MEMORANDUM

Missouri Department of Transportation

DATE: May 8, 2020

TO: Thomas Blair, P.E.
District Engineer

FROM: Stacey Smith, P.E.
Project Manager

SUBJECT: District St. Louis - Design
Route I-70, St. Charles County
I-70 Improvements
Job No. J6I0624
Conceptual Study Report (Draft)

Purpose of Study

The purpose of this conceptual study was to investigate improvements of I-70 corridor in St. Charles County, from west of Wentzville Parkway to east of the Route Z interchange. These improvements include options to address the Norfolk Southern Railroad Bridge (NSRR) over I-70 in Wentzville. The corridor has experienced ever increasing congestion along the mainline alignment due to the heavy traffic and substandard alignment beneath the NSRR structure. The study investigated three alternatives to improve safety and decrease congestion by revising the mainline I-70 alignment, widening the I-70 template, and addressing the NSRR structure.

Following a Record of Decision of the Second Tier I-70 Environmental Impact Study (EIS) completed in April of 2006, the Conceptual Study Report is the next step for this segment of I-70. As part of this study, HDR revisited and updated the original EIS document for Section of Independent Utility (SIU) No. 7, which encompasses the project limits, for any changes since creation of the original document or impacts from the proposed project.

Roadway, traffic and railroad impacts associated with each option were studied, along with the development of estimated construction costs. Segments of West Pearce Boulevard and Mar-Le Drive adjacent to north side of I-70 were also investigated.

The Conceptual Study Recommendations can be found on Page 70 of this report.

REMARKS:

☒ Major Route ☐ Minor Route

DESIGN TRAFFIC
I-70 Eastbound

ADT (Const.)	= 43,330
ADT (Design)	= 54,162
DHV	= 3,899
D	= 0.6
% Trucks	= 15%
Operational (Posted) Speed	= 65 mph

CONCEPTUAL COST ($1,000's)

Utilities:	460
Right of Way:	1,208
Construction:	34,213

DESIGN TRAFFIC
I-70 Westbound

ADT (Const.)	= 43,786
ADT (Design)	= 54,732
DHV	= 3,940
D	= 0.6
% Trucks	= 15%
Operational (Posted) Speed	= 65 mph

EXISTING FACILITIES

Roadway	Location	Pavement		Year Built	Roadbed Width	Min. R/W Width	Access Control
		Width	Type				
I-70		12'	Asphalt Resurfacing over 9" Concrete Pavement	1959 (Original) 2003 (Overlay)	Varies 85' to 124'	300'	Full
Ramp 3	WB I-70 to Wentzville Parkway	18'-36'	13" Concrete	2000	30'- 48'	N/A	Full
Ramp 4	Wentzville Parkway to EB I-70	1-18'	13" Concrete	2000	30'	N/A	Full
Ramp 1	Route Z to WB I-70	1-18'	10" Concrete	2006	30'	N/A	Full
Ramp 2	EB I-70 to Route Z	1-18'	10" Concrete	2006	30'	N/A	Full

EXISTING BRIDGES

No.	Location	Type	Length	Width	Year Built	Condition Ratings		
						Deck	Super	Sub
A5800	Wentzville Parkway	Cont. PL Girder	269'-0"	89'-4"	2001	7	8	7
S45.25 (L-154)	NSRR	Cont. Comp. PL Girder	168'-0 ½"	15'-0"	Plans Dated 1949	Unk	Unk	Unk
A4320	EB I-70 at Route Z	P/S Conc. I-Gdr Spans	151'-0"	42'-1"	1985	7	7	8
A4323	WB I-70 at Route Z	P/S Conc. I-Gdr Spans	141'-0"	42'-1"	1985	7	7	8

EXISTING CONDITIONS

I-70 MAINLINE, WENTZVILLE PARKWAY INTERCHANGE, NORFOLK SOUTHERN RAILROAD BRIDGE, ROUTE Z INTERCHANGE

Interstate I-70, between Wentzville Parkway and Route Z, consists of two thru lanes with 4' (min.) inside shoulders and 10' (min.) outside shoulders in both the eastbound and westbound directions (typical outside the limits of the NSRR Bridge). The horizontal geometry of I-70 within the project limits consists of two horizontal curves (1926' radius and 2491' radius) in order to pass beneath the existing NSRR Bridge (S45.25), see **Figure 1**.

Figure 1 - Existing I-70 Mainline Alignment

The median transitions from a 40’ grass median entering from the west to a concrete median barrier which starts approximately 2400’ east of Wentzville Parkway interchange. From this location, the concrete barrier extends to the east along the centerline of I-70 through the I-64 interchange. The posted speed limit along the corridor is 65 mph. The roadway profile provides substandard 15’-8” and 15’-10” vertical clearance, in the eastbound and westbound directions respectively. The limited span lengths of the existing railroad structure only allow for 2 lanes of traffic in each direction with minimal shoulders, see **Figure 2**.

Figure 2 - Existing NSRR Grade Separated Crossing

The combination of the narrow template, horizontal curvature and substandard vertical clearance create significant congestion as well as limit the possibility of even minor improvements. The profile grade is a gentle down grade (approximately 0.6%) from west to east. Side slopes vary along the corridor due to the numerous appurtenances that have been added, but generally the drainage pattern of this section of the corridor flows from northwest to southeast.

The property abutting the fully controlled access right of way is generally commercial in nature. The existing railroad right of way serves as a divider with respect to access and development within the project limits.

The Wentzville Parkway interchange is a standard diamond configuration with signalized ramp terminal intersections. Commercial development is present in all four quadrants of the interchange. West Pearce Boulevard serves as the north frontage road and is located approximately 1,000 feet north of I-70. Wentzville Parkway currently ends at Veteran’s Memorial Parkway. Veteran’s Memorial Parkway serves as the south frontage road and is located approximately 350’ south of I-70. An upcoming project for improvements on Wentzville Parkway will attempt to alleviate issues with the closely spaced signalized intersections at the southern ramp terminal and Veteran’s Memorial Parkway. This project will reconstruct the southern half of the interchange, install a roundabout in the southwest quadrant, and extend Wentzville Parkway south of Veteran’s Memorial Parkway, see **Figure 3**.

Figure 3 - Preliminary Wentzville Parkway Interchange Improvements (by others)
(Interchange layout likely to be modified as separate design progresses)

Between Wentzville Parkway and the west side of the railroad, West Pearce Boulevard serves as the north frontage road along I-70. Commercial business uses along this roadway include strip malls, fast food restaurants, car dealerships, and other retail functions. West Pearce Boulevard continues east towards downtown Wentzville. Veteran's Memorial Parkway serves as the south frontage road in this area. Commercial business include big box farm store, restaurants, car dealership, and equipment sales companies. Veteran's Memorial Parkway does not continue eastbound and provides no local connection to the east of the railroad property.

Between the east side of the railroad and Route Z, Mar-Le Drive serves as the north frontage road and no frontage road exists along the south side of I-70. Along the south side of I-70, MoDOT currently owns a large, heavily wooded parcel that contains no development. Recent developments along Mar-Le Drive include a hotel, commercial properties, and multi-family residential. Mar-Le Drive provides a connection to Route Z, just north of the interchange with I-70.

The Route Z interchange is a standard diamond configuration. The northern ramp terminal intersection is a multi-lane roundabout and the southern ramp terminal is an unsignalized intersection with Route Z. Commercial development is present in the southwest quadrant, but heavy commercial activity is not present at this interchange.

The Wentzville Parkway interchange contains existing high mast lighting. Continuous lighting exists along the eastbound lanes of I-70 between Wentzville Parkway and the Norfolk Southern Railroad Bridge. Route Z has lighting at the entrance and exit gores only. The corridor in this area only contains ground mounted signage.

As-built plans for the roadway and affected structures are included in Appendix A.

PROPOSED DESIGN

Roadway	Design Speed	No. & Width Of Lanes	Roadbed Width	Right of Way	
				Width	Control
I-70	65	8-12’ lanes 12’ shoulders	150’	N/A	Full
West Pearce Boulevard	35	3-12’ lanes 2’ C&G	40’	N/A	N/A
Wentzville Parkway Ramp 3	50	2-12’ lanes 4’-8’ shoulders	36’	N/A	Full
Route Z Ramp 1	50	1-18’ lane 4’-8’ shoulders	30’	N/A	Full
Route Z Ramp 2	50	1-18’ lane 4’-8’ shoulders	30’	N/A	Full

BRIDGE REPLACEMENT: NORFOLK SOUTHERN RR BRIDGE OVER I-70					
Number and Length of Spans	Total Length	No. & Width of Lanes	Deck Width	Girder	
				Type	Depth
(50.5’)(117.3’)(117.3)(99.5’) Permanent	385’-0 ½”	1 Track	22’-0”	Simple PL Girder	5’-8 ½”
7@(48’) Temporary	337’-7”	1 Track	10’-0”	Simple PL Girder	3’-3 3/8”

NOTE: Initial coordination with Norfolk Southern RR has occurred during preparation of this Conceptual Study. It is anticipated that this coordination will continue throughout the design process and may result in some changes to the proposed replacement of the NSRR structure. Though it has not been agreed upon at this phase, the Conceptual Cost Estimate, included in Appendix D, accounts for construction of additional substructure to support the future widening of the bridge superstructure by others.

BRIDGE REHABILITATION AND WIDENING: I-70 OVER ROUTE Z					
Number and Length of Spans	Total Length	No. & Width of Lanes	Deck Width	Girder	
				Type	Depth
A4320: 3 spans (49’-59’-42’)	151’-2 3/4”	3-12’	62’-2 ½”	Type 3 Precast Conc.	3’-3”
A4323: 3 spans (44’-59’-37’)	141’-2 3/4”	3-12’	62’-2 ½”	Type 3 Precast Conc.	3’-3”

ALTERNATIVE 1: RELOCATING I-70 OVER NORFOLK SOUTHERN RAILROAD

Proposed Improvements:

I-70 Mainline:

In order to improve safety and to allow for an increase in the number of eastbound and westbound traffic lanes, HDR investigated the relocation of I-70 approximately 250 feet to the southwest, see **Figure 4**. Relocated I-70 will span over the existing NSRR alignment, providing a minimum 23'-0" of vertical clearance. This alternative requires an extensive amount of MSE walls, or similar earth retention systems, to accommodate the substantial grade raise (50 feet plus) over the existing I-70 alignment. The overall improvements will extend from just east of the Wentzville Parkway interchange to the termini of the eastbound I-64/ Route 40/61 on ramp to eastbound I-70. The westbound off ramp to Wentzville Parkway will be partially reconstructed and the two western ramps of the Route Z interchange will be completely reconstructed. An auxiliary lane will be constructed connecting the Wentzville Parkway and Route Z on and off ramps. The I-70 Bridges (A4320 and A4323) over Route Z will also be widened with an additional lane and new shoulders in each direction to accommodate the new I-70 template. I-70 will be restriped between Route Z and the eastbound I-64/ Route 40/61 on ramp to accommodate the additional lane work. There is existing pavement in place to accommodate the restriping work.

Figure 4 - I-70 Mainline Realignment (Over)

The proposed typical roadway section of I-70 consists of a 12' inside shoulder, 3-12' through lanes, a 12' auxiliary lane between Wentzville Parkway and Route Z, and a 12' outside shoulder. This template is applicable for both the eastbound and westbound directions, see **Figure 5**.

The MSE walls and I-70 bridges over the NSRR will be located to accommodate an additional 12' of horizontal clearance in each direction beyond the roadway template described above. This additional clearance is noted in the I-70 EIS document to account for a possible lane addition in the future. With the expected life span of the new railroad crossing and the close proximity to the I-70/I-64 Interchange, it was prudent to look beyond the typical 30 year design time frame when setting the structure limits. This will allow for construction of a future lane without having to reconstruct MSE walls and allow widening of the proposed bridges over the NSRR and still meet the current minimum vertical clearance requirements.

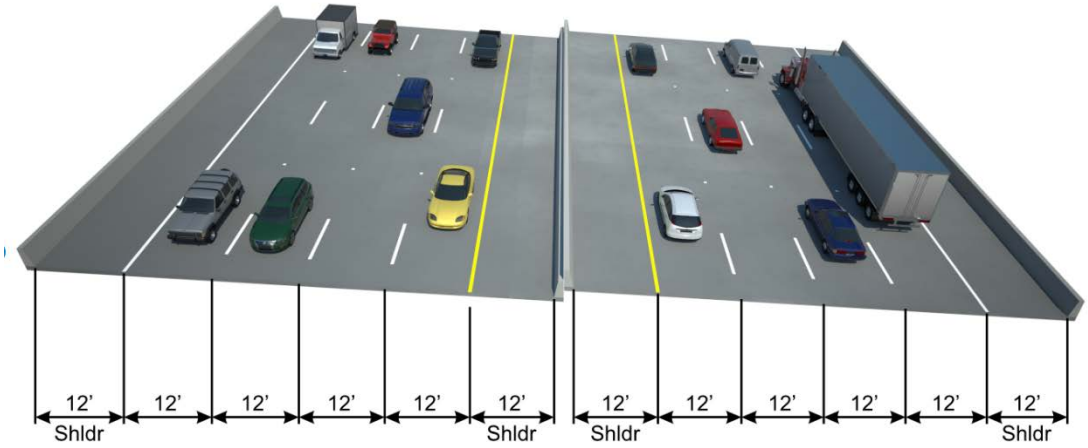


Figure 5 - I-70 Mainline Template

I-70 Mainline Bridges over NSRR:

The center bridge span is set to provide adequate room for a second mainline track at 14 feet spacing, along with 22 and 26 feet clearance (maintenance road) per NSRR guidelines, see **Figures 6 and 7**. This results in a 3 span bridge with a span arrangement of roughly (73'-80'-72'), with the end spans providing for 2:1 spill slopes.

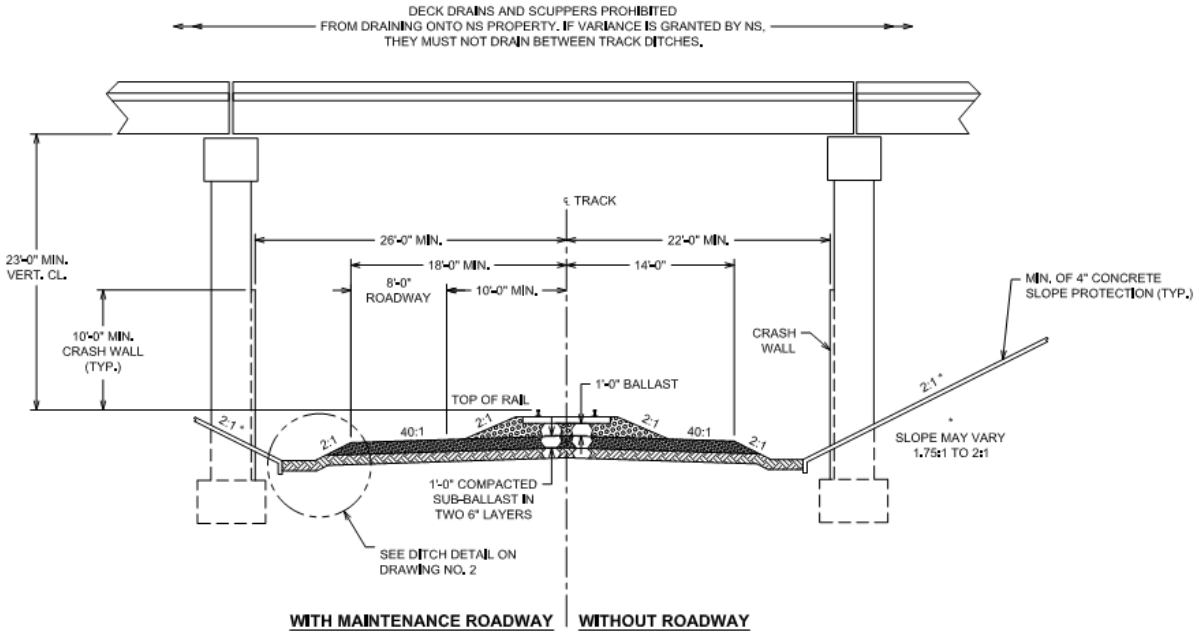


Figure 6 - NSRR Overpass Requirements

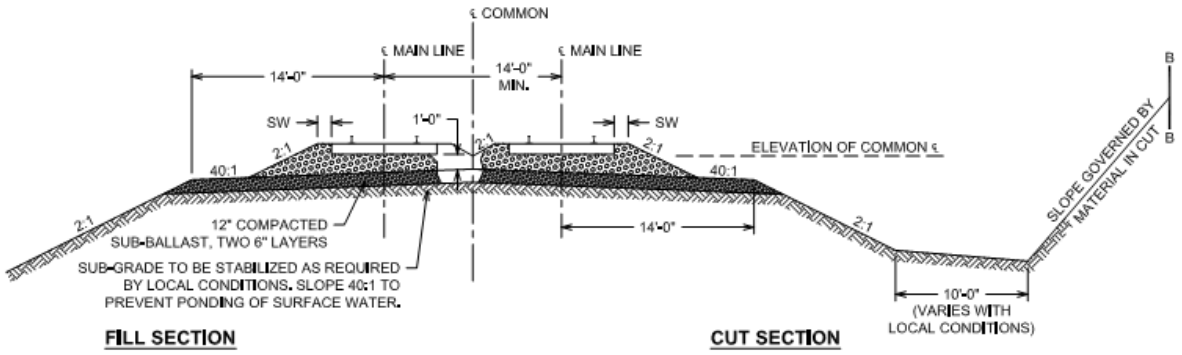


Figure 7 - NSRR Standard Double Track Cross Section

The bridge widths were set to match the roadway and accommodate the following template in each direction, see **Figure 8**:

- 12’ inside shoulder
- 3-12’ through lanes
- 12’ auxiliary lane (required due to steep profile grade)
- 12’ outside shoulder

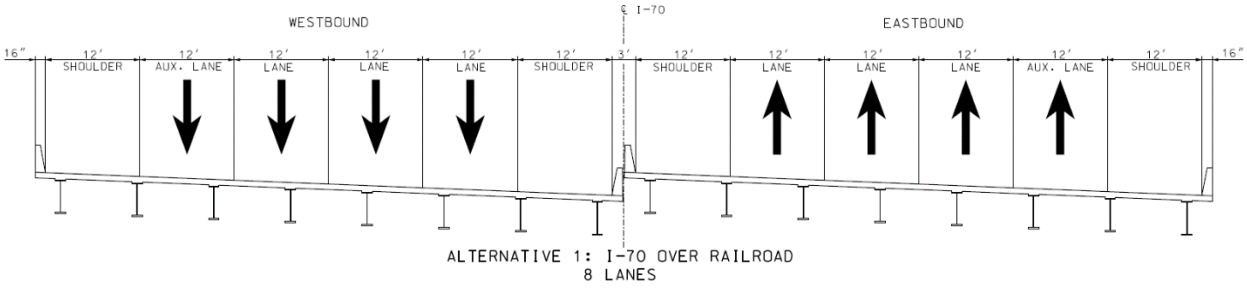


Figure 8 - I-70 Mainline Bridges Typical Section

As previously mentioned, the bridge layout will also accommodate a future widening to accommodate the possible addition of a fourth through lane to the outside and still provide the required 23’-0” minimum vertical clearance over the NSRR alignment at the low side of the superelevated deck. In order to limit the amount of approach fill, the eastbound and westbound lanes will follow offset vertical alignments. As a result of this, along with the wide (84’ clear) nature of both the eastbound and westbound lanes, two independent superstructures will be required.

Due to the combination of the span lengths, skew (approx. 33 degrees LA) and the curved horizontal alignment, curved steel plate girders were the clear choice for superstructure type. The girders will support a full depth 8 ½” thick cast-in-place concrete deck. The superstructure will be supported on cast-in-place open multicolumn intermediate bents founded on drilled shaft foundations with rock sockets and integral end bents founded on steel H-piling driven to rock. For areas where the horizontal clearance is less than 25 feet, the intermediate bents will be protected by crash walls meeting AREMA design requirements.

Per NSRR direction, the new I-70 overhead structure(s) are located a minimum of 60 feet away from west abutment of the existing NSRR bridge to facilitate future craning operations, see **Figure 9**.

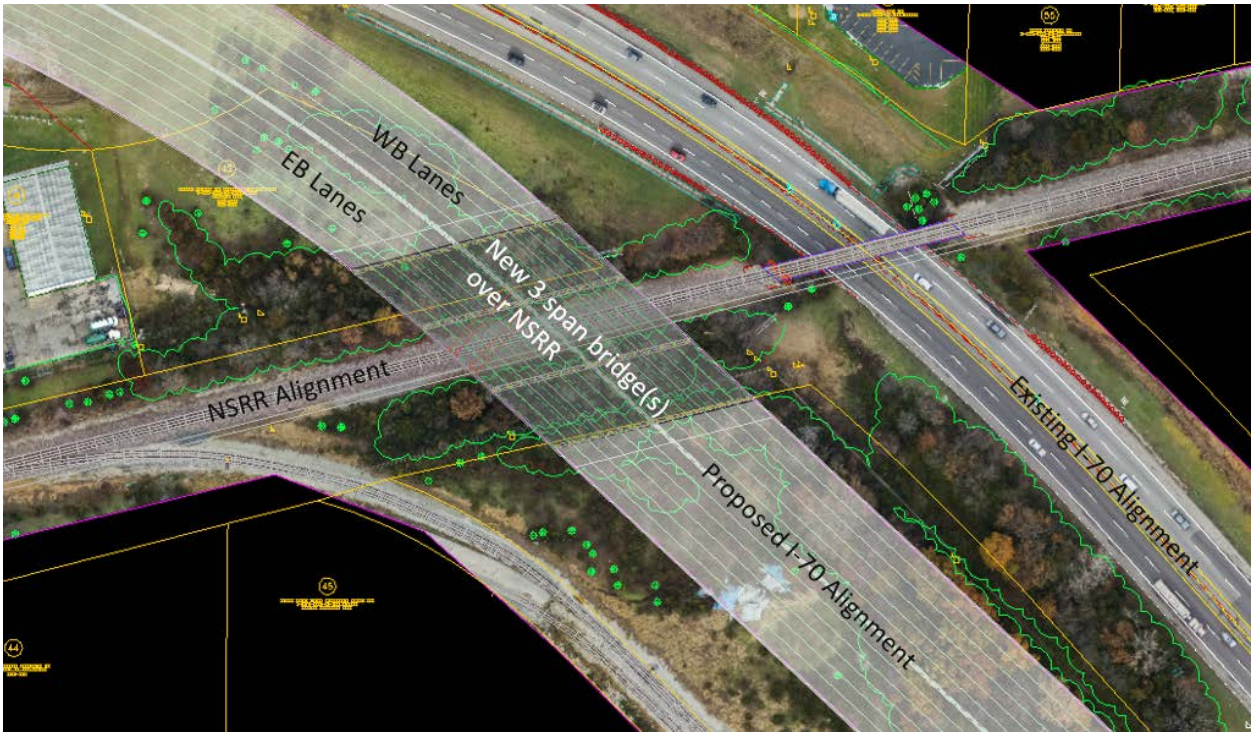


Figure 9 - I-70 Mainline (Realigned) Bridges over NSRR

West Pearce Boulevard:
This option will require the realignment of approximately 2200' of West Pearce Boulevard. The road will be located approximately 24' to the north. Approximately 6 parcels will be affected by this relocation. West Pearce Boulevard will be separated from I-70 by retaining wall or concrete traffic barrier. West Pearce Boulevard will have 2-12' lanes, a 12' center turn lane, and a 2'-6" curb and gutter. There will be 6' sidewalk located on north side of the relocated roadway and West Pearce Boulevard will be signed for 35 mph.

