economic benefits and an increase in the global economic competitiveness • Reduce highway congestion and bottlenecks • Improve connectivity between modes of freight transportation • Enhance the resiliency of critical highway infrastructure and help protect the environment • Improve roadways vital to national energy security • Address the impact of population growth on the movement of people and freight	A Notice of Funding Opportunity (NOFO) for the Nationally Significant Multimodal Freight and Highway Projects Program — INFRA has not been published for 2023. In 2022, INFRA grant program funding was made available under the Multimodal Project Discretionary Grant Opportunity (MPDG) combined NOFO that allowed applicants to use one application to apply for up to three separate discretionary grant opportunities: • Nationally Significant Multimodal Freight and Highway Projects Program (INFRA) • National Infrastructure Project Assistance Program (MEGA) • Rural Surface Transportation Grant

National Infrastructure Project Assistance — MEGA (New 23 U.S.C. 6701)	Office of Intermodal Freight Infrastructure and Policy	• $5 billion
		• An additional $10 billion is authorized for future appropriations, so the total available funding could reach as much as $10 billion with future appropriations.
			(FY22-FY26)	• State or a group of States
				• Metropolitan planning organization
				• Unit of local government
				• Political subdivision of a State
				• Special purpose district or public authority with a transportation function, including a port authority
				• Tribal government or a consortium of Tribal governments
				• Partnership between Amtrak and one or more entities
				• Group of entities
					Half of the available funding must be provided to projects with total costs between $100 million and $500 million.
					
					• A highway or bridge project carried out on—
					  ○ The National Multimodal Freight Network of Title 49, United States Code (USC)
					  ○ The National Highway Freight Network of Title 49, USC
					  ○ The National Highway System of Title 49, USC
					  ○ A freight intermodal (including public ports) or freight rail project that provides a public benefit
					  ○ A railway-highway grade separation or elimination project
					  ○ An intercity passenger rail project
					  ○ Certain public transportation projects that are eligible for Federal Transit Administration funding of Title 49, United States Code, and is a part of one of other eligible project types above
						A NOFO for the National Infrastructure Project Assistance — MEGA has not been published for 2023.
						
						In 2022, MEGA grant program funding was made available under the Multimodal Project Discretionary Grant Opportunity (MPDG) combined NOFO that allowed applicants to use one application to apply for up to three separate discretionary grant opportunities:
						
						• National Infrastructure Project Assistance Program (MEGA)
						• Nationally Significant Multimodal Freight and Highway Projects Program (INFRA)
						• Rural Surface Transportation Grant

Grant Program	Implementing Agency	Funding	Period of Availability	Eligible Applicants	Eligible Projects	When is Funding Available?
Regional and Local Project Assistance — RAISE (New 23 U.S.C. 6702)	Office of Multimodal Freight Infrastructure and Policy	$8.25 billion[18]	(FY22-FY26)	• States and the District of Columbia • Any territory or possession of the United States • Unit of local government • Public agency or publicly chartered authority established by one or more States • Special purpose district or public authority with a transportation function, including a port authority • Federally recognized Indian Tribe or a consortium of such Indian Tribes • Transit agency • Multi-State or multijurisdictional groups • In addition to projects located in the United States, eligible projects for RAISE grants include projects that are necessary for reconstruction of the Alaska Highway from the Alaskan border at Beaver Creek, Yukon Territory, to Haines Junction in Canada and the Haines Cutoff Highway from Haines Junction in Canada to Haines, Alaska, as provided in 23 United States Code 218.	The grants awarded under this program must be at least $1 million for rural areas and $5 million for urban areas with no more than 15 percent of the funds available going to any one state in a single year. Additionally, the program requires a 50-50 split between urban and rural projects and requires that at least 1 percent of available funds go toward projects in historically disadvantaged communities or areas of persistent poverty, as defined by the Infrastructure Investment and Jobs Act. • Capital projects including but not limited to: ○ Highway, bridge, or other road projects eligible under Title 23, United States Code ○ Public transportation projects eligible under Chapter 53 of Title 49, United States Code ○ Passenger and freight rail transportation projects ○ Port infrastructure investments (including inland port infrastructure and land ports of entry) ○ The surface transportation components of an airport project eligible for assistance under Part B of Subtitle VII ○ Intermodal projects ○ Project to replace or rehabilitate a culvert or prevent stormwater runoff for the purpose of improving habitat for aquatic species while advancing the goals of the RAISE program. ○ Projects investing in surface transportation facilities that are located on Tribal land and for which title or maintenance responsibility is vested in the Federal Government. ○ Any other surface transportation infrastructure project that the Secretary considers to be necessary to advance the goals of the program). • Planning projects which include planning, preparation, or design (for example-environmental analysis, feasibility studies, benefit cost analysis (BCA), and other pre-construction activities) of eligible surface transportation capital projects.	A NOFO for the Regional and Local Project Assistance — RAISE Program already been published for 2023. The deadline for submittal of FY23 RAISE grant applications was February 28, 2023.

