MEMORANDUM

Missouri Department of Transportation

Saint Louis District - Design

DATE: March 4, 2025

TO: Thomas Blair, P.E.
District Engineer

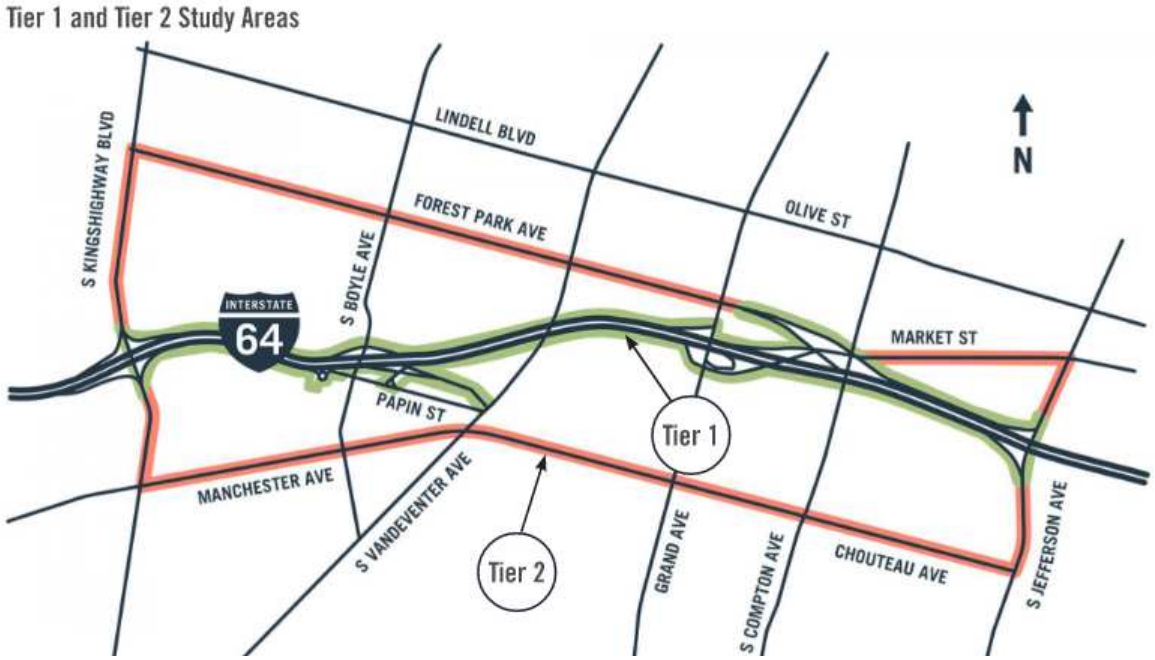
FROM: Heather Copeland, P.E.
Project Manager

SUBJECT: District St. Louis - Design
Route I-64, City of St. Louis
Future64 Corridor Improvements
J6I3585
Conceptual Study Report

REMARKS

Purpose of the Study

The purpose of the Conceptual Study Report (CSR) was to build on the analysis that was performed during the Future64 PEL (PEL) study, completed in 2023. The project limits remain the same as the PEL and include the I-64 corridor (Tier 1) from the western limit of Kingshighway Boulevard to the eastern limit of Jefferson Avenue, a total of 2.7 miles. A second area (Tier 2) includes the transportation system north of I-64 to Forest Park Avenue and south to Route 100 (Chouteau Avenue/Manchester Avenue).



The PEL identified three Reasonable Alternatives that met the Purpose and Need to move forward for further study. Each alternatives strengths and weaknesses were discovered through the analysis and the public engagement efforts that informed the final screening of the alternatives. The PEL provided guidance in the Implementation Plan for next steps in the project development and planning process. These included recommendations for refinement of alternatives, as well as potential projects including early action bridge projects. MoDOT has already taken action addressing the I-64 EB and WB bridges over Vandeventer Ave, under project J6I3502 /J6I3574. These bridges are not addressed in this CSR.

Prior to beginning the Conceptual Phase of the project, there was additional coordination with the City of St. Louis on the Grand Blvd. and Forest Park Avenue Intersection. Ultimately this intersection is the responsibility of the City, and through this coordination it was decided to use the existing condition of the grade separated intersection at this location. The City will continue to review this intersection and propose improvements however for the purposes of this study improvements would tie into the existing condition.

The focus of this CSR is the evaluation of the reasonable alternatives and considerations of the recommended refinements from PEL to develop a Recommended Concept for the corridor.

Recommended Concept Development

The development of the Recommended Concept was a two-phase process consisting of an Initial and Refined Recommended Concept.

Initial Recommended Concept
The development of the Initial Recommended Concept was based on the previous findings and recommended refinements to the three Reasonable Alternatives from the PEL. It is important to note that the alternatives from the PEL were developed to allow for analysis and evaluation of various components of each alternative, and it was envisioned that the Recommended Concept would be a combination of components from all three Reasonable Alternatives.
Components include interchange ramp configuration, a particular alignment of a roadway, access to transit or a type of intersection that was part of one or more of the alternatives. Each component (19 total) from the three Reasonable Alternatives were evaluated with additional screening criteria as part of this CSR which included:

- Geometrics/Standards - The extent to which the alternative’s component meets the standards proposed in the design criteria.
- Safety - The extent to which the alternative’s component maintains and/or improves safety for vehicles, pedestrians and/or cyclists.
- Traffic Operations - The extent to which each alternative’s component supports intuitive and efficient traffic movements for all road users.
- Environmental Impacts - The extent to which each alternative's has impact on the natural, social, and built environment.

- Economic Development -The extent to which each alternative's component provides additional developable land or could spur development.
- Construction Costs - The extent to which the alternative's component cost estimate is relative to the other alternatives cost estimates.
- Constructability/Maintenance of Traffic - The extent to which the alternative's component can maintain existing lanes of travel.
- ROW Impacts -The extent to which the alternative's component requires right-of-way purchase or relocation.
- Utility Impacts - The extent to which the alternative's component requires utility relocations.
- Asset Management - The extent to which the alternative's component addresses existing asset management needs or creates additional assets.

A screening matrix was developed showing how each component addressed the criteria. This information along with a summary of public feedback including the final public meeting and Community and Technical Advisory Group (CAG & TAG) meetings was evaluated and distilled by the project team and provided to participants of the Recommended Concept Development Workshop which was held on March 28, 2024. Participants included the consultant team, MoDOT, City of St. Louis, St. Louis Development Corporation (SLDC), East-West Gateway Council of Governments (EWG), and Great Rivers Greenway (GRG). During the meeting participants were divided into small groups and asked to provide priority elements at the two main interchange locations in the corridor defined as the West and East interchange locations. The feedback provided from this workshop led to the development of the Initial Recommended Concept. **Appendix A** provides a summary of the meeting including recommendations and the initial screening matrix.

The Initial Recommended Concept was developed and presented to the City of St. Louis during a stakeholder meeting on May 15, 2024, to gain concurrence of concept prior to sharing it with the CAG and TAG. The City concurred with the Initial Recommended Concept which is shown in **Appendix B**.

The CAG and TAG were convened on June 4, 2024, to review the Initial Recommended Concept and provide feedback. Overall, the feedback was positive and provided guidance for minor refinement. A summary of the meetings is provided in **Appendix C**.

Refined Recommended Concept

Based on the feedback provided from the initial concept, refinements were made to the geometry and components of the improvements to the corridor. This Refined Recommended Concept would be the basis of all technical analyses performed during the Conceptual Study. Additionally, the design was advanced from the PEL's 5% design to approximately 15% design for the CSR. The Design Criteria shown in **Appendix D** prepared during the PEL was utilized for this phase of the project as well. To advance the design, several additional design components were evaluated, including:

- Horizontal Alignments - Proposed alignments were designed to meet appropriate design speeds with sufficient radii. The number of lanes was refined in several areas based on the traffic evaluation and updated proposed City of St. Louis projects. Bicycle and pedestrian infrastructure types were selected for each location and drawn to scale with the roadway linework.
- Vertical Alignments - Conceptual profiles were designed for new ramps and roadways. The existing ground profiles were generated from a mix of pickup survey data and publicly available four-foot GIS contours. Where vertical clearance needed to be considered, clearance was based on the Design Criteria and a structure depth of four feet.
- Retaining Walls - With conceptual vertical alignments designed, retaining wall locations were identified and located in the plan view. Retaining wall heights could be estimated by comparing the proposed profiles to the existing elevations and were used to estimate costs. Each location was further evaluated for the type of retaining wall that could be constructed, including MSE (mechanically stabilized earth), CIP (cast-in-place), or a barrier wall.
- Stormwater Detention – Knowing that stormwater detention would be required for final design, potential detention areas were identified by locating available greenspace that is considered downstream of the roadway.

The Recommended Concept is shown in **Appendix E**, while horizontal alignments can be found in **Appendix F**, and vertical profiles in **Appendix G**.

The evaluation of existing conditions was performed during the PEL and not included in the CSR, however the Future64 Existing Conditions Technical Memo can be found in **Appendix H**.