North Outer Road (Future):
The existing NSRR Bridge will be maintained to accommodate a future outer road which can be constructed along the existing I-70 westbound alignment. This north outer road is noted in the original I-70 EA document. This outer road will connect to the south side of existing West Pearce Boulevard, near Patricia Court, and traverse under the existing railroad bridge to the available quadrant near Mar-Le Drive. The exact location as yet to be determined. It is assumed that the outer road will be posted for 35 mph and consist of 2-12' lanes and 2-4' shoulders. Since construction of the north outer road is considered a future project, costs are not included in the project cost estimates.

Staged Construction:
Since the proposed bridges are constructed along a new alignment, staged construction is not required. Traffic will be maintained on the existing I-70 alignment until the new structures and

approaches are ready for traffic. The majority of impacts will be for the tie-ins of relocated I-70 to existing mainline.

Concerns/Benefits:
The following are some concerns and benefits of this option.

Concerns:

- Settlement issues due to extreme fill heights which may increase construction time.
- Significant cost for embankment and MSE walls.
- Site distance concerns on the crest vertical curve for I-70 mainline.
- Long up-grade movements to access I-70 from Route Z interchange.
- Superelevation requires that bridge layout be set up now for future template as widening of the eastbound lanes will result in reduced vertical clearance over NSRR.
- May require the reconstruction of segments of West Pearce Boulevard and Mar-Le Drive to accommodate the full I-70 template.
- Right of way may be required along West Pearce Boulevard and Mar-Le Drive, impacting several commercial businesses

Benefits:

- The new I-70 alignment can be constructed without significant traffic impacts.
- Provides an increase in the horizontal radii of I-70 which improves sight distance.
- Relocated I-70 can be constructed without additional right of way as MoDOT already owns the property along the south side of I-70.
- Interstate bridge over NSRR right of way simplifies RR review and approval process
- An extra lane has been added in the area of the Route 61/I-64 on ramp which will help driver merging.
- Standard construction methods
- Does not require new or temporary NSRR alignments/bridges. Eliminates need to invest limited funds in transportation systems that are owned and maintained by others.

Conceptual Strip Maps and Profiles Sheets for this alternative can be found in Appendix B.

For Typical Sections of Alternate 1 and the Route Z Bridge widening, see Appendix C.

The estimated cost of Alternate 1 is **$58,170,000**. For a detailed breakdown of the anticipated costs see Appendix D.

ALTERNATIVE 2: RELOCATING I-70 UNDER NORFOLK SOUTHERN RAILROAD

Proposed Improvements:

I-70 Mainline:

This option involves relocating the existing I-70 alignment approximately 65' to the southwest in the vicinity of the NSRR Bridge, see **Figure 10**. This realignment calls for the proposed westbound lanes to occupy the entirety of the existing eastbound and westbound lanes, while the proposed eastbound lanes will be constructed immediately to the southwest. Proper phasing of this construction will allow for the maintenance of two lanes of traffic in each direction throughout construction. This approach is discussed later in more detail. The existing horizontal curves in this corridor of 1926' and 2491' will be upgraded to 2090' and 2580' respectively. This new geometry allows for additional site distance and requires lower superelevation rates which is beneficial due to the reverse curvature within this corridor. There will be a need to lower the I-70 profile grade through the NSRR crossing approximately four feet to accommodate the wider pavement, required superelevation, and additional structural depth needed for longer bridge spans on the proposed NSRR structure.

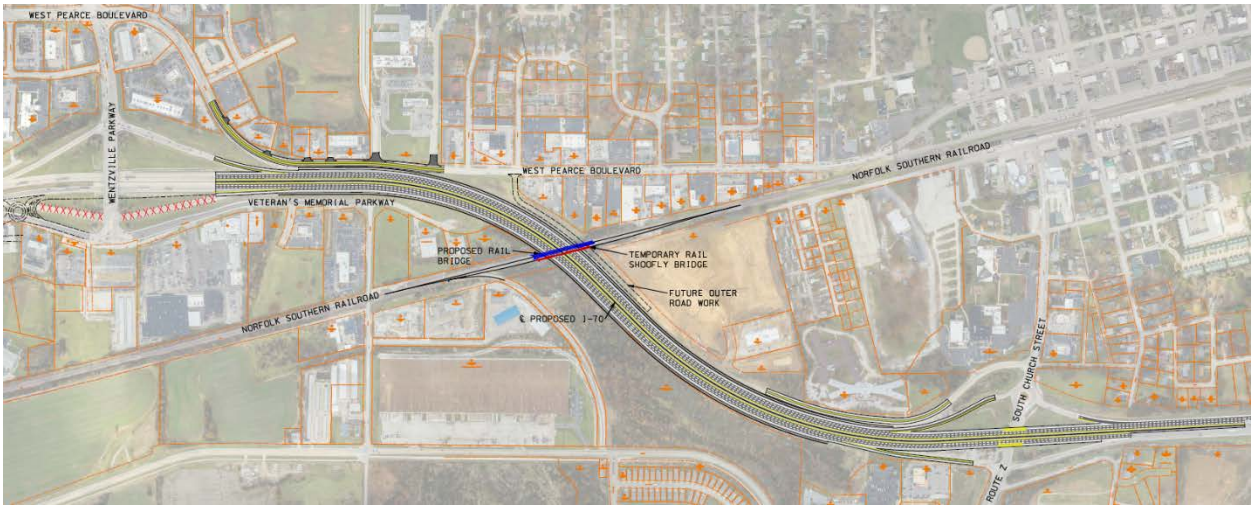


Figure 10 - I-70 Mainline Realignment (Under)

Similar to Alternative 1, the proposed typical section of I-70 will consist of a 12' inside shoulder, 3-12' through lanes, a 12' auxiliary lane between Wentzville Parkway and Route Z, and a 12' outside shoulder. This template is applicable for both the eastbound and westbound directions, see **Figure 11**.

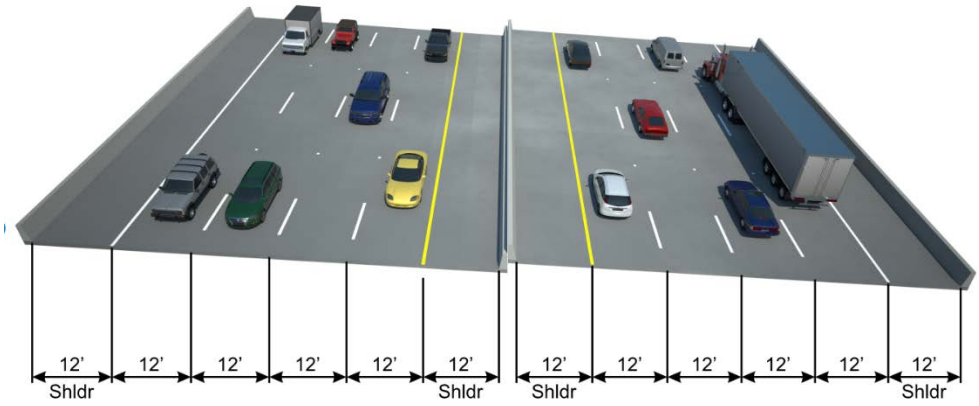


Figure 11 - I-70 Mainline Template

The overall improvements will extend from just east of the Wentzville Parkway interchange to the termini of the eastbound I-64/ Route 40/61 on ramp to eastbound I-70. The westbound off ramp to Wentzville Parkway will be partially reconstructed and the two western ramps of the Route Z interchange will be completely reconstructed. The auxiliary lane will be extended to connect to the new EB on-ramp from Wentzville Parkway that is being constructed within a separate project. The existing I-70 bridges over Route Z will be widened with an additional lane and new full 12' shoulders added in both directions. I-70 will be restriped between Route Z and the southbound Route 61 on ramp to accommodate the additional lane work.

The reconstructed NSRR Bridge will accommodate a future north outer road extension, as well as the main spans have an additional 12' of horizontal clearance in each direction beyond the roadway template described above. This additional clearance will account for a possible lane addition in the future. With the expected life span of the new NSRR Bridge and the close proximity to the I-70/I-64 Interchange, it was prudent to look well beyond the typical 30 year design time frame when setting the bridge opening. This will allow for construction of a future lane beneath the NSRR Bridge and will require limited interaction with NSRR.

<u>Norfolk Southern Bridge over I-70 Mainline:</u>
The project will involve the replacement of the existing 4 span NSRR Bridge with a new 4 span structure (see **Figure 12**) to accommodate the widening of I-70. The proposed bridge layout will be developed to span the roadway urban template depicted in the I-70 EIS as set for Section of Independent Utility (SIU) No. 7. This template accommodates 4-12' traffic lanes with 12' inside and outside shoulders and an additional 12' clearance, in each direction.

Replacement of the existing NSRR Bridge will require construction of a temporary shoofly and railroad bridge (see **Figures 13 and 14**) south of the existing railroad alignment. This portion of the NSRR track serves as the mainline connection to downtown St. Louis and more locally services the GM auto plant in Wentzville and must remain operational at all times. NSRR has noted that this location has up to 15 trains per day that operate on a 24 hours schedule, 7 days a week. Limited 4 hour closure windows will be allowed for the tie-ins of the temporary shoofly to the existing track. NSRR is requiring that this temporary shoofly be designed for train operating speeds of 60 mph. Approximately 2400' of track, centered about the existing NSRR Bridge, will be required to maintain a 60 mph operating speed. One track switch will be required along the temporary track, approximately 700' south of the existing NSRR Bridge.

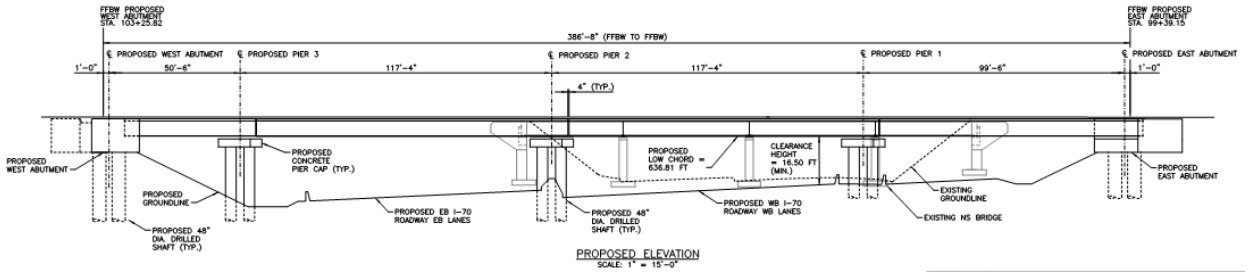


Figure 12 - Proposed 4 Span NSRR Bridge

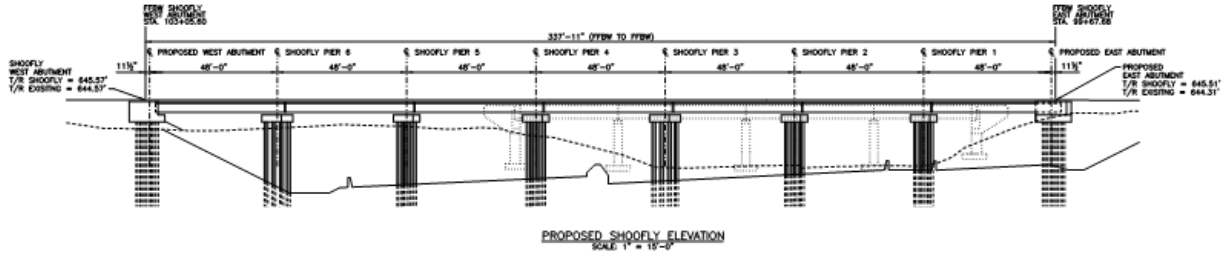


Figure 13 - Proposed 7 Span Temporary Shoofly Bridge

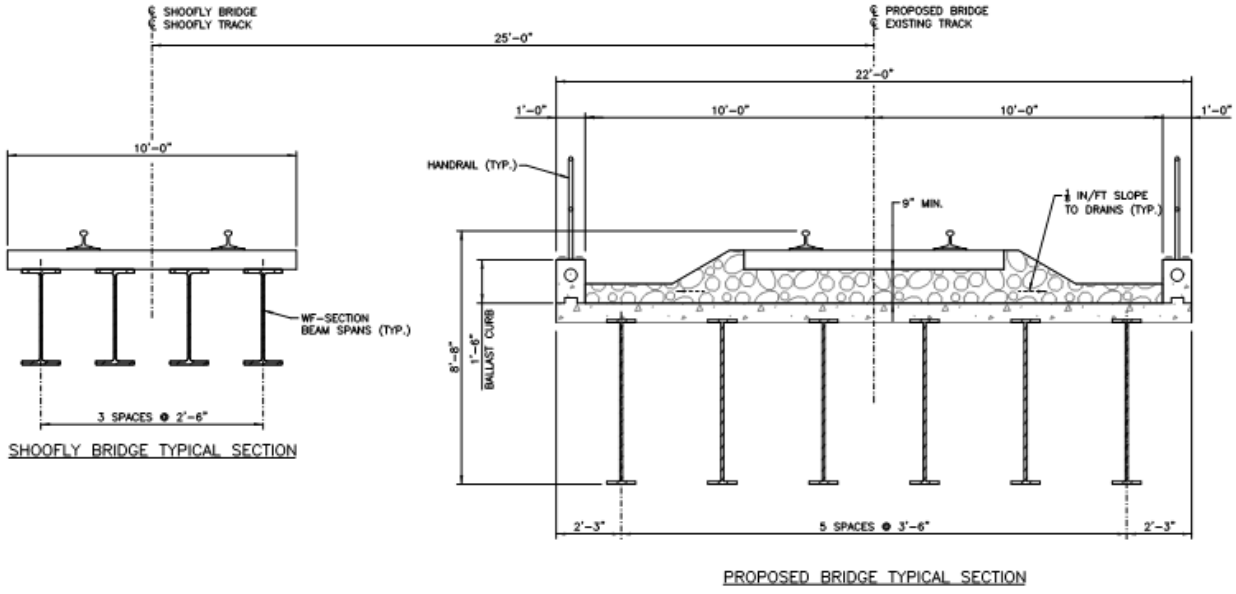
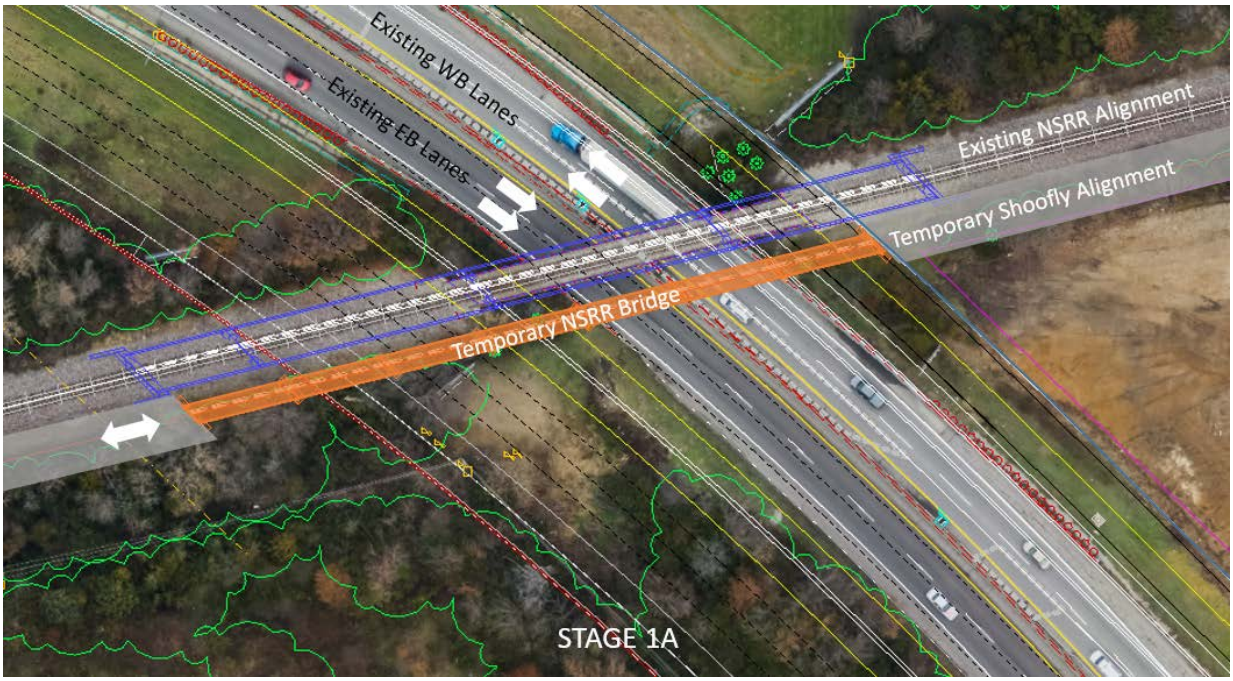


Figure 14 – Typical Section thru RR Bridge and Shoofly

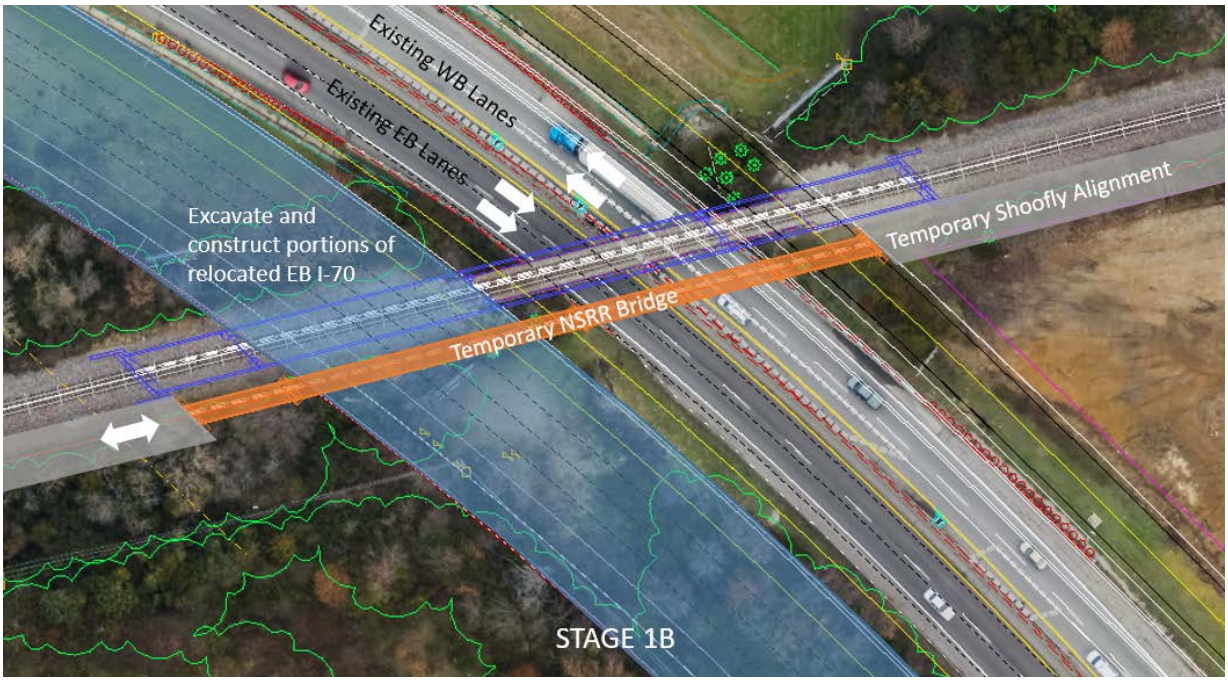
Construction Staging:

The basic premise for this I-70 relocation option is to maintain two lanes of eastbound and westbound I-70 traffic at all times during construction (with the exception of potential short term overnight or weekend lane closures) and utilize a temporary shoofly track alignment with a temporary rail bridge over I-70 to maintain rail traffic. The following is a brief description of the proposed traffic/train staging plan:

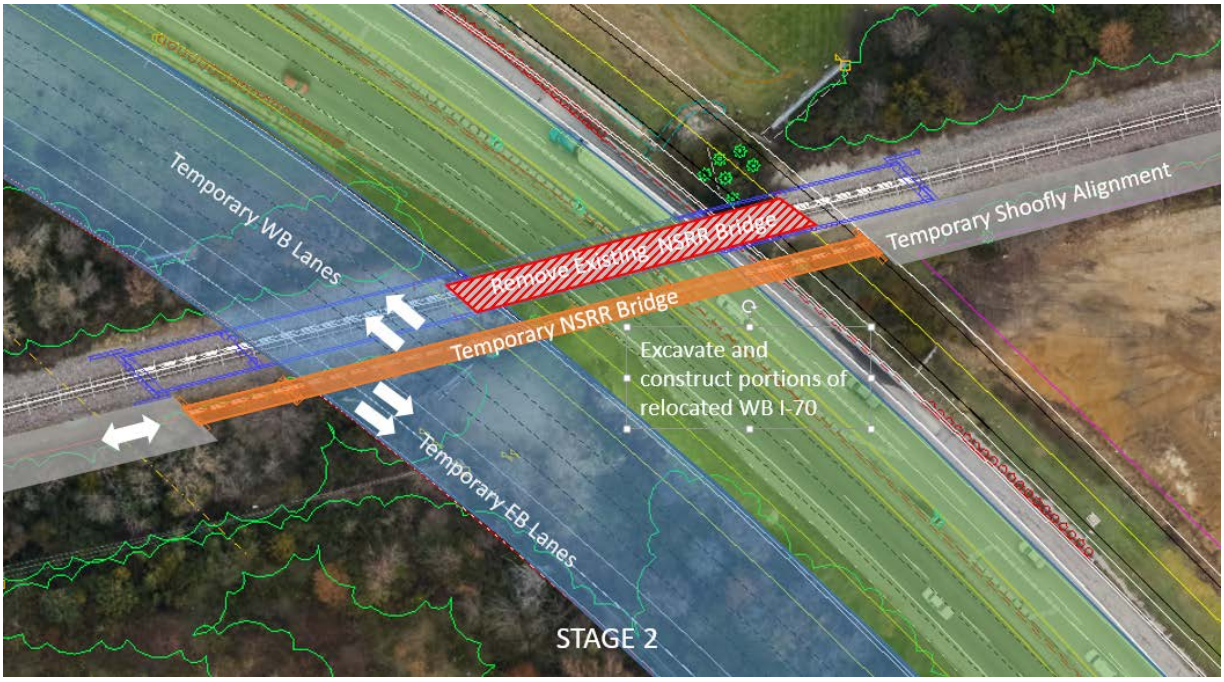
Stage 1A: Construct the temporary railroad shoofly alignment and bridge 25 feet south of the current NSRR tracks. The temporary bridge will be at approximately the same grade as the existing structure and will consist of seven spans, which will accommodate both the existing I-70 and temporary roadway alignments. This bridge layout will require a temporary support be constructed between the existing concrete traffic barriers along the median of existing I-70. Construction of this median support will require that this work be completed at night, with a single lane closure in either direction. Discussions with local MoDOT staff have found this approach to be acceptable. Upon completion of the temporary shoofly and bridge, NSRR rail traffic will be shifted to the temporary railroad alignment.



