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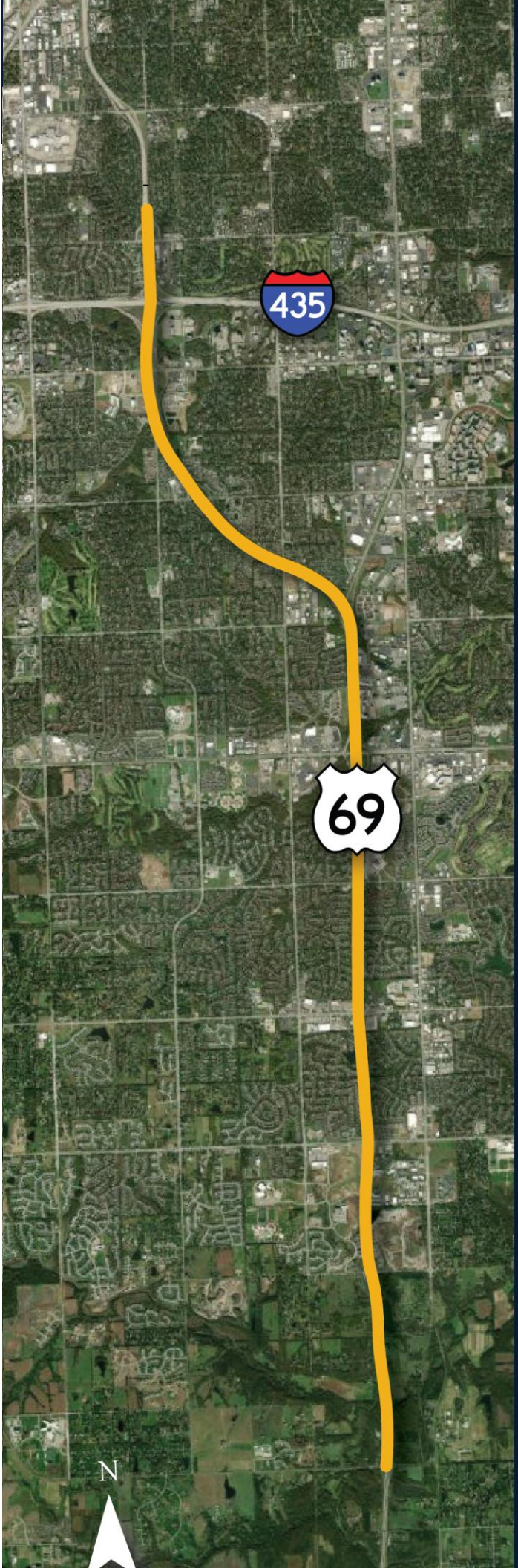

69 EXPRESS

FINAL DRAFT

US 69 EXPANSION PROJECT

Break in Access Request

November 1, 2021

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1.0 Introduction

1.1 Project Description

The Kansas Department of Transportation (KDOT) and the Federal Highway Administration (FHWA) are proposing to modernize and expand the U.S. 69 Corridor and improve connections with the I-435 interchange within the city limits of Overland Park, in Johnson County, Kansas. The project proposes widening U.S. 69 to six lanes from four lanes, with three lanes in each direction, from 103rd Street to 179th Street. One express toll lane (ETL) in each direction of U.S. 69 will be added as a mechanism for managing congestion and improving safety. A detailed description of the proposed improvements can be found in **Section 1.4**.

The following Break-in-Access (BIA) Request is a Federally mandated document that demonstrates the proposed network changes will not have a significant adverse effect on the future traffic and safety operations of the corridor, account for all traffic movements entering and exiting the mainline and adhere to approved design standards. It is important to note that Federal guidance only requires a traffic and safety evaluation on the interstate network and not state highways. However, KDOT, with support from the FHWA, has decided to the include the operations and safety analysis for U.S. 69 and supporting arterial roadways in this report to create efficiencies in the planning process that without would have led to producing separate Federal and state documents.