☒ Major Route ☐ Minor Route

DESIGN TRAFFIC
I-64 Eastbound
ADT (Const.) = 55,280
ADT (Design) = 60,220
DHV = 5,450
% Trucks = 12%
Operational (Posted) Speed = 55 mph

DESIGN TRAFFIC
I-64 Westbound
ADT (Const.) = 56,580
ADT (Design) = 62,530
DHV = 4,960
% Trucks = 18%
Operational (Posted) Speed = 55 mph

CONCEPTUAL COST ($1,000's)

Right of Way: TBD
Construction: $146,100

Proposed Corridor Improvements

The proposed corridor improvements presented in the Recommended Concept concentrate on the two main interchange complexes within the corridor, which are divided by a stretch of I-64 that is mostly on structure and is being addressed by J6I3502/J6I3574. The West Interchange was defined in the PEL to include the Boyle Ave. /Tower Grove Ave. full interchange as well as the partial interchange with Vandeventer Ave. The East Interchange includes the Grand Ave./Market Street/Bernard Street and Forest Park interchanges.

In the Implementation Plan section of the PEL several projects of independent utility were identified within each interchange location. The projects have been further evaluated during this phase and are described below.

West Project 1 – Tower Grove Bridge Multimodal Improvements

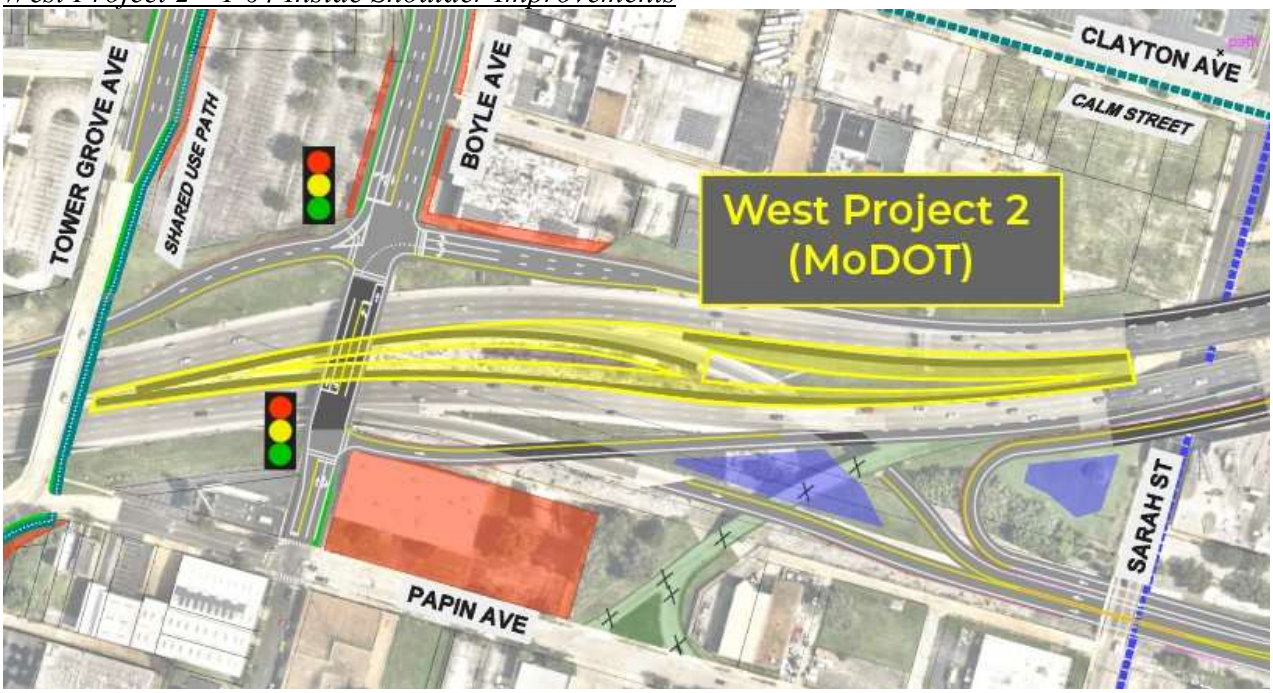
This project improves the multimodal facilities across I-64 along the Tower Grove Ave. bridge. This may include widening the existing bridge or adding a stand-along bridge to provide a shared-use path separated from traffic.

Table 1 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 1. West Project 1 Costs in 2024 Dollars

Total Cost - West Project 1	Recommended Concept
MoDOT	$1,800,000
Shared (MoDOT + Local Agency)	n/a
Local Agency	$100,000

West Project 2 – I-64 Inside Shoulder Improvements



This project includes widening of the I-64 westbound and eastbound inside shoulder to ten feet from approximately Tower Grove Ave. to the Sarah St. Bridge.

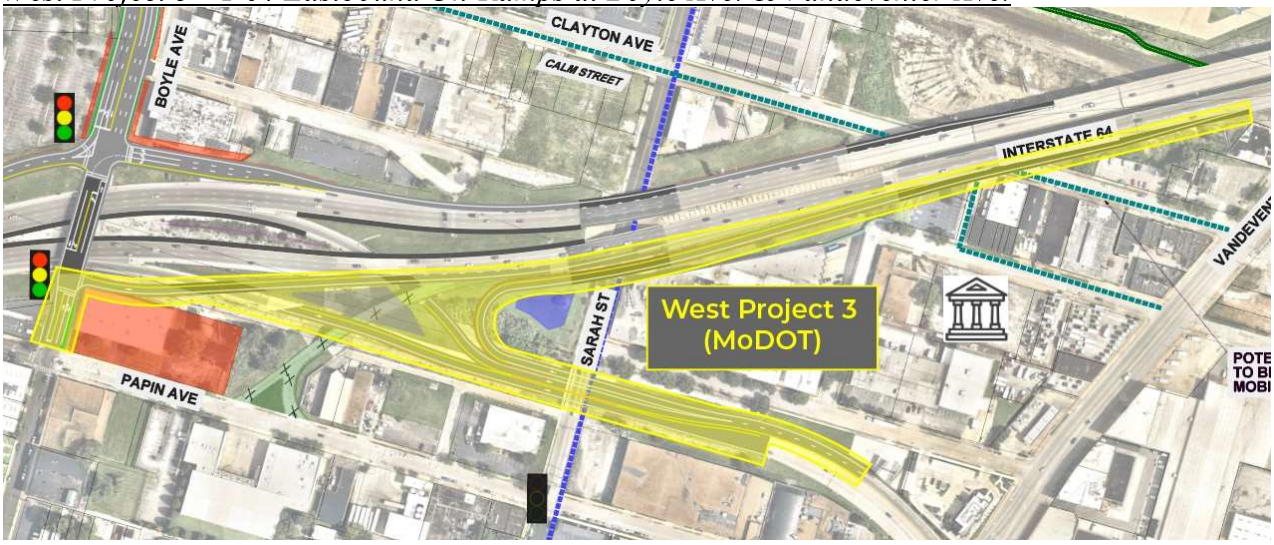
Table 2 provides the estimated engineering and construction cost for the Recommended Concept.

It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 2. West Project 2 Costs in 2024 Dollars

Total Cost – West Project 2	Recommended Concept
MoDOT	$1,100,000
Shared (MoDOT + Local Agency)	n/a
Local Agency	n/a

West Project 3 – I-64 Eastbound On-Ramps at Boyle Ave. & Vandeventer Ave.



This project includes relocating the Papin Ave. to eastbound I-64 on-ramp west to Boyle Ave. and lengthening the acceleration lane. It also includes adding a loop ramp to eastbound I-64 from Vandeventer Ave, with modifications to the existing on/off ramp system that crosses under Sarah St.

The Boyle Ave. to eastbound I-64 on-ramp crosses over the existing on-off ramps to Vandeventer Ave. and merges into I-64. The loop ramp from Vandeventer Ave. to eastbound I-64 passes beneath Sarah St., gaining elevation then crossing back over Sarah St. with a parallel bridge to eastbound I-64, and merges into I-64 eastbound separately from the Boyle Ave. ramp. The loop ramp's acceleration lane extends onto the eastbound I-64 bridge over Vandeventer Ave. The length from gore to gore of these proposed entrance ramps is over 1000' per the standard. Retaining walls will be required in several locations along these ramps to stay within MoDOT right-of-way and minimize impacts to the existing roadway system.

To maximize the space for the loop ramp and enable it to be vertically separated from the adjacent ramp, the westbound on-ramp from Vandeventer Ave. and the eastbound off-ramp to Vandeventer Ave. were realigned and shifted to the south to utilize the existing opening under the Sarah St. overpass. To provide the space needed for both lanes under the southern side of the bridge, the off-ramp was reduced to one lane through this section. The existing bridge opening is wide enough to accommodate both ramps; however, the existing retaining walls will need to be extended to the east and west. The location of the I-64 on-ramp from Vandeventer Ave. is located in a highly constrained area. The design in this study provides the minimum horizontal radius for 20 mph and results in a vertical grade of approximately 7.5%. The ramp is constrained vertically by the required clearance over Sarah St. This issue is a result of the limited space available to lengthen the ramp to provide additional clearance prior to Sarah St. resulting in the 7.5% grade. The geometry and length of the ramp maintains separation from the mainline of the interstate until trucks can achieve a minimum operating speed of 40mph (achieving greater than 70% of the mainline operating speed of 55mph). The ramp acceleration lane distance allows for

acceleration to mainline speeds. With more complete topographical information in final design, this profile may be able to be optimized to reduce the grade below 7%. During the preliminary design phase this ramp will be re-evaluated based on the survey and if the grade is still above 7% then a design exception request will be prepared and submitted for approval.

Potential stormwater detention areas were identified in the available green space adjacent to the eastbound I-64 to Vandeventer Ave. off-ramp and inside the Vandeventer Ave. to eastbound I-64 loop ramp. There is an existing roadside ditch that could be expanded to increase its capacity. Both potential stormwater detention areas are located at a low point on Mainline I-64 and could intercept significant amounts of water from the interstate. There are some impacts due to the widened shoulders proposed along I-64 that would potentially decrease the existing stormwater detention volume located in the median and gore areas near the Vandeventer ramps along I-64. During preliminary design the reduction in volume will need to be accounted for with the other detention areas proposed.