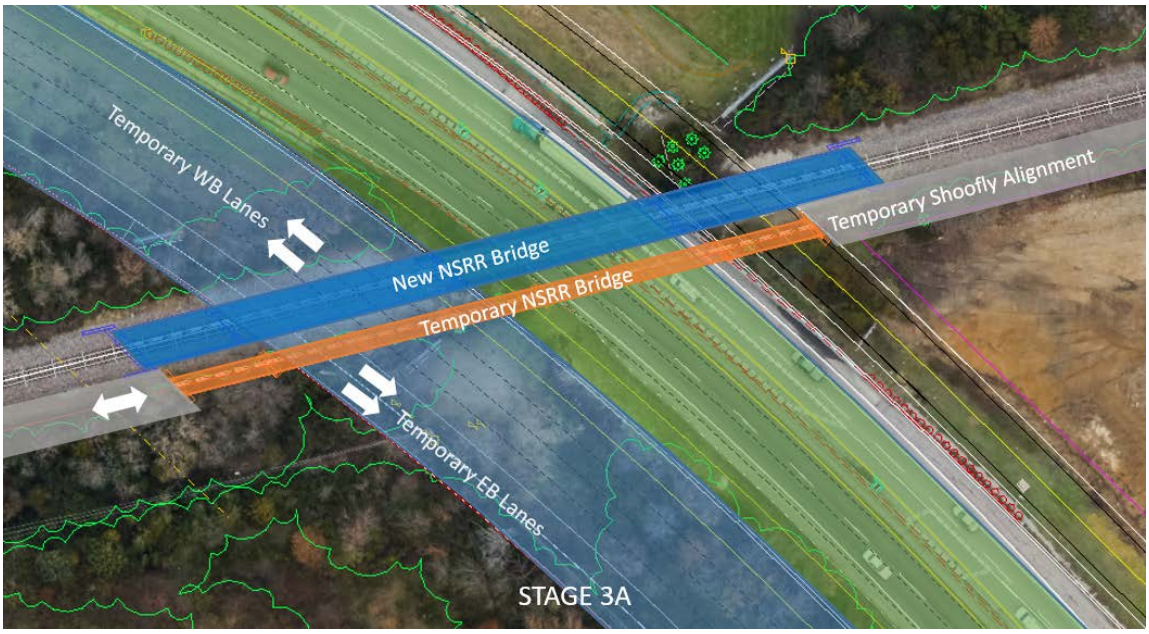
Stage 1B: The proposed eastbound lanes of relocated I-70 will be fully excavated, to include the west embankment of the NSRR alignment. Usable portions of these lanes, at the contactor's option, will be paved such that two temporary lanes in each direction can be maintained during the next construction stage. Due to the span arrangement of the temporary bridge, some of the proposed lanes will not be fully paved as their locations are occupied by temporary railroad piers.



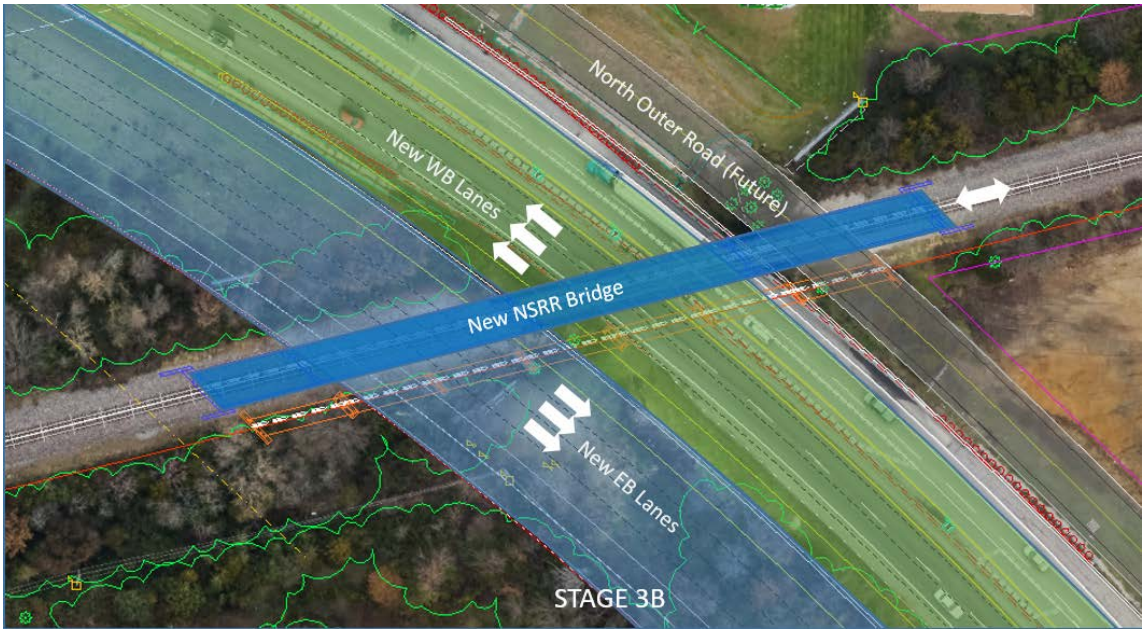
Stage 2: All eastbound and westbound traffic from existing I-70 will be shifted to the temporary portion of the proposed eastbound lanes of relocated I-70. Once traffic has been relocated, the existing NSRR Bridge will be removed and the proposed westbound lanes of relocated I-70 will be fully excavated. Similar to the proposed eastbound lanes, all westbound lanes not impacted by the temporary bridge pier locations will be constructed.



Stage 3A: Construct the proposed NSRR Bridge along the existing NSRR alignment and transfer rail traffic back to the existing alignment. This allows removal of the temporary shoofly alignment, temporary bridge, and construction of the remaining portions of relocated westbound I-70.



Stage 3B: Westbound I-70 traffic will be shifted to the newly constructed westbound lanes of relocated I-70 and the remaining pavement will be constructed as required for the eastbound lanes which were left vacant by the temporary supports of the railroad bridge. Once completed, eastbound I-70 traffic will be relocated into their final locations. The NSRR Bridge has been sized to accommodate a future North Outer Road which will be constructed at a later time as part of another project.



West Pearce Boulevard:
This option will require the realignment of approximately 2200' of West Pearce Boulevard. The road will be located approximately 24' to the north. Approximately 6 parcels will be affected by this relocation. West Pearce Boulevard will be separated from I-70 by retaining wall or concrete traffic barrier. West Pearce Boulevard will have 2-12' lanes, a 12' center turn lane, and a 2'-6" curb and gutter. There will be a 6' sidewalk located on north side of the relocated roadway and West Pearce Boulevard will be signed for 35 mph.

North Outer Road (Future):
The proposed NSRR Bridge will include an additional span such that a future outer road can be constructed along the north side of I-70. This outer road will connect to the south side of existing West Pearce Boulevard, near Patricia Court, and traverse under the new railroad bridge to the available quadrant near Mar-Le Drive. The exact location as yet to be determined. It is assumed that the outer road will be posted for 35 mph and consist of 2-12' lanes and 2-4' shoulders.

Concerns/Benefits:
The following are some concerns and benefits of this option.

Concerns:

- Additional costs related to temporary railroad bridge and track.
- Significant cost for the new NSRR Bridge.
- Additional coordination and approvals from NSRR.
- May require the reconstruction of segments of West Pierce Drive and Mar-Le Drive to accommodate full I-70 template, similar to Alternate 1.
- Right of way may be required along West Pearce Boulevard and Mar-Le Drive, impacting several commercial businesses, similar to Alternate 1.
- Significant bridge construction requires longer construction duration.
- Proposed grade for EB off ramp to Route Z matches the existing grade of 6.75%.

Benefits:

- Acceptable roadway grades and no significant fills or retaining walls.
- The new I-70 alignment and RR Bridge can be constructed without significant traffic impacts, similar to Alternate 1.
- Provides an increase in the horizontal radii of I-70 which improves sight distance, similar to Alternate 1.
- Relocated I-70 can be constructed without additional right of way as MoDOT already owns the property along the south side of I-70, similar to Alternate 1.
- Additional span length in the eastern most span of the NSRR Bridge provides space for a future outer road system which increases local mobility.
- An extra lane has been added in the area of the Route 61/I-64 on ramp which will help driver merging, similar to Alternate 1.

Conceptual Strip Maps and Profiles Sheets for Alternate 2 can be found in Appendix B.

For details of the NSRR Bridge along with Typical Sections of the Route Z Bridge widening, see Appendix C Bridge Details.

The estimated cost of Alternate 2 is **$35,881,000**; of this amount approximately **$8,850,000** is associated with NSRR costs. For a detailed breakdown of the anticipated costs see Appendix D. *The estimate assumes overbuild of the NSRR substructure elements ($450,000) to accommodate the future construction of a second mainline track by others. This additional work may or may not be included in the final project, pending coordination and agreements with NSRR.*

ALTERNATE 3: RELOCATING EASTBOUND I-70 OVER NORFOLK SOUTHERN RAILROAD

This option consists of a hybrid of the previous two alternates, in that it would involve relocating eastbound I-70 to the southwest and over the NSRR alignment. The westbound lanes will remain along the existing I-70 alignment and lowered to provide adequate vertical clearance beneath a new NSRR railroad bridge. The option will consist of three 12' through lanes, an auxiliary lane between Wentzville Parkway and Route Z, and 12' inside and outside shoulders. Similar to Alternate 1, this option will require an extensive amount of MSE walls or similar earth retention systems to accommodate the required grade raise. The overall improvements will extend from just east of the Wentzville Parkway interchange to the termini of the eastbound I-64/ Route 40/61 on ramp to eastbound I-70. The westbound off ramp to Wentzville Parkway and westbound on ramp from Route Z will be used in place. The eastbound off ramp to Route Z will be completely reconstructed. Auxiliary lanes will be constructed between Wentzville Parkway and Route Z to connect the on and off ramps. The existing I-70 bridges over Route Z will be widened to include an additional lane and new full 12' shoulders in both directions. I-70 will be restriped between Route Z and the southbound Route 61 on ramp to accommodate the additional lane work.

<u>Construction Staging:</u>
The benefit of this option is that relocated eastbound I-70 can be constructed with minimal interference to existing I-70 traffic operations. Majority of impacts will be for the tie in of relocated pavement to existing I-70. Staged construction will still be required for NSRR in order to construct the temporary and permanent railroad bridges over the remaining I-70 westbound lanes.

<u>Concerns/Benefits:</u>
The main issue with a hybrid approach is that it combines all of the concerns and limited benefits of the previous two alternatives into a single project. The concerns regarding settlement of extreme fills, embankment costs, site distance, cost of temporary railroad infrastructure, and a temporary and permanent railroad bridge spanning I-70 will overwhelm the collective benefits of the previous alternatives.

Due to the combined concerns related to the hybrid alternative, it was dismissed from further consideration.

ALTERNATE 4: SOUTHERN RELOCATION OF EASTBOUND I-70

This option calls for relocating eastbound I-70 approximately 1500’ to the south of the existing Wentzville Parkway interchange and NSRR tracks, see **Figure 15**. The proposed eastbound template will consist of three 12’ lanes with 12’ shoulders. The westbound lanes will be maintained along the existing I-70 alignment. This alternative was evaluated at an extremely high level for delineation of potential impacts prior to moving forward with a conceptual layout.

This option is feasible, has positive traffic control benefits, and opens up additional properties for economic development. Preliminary discussions were held with County and Municipal stakeholders which ultimately led to the elimination of this concept as a viable alternative. Local stakeholders were concerned with the high cost of the right of way, impacts to approved developments, need for additional bridges over NSRR, and scheduling delays associated with environmental approval along a new corridor. The City of Wentzville currently has plans to extend Wentzville Parkway south over the NSRR to Interstate Drive, which will provide access to these same properties.

Figure 15 – Alternate 4: Alignment south of Existing I-70

The cost of this southern relocation and associated improvements was never calculated due to the negative reaction of the local stakeholders.

The following are some concerns and benefits of this option.

<u>Concerns/Benefits:</u>

Concerns:

- Extensive additional right of way costs
- Potential delays due to environmental clearance process
- Three additional bridges increase initial construction and long term maintenance costs
- Skewed bridge over railroad near western project limits is extremely expensive

Benefits:

- This will allow fewer impacts to traffic during the replacement of the existing railroad bridge since traffic could be diverted to the new eastbound lanes.

TRAFFIC ANALYSIS

Introduction and Purpose

The purpose of this traffic analysis was to investigate the proposed improvements along the I-70 corridor from east of the Wentzville Parkway interchange to just west of the I-64 interchange (approximately 1.75 miles) in St. Charles County, MO. This study includes modifications to the mainline segments and ramp locations within the study area. This document examines existing conditions, 2045 "No Build" conditions, and two build alternatives.

Project Definition

The traffic analysis included interstate mainline, ramps, merge/diverge areas, weaving segments, and intersections located in the surrounding street network. This document summarizes the operational analysis for the following four scenarios:

1. Existing Conditions for AM/PM Peak periods;
2. 2045 No Build Conditions for AM/PM Peak periods;
3. 2045 Build Alternative for AM/PM Peak periods; and
4. 2045 Build "Intermediate" Alternative for AM/PM Peak periods.

Project Study Area

The project area is located along the I-70 corridor from east of the Wentzville Parkway interchange, including the intersections at Wentzville Parkway, to just west of the I-64 interchange in St. Charles County. Based on the existing traffic operations and delays experienced within the surrounding area, the traffic analysis was extended to the east of I-64 to include the Highway A/Freymuth Road interchange. The study area is shown in more detail in **Figure 16**. It should be noted that the VISSIM analysis for this project includes a small portion of Route 61 north of I-70 and I-64 south of I-70, but does not include the subsequent interchanges, as I-64 operations were not considered as part of this analysis.

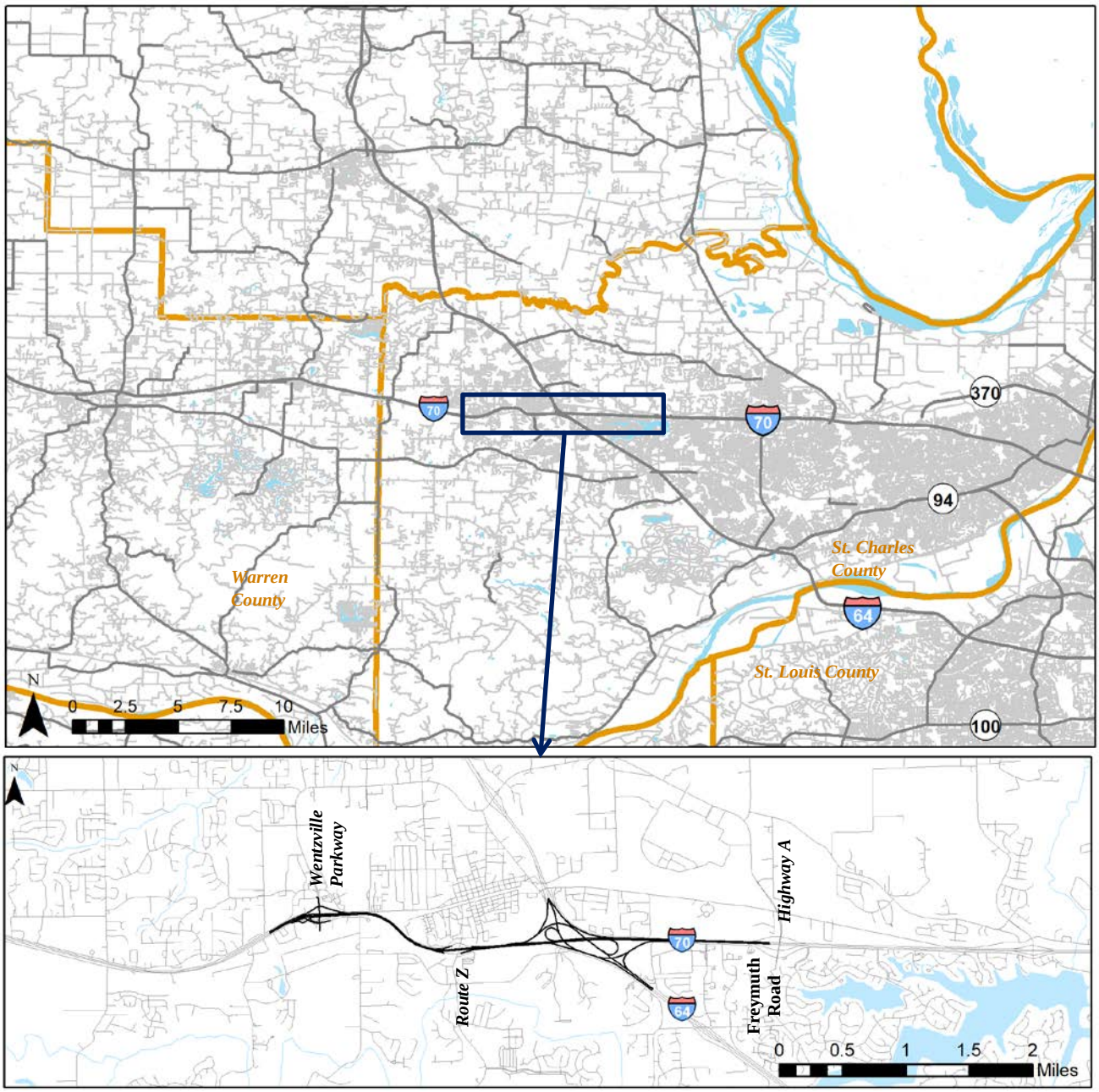


Figure 16: Location Map

Data Collection
The following data was collected to complete the traffic analyses for this project.

- **I-70 & I-64 Ramp Traffic Volumes:** On/off ramp volumes were collected along the study corridor from I-64 to Wentzville Parkway in the eastbound and westbound directions. Counts were conducted using Hi-Star in-lane vehicle detection devices for a period of one day, in 15-minute increments. Counts were conducted at the various ramp locations on November 8th, 2018.
- **I-70 Mainline Traffic Volumes:** Mainline traffic volumes were collected at two locations within the study corridor at I-70 west of Highway A and at I-70 west of Wentzville Parkway. Counts were conducted using Miovision traffic data collection cameras for a period of one day on November 8th, 2018. Data was collected in 15-minute increments for a twenty-four-hour period.
- **Intersection Turning-Movement Volumes:** Six-hour turning-movement counts were collected by Miovision cameras at two intersections within the study area: I-70 WB ramps & Wentzville Pkwy and I-70 EB ramps & Wentzville Pkwy. The counts were collected on November 13, 2018 from 6:00 – 9:00 AM and 3:00 – 6:00 PM.
- **Travel-Time Data:** Travel-time runs were completed during the AM and PM peak hours along I-70 and I-64 in the study area. GPS devices recorded speeds and positions along the study corridors for test vehicles utilizing the Average Car method, in which the test vehicle attempts to replicate the average speed of the travel stream of traffic for each run. This information was used to calibrate the existing peak-hour models with respect to network measures of effectiveness (MOEs). The travel-time runs were collected during the second week of November in 2018. Additional staff were in the field during these same peak periods, completing observations related to backups, slowdowns or other driver behavior patterns related to study-area traffic. Staff also observed corridor travel patterns, signal operations and queuing impacts at the signalized study intersections.
- **Traffic Signal Timings:** HDR was granted access to the MoDOT signal timing database in order to collect programmed cycle length, phase settings, offsets and coordination parameters for the traffic signals within the study area.
- **Geometry Data:** The number of lanes and traffic control were obtained from Google Earth aerial imagery and field data collection.

Figure 17 depicts the AM and PM peak-hour volumes used in the existing-condition peak-hour simulation models.

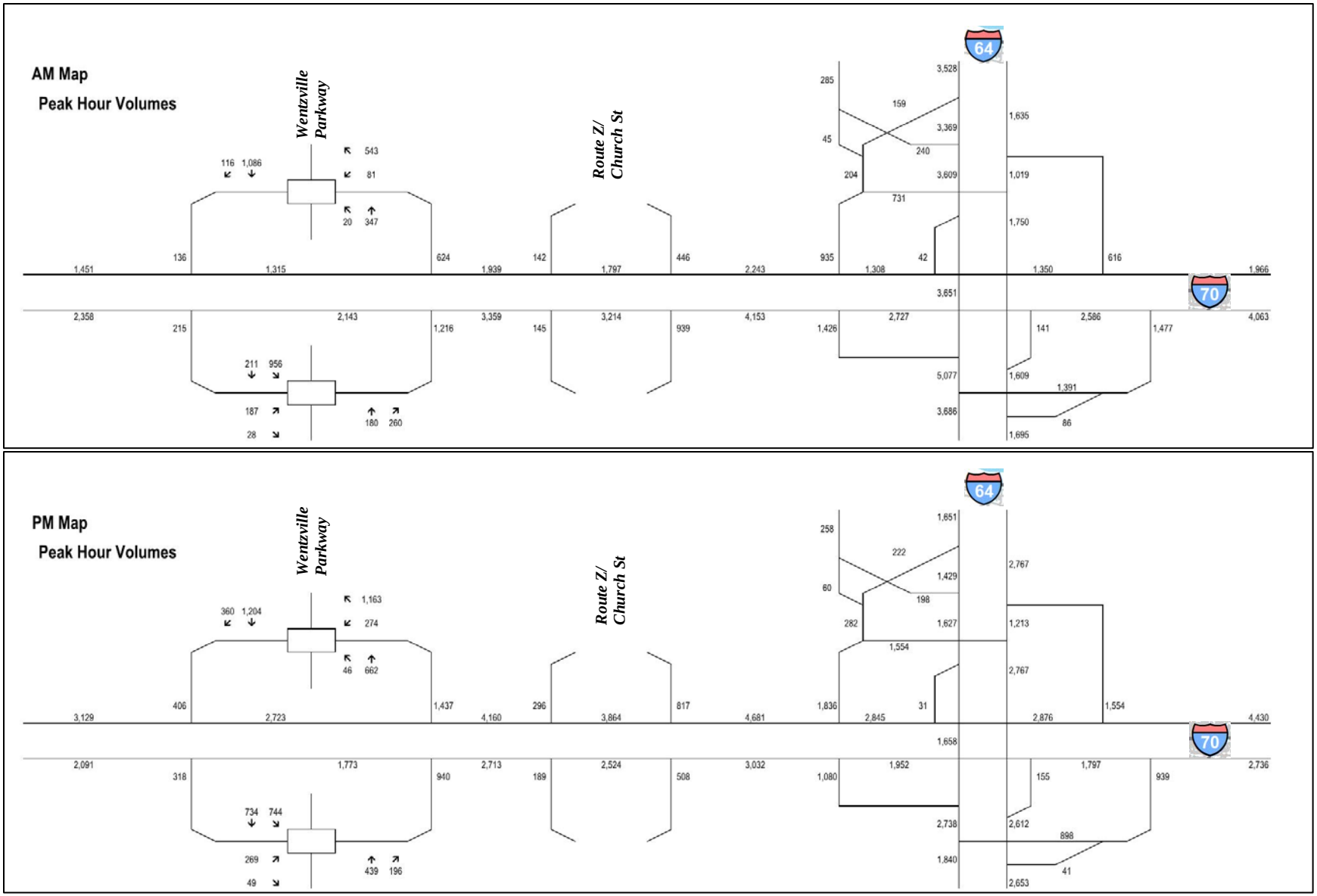


Figure 17: Existing AM and PM Peak Volumes

Traffic Evaluation Methodology

AM and PM peak-period microscopic traffic simulation models were developed for the entire project study area to evaluate traffic operations for the four analysis scenarios.