Grant Program	Implementing Agency	Funding	Period of Availability	Eligible Applicants	Eligible Projects	When is Funding Available?

Bridge Investment Program (New 23 U.S.C. 124)	Federal Highway Administration	$12.5 billion	(FY22-FY26)	• State or a group of States
				• Metropolitan planning organization that serves an urbanized area with a population of over 200,000
				• Unit of local government or a group of local governments
				• Political subdivision of a state or local government
				• Special purpose district or public authority with a transportation function
				• Federal land management agency
				• Tribal government or a consortium of Tribal governments
				• Multistate or multijurisdictional groups
					• Development phase activities, including planning, feasibility analysis, revenue forecasting, environmental review, preliminary engineering and design work, and other preconstruction activities.
					• Construction, reconstruction, rehabilitation, acquisition of real property (including land related to the project and improvements to the land), environmental mitigation, construction contingencies, acquisition of equipment, and operational improvements directly related to improving system performance.
					• Expenses related to protection (as described in 23 United States Code 133(b)(10)) of a bridge, including seismic or scour protection.
					
					Three types of awards:
					
					• Large Bridge Project Grants
					  ○ A maximum award amount cannot exceed 50 percent of the total eligible projects cost
					  ○ A minimum award amount of $50 million
					• Bridge Project Grants
					  ○ A maximum award amount cannot exceed 80 percent of the total eligible project cost
					  ○ A minimum award amount of $2.5 million
					• Planning Grants (for planning, feasibility analysis, and revenue forecasting of a project that would subsequently be eligible to apply for BIP funding).
						A NOFO for the Bridge Investment Program has not been published for 2023.
						
						In 2022, Bridge Investment Program grant program funding was made available under three separate discretionary grant opportunities:
						
						• Planning Grants
						  ○ The deadline for FY22 BIP Planning grant applications was July 25, 2022.
						• Large Bridge Project Grants
						  ○ The deadline for FY22 BIP Large Bridge Project grant applications was August 9, 2022.
						• Bridge Project Grants
						  ○ The deadline for FY22 BIP Bridge Project grant applications was September 8, 2022.

[18] The 2022 Consolidated Appropriations Act provided an additional $750 million for the RAISE program, making $2.25 billion available in fiscal year 2022. An additional $7.5 billion is authorized for future appropriations, so the total available funding could reach as much as $15 billion with future appropriations.

Appendices

Appendix A: Review of Previous Work Technical Memorandum

Appendix B: Conceptual Roadway and Bridge Evaluation Criteria Technical Memorandum

Appendix C: Roadway and Bridge Feasibility and Cost Analysis Technical Memorandum

Appendix D: Travel Demand Model Base Year Validation Technical Memorandum

Appendix E: Future Year Travel Demand Forecast Technical Memorandum

Appendix F: Benefit Cost Analysis Technical Memorandum

Appendix G: Purpose and Need / Likely NEPA Class of Action Technical Memorandum