Table 3 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 3. West Project 3 Costs in 2024 Dollars

Total Cost - West Project 3	Recommended Concept
MoDOT	$13,000,000
Shared (MoDOT + Local Agency)	$1,000,000
Local Agency	n/a

West Project 4 – Clayton Ave. Intersections with Tower Grove Ave. and Boyle Ave.

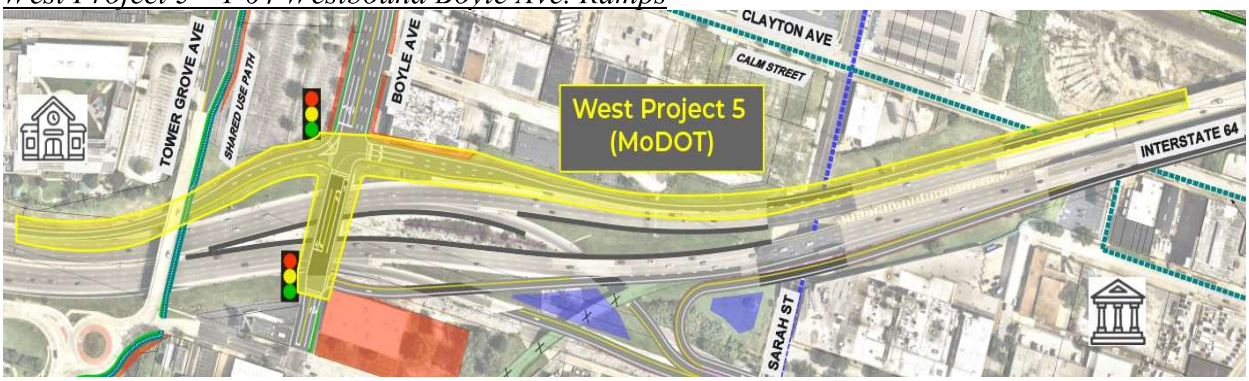
This project includes improvements to the local road network by adding capacity to Clayton Ave. intersections with Tower Grove Ave. and Boyle Ave. bicycle and pedestrian facilities that are separated from traffic are added to Tower Grove Ave., Clayton Ave., and extend north on Boyle Ave.

Table 4 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 4. West Project 4 Costs in 2024 Dollars

Total Cost - West Project 4	Recommended Concept
MoDOT	n/a
Shared (MoDOT + Local Agency)	n/a
Local Agency	$4,600,000

West Project 5 – I-64 Westbound Boyle Ave. Ramps



This project includes the following improvements:

- Westbound I-64 on-ramp is widened to two lanes.
- Westbound I-64 off-ramp deceleration lane is lengthened, and the ramp is widened to allow for an additional right-turn lane.
- The Boyle Ave. overpass is widened to carry four lanes from the westbound I-64 ramp intersection to Papin St., including the bridge carrying Boyle Ave. over I-64 (A8052).

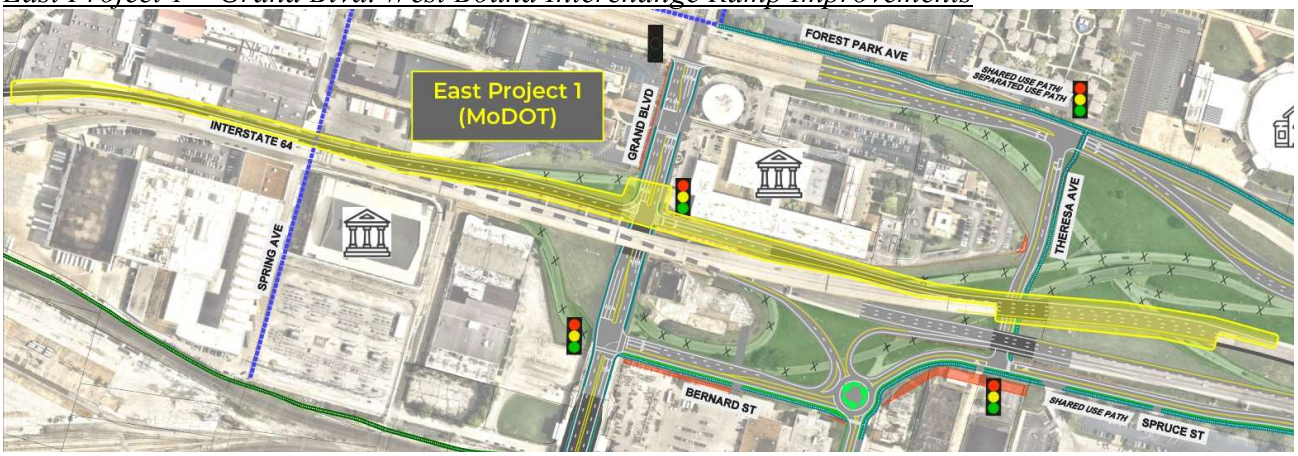
To accommodate the widening on both Boyle Ave. on/off ramps, retaining walls will be required to reduce impacts to adjacent properties and stay within MoDOT right-of-way.

Table 5 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 5. West Project 5 Costs in 2024 Dollars

Total Cost - West Project 5	Recommended Concept
MoDOT	$12,000,000
Shared (MoDOT + Local Agency)	$300,000
Local Agency	n/a

East Project 1 – Grand Blvd. West Bound Interchange Ramp Improvements



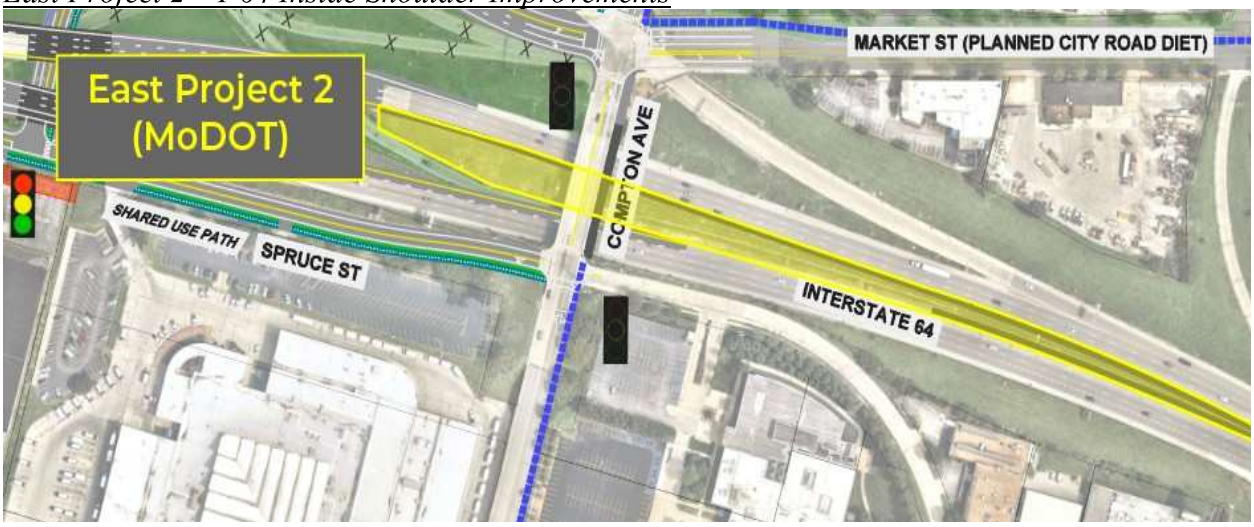
This project includes constructing a new two-lane I-64 westbound off-ramp to Grand Blvd. and reconstructing the I-64 westbound on-ramp from Grand Blvd. to align the ramps and create a signalized intersection at Grand Blvd. An additional lane will be added to the on-ramp to westbound I-64 from Grand Blvd. A retaining wall will be required on the I-64 westbound off-ramp to Grand Blvd., between the ramp and eastbound I-64 where there is an existing concrete slope. In this location, the I-64 westbound viaduct goes over I-64 westbound, and Grand Blvd. crosses perpendicular between them.

Table 6 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 6. East Project 1 Costs in 2024 Dollars

Total Cost - East Project 1	Recommended Concept
MoDOT	$50,600,000
Shared (MoDOT + Local Agency)	$1,100,000.00
Local Agency	n/a

East Project 2 – I-64 Inside Shoulder Improvements



This project includes the following improvements:

- Widening of the inside shoulder on I-64 eastbound from west of Compton Ave. to just east of Ewing Ave.
- Widening of the inside shoulder on the I-64 westbound from west of Compton Ave. to just east of Ewing Ave.

Table 7 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 7. East Project 2 Costs in 2024 Dollars

Total Cost - East Project 2	Recommended Concept
MoDOT	$800,000
Shared (MoDOT + Local Agency)	n/a
Local Agency	n/a

East Project 3 – Bicycle and Pedestrian Improvements on Grand Boulevard

This project includes reconfiguring the existing Grand Blvd. bridge to carry dedicated directional bicycle facilities that are separated from traffic.