The AM peak model addressed the 6:00 AM to 9:00 AM timeframe on a typical weekday, while the PM peak model addressed 3:00 PM to 6:30 PM. These periods are representative of the two highest typical peak travel periods for the facilities in the study area. Though the model periods are three to three-and-a-half hours long, several of the measures reported in the results are based on the peak hour of the peak period. The VISSIM software package was used to conduct the analysis.

For each scenario, the freeways and ramps were coded to represent the existing geometry (e.g. number of lanes, lengths of merges/diverges, lane widths, lane closures, etc.). Driver behavior parameters such as decision sight distances, speed parameters and other required inputs were also set, with the same or similar parameters used across all models to the extent reasonable. The existing traffic volumes were then loaded into the network to simulate the traffic demand. The traffic demand included both auto and truck traffic. It also included peaking characteristics developed from the collected traffic count information.

For future demand, the St. Charles County Travel Demand Model was used to generate the various 2045 volume scenarios. The future volume scenarios assumed several roadway improvement projects for which construction funds have already been committed. This includes construction of the David Hoekel Parkway interchange to the west of Wentzville Parkway.

Model outputs were examined at both the segment and intersection levels. Analysis segments were defined as individual VISSIM links, or as groups of links that operated as one unique "functional" segment. The lengths of these segments generally correspond to the lengths recommended in the Highway Capacity Manual (HCM). For example, mainline merge and diverge segments were set at lengths of 1,500 feet in accordance with HCM guidance. Level of Service (LOS) was estimated for each freeway segment using the density threshold values identified in the HCM version 6, published by the Transportation Research Board; these values are shown in **Table 1**. Travel times were also extracted from the models, based upon measurement points that matched locations used for field travel-time data collection. Additionally, simulated segment speeds were also examined by segment.

Table 1: HCM LOS Thresholds for Freeways (6th Edition)

Level of Service	Basic Freeway Segments Density (pc/mi/ln)	Freeway Weaving & Merge/Diverge Segments Density (pc/mi/ln)	Freeway Traffic Flow Characteristics
A	**≤ 11**	**≤ 10**	Free flow, vehicle maneuverability unimpeded.
B	**> 11-18**	**> 10-20**	Reasonably free-flow, maneuverability only slightly restricted, physical and psychological comfort high.
C	**> 18-26**	**> 20-28**	Speeds near free-flow, freedom to maneuver noticeably restricted, incidents can cause local deterioration to service quality.
D	**> 26-35**	**> 28-35**	Speeds decline with increasing flow, freedom to maneuver seriously restricted, reduced physical and psychological comfort, minor incidents can create queues.
E	**> 35-45**	**> 35**	Operation at capacity, highly volatile, little room to maneuver, incidents can produce serious breakdown and queues, physical and psychological comfort levels poor.
F	**> 45 Demand exceeds capacity**	**Demand exceeds capacity**	Demand exceeds capacity, breakdown with unstable flow, these conditions exist within queues formed behind bottlenecks.

LOS is also used to characterize traffic performance at signalized and unsignalized intersections. For signalized intersections, LOS is based on the total average control delay experienced by that demand as it travels through the intersection. An acceptable LOS for a signalized intersection is considered to be LOS D or better (i.e. A, B, C or D). At unsignalized intersections, LOS is based on the control delay for the movements that must yield right-of-way. It is fairly typical for stop-controlled minor streets to experience longer delays during peak periods, while the majority of the traffic flows through the intersection on the major street experiencing little or no delay. **Table 2** highlights the delay thresholds for the different LOS categories for interchange areas, individual signalized intersections and unsignalized intersections.

Table 2: HCM LOS Thresholds for Signalized Interchanges/Intersections and Unsignalized Intersections

Level of Service	Signalized Interchange Control Delay (sec/veh)	Signalized Intersection Control Delay (sec/veh)	Unsignalized Intersection Control Delay (sec/veh)	Traffic Flow Characteristics
A	**≤ 15.0**	**≤ 10.0**	**≤ 10.0**	Free flow, insignificant delays.
B	**> 15.1-30.0**	**> 10.1-20.0**	**> 10.1-15.0**	Stable operation, minimal delays.
C	**> 30.1-55.0**	**> 20.1-35.0**	**> 15.1-25.0**	Stable operation, acceptable delays.
D	**> 55.1-85.0**	**> 35.1-55.0**	**> 25.0-35.0**	Restricted flow, common delays.
E	**> 85.1-120.0**	**> 55.1-80.0**	**> 35.1-50.0**	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	**> 120.0**	**> 80.0**	**> 50.0**	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Evaluation Scenarios

Existing Conditions

The Existing Conditions scenario is based upon the existing lane geometrics, traffic control, signal timing plans, and traffic volumes obtained during the data collection portion of the study.

2045 No-Build Conditions

The 2045 Future No-Build Conditions scenario was developed to assess anticipated impacts of traffic volume increases on the existing street network. The St. Charles County travel demand model was used to extract growth volumes. The existing geometrics and future volumes were first modeled within Synchro to optimize signal timings along Wentzville parkway. These timings were then used in the VISSIM models. One future geometric improvement was assumed to be in place under this scenario, based on a traffic impact study completed for the Wentzville Parkway corridor and interchange (completed in June 2016). The study suggested building a roundabout west of Wentzville Parkway at the eastbound I-70 ramp location. The geometric configurations from the proposed design were coded into VISSIM.

2045 Build Alternative

The Build alternative included the addition of one mainline lane and an auxiliary lane in both directions between Wentzville Parkway and Route Z (Church Street), to widen the corridor to 4 lanes in total (3 lanes + auxiliary lane) and the addition of one mainline lane between Route Z and I-64. The build alternative was modeled within VISSIM. A VISUM model was used utilized to reassign the existing traffic volumes within the network based upon forecasted demand and modified system connections.

2045 Build "Intermediate" Alternative

The Intermediate alternative is similar to the 2045 Build alternative with the exception that improvements to the roadway section between Wentzville Parkway and Route Z include the auxiliary lane only in both directions, resulting in 3 lanes in total (2 lanes + auxiliary lane).

2018 Existing Conditions
The existing AM/PM peak period VISSIM models were developed using existing lane geometrics, intersection control, and traffic volumes. These models were calibrated against the existing traffic demand volumes and field-measured travel time data. Model calibration is an iterative process in which the modeler adjusts operational characteristics and constraints to fine-tune the model in an attempt to replicate real-world conditions as closely as possible.

The existing peak-hour models were first calibrated to the input and output volumes to verify that the model was matching the observed volumes. The next step was comparing modeled travel-time durations to the field-measured travel-time data. Adjustments were made to the driver characteristics and vehicle compositions to help fine-tune the model simulation outputs to the field-measured data. The calibration thresholds used to measure the effectiveness of the model were based on guidelines provided by FHWA. The calibrated models were run ten times, for the peak periods, and the AM/PM peak hour results were averaged over the ten runs to remove statistical anomalies.

Freeway Segment Results
The freeway analyses cover I-70 segments from Wentzville Parkway to Highway A. The Existing Conditions LOS, density, and speed results for each freeway segment are provided in **Table 3**.

AM Peak Hour
The Existing Conditions freeway operations results indicate that, during the AM peak period, most study segments are currently operating at LOS C or better along eastbound and westbound I-70. All segments along westbound I-64 are shown to operate at LOS C or better; however, there are six segments along eastbound I-64/southbound Route 61 that currently operate at LOS E or worse:

- the basic freeway segment along Route 61, south of Wentzville Parkway,
- the diverge segment from Route 61 SB to I-70 WB On-Ramp,
- the basic freeway segment between the Route 61-SB-to-I-70-WB Off-Ramp and the Luetkenhaus On-Ramp to I-64 EB,
- the merge segment between the Luetkenhaus On-Ramp to I-64 EB and the I-70 WB on-loop to I-64 EB,
- the merge segment between I-70 WB On-Ramp to I-64 EB and the I-70 EB On-Ramp to I-64 EB; and
- the weaving segment between I-70 EB On-Ramp to I-64 EB and the I-64-EB-to-I-70-EB Off-Ramp.

Speeds are expected to continue to decline within these freeway segments, as well.

PM Peak Hour
During the PM peak period, all segments along eastbound I-70 currently operate at LOS C or better. However, five segments along westbound I-70 operate at LOS F, essentially creating a bottleneck for westbound travelers along the entire length of I-70 between Wentzville Parkway interchange and I-64. Specifically, the five poorly operating segments are:

- the basic freeway segment between the I-70 WB Off-Ramp to I-64 EB and the Route 61 SB On-Ramp to I-70 WB,
- the weaving segment between the Route 61 SB On-Ramp and the Route Z Off-Ramp,
- the basic freeway segment between Route Z Off-Ramp & On-Ramp,
- the merge segment at the Route Z On-Ramp to I-70 WB; and
- the basic freeway segment between the Route Z On-Ramp and the Wentzville Parkway Off-Ramp.

Along westbound I-64, there are four segments that operate at LOS E or worse:

- the basic freeway segment north of Prospect Rd,
- the diverge segment at the I-64 WB Off-Ramp to I-70 EB,
- the basic freeway segment between the I-64 WB Off-Ramp and the I-70 EB On-Ramp; and
- the merge segment between I-70 EB On-loop and the Route 61 SB Off-Ramp to I-70 WB.

Along southbound Route 61, one segment currently operates at LOS E: the basic freeway segment south of Wentzville Parkway. **Figure 18** depicts freeway LOS of the AM and PM peak-hour volumes for the existing conditions.

I-70 Bottleneck

As described above, the existing conditions analysis reports a major traffic bottleneck occurring during the PM peak period along westbound I-70. This analysis is in agreement with observed field conditions as well as prior studies, including the St. Louis Regional Freightway Plan, which includes improvements to this area of I-70 on its 2020 Freightway Multimodal Transportation Project List.

The project fact sheet for the *I-70 Improvements from Warrenton to Stan Musial Veterans Memorial Bridge* project states that the I-70 / I-64 interchange is one of the greatest freight bottlenecks in the St. Louis region, and the 20-mile section of I-70 west of the interchange, from Wentzville to Warrenton, experienced an estimated user delay cost of $12.7 million in 2016. It goes on to say that by reconstructing and expanding the existing four-lane interstate to six-lanes for that 20-mile section (which includes the Wentzville project study area), that the safety, reliability, and capacity of I-70 for both freight and passenger vehicles will be improved.

As suggested by the Freightway plan, the Build alternatives for this Wentzville project (presented in the following sections) include widening of I-70 from four-lanes to six-lanes as a way to help improve this bottleneck.

Table 3: Existing Conditions Freeway Results Summary

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Eastbound I-70	West of Wentzville Parkway	Basic	B	17.3	65.9	B	16.2	65.9
	I-70 EB Off-Ramp to Wentzville Parkway	Diverge	B	14.5	65.0	B	13.6	65.0
	Between Wentzville Parkway On-Ramp & Off-Ramp	Basic	B	15.8	65.3	B	13.8	65.6
	Wentzville Parkway On-Ramp to I-70 EB	Merge	C	22.4	58.9	B	18.1	61.5
	Between Wentzville Parkway On-Ramp & Route Z Off-Ramp	Basic	C	25.6	63.0	C	21.2	63.9
	I-70 EB Off-Ramp to Route Z	Diverge	C	21.2	63.6	B	17.7	64.3
	Between Route Z On-Ramp & Off-Ramp	Basic	C	20.3	63.8	B	16.4	64.3
	Route Z On-Ramp to I-70 EB	Merge	B	15.2	64.7	B	11.4	64.8
	I-70 EB Off-Ramp to I-64 EB	Diverge	B	15.9	64.2	B	11.7	65.0
	Between I-70 EB Off-Ramp to I-64 EB & I-70 EB Off-Ramp to US-61 NB Off-Ramp	Basic	B	13.4	65.7	A	10.1	66.0
	I-70 EB Off-Ramp to US-61 NB	Diverge	B	11.1	63.9	A	8.3	64.0
	Between I-70 EB Off-Ramp to US-61 NB & I-64 WB to I-70 EB On-Ramp	Basic	B	12.7	65.9	A	9.3	66.3
	I-64 WB On-Ramp to I-70 EB	Merge	B	19.3	60.1	B	13.0	63.0
	West of Highway A	Basic	C	19.9	64.9	B	13.8	65.7
Westbound I-70	West of Highway A	Basic	A	9.7	66.3	C	23.2	64.5
	I-70 WB Off-Ramp to US-61 NB	Diverge	A	9.8	65.7	C	23.7	63.2
	Between US-61 NB Off-Ramp & I-64 EB On-loop	Basic	A	10.1	65.9	C	22.9	63.5
	I-70 WB Off-Ramp to I-64 EB	Diverge	A	8.4	64.0	B	19.3	61.8
	Between I-70 WB Off-Ramp to I-64 EB & US-61 SB On-Ramp to I-70 WB	Basic	A	9.8	65.8	F	45.5	37.7
	Between US-61 SB On-Ramp & Route Z Off-Ramp	Weave	B	10.0	60.7	F	64.5	25.6
	Between Route Z Off-Ramp & On-Ramp	Basic	B	13.4	65.2	F	85.5	24.0
	Route Z On-Ramp to I-70 WB	Merge	B	12.3	63.7	F	55.1	34.7
	Between Route Z On-Ramp & Wentzville Parkway Off-Ramp	Basic	B	14.8	64.7	F	52.1	40.9
	I-70 WB to Wentzville Parkway Off-Ramp	Diverge	B	12.4	64.5	D	30.1	58.5
	Between Wentzville Parkway Off-Ramp & On-Ramp	Basic	A	9.1	65.7	C	21.5	63.6
	Wentzville Parkway On-Ramp to I-70 WB	Merge	A	8.4	65.3	C	20.6	63.3

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Westbound I-64	North of Prospect Rd	Basic	B	12.7	66.1	E	38.7	51.3
	I-64 WB Off-Ramp to I-70 EB	Diverge	B	10.7	62.0	F	51.8	39.5
	Between I-70 EB Off-Ramp & I-70 EB On-loop	Basic	B	12.2	65.4	F	75.9	31.9
	Between I-70 EB On-loop & I-64 WB Off-Ramp to I-70 WB	Merge	B	11.5	58.9	F	46.4	36.0
	Between I-64 WB Off-Ramp to I-70 WB & I-70 EB Off-Ramp to US-61 NB	Basic	A	7.7	64.7	A	10.8	58.4
	After I-70 WB Off-Ramp to US-61 NB	Weave	A	8.3	64.5	B	15.0	63.1
Eastbound I-64	South of Wentzville Pkwy	Basic	E	41.7	31.1	E	38.7	51.3
	US-61 SB to I-70 WB Off-Ramp	Diverge	F	131.4	8.9	A	7.6	66.8
	Between US-61 SB to I-70 WB Off-Ramp & Luetkenhaus On-Ramp to I-64 EB	Basic	F	107.9	14.5	A	7.7	66.3
	Between Luetkenhaus On-Ramp to I-64 EB & I-70 WB On-loop to I-64 EB	Merge	F	85.5	19.0	A	10.0	66.3
	Between I-70 WB On-loop to I-64 EB & I-70 EB Off-Ramp to I-64 EB	Merge	F	80.3	19.8	A	9.7	63.1
	Between I-70 EB On-Ramp to I-64 EB & I-64 EB to I-70 EB On-Ramp	Weave	F	66.7	24.0	A	9.9	61.3
	North of Prospect Rd	Basic	A	3.8	54.3	B	14.3	61.7

Intersection Results

The LOS and delay results for the signalized intersections are provided in **Table 4**. The results indicate that the intersections within the study area operate acceptably during the AM and PM peak hours, at LOS C or better.

Table 4: Existing Conditions Intersection Results Summary

		AM Peak Hour		PM Peak Hour	
Description	**Intersection Type**	**Delay [sec/veh]**	**LOS**	**Delay [sec/veh]**	**LOS**
I-70 WB ramps & Wentzville Pkwy	Signal	7.6	A	13.3	B
I-70 EB ramps & Wentzville Pkwy	Signal	26.1	C	26.5	C

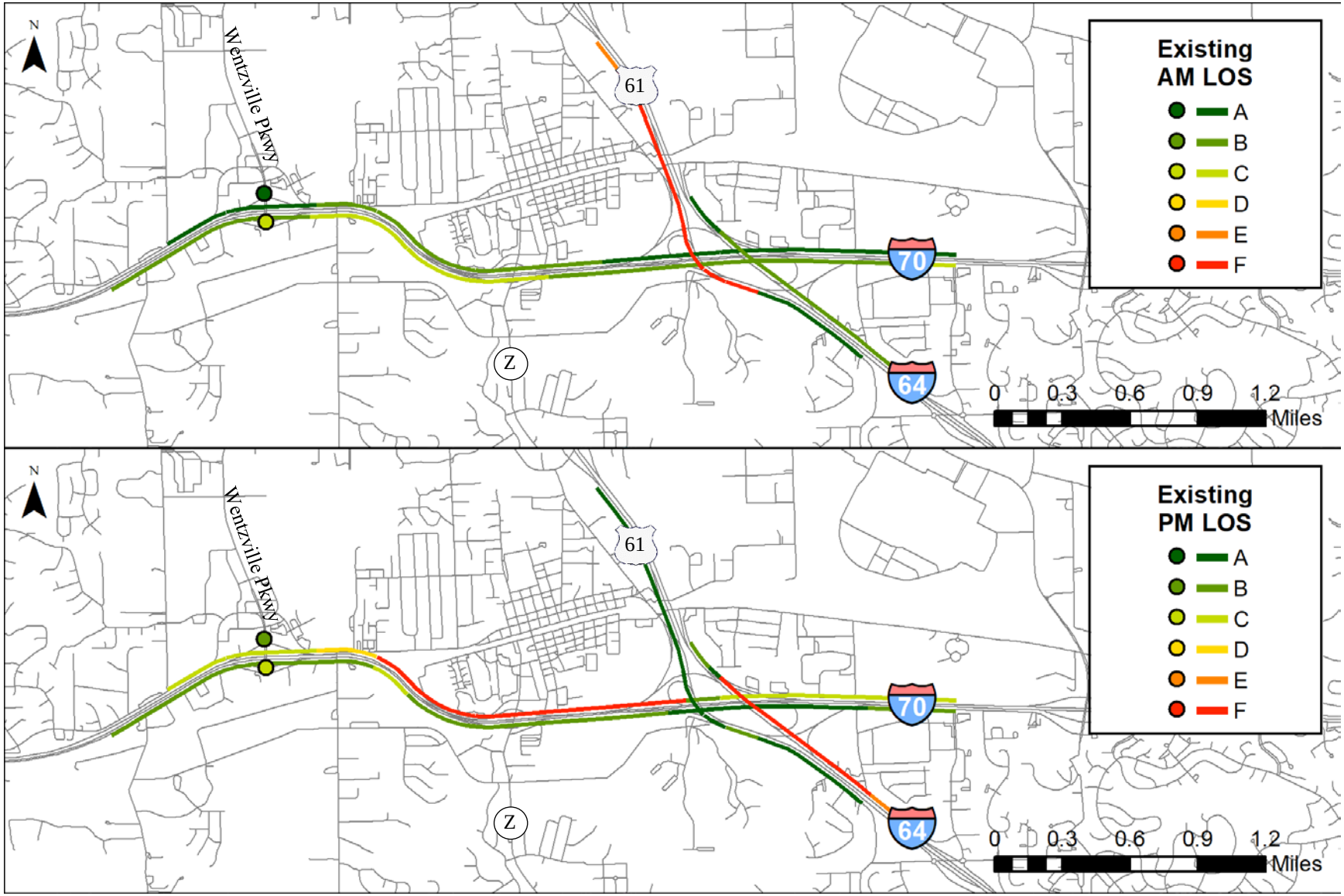


Figure 18: Existing Freeway LOS for AM and PM peak hours

2045 Traffic Volume Forecasts
The alternatives in this Concept Study were evaluated considering future traffic volumes to account for expected changes over the next couple of decades, to identify the long-term viability of improvements.

Future traffic growth volumes were extracted from the St. Charles County Travel Demand Model. This was achieved by subtracting the 2015 Base Year model volumes from the 2045 committed model volumes. The resulting traffic volumes represent the anticipated growth from 2015 to 2045 on the basis of socio-economic data. This calculation was performed for both the AM and PM peak-period models. The peak-period growth volumes were then added to the existing traffic volumes.

Figure 19 illustrates the 2045 volume forecasts.

2045 No-Build Conditions
To assess traffic operations for the 2045 Future No-Build Conditions, the existing calibrated AM and PM peak-period simulation models were modified with the developed 2045 future traffic volumes.

Freeway Segment Results
The LOS, density, and speed results for the 2045 No-Build Conditions freeway segments are listed in **Table 5**. As shown below, the forecasted increase in volumes by 2045 is expected to result in increased congestion and reduced speeds, leading to poor LOS along many segments within the study area under the no-build conditions.

AM Peak Hour
During the AM peak hour, the 2045 No Build Conditions freeway operational results indicate that LOS will be maintained at LOS D or better for all segments along westbound I-70. Two segments on eastbound I-70 are expected to degrade to LOS E or worse by 2045:

- the merge segment at the Wentzville Parkway On-Ramp to I-70 EB and,
- the basic freeway segment between the Wentzville Parkway On-Ramp and the Route Z Off-Ramp.

All segments of westbound I-64 are expected to continue to operate at LOS C or better, during the AM peak. However, on eastbound I-64, six segments are expected to operate at LOS F:

- the basic freeway segment on Route 61 south of Wentzville parkway,
- the diverge segment at the Route 61-SB-to-I-70-WB Off-Ramp,
- the basic freeway segment between I-70 WB Off-Ramp and the Luetkenhaus On-Ramp to I-64 EB,
- the merge segment between the Luetkenhaus On-Ramp to I-64 EB and the I-70 WB On-loop to I-64 EB,
- the merge segment between the I-70 WB On-loop to I-64 EB and the I-70 EB On-Ramp to I-64 EB, and

- the weaving segment between the I-70 EB On-Ramp to I-64 EB and the I-64-EB-to-I-70-EB Off-Ramp.

Speeds are expected to continue to decline with the additional background traffic growth on the network.

PM Peak Hour

During the PM peak hour, the same two segments of eastbound I-70 (as the AM peak) are expected to operate at LOS E or worse. On westbound I-70, the bottleneck that was present under Existing conditions is expected to worsen, extending queues all the way back to Highway A. In the No-Build scenario, nine segments are expected to operate at LOS F:

- the basic freeway segment west of Highway A,
- the diverge segment at the I-70 WB Off-Ramp to Route 61 NB,
- the basic freeway segment between the Route 61 NB Off-Ramp and the I-64 EB On-loop
- the diverge segment at the I-70 WB Off-loop to I-64 EB,
- the basic freeway segment between the I-70 WB Off-Ramp to I-64 EB and the Route 61 SB On-Ramp to I-70 WB,
- the weaving segment between the Route 61 SB On-Ramp and the Route Z Off-Ramp,
- the basic freeway segment between the Route Z Off-Ramp and On-Ramp,
- the merge segment at the Route Z On-Ramp to I-70 WB, and
- the basic freeway segment between the Route Z On-Ramp and the Wentzville Parkway Off-Ramp.

Along I-64, all of the freeway segments along eastbound I-64/southbound Route 61 are expected to operate at LOS F. In addition, four segments along westbound I-64 are projected to operate at LOS F:

- the basic freeway segment north of Prospect Rd,
- the diverge segment at the I-64 WB Off-Ramp to I-70 EB,
- the basic freeway segment between the I-70 EB Off-Ramp & I-70 EB On-loop, and
- the merge segment between the I-70 EB On-loop and the I-64 On-Ramp to I-70 WB.