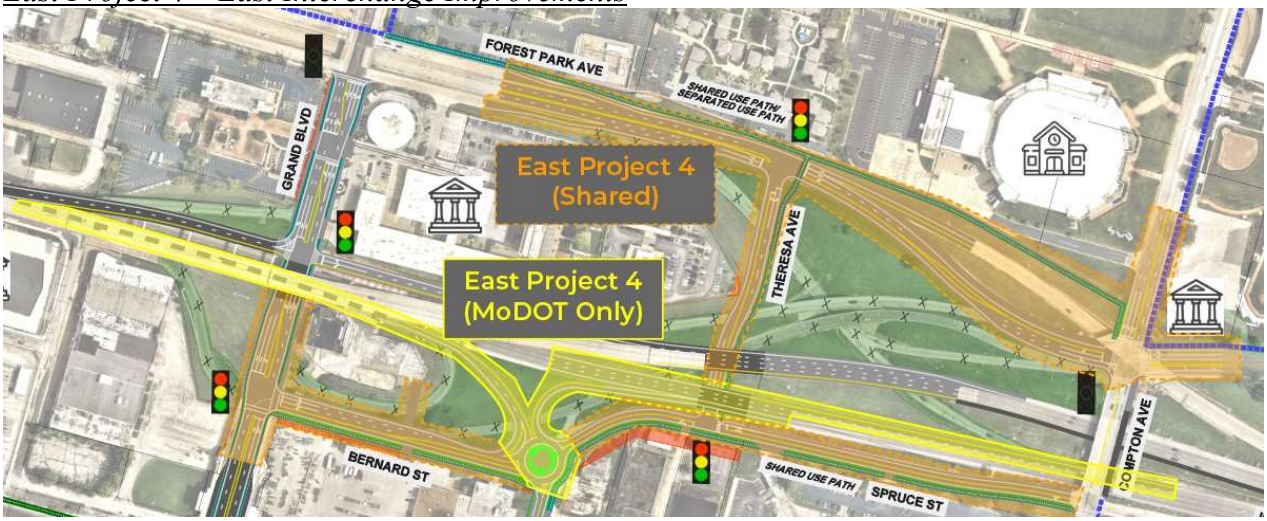
To accomplish this, the center median is reduced to gain additional width for the bicycle lanes and barriers to separate them from the vehicle lanes. Bus access to the existing MetroLink station at Grand will be maintained and the pedestrian sidewalks not affected.

Table 8 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 8. East Project 3 Costs in 2024 Dollars

Total Cost - East Project 3	Recommended Concept
MoDOT	n/a
Shared (MoDOT + Local Agency)	n/a
Local Agency	$4,300,000.00

East Project 4 – East Interchange Improvements



This project includes the following improvements:

- Reconfigure I-64 eastbound ramps to access Grand Blvd. in the southeast quadrant of the interchange to connect to Bernard St., Spruce St., and S. Theresa St. with a roundabout.
- Realign Forest Park Ave. to create a four-way intersection at Market St. by removing Grand Blvd. to I-64 eastbound ramp, Grand Blvd. to Market St. eastbound ramp, Market St. to I-64 westbound ramp, and I-64 eastbound to Market St. ramp.
- Remove Grand Blvd. bridge over I-64 eastbound to Market St. ramp and establish at-grade intersection at Grand Blvd. and Bernard St.
- Widen Grand Blvd. from Bernard St. to Forest Park Ave. and reconstruct Grand Blvd. bridge over I-64 eastbound/under I-64 westbound.
- Provide a north/south connection via N. Theresa Ave. from Forest Park Ave. to Spruce St.
- Provide a shared-use path connecting from Grand Blvd. to Theresa Ave. and along Forest Park Ave. to Compton Ave.

The roundabout was located horizontally to accommodate the connections to Bernard St., Theresa Ave., Spruce St., and the I-64 eastbound on/off ramps. Vertically, a roundabout elevation of 480.00’ was chosen to align with the existing elevations on the south and east side of the roundabout, where it is close to the adjacent buildings and doesn’t have flexibility in elevation. A 5% maximum grade was maintained to meet ADA requirements for pedestrians where bicycle or pedestrian facilities are present.

The Theresa Ave. horizontal alignment was located to fit between the existing bridge columns. This also allows flexibility in construction staging if they are unable to be fully removed.

Retaining walls will be required to keep vertically separated roadways close together to minimize the overall footprint, reduce impacts to adjacent properties and minimize right-of-way takings. Included are locations along the south side of Bernard St., between the roundabout to I-64 eastbound ramp and Spruce St., and along Theresa Ave.
With the removal of the existing ramp system north of I-64 and restoring the roadway grid, there is a great opportunity to redevelop the available land. It will require significant grading to restore the site which was not accounted for in the design or estimate. The future design is variable depending on the proposed use.

Table 9 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 9. East Project 4 Costs in 2024 Dollars

Total Cost - East Project 4	Recommended Concept
MoDOT	$15,100,000.00
Shared (MoDOT + Local Agency)	$23,900,000.00
Local Agency	n/a

East Project 5 – Theresa Avenue Extension South with Grade-Separated Railroad Crossing

This project includes a new grade-separated crossing over the railroad tracks to allow Theresa Ave. to connect the two existing segments of Theresa Ave. that are currently separated by the railroad tracks. A shared use path parallels the roadway, enabling an additional bicycle and pedestrian crossing over the railroad. This project can be done independently of the Theresa Ave. extension to the north.

The proposed profile for the Theresa Ave. bridge over the railroad was designed to maintain a vertical clearance of 23'-6" over the heavy rail lines and 17'-6" over the Metrolink light rail line. The vertical raise of Theresa Ave. will also affect the adjacent Scott Ave. profile, requiring some reconstruction to maintain the existing intersection. A 5% maximum grade was maintained to meet ADA requirements for pedestrians.

Retaining walls will be necessary along this stretch of Theresa Ave. to reduce impacts to adjacent properties and stay within St. Louis City right-of-way.
Table 10 provides the estimated engineering and construction cost for the Recommended Concept. It is broken down between improvements to be funded by MoDOT, shared between MoDOT and local agencies, and only local agencies.

Table 10. East Project 5 Costs in 2024 Dollars

Total Cost - East Project 5	Recommended Concept
MoDOT	n/a
Shared (MoDOT + Local Agency)	n/a
Local Agency	$15,200,000.00

Constructability/Project Phasing

It is important to consider not just the final conditions of all the potential finished projects, but also a realistic phasing of how they can be constructed to minimize traffic impacts. With the scheduled construction for the new I-64 EB bridge over Vandeventer Ave. and the major rehabilitation of the I-64 WB bridge over Vandeventer as part of J6I3502 /J6I3574, there is an opportunity to maximize the work that can be accomplished during that project. For the purpose of this evaluation, it is assumed that during the construction of the I-64 EB bridge the existing I-64 EB lanes will have no traffic on them from the EB exit to Vandeventer to the EB on-ramp from Forest Park Avenue.

- Construct portions of East Project 4 during the planned eastbound I-64 shut down to reconstruct the bridge over Vandeventer Ave. Since the crossover of the eastbound I-64 lanes is east of Compton Ave., Bernard St., the on/off ramps, the roundabout, Spruce St., could be constructed during the shutdown. The eastbound I-64 to Market St. off-ramp could be closed and partly demolished to remove/reconstruct the eastbound I-64 bridges. Once the roundabout to eastbound I-64 on-ramp connection is completed, the Forest Park Ave. to eastbound I-64 ramp can be closed and demolished.
- The Grand Ave. to westbound I-64 on-ramp could then be reconstructed. Maintaining the Market to westbound I-64 on ramp will be crucial during this time to give drivers a close detour during construction.

- Once the westbound on-ramp from Grand Blvd. is completed, the Market St. to westbound I-64 ramp can be closed and demolished. With the existing ramps removed, westbound I-64 can be reconstructed to remove the extra bridges along I-64 westbound and the westbound I-64 to Grand Blvd. off-ramp can be constructed. This work would be done concurrently with the westbound I-64 rehabilitation project.
- Once the I-64 eastbound and westbound bridge removals and reconstruction over Theresa Ave. are complete, the Theresa Ave., Forest Park Ave., and Market St. intersections can be completed.
- Once the I-64 mainline improvements are complete, then the Grand Ave. construction can take place. By performing the work at this stage it will reduce the impacts as much as possible to the north-south traffic on Grand. Once the Grand Ave. bridge at I-64 is widened, the rest of the roadway can also be widened to accommodate the additional lanes.
- Phasing the majority of the West Interchange improvements after the I-64 Vandeventer Bridge projects are completed would be beneficial to allow for more efficient MOT scenarios during both projects. There may be some benefit to performing the widening of the WB I-64 ramps to and from Boyle Ave from West shown in Project 5 during rehabilitation of the I-64 WB bridge over Vandeventer. Constructing Local Project 4 at the West Interchange in conjunction with this work would allow for full utilization of the ramp capacity improvements.
- West Projects 2, 3 and Local Project 1 can be constructed at any time after the completion of the I-64 Vandeventer bridge projects.

Utility Impacts

The utility information used for the assessment of the utility impacts was developed from the utility information collected during the PEL, for more information see **Appendix H.**
Most utilities within MoDOT right of way are installed under the permit process. Relocation of facilities in this classification are non-reimbursable. Meaning that the utility owner is responsible for all costs, associated with any relocation of their facilities, required to accommodate roadway improvements. However, some utility facilities exist within MoDOT right of way with prior rights. Two utilities with facilities that often fall in this category are Lumen (Legacy CenturyLink) and City of St. Louis Water.

MoDOT and Lumen are parties to an agreement that grants Lumen an easement for the placement of Lumen facilities along routes in MoDOT's St. Louis Freeway System. This easement provides for Lumen's cost of relocation to be reimbursed by MoDOT.
City of St. Louis Water facilities crossing the MoDOT I-64 corridor likely pre-date the highway. Based on this, cost for relocation of these facilities to accommodate roadway improvements are MoDOT's responsibility.

Based on this information, the Recommended Concept was reviewed to identify and quantify potential impacts to Lumen and City of St. Louis Water facilities. Range of magnitude (ROM) unit costs were then applied to the linear relocation quantities to generate ROM costs.

Below are the potential conflicts and the ROM utility relocation cost estimate is shown in Table 11 for the Recommended Concept:

Potential Utility Impacts

1. 6” City Water Main vs proposed structure crossing I-64 along Tower Grove Ave. (375 FT conflict)
2. 6” City Water Main vs proposed structure crossing I-64 along Boyle Ave. (350 FT conflict)
3. CenturyLink buried fiber along N. side of I-64 between Newstead and Sarah St (2450 FT conflict)
4. 12” City Water Main vs proposed EB & WB I-64 ramp structures at Sarah St (250 FT conflict)
5. 12” City Water Main vs proposed structure along WB I-64 at Foundry (140 FT conflict)
6. 8” City Water Main vs proposed structure along WB I-64 at Spring Ave. (140 FT conflict)
7. 12” City Water Main vs proposed WB I-64 ramp structure and proposed underpass at Prospect Ave. (140 Conflict)
8. 30” City Water Main vs proposed underpass and proposed structures at Grand (350 FT conflict)
9. CenturyLink buried fiber along Bernard St from west of Grand to Edwin St (1500 FT conflict)
10. 30” City Water main vs proposed improvements at Grand and Forest Park Ave. (300 FT conflict)
11. 12” City Water main vs proposed improvements at Theresa Ave. (175 FT conflict)
12. 48” City Water main vs proposed improvements at Theresa Ave. (175 FT conflict)
13. 20” City Water main vs proposed improvements at Theresa Ave. (175 FT conflict)
14. 36” City Water main vs proposed ramp structure at Edwin St (100 FT conflict)
15. 30” City Water vs proposed structure at Market and Compton (225 FT conflict)
16. 12” City Water vs proposed structure at Market and Compton (225 FT conflict)

Table 11. ROM Reimbursable Utility Relocation Costs

No.	Utility Owner	Facility	Estimated Length Conflict (LF)	Unit Cost	Total Cost
1	City Water	6" Main	375	$ 270.00	$ 101,250.00
2	City Water	6" Main	350	$ 270.00	$ 94,500.00
3	CenturyLink	Buried Fiber	2450	$ 80.00	$ 196,000.00
4	City Water	12" Main	250	$ 350.00	$ 87,500.00
5	City Water	12" Main	140	$ 350.00	$ 49,000.00
6	City Water	8" Main	140	$ 300.00	$ 42,000.00
7	City Water	12" Main	140	$ 350.00	$ 49,000.00
8	City Water	30" Main	350	$ 950.00	$ 332,500.00
9	CenturyLink	Buried Fiber	1500	$ 80.00	$ 120,000.00
10	City Water	30" Main	300	$ 950.00	$ 285,000.00
11	City Water	12" Main	175	$ 350.00	$ 61,250.00
12	City Water	48" Main	175	$ 1,250.00	$ 218,750.00
13	City Water	20" Main	175	$ 530.00	$ 92,750.00
14	City Water	36" Main	100	$ 1,100.00	$ 110,000.00
15	City Water	30" Main	225	$ 950.00	$ 213,750.00
16	City Water	12" Main	225	$ 350.00	$ 78,750.00
					$ 2,132,000.00

ROW Impacts

Right-of-way impacts of the recommended concept were evaluated and displayed on the strip map in **Appendix E**. The need for right-of-way is primarily portions or strips of property to accommodate the improvements and include parcels along MoDOT and City routes. One total property acquisition is required in the northeast quadrant of the Boyle and Papin intersection. Table 12 shows the approximate area of right-of-way acquisition required.

Table 12. Approximate ROW Impacts

	Project	STRIP TAKES (SQFT)				TOTAL TAKES (SQFT)	
		MODOT	CITY	SHARED	TOTALS	MODOT	TOTALS
WEST	1	-	6,450	-	6450	-	-
	2	-	-	-	0	-	-
	3	-	-	-	0	56,550	-
	4	-	33,300	-	33,300	-	-
	5	2,000	-	-	2,000	-	-
WEST TOTAL		**8,600**	**39,750**	**0**	**41,750**	**56,550**	**0**
EAST	1	-	-	-	0	-	-
	2	-	-	-	0	-	-
	3	-	6200	-	6,200	-	-
	4	-	-	26,500	26,500	-	-
	5	-	11,700	-	8,200	-	-
EAST TOTAL		**0**	**17,900**	**26,500**	**44,400**	**0**	**0**
TOTAL		**2,000**	**57,650**	**26,500**	**86,150**	**56,550**	**56,550**

Bridges

During the PEL all of the existing bridges in the project area including Tier 1 (22 bridges) and Tier 2 (7 bridges owned by City of St. Louis) limits were evaluated and their NBI condition ratings presented, this information can be found in **Appendix H**. Also, during the PEL each of the bridges in Tier 1 were evaluated to determine what repairs or replacement would be needed should they remain in place. The evaluation included proposed 10-, 25- or 50-year rehabilitation life cycles, or full replacement. Identified in Tier 1 was a total of 13 bridges that necessitated repairs, or replacement, this information can be found in **Appendix O**. Due to the information presented in the PEL, MoDOT has identified several bridges for early action and those are now part of Projects J6I3502/J6I3574. These bridges are shown below with additional information on how this project J6I3585 effects each bridge (note that the improvements related to this project are included in the project cost estimates).

- L0667 (EB I-64 over Vandeventer Ave.)– Widening for the EB I-64 On-Ramp from Vandeventer Ave.
- A3594 (WB I-64 over Vandeventer Ave.) – Widening for the WB I-64 Off-Ramp to Boyle Ave., Widening for WB I-64 On-Ramp from Grand Blvd. and potentially shortening of the bridge due to the removal of the I-64 EB On-Ramp to Market/Bernard and I-64 WB On-Ramp from Forest Park Ave.
- L0669 (EB I-64 over WB I-64 On-ramp from Vandeventer Ave.) – Widening for the EB I-64 On-Ramp from Boyle and Inside Shoulder on mainline I-64
- A3651 (WB I-64 over Sarah St.) – Widening for WB I-64 Off-Ramp to Boyle Ave.
- A3893 (EB I-64 over Sarah St.) - Widening for EB I-64 On -Ramp from Boyle Ave.

The recommended concept includes the following actions related to each of the remaining bridges in the Tier 1 study area (MoDOT ROW):

- A8034 (Pedestrian Overpass over I-64,East of Kingshighway) – Use in Place
- A8049 (Taylor Ave. over I-64) - Use in Place
- A8050 (Newstead Ave. over I-64) - Use in Place
- A8051 (Tower Grove Ave. over I-64) - Use in Place, potential widening for Shared Use Path if not on separate pedestrian bridge structure
- A8052 (Boyle Ave. over I-64) - Widening for additional lane and Shared Use path and lanes
- A3735 (EB On-Ramp to I-64 from Papin) – Remove
- A3740 (WB On-Ramp to I-64 from Grand Ave) – Remove and Replace
- L0638 (Grand Ave over I-64) - UIP/Rehabilitation
- A0549 (EB I-64 Exit Loop Ramp over Private Entrance) – Remove
- A3741 (WB I-64 On-Ramp from Market) – Remove
- A0832 (EB I-64 Over exit to Market) – Remove
- A3636 (Market Street Ramp to WB I-64 over Forest Park to I-64 EB Ramp) – Remove
- A0835 (Market Street Ramp from EB I-64 over Forest Park to I-64 EB Ramp) – Remove
- A7080 (Compton Ave. over WB I-64 to Forest Park Ramp) – Use in Place
- A7081 (Compton Ave. over I-64) – Use in Place
- A8841 (Ewing Ave. over I-64) – Use in Place
- A7853 (Jefferson Ave. over I-64) - Use in Place

Traffic Operations, Safety and Multimodal Analysis

The conceptual phase of this project seeks to build on the extensive analysis of traffic operations, safety and multimodal conditions that was done as part of the PEL. This section also summarizes the additional analysis performed for predictive safety as well as the key findings. **Appendix L** contains the complete Traffic, Safety & Multimodal Report.

No Build (Maintenance Only) Scenario

The No Build (maintenance only) Scenario (2050) is consistent with the conditions that were presented in the PEL and is the basis of comparison to the performance of the Recommended Concept. It does not reflect any additional vehicular capacity expansions along the I-64 corridor nor the adjacent road network within the study area other than the completion of the Jefferson/22nd Street Interchange improvements (which were reflected in the Existing Conditions), the Compton Bridge replacement, and the introduction of a northbound left turn lane on Grand Boulevard at Chouteau Ave. in conjunction with the expansion of the SLU Medical Campus.

With respect to multimodal uses, proposed improvements that have already been identified by MoDOT, City of St. Louis, and/or Great Rivers Greenway to the pedestrian and bicycle network in the study area were assumed to be in place in the No Build (Maintenance Only) scenario. These committed and likely improvements (meaning they have or are highly likely to have funds allocated for construction) consist of new segments of the Brickline Greenway, the Tower Grove-Cortex Connector, the Compton Avenue Cycle Track, Spring Avenue overpass, etc. In short, approximately 12 miles of bike/pedway projects have been committed to or are likely to be completed by 2050 and are reflected in the No Build (Maintenance Only) scenario.

The No Build traffic operations and Multimodal analysis remain the same as presented in the PEL but are re-stated for comparison purposes in **Appendix L**.