2045 Traffic Volume Forecasts are shown in **Figure 19**. Due to congestion and high density, the speed is projected to drop significantly at these locations.
Figure 20 depicts freeway LOS of the AM and PM peak-hour volumes for the 2045 No-Build conditions.

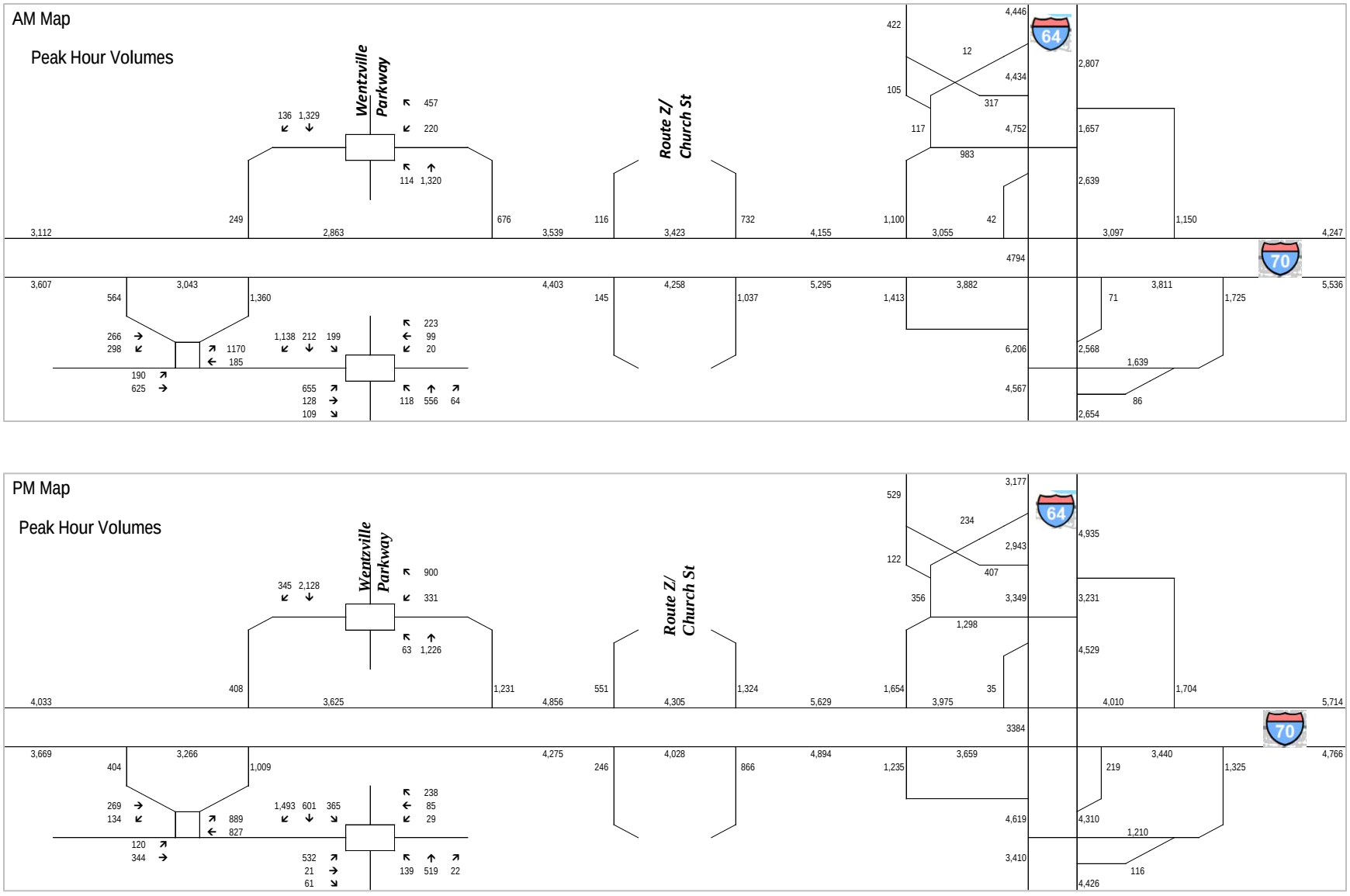


Figure 19: 2045 Volume Forecasts

Table 5: 2045 No-Build Conditions Freeway Results Summary

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Eastbound I-70	West of Wentzville Parkway	Basic	D	28.4	63.7	D	29.2	63.2
	I-70 EB Off-Ramp to Wentzville Parkway	Diverge	C	23.8	63.0	C	25.6	60.6
	Between Wentzville Parkway On-Ramp & Off-Ramp	Basic	C	25.6	60.3	D	28.7	58.4
	Wentzville Parkway On-Ramp to I-70 EB	Merge	F	74.2	34.8	F	74.5	34.7
	Between Wentzville Parkway On-Ramp & Route Z Off-Ramp	Basic	E	37.7	54.8	E	38.4	53.7
	I-70 EB Off-Ramp to Route Z	Diverge	D	29.3	59.9	D	29.4	59.4
	Between Route Z On-Ramp & Off-Ramp	Basic	D	27.2	62.0	D	26.3	62.1
	Route Z On-Ramp to I-70 EB	Merge	B	18.9	64.5	B	17.9	64.3
	I-70 EB Off-Ramp to I-64 EB	Diverge	B	19.4	64.6	B	18.2	64.7
	Between I-70 EB Off-Ramp to I-64 EB & I-70 EB Off-Ramp to US-61 NB Off-Ramp	Basic	C	19.1	65.1	C	18.7	65.0
	I-70 EB Off-Ramp to US-61 NB	Diverge	B	15.9	63.5	B	15.8	63.2
	Between I-70 EB Off-Ramp to US-61 NB & I-64 WB to I-70 EB On-Ramp	Basic	C	18.8	65.1	B	17.5	65.1
	I-64 WB On-Ramp to I-70 EB	Merge	C	24.4	61.6	C	23.7	60.9
	West of Highway A	Basic	D	26.1	64.0	C	25.3	63.9
Westbound I-70	West of Highway A	Basic	C	22.0	64.7	F	88.2	23.1
	I-70 WB Off-Ramp to US-61 NB	Diverge	C	25.2	57.6	F	98.9	17.1
	Between US-61 NB Off-Ramp & I-64 EB On-loop	Basic	D	26.5	59.2	F	106.9	15.4
	I-70 WB Off-Ramp to I-64 EB	Diverge	C	21.1	60.6	F	92.7	19.2
	Between I-70 WB Off-Ramp to I-64 EB & US-61 SB On-Ramp to I-70 WB	Basic	C	24.9	62.2	F	113.4	14.4
	Between US-61 SB On-Ramp & Route Z Off-Ramp	Weave	C	20.8	56.0	F	74.5	20.8
	Between Route Z Off-Ramp & On-Ramp	Basic	D	28.2	60.4	F	98.3	19.0
	Route Z On-Ramp to I-70 WB	Merge	C	25.6	57.7	F	59.4	32.6
	Between Route Z On-Ramp & Wentzville Parkway Off-Ramp	Basic	D	30.4	58.7	F	46.8	46.0
	I-70 WB to Wentzville Parkway Off-Ramp	Diverge	C	24.9	61.5	D	29.5	60.8
	Between Wentzville Parkway Off-Ramp & On-Ramp	Basic	C	22.3	63.6	C	24.6	63.8
	Wentzville Parkway On-Ramp to I-70 WB	Merge	C	20.3	61.9	C	23.3	62.3

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Westbound I-64	North of Prospect Rd	Basic	C	20.0	65.1	F	90.7	23.4
	I-64 WB Off-Ramp to I-70 EB	Diverge	B	16.9	61.0	F	75.4	26.2
	Between I-70 EB Off-Ramp & I-70 EB On-loop	Basic	C	19.6	64.2	F	92.9	22.7
	Between I-70 EB Onloop & I-64 WB Off-Ramp to I-70 WB	Merge	B	17.5	57.8	F	45.6	41.2
	Between I-64 WB Off-Ramp to I-70 WB & I-70 EB Off-Ramp to US-61 NB	Basic	B	12.6	63.4	C	25.0	60.9
	After I-70 WB Off-Ramp to US-61 NB	Weave	B	14.4	63.7	C	23.1	64.3
Eastbound I-64	South of Wentzville Pkwy	Basic	F	146.2	9.1	F	52.8	26.3
	US-61 SB to I-70 WB Off-Ramp	Diverge	F	151.2	8.0	F	129.1	9.8
	Between US-61 SB to I-70 WB Off-Ramp & Luetkenhaus On-Ramp to I-64 EB	Basic	F	114.9	13.9	F	109.2	14.8
	Between Luetkenhaus On-Ramp to I-64 EB & I-70 WB On-loop to I-64 EB	Merge	F	89.3	19.0	F	84.4	20.2
	Between I-70 WB On-loop to I-64 EB & I-70 EB Off-Ramp to I-64 EB	Merge	F	82.5	20.1	F	74.2	22.8
	Between I-70 EB On-Ramp to I-64 EB & I-64 EB to I-70 EB On-Ramp	Weave	F	68.6	24.2	F	63.9	25.7
	North of Prospect Rd	Basic	B	15.4	37.1	F	51.3	10.4

Intersection Results

The LOS and delay results for the signalized intersections are provided in **Table 6**.The results of the intersection analysis show that the signalized intersections are projected to operate acceptably during the AM and PM peak hours, at LOS D or better. The operations at I-70 EB Off-Ramp & Veterans Memorial Parkway are projected to become congested and operate at LOS E during the AM peak. This delay is caused by the heavy eastbound freeway volumes exiting within this area.

Table 6: 2045 No Build Conditions Intersection Results Summary

		AM Peak Hour		PM Peak Hour	
Description	**Intersection Type**	**Delay [sec/veh]**	**LOS**	**Delay [sec/veh]**	**LOS**
I-70 ramps & Wentzville Pkwy	Signal	51.6	D	35.7	D
Veterans Memorial Pkwy & Wentzville Pkwy	Signal	42.3	D	30.3	C
I-70 EB ramps & Veterans Memorial Pkwy	Roundabout	39.3	E	14.8	B

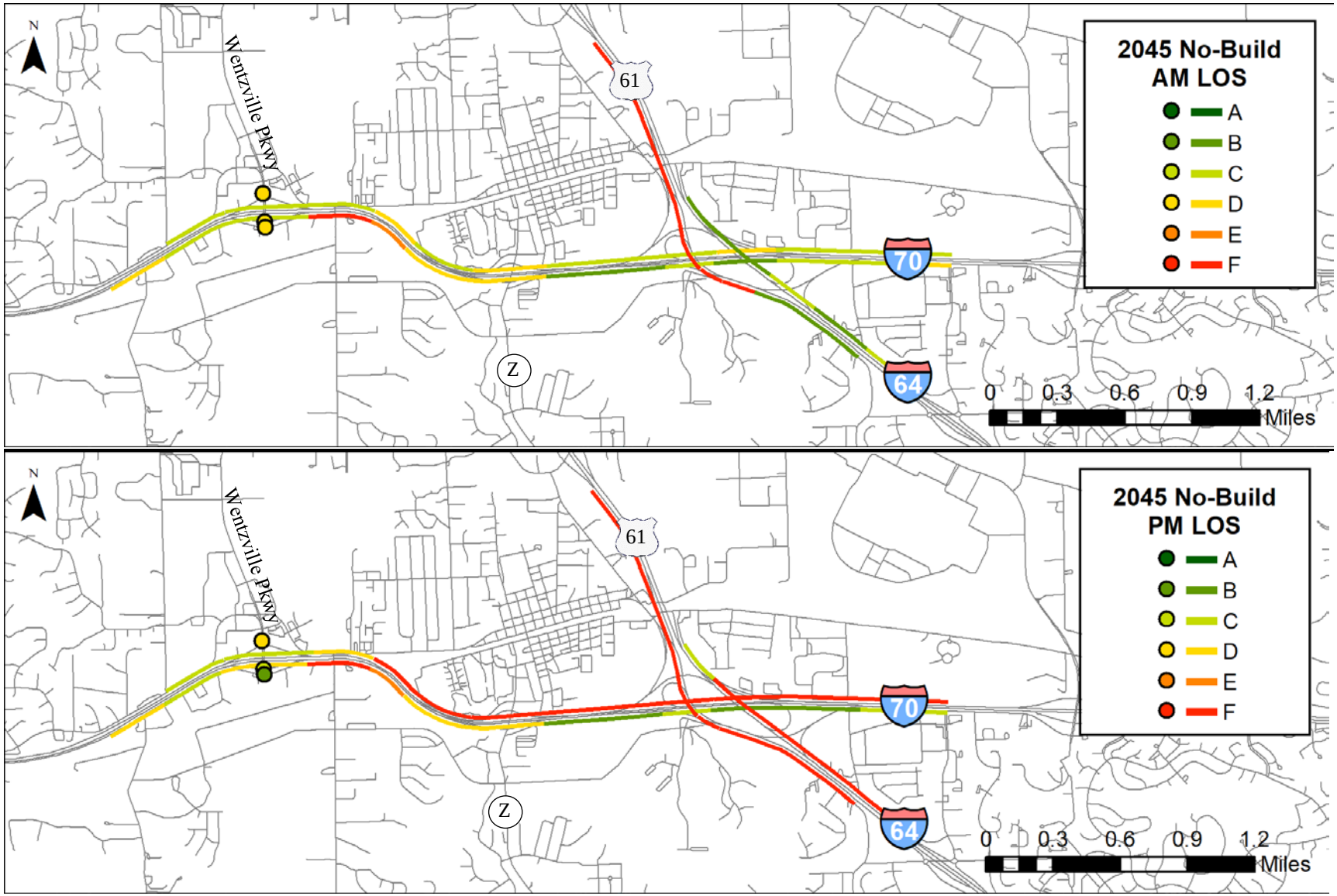


Figure 20: 2045 No-Build Freeway LOS Conditions for AM and PM peak hours

2045 Build Alternative Conditions
To evaluate the proposed improvements between Wentzville Parkway and I-64 for the 2045 Build Alternative, the existing calibrated AM and PM peak-period simulation models were modified to include the developed 2045 future traffic volumes, and the following geometric improvements:

1- Addition of a mainline lane and an auxiliary lane in both directions between Wentzville Parkway and Route Z (Church Street), for 4 total lanes (3 lane + auxiliary lane).
2- Addition of a mainline lane in both directions between Route Z and I-64.

Freeway Segment Results
The LOS, density, and speed results for the 2045 Build Alternative freeway segments are listed in **Table 7**.

AM Peak Hour
The 2045 Build Alternative freeway operations results indicate that all segments are forecasted to improve to LOS D or better during the AM peak along eastbound and westbound I-70. Along I-64, the Build alternative includes no proposed improvements; therefore, the projected westbound and eastbound I-64 freeway operations are the same as for the 2045 No Build alternative, with multiple segments operating at LOS F in the eastbound direction.

PM Peak Hour
During the PM peak, most freeway segments are projected to improve to LOS D or better along eastbound and westbound I-70. There is one segment that is still forecasted to operate at LOS E on I-70 westbound: the diverge at the I-70 WB Off-Ramp to Route 61 NB, however, this is beyond the area where the Build improvements are assumed. The bottleneck along westbound I-70, observed under Existing and No-Build conditions (between I-64 and Wentzville Parkway), is expected to be eliminated under the Build conditions.

As with the AM peak, the I-64 freeway operations show similar forecasted results to 2045 No Build alternative. **Figure 21** depicts freeway LOS of the AM and PM peak-hour volumes for the 2045 Build Alternative Conditions.

Table 7: 2045 Build Alternative Conditions Freeway Results Summary (3 Lanes + 1 Auxiliary Lane)

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Eastbound I-70	West of Wentzville Parkway	Basic	D	28.4	63.7	D	30.1	62.0
	I-70 EB Off-Ramp to Wentzville Parkway	Diverge	C	23.8	63.0	C	27.8	58.6
	Between Wentzville Parkway On-Ramp & Off-Ramp	Basic	C	19.6	65.2	C	21.7	63.9
	Wentzville Parkway On-Ramp to I-70 EB	Merge	B	18.8	64.8	B	17.7	64.8
	Between Wentzville Parkway On-Ramp & Route Z Off-Ramp	Basic	B	16.6	65.9	B	16.1	65.8
	I-70 EB Off-Ramp to Route Z	Diverge	B	16.3	63.7	B	15.7	63.9
	Between Route Z On-Ramp & Off-Ramp	Basic	C	21.8	65.1	C	20.6	65.1
	Route Z On-Ramp to I-70 EB	Merge	C	21.6	63.3	C	20.1	63.3
	I-70 EB Off-Ramp to I-64 EB	Diverge	C	21.1	63.0	B	19.5	63.6
	Between I-70 EB Off-Ramp to I-64 EB & I-70 EB Off-Ramp to US-61 NB Off-Ramp	Basic	C	19.9	65.0	C	19.0	65.0
	I-70 EB Off-Ramp to US-61 NB	Diverge	B	16.5	62.1	B	16.2	61.8
	Between I-70 EB Off-Ramp to US-61 NB & I-64 WB to I-70 EB On-Ramp	Basic	C	19.5	65.1	B	17.9	65.1
	I-64 WB On-Ramp to I-70 EB	Merge	C	24.4	60.8	C	23.7	60.0
	West of Highway A	Basic	D	26.7	64.1	C	25.5	64.1
Westbound I-70	West of Highway A	Basic	C	22.0	64.7	D	31.5	58.5
	I-70 WB Off-Ramp to US-61 NB	Diverge	C	25.2	57.6	E	41.5	46.5
	Between US-61 NB Off-Ramp & I-64 EB On-loop	Basic	D	26.5	59.2	D	33.9	55.7
	I-70 WB Off-Ramp to I-64 EB	Diverge	C	21.1	60.6	C	26.1	59.1
	Between I-70 WB Off-Ramp to I-64 EB & US-61 SB On-Ramp to I-70 WB	Basic	C	24.7	62.6	D	30.2	61.6
	Between US-61 SB On-Ramp & Route Z Off-Ramp	Weave	B	16.5	63.2	C	21.4	63.1
	Between Route Z Off-Ramp & On-Ramp	Basic	B	17.5	64.9	C	21.0	65.0
	Route Z On-Ramp to I-70 WB	Merge	B	10.9	66.6	B	16.0	65.6
	Between Route Z On-Ramp & Wentzville Parkway Off-Ramp	Basic	B	13.4	65.5	B	17.8	65.0
	I-70 WB to Wentzville Parkway Off-Ramp	Diverge	B	10.3	64.5	B	15.4	62.5
	Between Wentzville Parkway Off-Ramp & On-Ramp	Basic	C	18.7	62.4	C	23.3	61.1
	Wentzville Parkway On-Ramp to I-70 WB	Merge	C	20.7	61.4	C	26.9	59.2

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Westbound I-64	North of Prospect Rd	Basic	C	20.0	65.1	F	90.7	23.5
	I-64 WB Off-Ramp to I-70 EB	Diverge	B	16.9	61.0	F	75.8	26.1
	Between I-70 EB Off-Ramp & I-70 EB On-loop	Basic	C	19.6	64.2	F	93.0	22.7
	Between I-70 EB On-loop & I-64 WB Off-Ramp to I-70 WB	Merge	B	17.5	57.8	F	45.6	41.3
	Between I-64 WB Off-Ramp to I-70 WB & I-70 EB Off-Ramp to US-61 NB	Basic	B	12.7	63.4	C	25.0	61.0
	After I-70 WB Off-Ramp to US-61 NB	Weave	B	14.4	63.7	C	24.2	64.0
Eastbound I-64	South of Wentzville Pkwy	Basic	F	148.4	8.7	F	64.4	20.6
	US-61 SB to I-70 WB Off-Ramp	Diverge	F	153.8	7.8	F	133.9	9.1
	Between US-61 SB to I-70 WB Off-Ramp & Luetkenhaus On-Ramp to I-64 EB	Basic	F	116.3	13.6	F	110.4	14.5
	Between Luetkenhaus On-Ramp to I-64 EB & I-70 WB On-loop to I-64 EB	Merge	F	90.2	18.5	F	85.6	19.8
	Between I-70 WB On-loop to I-64 EB & I-70 EB Off-Ramp to I-64 EB	Merge	F	83.5	19.7	F	75.6	22.3
	Between I-70 EB On-Ramp to I-64 EB & I-64 EB to I-70 EB On-Ramp	Weave	F	69.2	24.0	F	64.9	25.3
	North of Prospect Rd	Basic	B	15.3	37.4	F	57.9	9.4

Interchange/Intersection Results

The LOS and delay results for the 2045 Build Alternative signalized intersections are provided in **Table 8.** The results of the intersection analysis show that the intersections are projected to operate at LOS C or better during the AM peak hour and PM peak hour.

Table 8: 2045 Build Alternative Conditions Intersection Results Summary

		AM Peak Hour		PM Peak Hour	
Description	**Intersection Type**	**Delay [sec/veh]**	**LOS**	**Delay [sec/veh]**	**LOS**
I-70 WB ramps & Wentzville Pkwy	Signal	15.2	B	26.6	C
Veterans Memorial Pkwy & Wentzville Pkwy	Signal	31.2	C	31.2	C
I-70 EB ramps & Veterans Memorial Pkwy	Roundabout	24.9	C	17.8	B

Figure 21: 2045 Build Freeway LOS Conditions for AM and PM peak hours

2045 Build Intermediate Alternative Conditions
To assess the impact of 2045 Build Intermediate Alternative Conditions, the existing calibrated AM and PM peak-period simulation models were modified to include the developed 2045 future traffic volumes, and the following geometric improvements:

1- Addition of an auxiliary lane in both directions between Wentzville Parkway and Route Z (Church Street), for 3 total lanes (2 lanes + auxiliary lane).

The purpose of this alternative was to investigate the effect of adding an auxiliary lane only, versus adding a basic lane and an auxiliary lane, as in the 2045 Build Alternative.

Freeway Segment Results
The LOS, density, and speed results for the 2045 Build Intermediate Alternative freeway segments are listed in **Table 9**.

AM Peak Hour
The 2045 Build Intermediate Alternative freeway operations results indicate that all study segments are forecasted to improve to LOS D or better along eastbound and westbound I-70, during AM peak. Freeway speeds under this alternative will be decreased slightly compared to the 2045 Build Alternative. Eastbound and westbound I-64 freeway operations show similar projected results to the 2045 Build Alternative.

PM Peak Hour
During the PM peak, all freeway segments are projected to improve to LOS D or better along eastbound I-70. Many of the study segments along westbound I-70 are also expected to improve under the Build Intermediate conditions, however, three segments are expected to remain at LOS E:

- the diverge segment at the I-70 WB Off-Ramp to Route 61 NB,
- the basic freeway segment between the Route 61 NB Off-ramp and the I-64 EB On-loop, and
- the basic freeway segment between the I-70 WB Off-Ramp to I-64 EB and the Route 61 SB On-Ramp to I-70 WB.

Similar to the Build alternative, each of these segments remaining at LOS E are beyond the limits of the assumed geometric improvements. Like the Build alternative, the Build Intermediate alternative is expected to eliminate the bottleneck along westbound I-70 between Wentzville Parkway and I-64.

The Eastbound and Westbound I-64 freeway segments are projected to operate similarly to the 2045 Build Alternative. **Figure 22** depicts freeway LOS of the AM and PM peak-hour volumes for the 2045 Build Intermediate Alternative Conditions.