The safety analysis performed during the PEL were qualitatively evaluated for the Existing, No Build, and Build conditions. As part of the conceptual phase of this project, the safety conditions were quantitively evaluated using IHSDM due to the unique configuration of the existing interchanges within the study area. A summary of this effort is provided within the safety analysis subsection for clarity.

Recommended Concept Traffic Operations

The traffic forecasts for the year 2050 were revisited during this phase of the project to allow for rerouting of the traffic to represent the changes to the infrastructure presented with the Recommended Concept.

Overall conditions for the Recommended Concept VISSIM network were summarized with regards to average delay, average stops, total delay and throughput. It should be noted that total delay includes the latent delay associated with vehicles unable to enter the network and throughput volumes include traffic traveling through critical intersections immediately adjacent to the interstate that were included due to their potential to influence I-64 operations (such as Clayton at Boyle or Forest Park at Grand).
Table 13 compares these network parameters to those associated with the No Build (Maintenance Only) alternative.

Table 13. Recommended Concept: Overall Network Performance Comparison to No Build (Maintenance Only) Scenario

Time Period/Variable	No Build (Maintenance Only) Alternative	Recommended Concept
AM Peak Hour		
Average Delay	133 sec/veh	91 sec/veh
Average Stops	6.3 stops/veh	3.1 stops/veh
Throughput	27,588 veh	28,468 veh
PM Peak Hour		
Average Delay	86 sec/veh	73 sec/veh
Average Stops	2.5 stops/veh	2.1 stops/veh
Throughput	29,856 veh	31,195 veh

Within the Tier 1 limits, the interstate experiences reasonable levels of service at many locations during the peak hours. All the segments in the study area experience level of service D or better. Additionally, the ramp terminals operate at an overall LOS D or better.

The VISSIM model does not indicate congestion on the mainline. During the morning peak, the density ranges from 17.1 to 32.8 vehicles per mile per lane, with speeds between 52.9 and 59.0 mph. In the afternoon peak, the density varies from 15.7 to 30.0 vehicles per mile per lane, with speeds ranging from 50.0 to 59.2 mph. However, the VISSIM model does indicate congestion at a few locations, however the only one that is within the scope of improvements of this project is during the PM Peak Hour at the Clayton Avenue and Boyle Avenue intersection. This intersection is actually in Tier 2 but included in this analysis due to its proximity to the Tier 1 limits. The Synchro results at this intersection show a LOS D in the PM Peak.

The Year 2050 Recommended Concept operating conditions at the intersections within Tier 1 limits were evaluated using Synchro 11, while the roundabouts at the intersection of the I-64 eastbound off ramp at Tower Grove Avenue and Grand Boulevard were analyzed using Sidra 9. The intersections within the Tier 1 limits operate well overall, with each intersection expected to have an overall LOS D or better, with the exception of Forest Park Avenue and Grand Boulevard which has a LOS E overall during the PM peak hour. While not in Tier 1, the intersection of Forest Park Avenue and Grand Boulevard greatly impacts the operations of Tier 1 intersections, especially with the proposed changes along Grand Boulevard Therefore, the intersection of Forest Park Avenue and Grand Boulevard was referenced in the Tier 1 intersections. Some of the ramp terminals at Kingshighway and I-64 showed LOS E or have v/c ratios above 0.90, which is also present in the no-build and existing condition models at this interchange. It should be noted that improvements to this interchange was outside the scope of this project.

The traffic operations conditions within the Tier 2 limits were completed using the same methodology used for the Tier 1 traffic operations but were analyzed using Synchro and/or Sidra, as necessary (VISSIM was not employed within Tier 2). Event traffic for Grand Center or Midtown entertainment venues was not considered in the analysis. Each of the intersections has an overall LOS of E or better, with the exception of one intersection. Similar to the 2050 No

Build (Maintenance Only) scenario, Kingshighway Boulevard at Route 100 operates at a failing LOS during both peak periods.

Many intersections within the further reaches of Tier 2 experience the same operating conditions as the No Build (Maintenance Only) scenario. This is because no lane configuration or traffic volumes changes were expected at those intersections due to the improvements being outside the scope of this project.

Overall, the recommended lane configurations and traffic control are able to accommodate the projected traffic volumes within the road network. The addition of the Theresa Avenue connection between Forest Park Avenue and Chouteau Avenue improves operations along Grand Boulevard as it provides an alternate route to Grand Boulevard that can accommodate some of the local traffic movements.

Traffic Operation Conclusions

- Under the Recommended Concept, interchange spacing would be improved due to the removal of the ramps to and from Market Street and Compton Avenue as well as the eastbound on ramp to I-64 from Forest Park Avenue.
- Favorable operating conditions could be provided along I-64 mainline, merge, diverge and weave segments assuming the Recommended Concept is in place.
- The interchange of I-64 with Kingshighway would continue to show congestion during the peak hours due to the anticipated volume of traffic. However, modifications to this interchange were not contemplated as part of this PEL given its relatively recent reconstruction.
- The widening of the westbound I-64 off ramp and lengthening of the deceleration lane to Boyle Avenue would accommodate the anticipated Year 2050 volumes and minimize any impacts upon the I-64 corridor.
- The intersection of Clayton Avenue at Boyle Avenue, as well as both Clayton Avenue and Boyle Avenue themselves, would require significant reconstruction to provide numerous turn and travel lanes to efficiently accommodate the traffic traveling between I-64 and the Washington University Medical Campus.
- Access to I-64 eastbound from Vandeventer is beneficial in that it would divert a portion of the traffic originating along Forest Park Avenue away from the heavily traveled intersection with Grand Boulevard as well as the on ramp at Grand Boulevard to I-64.
- A roundabout would be the preferred means of traffic control at the intersection of the eastbound I-64 off ramp with Bernard Street/Theresa Avenue/Spruce Street A right-turn bypass lane is recommended on the I-64 westbound off ramp to the roundabout to prevent queueing on the ramp.
- The existing grade separated configuration at Grand Boulevard and Forest Park Avenue allows the overall intersection footprint to remain the same while maintaining operations.
- The extension of Theresa Avenue between Forest Park Avenue and Chouteau Avenue provides an alternate north-south route to Grand Boulevard for local traffic, bikes and pedestrians and should be pursued as a two-lane roadway.

Safety Analysis

During the PEL process, a safety analysis was performed using MoDOT provided crash data within the study area (Tier 1 and Tier 2 limits) from 2016 through 2020, the latest data available at that time. Predictive safety methods (HSM, ISATe and/or IHSDM) were not utilized for the I-64 PEL. Rather, historical safety statistics were analyzed, and crashes were categorized by contributing factors and severity. The safety analysis of the No Build and three corridor alternatives was *qualitatively* based upon how each alternative would be expected to address the safety deficiencies and needs identified in the historical safety analysis.

As part of the current conceptual phase, the intention is to dive deeper into the safety analysis using HSM predictive tools, in particular IHSDM due to its ability to analyze the configurations of the existing interchanges. A predictive safety analysis was done for the No Build and Recommended Concept conditions for the year 2050. An initial step in the safety analysis was to update the historical crash database to include the years 2021 and 2022, for which crash data has become available since the original PEL analysis.

In general, the crash trends and characteristics that were identified within the study area for the crash data between 2016-2020 remain the same with the updated two years of crash data.

No Build Safey

Two types of intersections were categorized for the safety analysis: Ramp Terminals (Tier 1) and Standard Intersections (Tier 2). As shown in Table below, the total number of predicted crashes in the No Build condition is 143.

Table 14. Intersection Crash Prediction Comparison (2050 Forecast Year Crashes Only)

	No-Build		
	Ramp Terminal (Tier 1)	***Int/RAB (Tier 2)***	***All Intersections***
No. of sites	10	7	**17**
Total Predicted Crashes	79	64	**143**
Total Predicted FI Crashes	34	16	**50**
Total Predicted PDO Crashes	45	48	**93**
Crash Density (crashes/int)	7.9	9.1	8.4
FI	3.4	2.3	2.9
PDO	4.5	6.8	5.5

The full system analysis is categorized by three functional classifications: Freeways (Tier 1), Ramps (Tier 1), and Arterials (Tier 2). As noted in the tables below, the intersection crashes are excluded from the arterial totals. As shown in

Table , the total number of expected crashes is 174.

Table 15. System-Wide Crash Prediction Comparison (2050 Forecast Year Crashes Only)

	No-Build			
	Tier 1		**Tier 2**	
	Freeway	***Ramp***	***Arterial***	***Total***
Length (mi)	4.1	4.8	0.94	**9.9**
Total Crashes	150	16	9	**175**
Fatal and Injury Crashes	41	7	3	**51**
Property-Damage-Only Crashes	110	10	6	**126**

Note: Intersection crashes are excluded in the arterial totals.

Recommended Concept Safety Conditions

The intent of the improvements presented as the Recommended Concept are to address several existing safety issues from a vehicular perspective within the Tier 1 area, including the following:

- Extension of substandard deceleration length for the westbound I-64 off ramp to Boyle Ave.
- Improvements to Clayton Ave. and Boyle Ave. to better facilitate the flow of traffic to and from the Washington University Medical Campus and Cortex Commons.
- Removal of the substandard I-64 eastbound loop ramp to Grand Blvd.
- Removal of the left-hand eastbound entrance from Forest Park Ave. to I-64.
- Removal of the substandard I-64 eastbound ramp from Papin Avenue.
- Extension of the substandard acceleration length for the westbound I-64 entrance ramp from Grand Boulevard.
- Removal of the substandard I-64 eastbound exit ramp to Market Street.
- Removal of the substandard I-64 westbound entrance ramp from Market Street.
- Widening of narrow substandard shoulders throughout various sections of the I-64 project corridor. It should be noted that even though these shoulders are widened to ten feet in width, due to the truck percentage in the corridor, the standard shoulder width is twelve feet. A design exception will be required and submitted during the preliminary design phase.

As shown in Table 16 below, the total number of predicted intersection crashes is expected to increase under the Recommended Concept Build scenario. This is mainly due to the increase in the number of intersections under the proposed improvements, introducing new conflict points into the system as compared to the No Build scenario. Additionally, the ramp terminals in the proposed configuration provide access to the interstate that doesn't exist in the No Build condition, as well as increased connectivity to the local road network, which leads to an increase

in volumes accessing these terminals. Increased traffic volumes at these ramp terminals contributes to increased crashes at these locations.

Table 16. Intersection Crash Prediction Comparison (2050 Forecast Year Crashes Only)

	No-Build			**Build**			**▲(B-NB)**	
	Ramp Terminal	***Int/RAB***	***All Inter.***	***Ramp Terminal***	***Int/RAB***	***All Inter.***		
No. of sites	10	7	**17**	10	10	**20**	3.0	
Total Predicted Crashes	79	64	**143**	85	79	**165**	22	15%
Total Predicted FI Crashes	34	16	**50**	35	21	**56**	6	12%
Total Predicted PDO Crashes	45	48	**93**	50	59	**109**	16	18%
Crash Density (crashes/int)	7.9	9.1	8.4	8.5	7.9	8.2	-0.2	-2%
FI	3.4	2.3	2.9	3.5	2.1	2.8	-0.1	-5%
PDO	4.5	6.8	5.5	5.0	5.9	5.5	0.0	0%

A comparison of calculated crash density, which adjusts for the increased number of intersections in the Build scenario, shows that crashes per intersection are expected to decrease as a result of the proposed improvements. The total crash density, for all severity types, shows a two percent predicted decrease, with fatal injury (FI) crashes expected to decrease by five percent. During design, additional safety countermeasures at the newly created intersections should be considered to reduce the impact of increased crashes at these intersections.

The full system analysis is categorized by three functional classifications: Freeways (Tier 1), Ramps (Tier 1), and Arterials (Tier 2). As noted in the Table 17 below, the intersection crashes are excluded from the arterial totals. The total mileage of freeways, arterials, and ramps would increase from the No Build to Build conditions. This is due to the proposed longer acceleration and deceleration lanes along I-64, the proposed increase in ramp lengths, and the addition of several streets along the local road network, namely Theresa Avenue.

Despite the increased network length, the number of total crashes is expected to decrease by three percent under the Build conditions (Table). Notably, the fatal and injury crashes are expected to decrease as well.

Table 17. System-Wide Crash Prediction Comparison (2050 Forecast Year Crashes Only)

	No-Build				**Build**				**▲ (B-NB)**	
	Tier 1		**Tier 2**		**Tier 1**		**Tier 2**			
	Freeway	**Ramp**	**Arterial**	**Total**	**Freeway**	**Ramp**	**Arterial**	**Total**		
Length (mi)	4.1	4.8	0.9	**9.9**	4.2	5.6	1.1	**10.9**	1.1	11%
Total Crashes	150	16	9	**175**	147	18	9	**174**	-1	-0.57%
Fatal and Injury Crashes	41	7	3	**51**	40	8	4	**49**	1	1.96%

Property-Damage-Only Crashes	110	10	6	**126**	107	10	6	**123**	-3	-2.38%

Note: Intersection crashes are excluded in the arterial totals.

Safety Conclusions

- The consolidation of interchange access points, the lengthening of existing substandard ramps, and the widening of sections of I-64 with substandard shoulders all provide safety enhancements within the Tier 1 area, notably near the Grand Boulevard and Boyle Avenue interchanges. The removal of the left-hand entrance to eastbound I-64 from Forest Park Avenue has positive safety impacts tied to proper driver expectation and current standards of practice.
- Shifting the eastbound on ramp from Papin Street to a more typical diamond-type ramp at Boyle Avenue has dual benefits of removing a relatively atypical merge conflict on the existing ramp, while also improving the intuitiveness of the interchange from a driver perspective.
- These improvements are expected to lead to a reduction in crashes during the design year of 1% over the No Build scenario.
- The Tier 2 area would see safety benefits by addressing congestion at the Clayton Avenue and Boyle Avenue intersection with capacity upgrades. Bicycle and pedestrian safety are also enhanced by the addition of separated facilities along multiple Tier 2 routes. The Recommended Concept includes a valuable shared use path along Clayton Avenue from the heavily travelled Vandeventer Avenue to the Cortex Metrolink station via Boyle Avenue.
- Total crashes are expected to increase throughout the Tier 2 iintersections because of the new intersections added to the system and additional volume entering the system due to increased connectivity. However, the crash density (crashes per intersection) of the Tier 2 area is expected to decrease 2% over the No Build scenario, and 5% for fatal injury crashes over the No Build scenario.
- Additional safety countermeasures for the proposed intersections in the Tier 2 should be considered during design to help mitigate any expected crash increases.

Multimodal Mobility Conditions

As noted earlier, significant multimodal improvements are included in the No Build (Maintenance Only) scenario based on committed or likely projects by local agencies within the project area which include approximately 12 miles of bike/pedway projects. Regarding the transit system, there is no proposed transit improvements included with the Recommended Concept compared to the No Build Scenario.

Bicycle and Pedestrian Conditions

Pedestrian, bicycle and multiuse improvements proposed by the Recommended Concept include:

- Parallel multiuse path on Tower Grove Avenue across I-64, extending north of Clayton Avenue via Boyle Avenue
- Parallel multiuse path on Forest Park Avenue between Grand Boulevard and Market Street/Compton Avenue

- Separated bike lanes on Grand Boulevard from Chouteau Avenue to north of Forest Park Ave.
- Parallel multiuse path on Theresa Avenue between Scott Avenue and Forest Park Avenue
- Parallel multiuse path as part of the grade-separated crossing along Theresa Avenue over the railroad tracks
- Parallel multiuse path on Bernard Street Between Grand Boulevard and Theresa Avenue

These improvements also add one additional crossing of I-64 at Theresa Avenue for a total of 16 crossings supporting active transportation, three of which are exclusive to non-vehicular users.

These improvements provide improvements in the experience and safety of the users based on analysis of the Pedestrian Level of Service (PLOS) and Bicycle Level of Traffic Stress (BTLS).

PLOS provides an objective measure of the perceived pedestrian experience based on sidewalk and roadway geometry and motor vehicle travel speeds. The underlying premise of the HCM's PLOS still drives the scoring in the simplified methodology: pedestrian comfort increases with fewer travel lanes, lower vehicle speeds, and greater separation from motor vehicle traffic. Scores range from PLOS 1 (lowest stress) to PLOS 5 (highest stress). The most notable improvement compared to the No Build is a 4% increase in the PLOS 1 network miles and a decrease of 5% of the PLOS 5 network miles.

BLTS provides an intuitive framework to categorize roadways based on the level of stress, or conversely level of comfort, for people bicycling. The analysis incorporates motor vehicle volumes, posted speed limits, the presence of parking, and the presence of bike lanes as key determinants of level of traffic stress. Scores range from BLTS 1 (lowest stress) to BLTS 4 (highest stress). The Recommended Concept shows an increase in the percentage of low-stress BLTS 1 roadways from 19% to 23%, a decrease in BLTS 2 roadways from 37% to 34% and minimal changes for BLTS 3 and BLTS 4 roadways.

Access to transit services was also evaluated. Since many, if not all, transit trips begin and/or end with a non-motorized trip (i.e., walking), walksheds help define the accessibility of transit stops within the study area. Additional pedestrian connections included in the Recommended Concept would help increase transit accessibility, including the Theresa Avenue extension across I-64, MetroLink, and the railroad lines and a better pedestrian connection at Forest Park Avenue and Market Street. A walkshed analysis was performed to compare the 5-minute and 10-minute walksheds as well as the area beyond a 10-minute walk to each transit stop in the study area of the No Build and Recommended Concept for the transit depended residents estimated for the Year 2050. While it showed negligible improvement the new pedestrian connections would help transit be more accessible to major destinations in the study area, including Saint Louis University and the Foundry, by providing a high-quality and comfortable walking environment, which is not captured by the walkshed distance analysis. Most of the benefit would be realized in the vicinity of the Grand MetroLink Station, because of improved pedestrian facilities linking north-south across I-64 and east-west to the MetroLink Station.

Multimodal Conclusions

- The Recommended Concept offers a moderate increase in active transportation facility mileage through new on-street bikeways and multiuse paths on Tower Grove Avenue, Grand Boulevard, Forest Park Avenue, and Theresa Avenue.
- With an additional 1.5 miles of new bicycle and multiuse facilities represented in the Recommended Concept, there is a moderate improvement in overall levels of pedestrian level of service and bicycle level of traffic stress (4% increase in low-stress PLOS 1 roadways and 4% increase in low-stress BLTS 1 roadways) over the No Build (Maintenance Only) scenario.
- While the proposed active transportation improvements provide a new north-south link across I-64 between Grand Boulevard and Jefferson Avenue at Theresa Avenue, overall levels of connectivity in the study area see only moderate increases outside the immediate vicinity Grand Boulevard and I-64.
- The Recommended Concept would provide for the same Year 2050 transit system as the No Build (Maintenance Only) alternative.
- Changes to the street network and interstate ramps in the Recommended Concept would result in increased traffic congestion along Grand Boulevard as compared to the No Build (Maintenance Only) scenario. The addition of future dedicated bus lanes would help negate the effects of increased congestion on transit travel times and on-time reliability.
- The Recommended Concept can accommodate, at a later date with the appropriate City and Metro support and approval, dedicated bus lanes along Grand Boulevard within the study area. Relocation of the proposed bike and pedestrian accommodations to a new facility cantilevered along the Grand Boulevard bridge would facilitate reallocation of the space on the bridge itself to the dedicated bus lanes. However, the transit benefits would be limited until the dedicated bus lanes could be extended beyond Forest Park Avenue or Chouteau Avenue.
- The additional pedestrian connections in the Recommended Concept would have a negligible effect on access to/from transit stops as compared to the No Build (Maintenance Only) alternative, based on the walksheds of transit-dependent populations. That said, qualitatively these new pedestrian connections would help transit be more accessible to major destinations in the study area.