Table 9: 2045 Build Intermediate Alternative Freeway Results Summary (2 Mainline Lanes + 1 Auxiliary Lane)

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Eastbound I-70	West of Wentzville Parkway	Basic	D	28.4	63.7	D	30.2	62.2
	I-70 EB Off-Ramp to Wentzville Parkway	Diverge	C	23.8	63.0	D	28.1	57.7
	Between Wentzville Parkway On-Ramp & Off-Ramp	Basic	C	23.7	64.2	D	26.4	62.4
	Wentzville Parkway On-Ramp to I-70 EB	Merge	C	21.9	61.7	C	21.2	62.1
	Between Wentzville Parkway On-Ramp & Route Z Off-Ramp	Basic	C	24.4	61.4	C	23.5	61.9
	I-70 EB Off-Ramp to Route Z	Diverge	C	22.4	61.5	C	20.9	62.6
	Between Route Z On-Ramp & Off-Ramp	Basic	D	29.5	60.7	D	27.2	61.8
	Route Z On-Ramp to I-70 EB	Merge	B	19.7	64.1	B	18.3	64.1
	I-70 EB Off-Ramp to I-64 EB	Diverge	C	20.1	64.4	B	18.7	64.3
	Between I-70 EB Off-Ramp to I-64 EB & I-70 EB Off-Ramp to US-61 NB Off-Ramp	Basic	C	19.9	64.9	C	19.1	64.8
	I-70 EB Off-Ramp to US-61 NB	Diverge	B	16.5	63.2	B	16.1	62.9
	Between I-70 EB Off-Ramp to US-61 NB & I-64 WB to I-70 EB On-Ramp	Basic	C	19.6	64.9	B	17.9	65.0
	I-64 WB On-Ramp to I-70 EB	Merge	C	25.0	61.4	C	24.1	60.5
	West of Highway A	Basic	D	26.8	63.8	C	25.6	63.9
Westbound I-70	West of Highway A	Basic	C	22.0	64.7	D	31.5	58.5
	I-70 WB Off-Ramp to US-61 NB	Diverge	C	25.2	57.6	E	41.8	46.2
	Between US-61 NB Off-Ramp & I-64 EB On-loop	Basic	D	26.5	59.2	E	35.2	54.5
	I-70 WB Off-Ramp to I-64 EB	Diverge	C	21.1	60.6	D	28.5	57.0
	Between I-70 WB Off-Ramp to I-64 EB & US-61 SB On-Ramp to I-70 WB	Basic	C	24.9	62.2	E	37.1	55.0
	Between US-61 SB On-Ramp & Route Z Off-Ramp	Weave	C	20.7	56.3	D	33.4	47.8
	Between Route Z Off-Ramp & On-Ramp	Basic	D	28.0	60.8	D	34.5	59.1
	Route Z On-Ramp to I-70 WB	Merge	B	17.5	63.4	C	24.1	61.9
	Between Route Z On-Ramp & Wentzville Parkway Off-Ramp	Basic	C	18.3	63.9	C	24.2	63.2
	I-70 WB to Wentzville Parkway Off-Ramp	Diverge	B	17.1	64.6	C	23.2	64.2
	Between Wentzville Parkway Off-Ramp & On-Ramp	Basic	C	22.2	63.9	D	26.8	63.6
	Wentzville Parkway On-Ramp to I-70 WB	Merge	C	20.7	61.5	C	25.9	60.8

Rte	Description	Segment Type	AM Peak Hour			PM Peak Hour		
			LOS	Density [veh/mi/ln]	Speed [mph]	LOS	Density [veh/mi/ln]	Speed [mph]
Westbound I-64	North of Prospect Rd	Basic	C	20.0	65.1	F	91.0	23.4
	I-64 WB Off-Ramp to I-70 EB	Diverge	B	16.9	61.0	F	75.8	26.2
	Between I-70 EB Off-Ramp & I-70 EB On-loop	Basic	C	19.6	64.2	F	93.2	22.6
	Between I-70 EB On-loop & I-64 WB Off-Ramp to I-70 WB	Merge	B	17.5	57.8	F	45.7	41.2
	Between I-64 WB Off-Ramp to I-70 WB & I-70 EB Off-Ramp to US-61 NB	Basic	B	12.7	63.4	C	24.9	61.1
	After I-70 WB Off-Ramp to US-61 NB	Weave	B	14.4	63.7	C	24.2	64.1
Eastbound I-64	South of Wentzville Pkwy	Basic	F	147.7	8.9	F	58.1	22.8
	US-61 SB to I-70 WB Off-Ramp	Diverge	F	153.1	7.9	F	134.9	8.9
	Between US-61 SB to I-70 WB Off-Ramp & Luetkenhaus On-Ramp to I-64 EB	Basic	F	116.2	13.7	F	110.5	14.6
	Between Luetkenhaus On-Ramp to I-64 EB & I-70 WB On-loop to I-64 EB	Merge	F	90.3	18.6	F	85.0	20.0
	Between I-70 WB On-loop to I-64 EB & I-70 EB Off-Ramp to I-64 EB	Merge	F	83.5	19.8	F	75.0	22.5
	Between I-70 EB On-Ramp to I-64 EB & I-64 EB to I-70 EB On-Ramp	Weave	F	67.9	24.5	F	63.7	25.9
	North of Prospect Rd	Basic	B	15.6	37.0	F	67.1	8.9

Interchange/Intersection Results

The LOS and delay results for the interchange areas and signalized intersections are provided in **Tables 10**. The results of the intersections analysis show that the intersections are projected to operate at LOS C or better during the AM peak hour and PM peak hour.

Table 10: 2045 Build Intermediate Alternative Intersection Results Summary

		AM Peak Hour		PM Peak Hour	
Description	**Intersection Type**	**Delay [sec/veh]**	**LOS**	**Delay [sec/veh]**	**LOS**
I-70 WB ramps & Wentzville Pkwy	Signal	15.3	B	26.0	C
Veterans Memorial Pkwy & Wentzville Pkwy	Signal	31.4	C	32.5	C
I-70 EB ramps & Veterans Memorial Pkwy	Roundabout	25.1	C	18.8	B

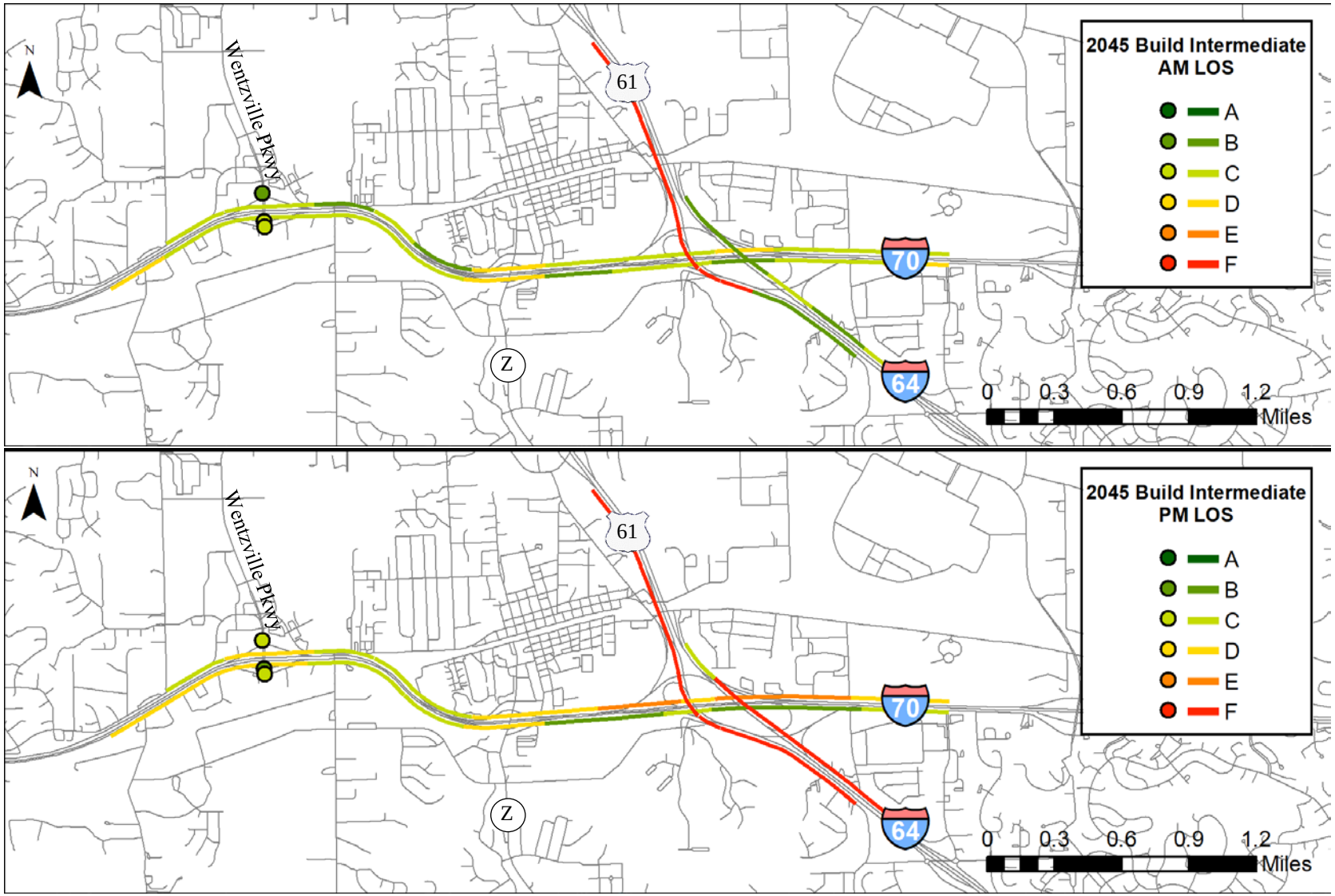


Figure 22: 2045 Build Intermediate Alternative LOS Conditions for AM and PM peak hours

Alternatives Comparison

Both the Build and Intermediate Build Alternatives are expected to improve conditions through the study area. As mentioned previously, the geometric improvements of both Build alternatives are expected to relieve the existing bottleneck along westbound I-70 during the PM peak hour. **Table 11** displays the LOS results of both Build alternatives next to the No-Build results for comparison purposes. Results are shown along I-70 only because, as discussed in previous sections, no modifications were assumed along I-64, therefore no improvements to LOS are expected.

Table 11: Freeway LOS for 2045 No-Build, Build and Intermediate Build Alternatives

			AM Peak Hour			PM Peak Hour		
Rte	**Description**	**Segment Type**	**NB**	**Build**	**Int. Build**	**NB**	**Build**	**Int Build**
Eastbound I-70	West of Wentzville Parkway	Basic	D	D	D	D	D	D
	I-70 EB Off-Ramp to Wentzville Parkway	Diverge	C	C	C	C	C	D
	Between Wentzville Parkway On-Ramp & Off-Ramp	Basic	C	C	C	D	C	D
	Wentzville Parkway On-Ramp to I-70 EB	Merge	F	B	C	F	B	C
	Between Wentzville Parkway On-Ramp & Route Z Off-Ramp	Basic	E	B	C	E	B	C
	I-70 EB Off-Ramp to Route Z	Diverge	D	B	C	D	B	C
	Between Route Z On-Ramp & Off-Ramp	Basic	D	C	D	D	C	D
	Route Z On-Ramp to I-70 EB	Merge	B	C	B	B	C	B
	I-70 EB Off-Ramp to I-64 EB	Diverge	B	C	C	B	B	B
	Between I-70 EB Off-Ramp to I-64 EB & I-70 EB Off-Ramp to US-61 NB Off-Ramp	Basic	C	C	C	C	C	C
	I-70 EB Off-Ramp to US-61 NB	Diverge	B	B	B	B	B	B
	Between I-70 EB Off-Ramp to US-61 NB & I-64 WB to I-70 EB On-Ramp	Basic	C	C	C	B	B	B
	I-64 WB On-Ramp to I-70 EB	Merge	C	C	C	C	C	C
	West of Highway A	Basic	D	D	D	C	C	C
Westbound I-70	West of Highway A	Basic	C	C	C	F	D	D
	I-70 WB Off-Ramp to US-61 NB	Diverge	C	C	C	F	E	E
	Between US-61 NB Off-Ramp & I-64 EB On-loop	Basic	D	D	D	F	D	E
	I-70 WB Off-Ramp to I-64 EB	Diverge	C	C	C	F	C	D
	Between I-70 WB Off-Ramp to I-64 EB & US-61 SB On-Ramp to I-70 WB	Basic	C	C	C	F	D	E
	Between US-61 SB On-Ramp & Route Z Off-Ramp	Weave	C	B	C	F	C	D
	Between Route Z Off-Ramp & On-Ramp	Basic	D	B	D	F	C	D
	Route Z On-Ramp to I-70 WB	Merge	C	B	B	F	B	C
	Between Route Z On-Ramp & Wentzville Parkway Off-Ramp	Basic	D	B	C	F	B	C
	I-70 WB to Wentzville Parkway Off-Ramp	Diverge	C	B	B	D	B	C
	Between Wentzville Parkway Off-Ramp & On-Ramp	Basic	C	C	C	C	C	D
	Wentzville Parkway On-Ramp to I-70 WB	Merge	C	C	C	C	C	C

As shown, along eastbound I-70 there were two segments that were expected to operate poorly under No-Build conditions that are expected to improve under both Build alternatives.

- The merge segment from the Wentzville Parkway On-Ramp to I-70 EB improves in both peak periods from LOS F to LOS B under Build conditions and LOS C in Intermediate Build conditions.

- The basic segment between the Wentzville Parkway On-Ramp and the Route Z Off-Ramp improves in both peak periods from LOS E to LOS B under Build conditions and LOS C in Intermediate Build conditions.

Along westbound I-70, during the AM peak hour, the No-Build conditions did not show any levels of service at E or F. However, in the PM peak hour, almost the entire length of the study area was shown to operate at LOS F under No-Build conditions. With the Build alternatives, most of those segments are shown to improve. Of particular interest to this study:

- The merge segment from the Route Z On-Ramp to I-70 WB is expected to improve from LOS F under No-Build conditions to LOS B under Build conditions and LOS C under Intermediate Build conditions.
- The I-70 westbound basic segment between the Route Z On-Ramp and the Wentzville Parkway Off-Ramp is expected to improve from LOS F under No-Build conditions to LOS B under Build conditions and LOS C under Intermediate Build conditions.

Network-wide Performance Comparison

VISSIM provides network-wide performance measures that can be used to compare the overall effectiveness of proposed corridor improvements. The following bullets highlight the network-wide performance measures, the specific data they collect, and how that information relates to overall network operations:

- Average Speed (mph) – This metric averages the total travel distance divided by the travel time to calculate the average speed for all vehicles traveling within the model during the peak hour.
- Total Delay of All Vehicles (Hr) – This metric calculates the total hours of delay for all vehicles experienced throughout the model during the peak hour.
- Average Delay per Vehicle (sec/veh) – This metric measures the total delay divided by the total number of vehicles that travel through the network during the peak hour.
- Average Number of Active Vehicles within the Network (veh) – This metric measures the total number of vehicles still traveling within the model at the end of the peak hour. A higher comparative value for this metric will be an indication of increased delays within a model, preventing entering vehicles from reaching their respective destinations.
- Average Number of Arrived Vehicles (veh) – This metric measures that total number of entering vehicles that have reached their destinations and are no longer active within the model. A higher comparative value indicates a model that flows better, allowing a greater number of vehicles to reach their destinations.
- Average Number of Demand Latent (veh) – This metric measures that total number of vehicles that have not entered the network within the model. A higher comparative value for this metric will be an indication of increased delays within a model, preventing an entering vehicles from reaching their respective destinations.

The network performance results indicate that, during the AM Peak, the two Build Alternatives exhibit similar performance in terms of average speed, total delay and average delay per vehicle.

During the PM peak, the 2045 Build Alternative`s results were superior to the 2045 Intermediate Build results for the following metrics:

- The average speed for the 2045 Build Alternative was 42 mph, compared to 40 mph in the Intermediate Build Alternative.
- The average delay per vehicle for the 2045 Build Alternative was 76 seconds, compared to 88 seconds in the Intermediate Build Alternative.
- The total hours of delay experienced by the vehicles within the 2045 Build Alternative was 510 hours, compared to 594 hours for the Intermediate Build Alternative.
- The average number of active vehicles within the network was 1,409 vehicles for the 2045 Build Alternative, while the Intermediate Build Alternative had an average of 1,588 vehicles at the end of the peak-hour simulation.
- The average number of arrived vehicles during the PM peak hour was 22,776 vehicles for 2045 Build Alternative while the Intermediate Build Alternative averaged 22,594 vehicles.

Table 12 summarize the network performance measures along all scenarios.

Table 12: Network Performance Results Comparison

AM Peak Hour	Average Speed (mph)	Total Delay All Veh (hr)	Average Delay (sec/veh)	Active Vehicles (veh)	Arriving Vehicles (veh)	Demand Latent (veh)
Existing	40	349	97	817	12,050	737
2045 No Build	28	1,071	190	1,950	18,337	2,532,842
2045 Build	31	901	161	1,772	18,346	2,562,178
2045 Intermediate Build	31	907	162	1,776	18,370	2,450,859

PM Peak Hour	Average Speed (mph)	Total Delay All Veh (hr)	Average Delay (sec/veh)	Active Vehicles (veh)	Arriving Vehicles (veh)	Demand Latent (veh)
Existing	44	309	67	1,021	13,964	6,248
2045 No Build	28	1,216	184	2,125	21,678	9,058,567
2045 Build	42	510	76	1,409	22,776	6,378,631
2045 Intermediate Build	40	594	88	1,588	22,594	6,358,943

As shown in the table, the 2045 Build Alternative will provide improved performance measurements in all categories over the 2045 Intermediate Build alternative. Additionally, the 2045 Build alternative will allow over 60 percent more vehicles to reach their destinations compared to the existing volume scenario, with less total delay. **Table 12** compare the freeway LOS for 2045 No-Build, Build and Intermediate Build scenarios.

ACCIDENT DATA AND SAFETY ENHANCEMENTS

This section presents a safety assessment of the corridor, both for existing and historical conditions.

Crash History and Statistics

Crash data were obtained within the study area for the five-year period from 2013 through 2017. This included crashes along I-70 from west of the Wentzville Parkway interchange to east of the Route Z (Church Street) interchange, as well as along those cross-street arterials between the ramp terminals, and along the southern outer road in the vicinity of the Wentzville Parkway interchange. As would be expected, crashes occurred most frequently in areas with high concentrations of conflicting traffic volumes, such as freeway ramp junctions and major arterial intersections. In the five-year analysis period, 640 crashes were reported, classified in the following manner:

Property Damage Only	81.9%
Minor Injury	16.9%
Disabling Injury	1.1%
Fatal	0.2%

Figure 23 shows the distribution of the crashes by severity, and **Figure 24** highlights where crash "hot spots" occur.

Figure 23: Crashes by Severity

Figure 24: Crash Densities

In the five-year analysis period, there was one fatal crash and seven disabling injury crashes. **Figure 25** is a summary chart of crash severity by year. The fatal crash occurred in 2015 and was a passing collision along westbound I-70, in which the vehicle ran off the road. The crash occurred under clear, dry, and dark with street lights off conditions. **Figure 26** includes an illustration of crash severity. There were no noticeable trends with the disabling injury crashes.

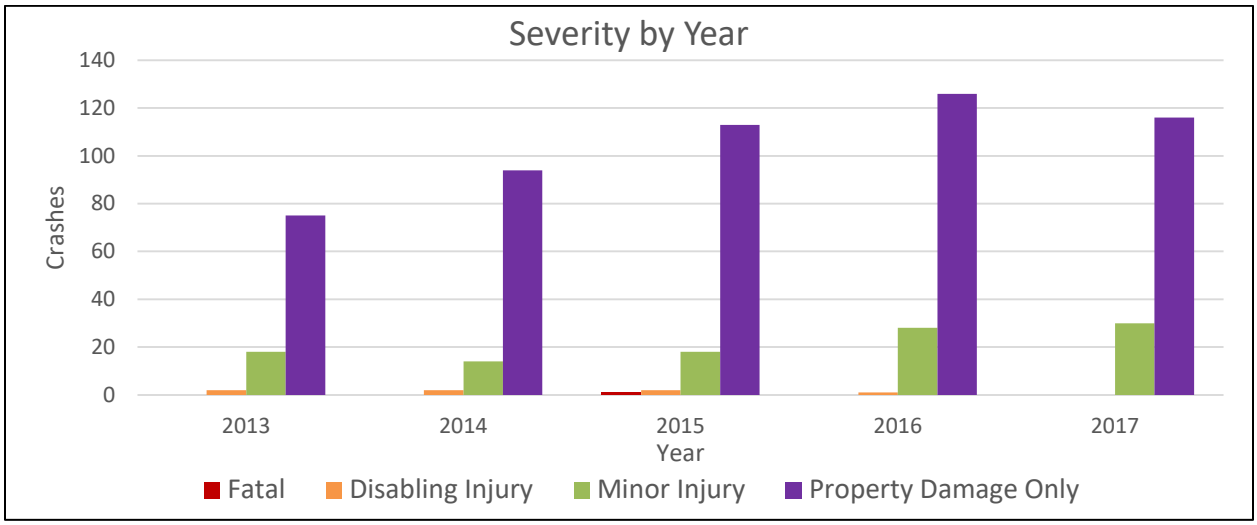


Figure 25: Crash Severity by Year

Figure 26: Crash Severity – Location Map

Figure 27 summarizes crashes by facility type. The majority of the reported crashes occurred on the interstate, and the trends were fairly consistent from year-to-year. Ramp crashes increased appreciably in 2016 and 2017.

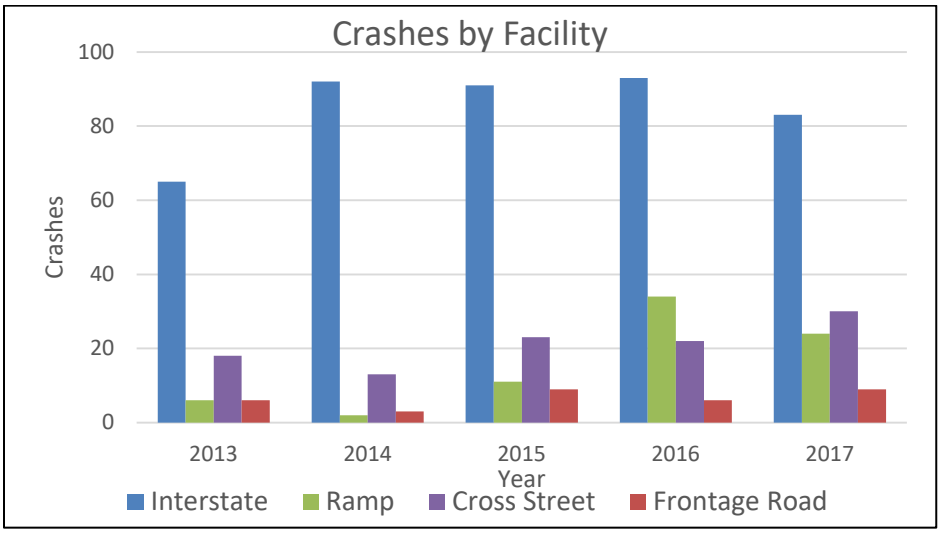


Figure 27: Crashes by Facility Type

Intersection collisions (developed using a 250-foot buffer around the intersections) accounted for approximately 25 percent of the crashes along the corridor, and accounted for the majority (75-percent range) of the ramp and cross-street crashes.