Noise Screening Analysis

A screening-level noise analysis was performed to determine potential impacts at noise sensitive receivers within the Noise Screening Area (NSA) based on the proposed improvements of the Recommended Concept. It utilized the traffic information that was utilized for the existing (2022), and Build (2050) conditions. The screening-level analysis followed the guidelines of EPG 127.13 “Noise”. **Appendix M** includes the Noise Screen Analysis Technical Memo.

The screening analysis is a simple procedure used to predict traffic noise levels and make a practical determination of impacts. The analysis was performed using a simplified FHWA Traffic Noise Model (TNM) run to assess the works-case conditions. A flat-terrain model design using the TNM was used to screen the project, this model describes a worst-case scenario with higher sound levels that would be expected in detailed modeling, representing a conservative

approach. If the results of the analysis indicate noise impacts are likely and the placement of a typical abatement device appears to be feasible, a detailed analysis would be required as part of the NEPA review.

Based on this analysis noise impacts were predicted at 94 out of the 248 receivers in the NSA. Based on the impacted receptor locations, two noise barriers are proposed for further investigation. These are located at NSA-03 and NSA-09. NSA-03 includes the receptors north of the proposed I-64 WB off-ramp to Grand Ave., from the proposed Theresa Ave. extension to Grand Blvd. NSA-09 includes the receptors north of I-64 between Tower Grove Ave. and Newstead Ave.

Economic Impact Study

An Economic Impact Study (EIS) was conducted to measure the economic activity generated in the City of St. Louis due to projected spending on infrastructure improvements within the I-64 Corridor based on the Recommended Concept. Based on cost estimates developed for the CSR, the EIS was performed based on an estimated cost of $140 million (with funds expected to come from the State and Federal government as well as local entities that may include the City of St. Louis). For the purposes of this analysis, it assumed construction starting in 2027 and occurs over a three-year period. **Appendix N** contains the full Economic Impact Study Technical Memo.

From 2027 to 2029, the direct spending of $140 million in total capital expenditures are projected to generate (in 2024 dollars):

- $187.1 million in total direct, indirect, and induced economic output;
- $75 million in total direct, indirect, and induced labor earnings;
- Support 327 average annual jobs; and,
- $2.4 million in tax revenue to the City of St. Louis and $1.4 million in state tax revenues in the form of income, property, sales and use taxes.

Environmental Impacts

An Environmental Constraints Technical Report was completed during the PEL that informed the alternatives development and screening process to date. The report determined floodplains and Waters of the U.S. were not present within the corridor and impacts to water quality could be avoided through best management practices. Based on coordination with various stakeholders the current proposed projects would avoid adverse impacts to land use and zoning, visual environment, disadvantaged communities, and parks or trails.

Based on the extents of the recommended projects and Environmental Constraints Technical Report, further environmental review is necessary to determine potential impacts to historic architecture, archaeology, hazardous materials, and protected species. MoDOT and FHWA may require archaeological survey that includes subsurface investigations for each project. There are no nationally registered historic sites or districts within the direct area of potential effect (APE), but some may be within the Visual APE of certain projects listed below in Table 18. Other potentially historic buildings (45 years and older) may also be within the visual APE of some

concepts. Consultation with Missouri State Historic Preservation Office would be necessary for each project to determine if an architectural survey is required.

No hazardous materials are anticipated to be directly impacted by the projects, but there are known sites located within the vicinity which are outlined in the Table below. Best management practices should be used to avoid impacting known sites and control release of hazardous materials potentially uncovered during construction.

Federally protected bat species and migratory birds may nest in human structures such as bridges that are impacted in some of these projects. A structure survey for protected bats should be conducted according to the U.S. Fish and Wildlife Service *Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* (March 2024) protocol prior to impacting suitable structures. Structures should also be surveyed for migratory bird nesting, and MoDOT standard migratory bird job special provisions should be included for projects that impact suitable structures.

Potential environmental impacts for these projects are based on results from the PEL and information may be outdated. During the NEPA process for each project an updated environmental review should be completed using the latest data sources.

Table 18: Summary of potential environmental impacts for each project at each interchange.

	Project	Historic Sites and Districts	Potential Historic Buildings	Hazardous Materials	Protected Species Habitat Present
WEST	1	None	Yes	Active underground storage tank at Barnes Jewish Hospital	Yes
	2	None	Yes	None	No
	3	Yes, *Rock Spring School* site	Yes	Active underground storage tank at Barnes Jewish Hospital	No
	4	None	Yes	None	No
	5	None	Yes	None	Yes
EAST	1	Yes, *138th Infantry Missouri National Guard Armory* and *Council Plaza* sites	Yes	Active waste cleanup site at Prospect Ave. and Bernard St.	Yes
	2	None	Yes	None	No
	3	Yes, *138th Infantry Missouri National Guard Armory* and *Council Plaza* sites	Yes	None	No
	4	Yes, *138th Infantry Missouri National Guard Armory, Council Plaza,* and *Vashon Community Center* sites	Yes	Active waste cleanup site at Prospect Ave. and Bernard St.	Yes
	5	Yes, *Council Plaza* site	Yes	None	No

Public and Stakeholder Engagement

During the PEL there was a robust public engagement effort. The conceptual phase built off the previous engagement efforts and continued to engage the Community and Technical Advisory Groups (CAG & TAG), the City of St. Louis and the general public.

As detailed in the Recommended Concept Development section, the project team met with the City of St. Louis on May 15, 2024, as well as the CAG and TAG to review the Initial Recommended Concept, on June 4, 2024. These meetings provided guidance for minor refinements. A summary of these meetings is provided in Appendix C.

Ater the development of the Final Recommended Concept and analyses, the project team met with the Mayor of St. Louis on November 18, 2024 to discuss the project.

A public open house meeting was held on November 19, 2024 at the STL Foundry located within the project limits. Additionally, an online public meeting video and display boards was posted the same day to the project website. A total of 89 people attended the in person public meeting. The comment period ran from November 19 to December 4, 2024, during that time a total 71 comment forms were received.

The Public Meeting Open House Summary is provided in **Appendix P**. Many of the respondents expressed satisfaction with the project's progress and integration of bike/pedestrian facilities. The top respondent concerns were safe pedestrian crossings, particularly across wider roads, and improving bike infrastructure. The top three responses response themes were:

- Reduce Project Footprint, Mostly related to the Tower Grove and Boyle Intersections with Clayton Ave.
- Overall Positive Sentiment
- Improving Pedestrian Safety

Andrew Potthast, P.E. Date 3/4/2025
Consultant Project Manager

Heather Copeland, P.E. Date 3/5/2025
MoDOT Project Manager

Recommendations or Comments:

The improvements to prioritize, based on funding availability, are those shown at the East Interchange. This will allow for safety and mobility gains during MOT due to traffic being removed on I-64 EB from Vandeventer to the I-64 EB on-ramp from Forest Park during construction of the J6I3502/J6I3574 projects. The projects of focus include:

Project 4 – EB I-64 ramps to/from Grand and Theresa north extension
Project 1 - WB I-64 ramps to/from Grand Ave.
Project 2 - I-64 inside Shoulder Widening

It is recommended to advance the acceleration lane and taper needed for the I-64 EB on-ramp from Vandeventer at the West Interchange. Including this element with the construction of the new I-64 EB bridge over Vandeventer (J6I3502/J6I3574) would be beneficial structurally and more cost effective than widening in the future.

The priority projects at the West Interchange are:

Projects 4 & 5 – Local improvements at Tower Grove/Boyle/Clayton and WB I-64 ramp improvements at Boyle Ave. (Build in tandem to realize full mobility benefits)
Remainder of Project 3 – I-64 Eastbound On-Ramps at Boyle Ave. & Vandeventer Ave.
Project 1 – Tower Grove (or Newstead) Ave Bike/Ped Improvements

Appendices:

A. Concept Workshop Summary
B. Initial Recommended Concept Strip Map
C. CAG-TAG Summary
D. Future64 Design Criteria
E. Recommended Concept Strip Map
F. Conceptual Horizontal Alignments
G. Conceptual Vertical Profiles
H. Future64 Existing Conditions Technical Memo
I. Conceptual Cost Estimating Methodology
J. Conceptual Project Cost Delineation Map
K. Conceptual Cost Estimates
L. Traffic, Safety & Multimodal Report – Concept Study
M. Noise Screen Analysis Technical Memo
N. Economic Impact Study Technical Memo
O. Bridge Rehabilitation/Replacement Summary
P. Public Meeting Open House Summary

Approved by: Tom Blair Digitally signed by Tom Blair Date: 2025.03.10 05:05:20 -05'00'

Thomas Blair, P.E. Date
District Engineer

cc: Design Division
Construction and Materials Division
Traffic Division