Crashes by time of day are indicative of traffic exposure, typically peaking during the typical a.m. and p.m. traffic peak hours – See **Figure 28**. The analysis did not reveal significant time trends/outliers except for the rear-end crashes at the mid-day, the out-of-control crashes at the morning and the passing crashes at late evening.

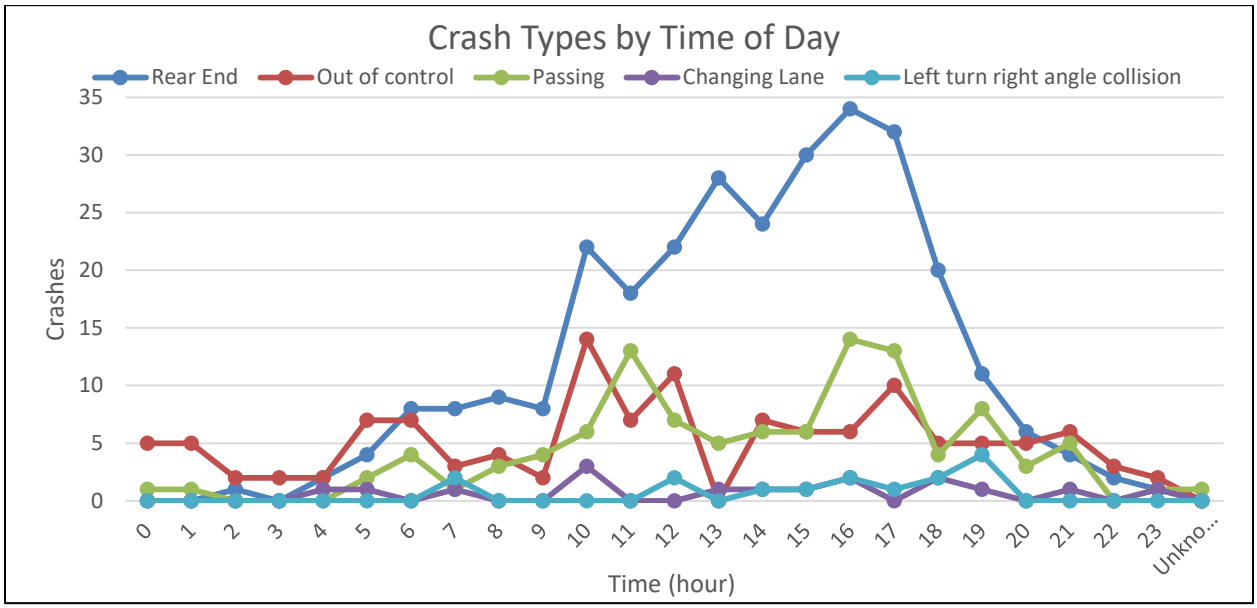


Figure 28: Crashes by Time of Day

Crashes also vary by day of the week (not shown), especially when looking at the interstate collisions. There are significantly lower crashes on Wednesdays, Saturdays, and Sundays. Ramps and outer roads have a significant increase in crashes for Fridays (with slight increases on Saturdays).

As **Figure 29** illustrates, rear-end collisions were by far the most common crash type, followed by out of control, passing, and changing lane. The prevalence of rear-end crashes is typically a sign of congestion.

Cross-examining the most common crash types by time-of-day shows that rear-end crashes trend with the overall time-of-day trend (in fact, they likely drive the trend), while out of control crashes also trend slightly with traffic volumes, although not as noticeably as rear–end crashes. The other common collision types show less variation throughout the day.

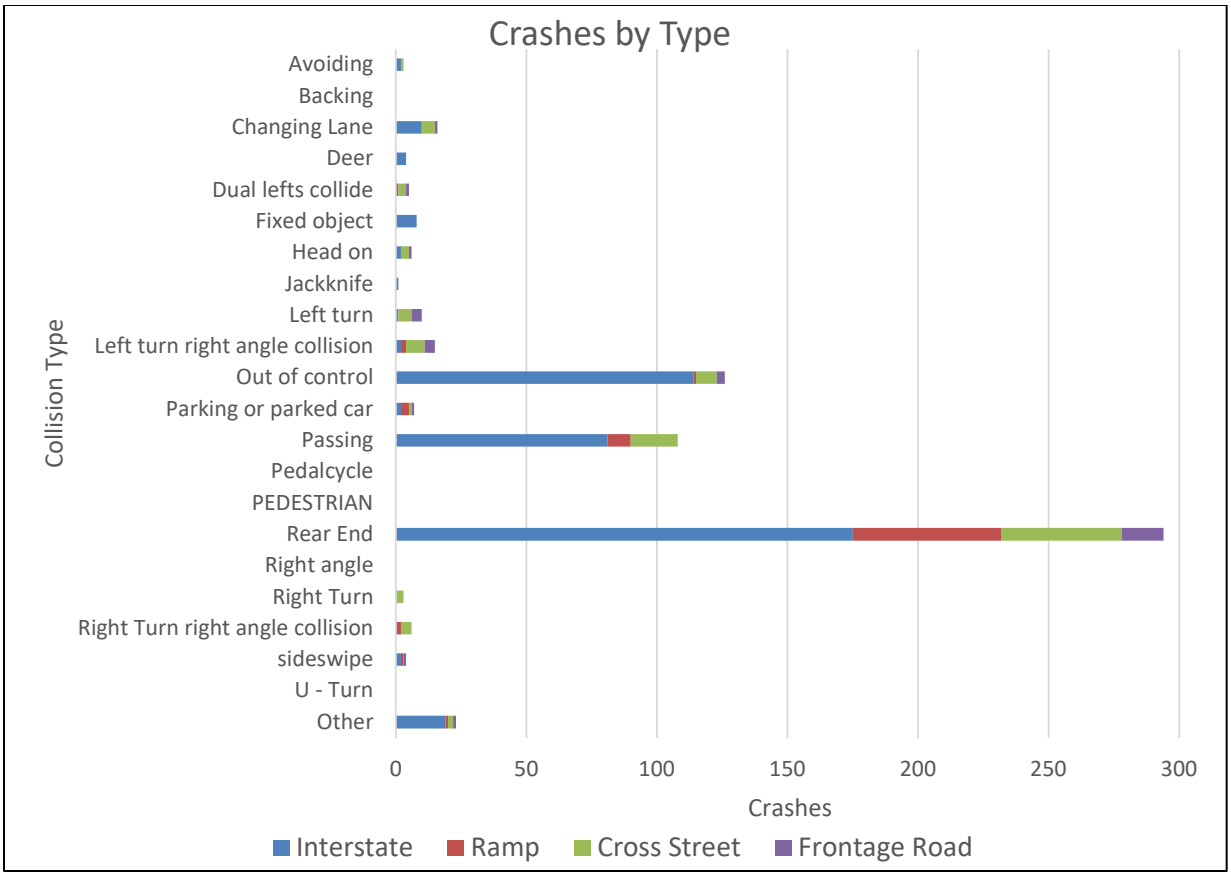


Figure 29: Crashes by Type

The crash analysis also examined weather, lighting conditions, and roadway surface conditions. As an example, **Figure 30** illustrates the distribution of weather conditions. None of these elements appear to be major factors in the crash trends, and exhibit fairly typical distributions.

Cross-examining roadway surface conditions with the common collision types shows that approximately half of the out-of-control crashes are attributed to non-dry roadway conditions (wet, snow, ice, slush, etc.). Non-dry conditions also account for 18 percent of rear-end crashes and 24 percent of passing crashes.

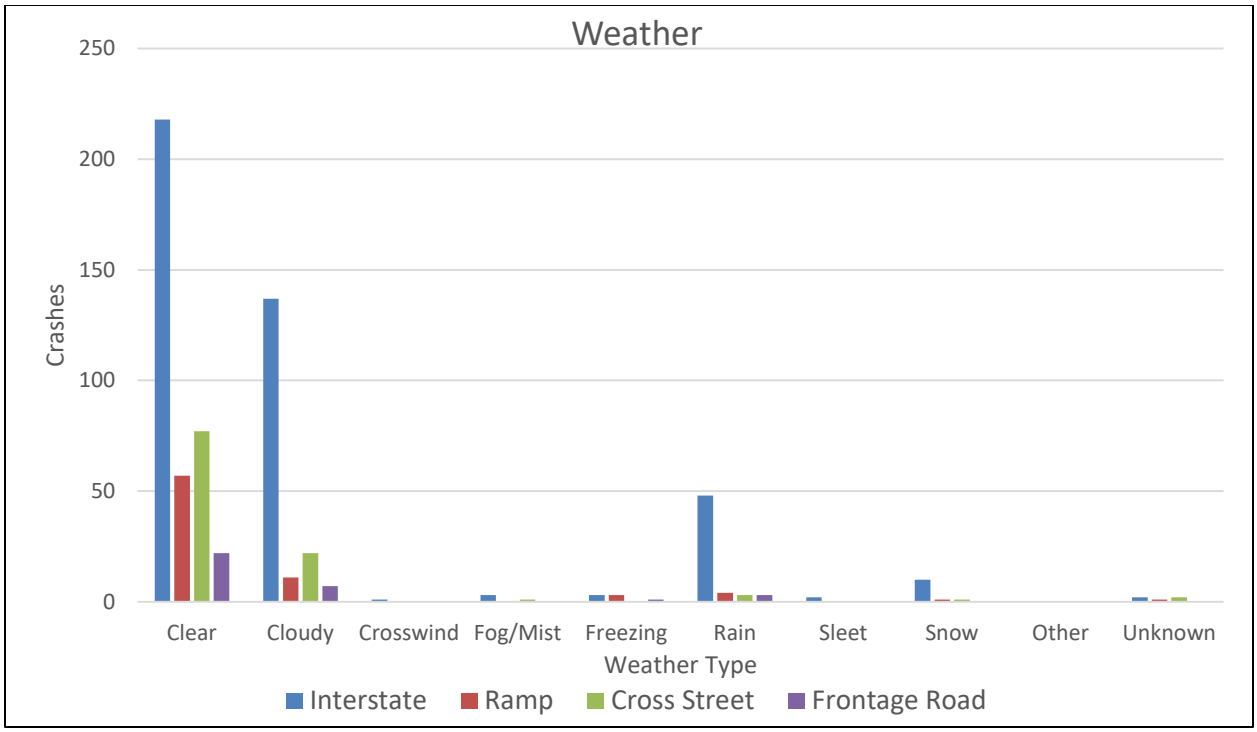


Figure 30: Contributing Circumstances – Weather

Crashes were specifically examined within the curved segment of I-70 (east of the Wentzville Parkway ramps to west of the Route Z ramps) to determine whether any spikes occur in that area that could be attributed (in part) to the roadway geometry. There were 96 crashes occurring within the curved area, which has a length of approximately 0.54 miles. There were 361 crashes within the remaining portions of I-70 outside of the curve, which has a total length of 1.14 miles. This indicates that there are a higher number of crashes per mile outside of the curved area. Specific types of crashes, including out-of-control, ran-off-road, and wet/icy/snowy condition crashes were also analyzed within and outside of the curved area. Again, the number of crashes per mile falling into each of those category types was higher outside of the curve. This is likely because there are fewer conflict points (merge areas) within the curve than outside the curve.

Crash rates along the interstate portion of the study area were calculated for each of the 5 years of the data collection period. The calculated crash rates are higher than the Missouri statewide average rate for interstates for each of the study years. However, the fatal crash rates calculated along this portion of I-70 are lower than the statewide average for similar facilities. **Table 13** summarize the annual crash rate for the interstate.

Table 13: Annual Crash Rates – Interstate

	2013	2014	2015	2016	2017	Average
Total Number of Fatal Crashes	0	0	1	0	0	0.2
Total Number of Crashes	65	92	91	93	83	84.8
Fatal Crash Rate (per 100MVM)	0.0000	0.0000	0.0017	0.0000	0.0000	0.0003
Total Crash Rate (per 100MVM)	145.37	200.34	180.68	179.80	156.35	172.49
MO Statewide Avg Fatal Crash Rate for Interstates (per 100MVM)	0.38	0.32	0.38	0.37	0.41	0.37
MO Statewide Avg Total Crash Rate for Interstates (per 100MVM)	88.14	68.52	78.72	82.49	80.78	79.73
Difference Fatal Rate	-0.38	-0.32	-0.38	-0.37	-0.41	-0.37
% Diff Fatal Rate	-100.00%	-100.00%	-99.55%	-100.00%	-100.00%	-99.91%
Difference Total Crash Rate	57.23	131.82	101.96	97.31	75.57	92.76
% Diff Total Crash Rate	65%	192%	130%	118%	94%	116%

UTILITIES

As concepts were developed and studied for the J6I0624 project, a high-level utility investigation was completed along the I-70 project corridor. This investigation included coordination with utility companies, records research, compilation of facility maps, submittal of tickets for field locates, coordination with survey crews, and review of survey deliverables to verify accuracy. A goal of the conceptual plan development is to raise awareness of utilities along the corridor and to minimize impacts to surrounding parcels. By constructing a majority of the recommended improvements within existing right-of-way, this helps lower projected utility relocation costs as these costs are typically non-reimbursable. Further analysis of impacts to existing utilities will be conducted as the project design progresses. An overview of the existing utilities located throughout the project limits is included below.

The following utilities exist between the Wentzville Parkway and Route Z Interchanges, see **Figure 31**:

- AT&T Distribution fiber optic along north side of West Pearce Boulevard.
- AT&T Distribution fiber optic crosses beneath I-70, north of Layla Lane.
- Century Link (local) fiber optic along the north side of West Pearce Boulevard and the WB I-70 off ramp to Wentzville Parkway
- Century Link (national) fiber optic along the north side of West Pearce Boulevard and along the north side of westbound I-70
- Charter/Spectrum along north side of I-70 westbound ramp to Wentzville Parkway and West Pearce Boulevard to Schroeder Creek Boulevard; crosses I-70 overhead between Schroeder Creek Boulevard and Wilmer road; along west side of Route Z running beneath I-70.
- Extenet crosses beneath I-70 midway between Schroeder Creek Boulevard and Campus Drive; extends east along the north side of West Pearce Boulevard.
- MCI/Verizon extends east along the north side of West Pearce Boulevard from Schroeder Creek Boulevard.
- MoDOT fiber optic along north side of the westbound lanes of I-70.
- MoDOT power and light poles along the south side of the eastbound I-70 lanes from Wentzville Parkway to NSRR; north side of I-70 westbound exit ramp at Wentzville Parkway and westbound I-70 lanes to Schroeder Creek Boulevard; north and south ramps at Route Z interchange
- Wentzville Water Facilities along the R/W limits north of the westbound I-70 Wentzville Parkway exit ramp passing beneath West Pearce Boulevard; buried line extends beneath I-70 north of Layla Lane; water line along the north side of Mar-Le Drive extending east from Route Z to Lodora Drive
- Ameren gas lines along north side of West Pearce Boulevard; crossing beneath I-70 between Schroeder Creek Boulevard and Wilmer Road.
- Ameren overhead power lines along the R/W limits north of the westbound I-70 Wentzville Parkway exit ramp crossing to the north side West Pearce Boulevard and extending to the east; overhead power line crosses I-70 north of Layla Lane; along the south side of eastbound I-70 east of NSRR tracks.

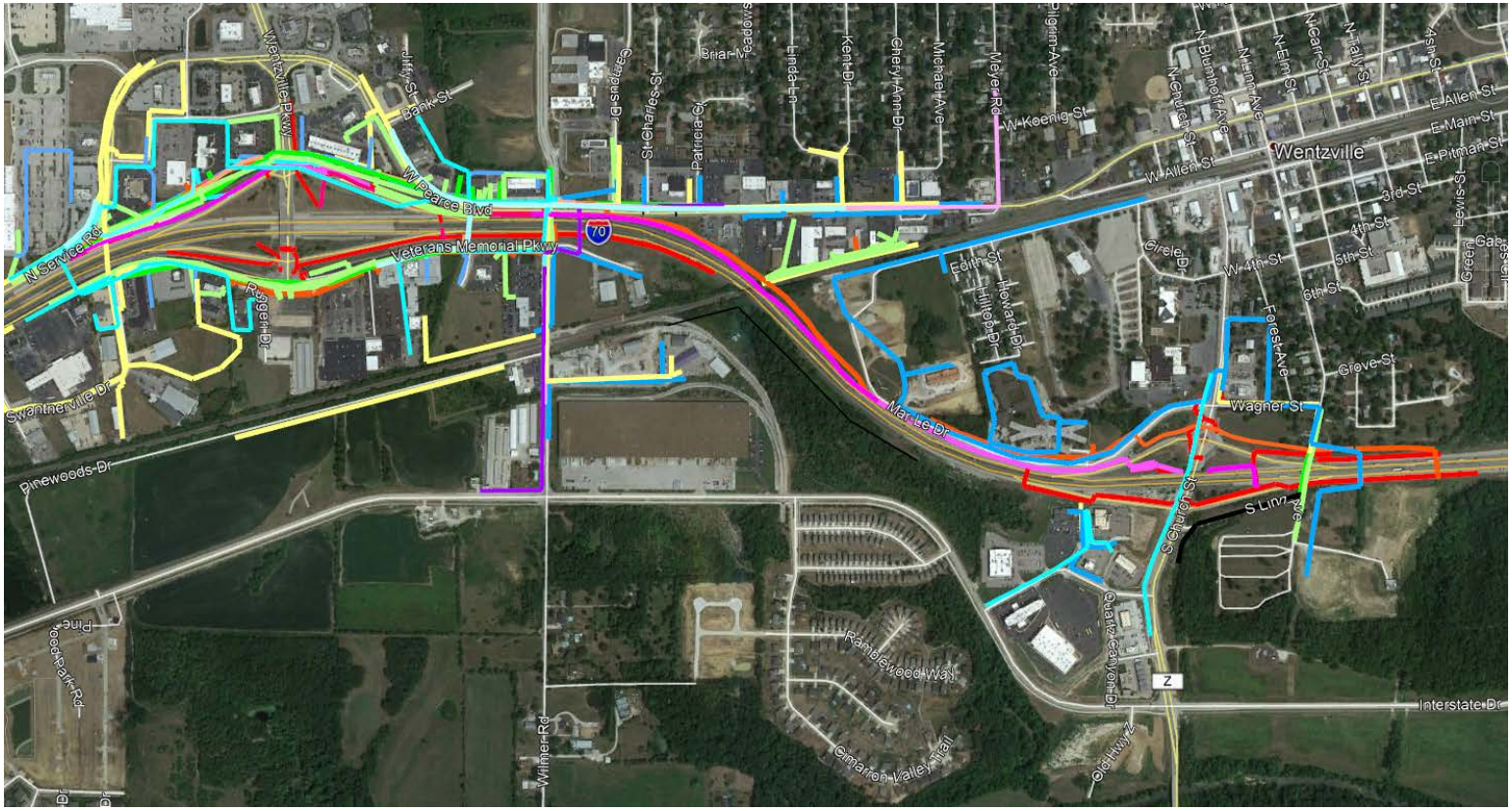


Figure 31: Utilities

Nearly all affected utilities are located within existing public right-of-way and will be relocated at the owner's expense, with the exception of the Century Link fiber optic line which runs along the north side of I-70 through the project limits. Relocation of this line will need to be reimbursed, per existing agreements with MoDOT. The anticipated cost of this reimbursement ($300,000) is included in the project cost estimate.

The presence of additional utilities in the corridor is not presently known and will be investigated as the proposed concept is further refined.

ENVIRONMENTAL SUMMARY

One of the most important limited-access highways across the United States is Interstate 70 (I-70), which provides an east-west connection across much of the United States. Construction of the I-70 corridor in Missouri began in 1956 and continued for nine years to span a distance of more than 250 miles across the state. Short portions of the corridor have been reconstructed, but otherwise, the newest sections of I-70 are more than 50 years old. With maintenance provided by the Missouri Department of Transportation (MoDOT), the facility has outlasted its original design life of 20 years and has carried traffic volumes of both cars and heavy trucks that have far exceeded the expectations of the original designers.

Per the Second Tier EIS completed for SIU 7, improvements within the SIU have been prioritized by MoDOT and SIU 7 has been packaged into smaller implementable sections. Since it has been more than three years since FHWA's approval of the EIS, a NEPA re-evaluation must be completed as required by 23 CFR 771.129. The smaller SIU 7 segment is Project J6I0624, see **Figure 32**, which will have construction limits east-west along the I-70 corridor from a point approximately 1,000 feet west of the centerline of Wentzville Parkway to a point approximately 1000 feet east of the centerline of the Route Z (Church Street) interchange. FHWA requires a detailed environmental review of Project J6I0624 and a desktop review of the entire SUI 7 corridor.

Figure 32: J6I0624 Project Limits

Affected Environment and Environmental Consequences

NEPA requires that federal project sponsors evaluate the potential social, economic and natural environmental impacts for the alternatives being considered for a proposed project. This is done so that decision-makers have the best available information to make an informed decision and so that the public and stakeholders are also informed. As individual projects progress with the SIU 7 corridor, a more detailed analysis will be conducted to determine the potential environmental effects of the proposed projects, along with mitigation measures.

Because this evaluation serves to evaluate the significance of impacts of the proposed J6I0624 project, the focus is on the context and intensity of effects that may significantly affect the quality of the human and natural environment. Due to the absence of certain resources, the results of previous environmental review, and a review of the project, there are several topics that do not warrant evaluation and are therefore not included in this evaluation. Those topics include:

- Geology
- Topography
- Mineral Resources
- Seismic Risk
- Caves
- Groundwater Resources
- Visual & Aesthetic Resources

Additional detail on other resources is included in the following sections.

Land Use and Related Characteristics

Land Use and Zoning

Local jurisdictions are responsible for land use planning along the I-70 corridor, including within SIU 7. These entities address existing and future land use in comprehensive plans and other planning documents. Since 2006, land use largely remains the same with limits of the J6I0624 project (see **Figure 33**). The study corridor is mostly retail/commercial in nature, flanked by residential development.

Figure 33: Prior/Existing Land Use Map

Comparison of Land Use, 2006 & 2018
Source: Google Earth Imagery
The proposed project is located within a developed urban area with a mix of commercial, office, industrial and residential uses along an interstate roadway. Future Land Uses are comprised of what currently exists.

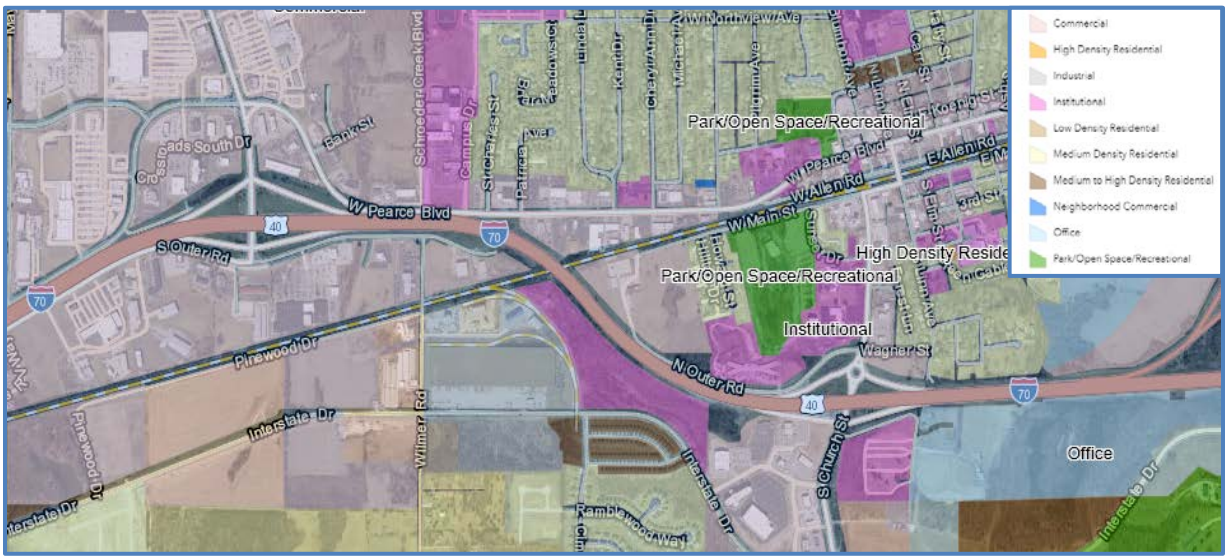


Figure 34: Future Lands Use Map

Future Land Use
Source: St. Charles County Master Plan – Envision 2030, January 28, 2019.
There will be no significant direct land use changes as a result of the proposed project because the proposed improvements will be constructed predominantly within existing right-of-way. The proposed project will be consistent with, and supportive of, land use plans.

The No Build Alternative will not support the St. Charles County Master Plan, which calls for completion of the transportation improvements to I-70 (St. Charles County, 2019).

Parks and Open Space
There are no parks located adjacent to project corridor. The closest park is Memorial Park located approximately 0.75 east of the eastern limits of the J6I0624 project. No impacts to parks or open spaces will occur as a result of the proposed project.

Pedestrian and Bicycle Facilities
Pedestrian and bicycle facilities will not be installed along I-70 due to interstate design standards.

The City of Wentzville's Comprehensive Plan Update includes planned trails or accommodations along the frontage roads of the I-70 corridor, including within the limits of the J6I0624 project. Ongoing coordination efforts should be carried out as the project progresses into more detailed engineering.

Socioeconomic Characteristics

Demographic data for the J6I0624 project was derived from the 2010 United States census and the American Community Survey 5-Year Estimates. This data is provided at the county and census tract areas to provide a summary of social and economic trends within the study corridor. The four block groups that border the project corridor were used as the foundation for the existing conditions analysis. Specifically, the block groups were used in the evaluation of demographics and economics. Demographic and economic data presented in the following tables.

The median household income for the block groups along the corridor ranges from $40,032 to $96,866; three of the six census tracts along the corridor have higher medians than that of St. Charles County ($78,380).

Environmental Justice (EJ) focuses on identifying and addressing disproportionately high and adverse human health or environmental effects of the project activities on minority populations and low-income populations to achieve an equitable distribution of benefits and burdens. EJ populations were identified through analysis of U.S. Census Bureau data at the county level and the Block Group level.

Concentrations of minority and low-income populations in the CSA were identified through analysis of the 2010 U.S. Census data and the 2009-2013 American Community Survey 5-year data at both the county and the Block Group level. Individual Block Group data was compared to the respective countywide data to determine whether any of the Block Groups will qualify as an "EJ Block Group" along the corridor. An EJ Block Group was defined to include any Block Group in which the minority or low-income population meets either of the following:

• The minority or low-income population in the Block Group exceeds 50 percent
• The percentage of a minority or low-income population in the affected area is higher than the average for St. Charles County.

The overall percentage of minorities in St. Charles County is 9.8 percent, and the low-income population in St. Charles County is 5.7 percent.

Based on review of the aforementioned Census and American Community Survey data, there are no concentrated areas of low income and/or minority populations that would be disproportionately impacted by the proposed project.

Demographic Profile, Project J6I0624

Census Tract	BG	Total Population	One Race	%	White	%	Black or African American	%	Am. Indian & Alaska Native	%	Asian	%	Nat. Hawaiian or Other	%	Other Race	%	Two or More Races	%	Hispanic or Latino of any Race	%
St. Charles County		385,115	375,577	97.5	347,505	90.2	16,439	4.3	687	0.2	9,167	2.4	116	0	1,663	0.4	9,538	2.5	12,163	3.2
3121.92	1	4,754	4,645	97.7	4,410	92.8	74	1.6	0	0	35	0.7	0	0	126	2.7	109	2.3	160	3.4
3121.93	1	7,532	7,498	99.5	7,168	95.2	307	4.1	0	0	23	0.3	0	0	0	0	34	0.5	15	0.2
3121.94	1	3,346	3,246	97.0	3,161	94.5	16	0.5	23	0.7	34	1.0	0	0	12	0.4	100	3.0	65	1.9
3121.95	1	1,997	1,920	96.1	1,835	91.9	78	3.9	0	0	7	0.4	0	0	0	0	77	3.9	51	2.6
	2	1,322	1,301	98.4	1,240	93.8	44	3.3	7	0.5	10	0.8	0	0	0	0	21	1.6	32	2.4

Source: U.S. Census Bureau 2013-2017a, b

Notes: One Race and Two or More Races make up the Total Population. One Race is the sum of White, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, and Other Race.

2017 Census Tracts, Block Groups boundaries were used. The data come from the 2013-2017 American Community Survey (ACS).

Economic Profile, Project J6I0624

Location		Population	Income ($)		Poverty* (# of persons)			
Tract	Block Group		Median Household Income	Per Capita Income	Income below Poverty Level	%	Income at or Above Poverty Level	%
St. Charles County		376,960	78,380	35,628	21,362	5.7	355,598	94.3
3121.92	1	4,745	81,771	39,090	128	2.7	4,617	97.3
3121.93	1	7,514	96,866	33,284	325	4.3	7,189	95.7
3121.94	1	3,344	89,839	42,574	207	6.2	3,137	93.8
3121.95	1	1,881	40,349	21,114	179	9.5	1,702	90.5
	2	1,293	61,513	27,154	136	10.5	1,157	89.5
	3	1,056	40,032	19,531	177	16.8	879	83.2

Source: U.S. Census Bureau 2013-2017e, f, g

Natural and Cultural Features

Water Resources (Wetlands, Ponds, Lakes, Rivers, and Streams)

A desktop and field wetland and stream review were conducted using available NWI mapping, USGS quadrangle mapping, and Google Earth online aerial photography to determine if potential waters of the U.S. (including wetlands) occur and will potentially be impacted by fill activities regulated under Section 404 of the Clean Water Act. NWI mapping and National Hydrography Dataset (NHD) USGS mapping depicts two blue line intermittent streams adjacent to I-70, see the impacted streams highlighted in **Figure 35**. No wetlands are depicted.

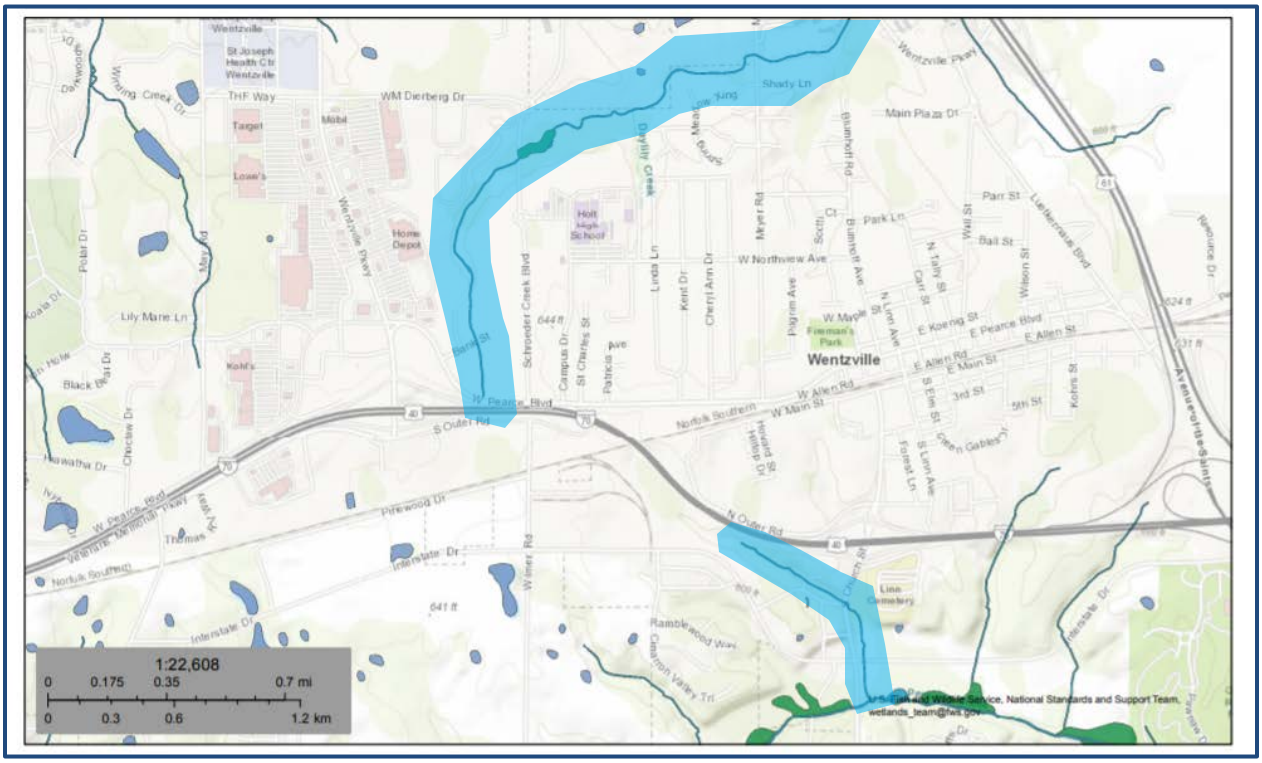


Figure 35: Water Resources Map (Source: USGS, National Wetlands Inventory, 2019)

A field assessment was conducted by MoDOT staff in August 2019 that confirmed the mapped stream channel adjacent to I-70 near the eastern limits of the project; and the mapped stream channel near the western limits of the project. No wetlands were observed.

A preliminary review of project concept design indicates potential impact to the stream channel adjacent to I-70 near the eastern limits of the project; and the mapped stream channel near the western limits of the project. The type of required Section 404 permit will be based on total impacts to waters of the U.S. If the project's impacts will likely be less than 0.5 acre of permanent fill in any single crossing, a Nationwide Permit # 14 (Linear Transportation) will be anticipated to authorize road fill and bridge and culvert construction. Steam mitigation will be determined by the USACE's review process for jurisdiction and impacts.

The federal Clean Water Act gives authority to the state of Missouri, specifically DNR, to issue a Section 401 water quality certification in coordination with the USACE Section 404 permit. The certification is verification by the state that a project will not violate state water quality

standards. A conditionally certified NWP 401 water quality certification is anticipated. No individual 404 or 401 permits are anticipated.

Threatened and Endangered Species

An official USFWS IPaC online review was conducted for federally listed threatened and endangered (T&E) species occurring in the Project study area. An MDC online Natural Heritage Review was also conducted. The IPaC auto-generated report is attached to this report in Attachment A. Federally listed species in the IPaC review included Gray Bat, Indiana Bat, Northern Long-eared Bat, Decurrent False Aster, and Running Buffalo Clover. No critical habitats for these species were indicated in the IPaC report. No sandy floodplains or areas of periodic flooding exist along the project corridor that will support Decurrent False Aster, and none have been recorded in the project area. Likewise, it is unlikely that Running Buffalo Clover will be encountered given lack of suitable habitat along the corridor.

Indiana bats and Northern long-eared bats may occur near the project area. These two species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas. There are no known hibernaculum nearby, known maternity sites and/or known roost trees for the species. A pedestrian survey was conducted and 20 mature trees located along a stream that could be suitable bat habitat were identified.

Per Department of Interior policy (see DOI Memorandum M-37050 Dec. 22, 2017) changes regarding incidental take of migratory birds, chicks, and bird eggs protected under the Migratory Bird Treaty Act have been made; incidental take is now not considered a willful "take". Therefore, tree and vegetation tree clearing associated with construction activities could be considered incidental to and will not result in a "direct" or purposeful "take" of migratory birds, chicks, or eggs. USFWS and related other federal agencies regulations to codify have not been promulgated. Therefore, further consultation with regulatory agencies should be conducted in the future to ascertain survey needs.

Noise

The federal regulation that FHWA uses to assess noise impacts is 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. The MoDOT noise policy, Policy on Highway Traffic Noise Abatement, constitutes the official MoDOT noise policy and procedures for the purpose of meeting the requirements of 23 CFR Part 772. Noise-abatement criteria (NAC) are used to define the noise levels that are considered an impact (in hourly A-weighted sound-level decibels) for each land-use activity category.

Per MoDOT policy, traffic noise analysis is performed for developed lands containing noise-sensitive land uses, undeveloped lands where noise-sensitive development is permitted, and to predict future noise levels for undeveloped lands. As further noted in MoDOT policy, land uses that are sensitive to highway noise can generally be identified based on review of project plans, aerial photography, web-based mapping, and property data.

For the purposes of the current level of design (conceptual), potential noise-sensitive land uses were identified (see **Figure 36**), and then assessed for potential noise barrier placement if NAC

is exceeded. Noise barriers do not typically work for isolated receptors. However, they are typically more successful for areas where receptors are clustered together. MoDOT Noise Policy requires at least a 5 dBA insertion loss for a minimum of two first-row, impacted receivers for noise abatement to be considered feasible. First-row receptors are noise-sensitive land uses that face the project roadways without substantial visual occlusion from traffic noise. Additionally, receptor parcels are required to abut the roadway right-of-way to be considered first-row. Receptors with developable intervening parcel(s) separating the receptor parcel from the abutting roadway right-of-way are considered second row or greater receptors. As shown on the aforementioned figure, two first-row receivers are not located next to one another in the preliminary noise study zone.

A more detailed noise analysis should be completed as design progresses.

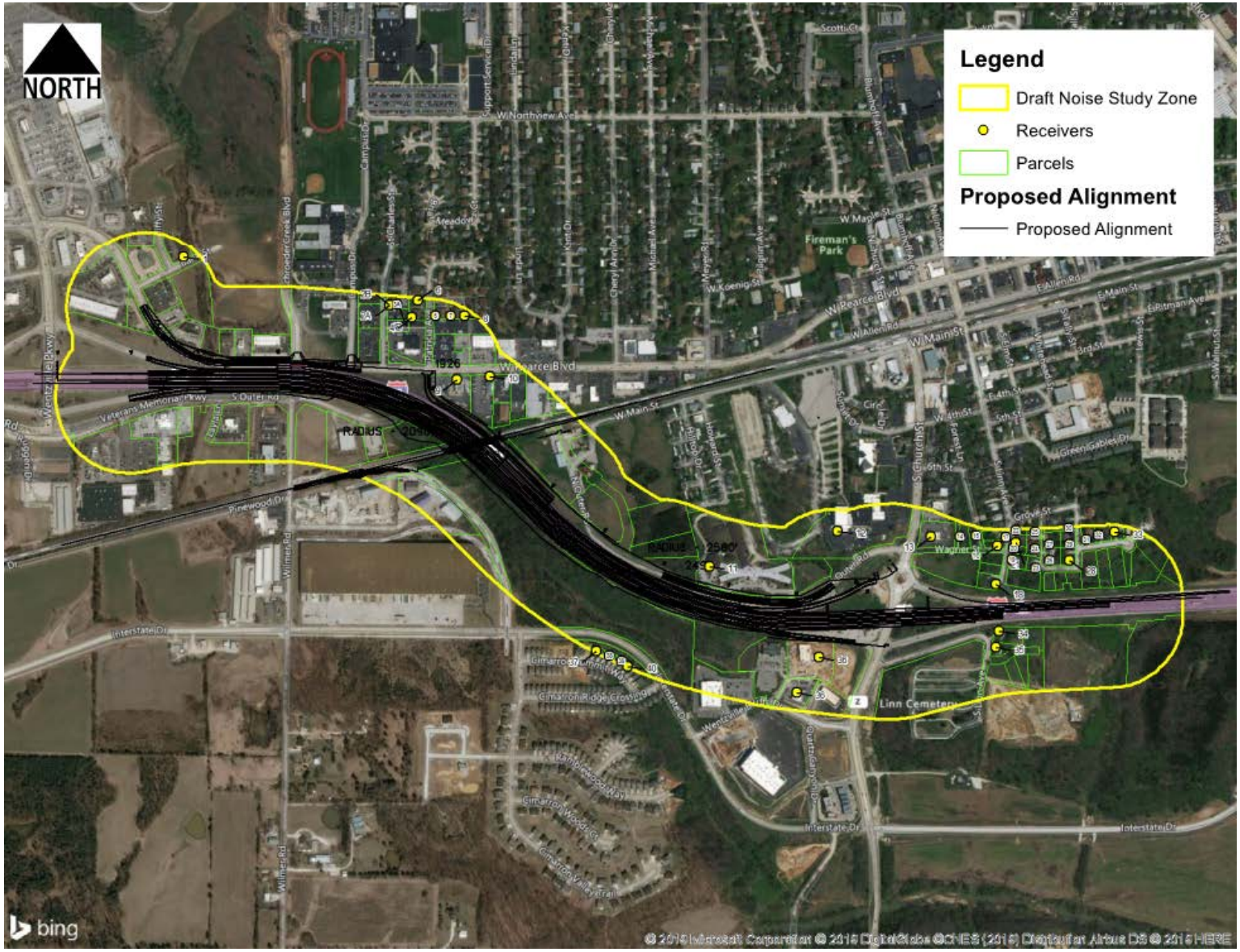


Figure 36: Noise Sensitive Receivers

Archaeological Resources and Cemeteries
No known archaeological sites, including cemeteries, are located within the limits of the J6I0624 project corridor. At this level of review, no environmental/agency approvals have been sought. As the project progresses, the SHPO should be contacted for additional information.

Historic Resources
No listed historic sites are located within the limits of the J6I0624 project corridor. The only site listed in the city of Wentzville is the Wentzville Tobacco Company Factory, located at 406 Elm Street in Wentzville. This site is located approximately 0.25-mile north of the eastern project limits and will not be impacted by the project.

Coordination
NEPA requires that agencies "make diligent efforts to involve the public and resource and regulatory agencies in preparing and implementing their NEPA procedures" (40 CFR 1506.6). Public and agency participation has been an important part of the Improve I-70 project since its inception. MoDOT made a commitment at the beginning of the project to encourage and solicit public and agency participation and feedback.

As the J6I0624 project progresses into more detailed design, additional information should be provided to the public and agencies, particularly those who could be affected by the project. MoDOT will subsequently work to address the issues that have been identified.

Conclusions and Commitments Summary
A summary of potential impacts of the J6I0624 project are as follows:

Land Use
Direct land use changes will be minimal. There will be no significant direct land use changes as a result of the proposed project. The proposed project will be consistent with, and supportive of, land use plans.
Socioeconomic Characteristics
No disproportionate impacts to low income or minority populations
Floodplains
There are no floodplains within the J6I0624 project.
Wetlands and Streams
A field assessment confirmed a mapped stream channel adjacent to I-70 near the eastern limits of the project; and a mapped stream channel near the western limits of the project. A preliminary review of project concept design indicates potential impact to the stream channels. No wetlands were observed.
Plant Communities / Wildlife
Limited impacts to plant communities and wildlife are anticipated.
Threatened and Endangered Species

Indiana bats and Northern long-eared bats may occur near the project area. A pedestrian survey was conducted and 20 mature trees located along a stream that could be suitable bat habitat were identified. Further consultation with regulatory agencies should be conducted in the future to ascertain survey needs.
Air Quality
No impacts to air quality anticipated.
Noise
For the purposes of the current level of design (conceptual), potential noise-sensitive land uses were identified and then assessed for potential noise barrier placement if NAC is exceeded. Even if noise impacts will occur, a noise barrier will not be feasible. A more detailed noise analysis should be completed as design progresses.
Archaeological / Historic Resources
No known archaeological or historical sites are located within the limits of the J6I0624 project corridor. As the project progresses, the SHPO should be contacted for additional information.

CONCEPTUAL STUDY RECOMMENDATIONS

Based on the findings of this study, Alternative 2 is the recommended approach. This alternative includes the following:

Bridges:

Norfolk Southern Bridge over I-70:

- Replace existing railroad bridge over I-70 with a new single track 4 span structure.

  NOTE: Conceptual Cost Estimate, Appendix D, includes increased substructure costs associated with overbuilding the substructure elements to accommodate a future second mainline track constructed by others. This additional work may, or may not, be included in the final project pending negotiations and agreements with NSRR.

- Construct temporary shoofly (approximately 2400' of track).
- Construct temporary 7 span railroad bridge south of the existing structure to maintain train access throughout construction.
- Main bridge spans will accommodate 4-12' traffic lanes with 12' inside and outside shoulders and an additional 12' clearance, in each direction in accordance with the I-70 EIS documents.
- End span will allow for future north outer road connection between West Pearce Boulevard and Mar-Le Drive.
- End span will not preclude the proposed City of Wentzville Bike/Pedestrian Plan.

I-70 Bridges over Route Z:

- The existing 42'-1 ½" wide eastbound and westbound bridges will be widened to the outside by 20'-1" to facilitate an additional 12' lane and full 12' shoulder in each direction. Resulting width 62'-2 ½" out to out.

Roadway:

I-70 Mainline:

- Relocate I-70 approximately 65' southwest of existing location in the vicinity of the NSRR Bridge
- Proposed typical section (each direction) includes:
  - 12' inside shoulder
  - 3-12' lanes
  - 12' auxiliary lane between Wentzville Parkway and Route Z
  - 12' outside shoulder
  - 12' additional horizontal clearance
- Improve horizontal curvature, increase site distance, and provide standard shoulder widths to improve safety.
- Lower mainline profile to provide standard vertical clearance.
- Maintain two lanes of traffic in each direction during peak traffic periods. Temporary short term lane closures may be required during overnight or weekend operations.

Wentzville Parkway Interchange:

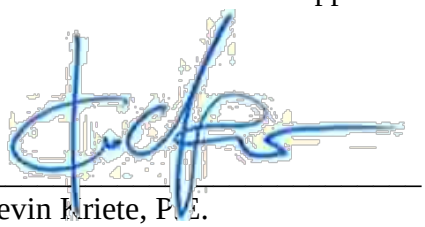
- Partially reconstruct westbound off ramp from I-70.
- Extend proposed auxiliary lane to connect with new eastbound on-ramp from Wentzville Parkway that is being constructed within a separate project.

- Realign segment of West Pearce Boulevard (3 lane template, 6’ sidewalk).

Route Z Interchange:

- Reconstruct ramps on western side of interchange.
- Restripe I-70 between Route Z and the I-64/ Route 40/61 interchange to accommodate the additional lane work.
- Realign segment of Mar-Le Drive (2 lane template).

A conceptual level strip map is shown in Appendix B and the conceptual cost estimate for the proposed items of work listed above is located in Appendix D.

Approved by:  Date: 4/30/2020

Kevin Kriete, P.E.
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Recommendations or Comments:

Approved by:  Date: 09/22/20

Thomas Blair, P.E.
District Engineer
MoDOT St. Louis District

Appendices:

A: As-Built Plans
B: Roadway Conceptual Strip map and Profile Sheets
C: Bridge Details
D: Conceptual Cost Estimate

cc: Design Division
Construction and Materials Division
Traffic Division

Appendix A

As-Built Plans

Appendix B

Roadway Conceptual Strip Maps and Profile Sheets

Appendix C

Bridge Details

Appendix D

Conceptual Cost Estimate