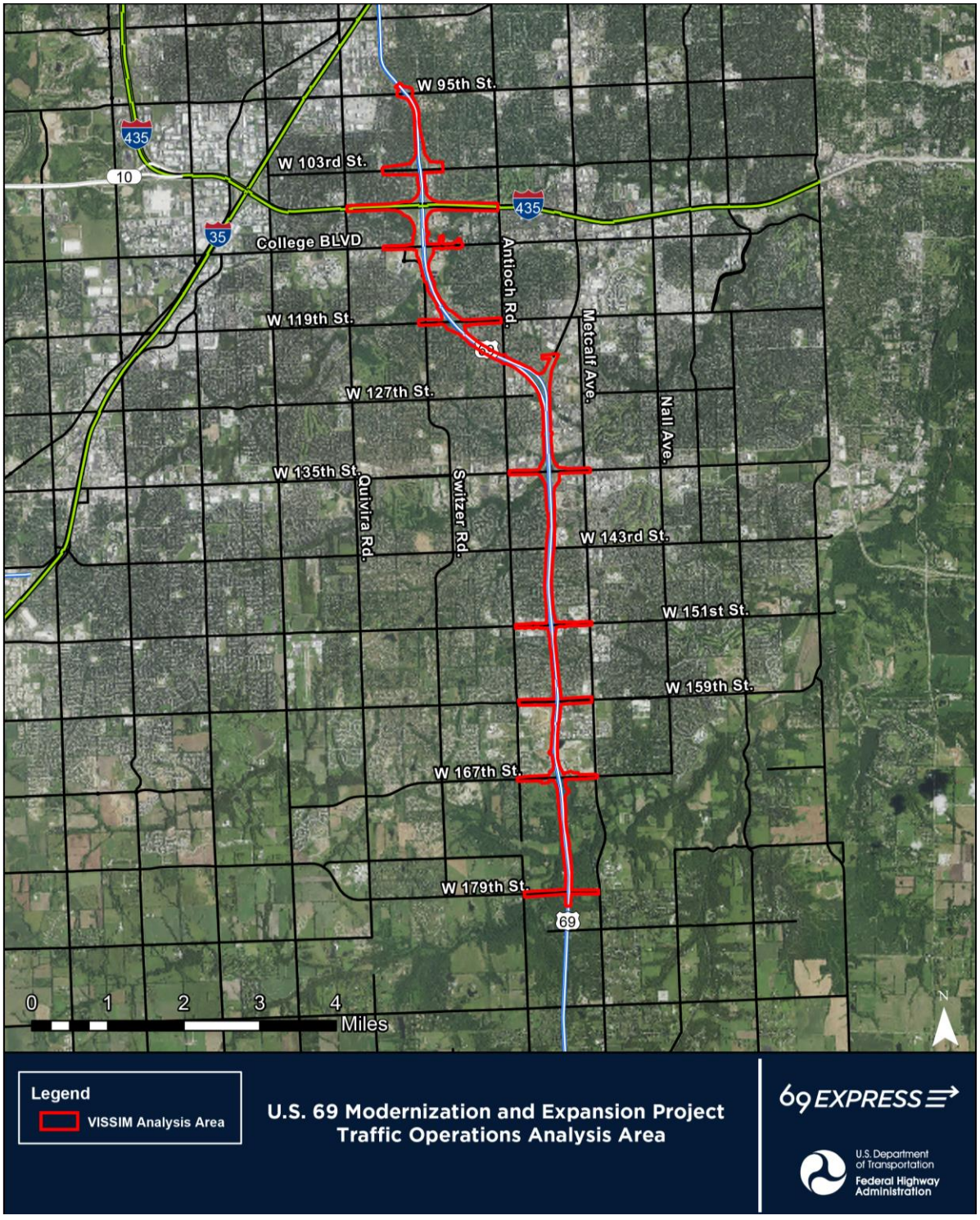
1.2 Project Location and Limits

The project is located in the City of Overland Park, Kansas, and affects the I-435 and U.S. 69 corridors just south and east of I-35. The overall project limits begin just south of 179th Street and extend north past 103rd Street. The overall length is approximately 10 miles.

There is a distinction, however, between the project area limits and the extent that must be reviewed for operations and safety. Federal guidance mandates that operational and safety analysis limits extend a minimum of one interchange upstream and downstream of the proposed improvements. These limits are known as the analysis area and can be seen in **Figure 1**. The mainline limits for U.S. 69 and I-435 are described as follows:

- U.S. 69 North - just past the 95th Street interchange
- U.S. 69 South – 179th Street. Due to the sufficient spacing (over two miles) and limited traffic impacts between the 179th Street and 199th Street ramp terminals, additional analysis to the 199th Street interchange is not required.
- I-435 West - Quivira Road at the west-facing ramp gores
- I-435 East - Antioch Road at the east-facing ramp gores

Figure 1: U.S. 69 Project Analysis Area



Source: ESRI, KDOT

Federal guidelines also state that arterial intersection evaluations must extend a minimum of one major intersection from the service interchanges affected by the proposed improvements. **Table 1** below lists all the interchanges and intersections included in the evaluation.

Table 1: Study intersections

1. 95th St. & U.S. 69 NB	2. 103rd St. & U.S. 69 NB
3. 95th St. & U.S. 69 SB	4. 103rd St. & U.S. 69 SB
5. 103rd St. and Neiman Rd.	6. 103rd St. & Mastin St.
7. I-435 & Antioch Rd. EB	8. I-435 & Antioch Rd. WB
9. I-435 & Quivira Rd. EB	10. College & U.S. 69 NB
11. I-435 & Quivira Rd. WB	12. College & U.S. 69 SB
13. College Blvd. & Switzer Rd.	14. College & Mastin St.
15. 119th St. & Antioch Rd.	16. 119th St. & U.S. 69 NB
17. 119th St. & Switzer Rd.	18. 119th St. & U.S. 69 SB
19. 119th St. & Hayes St.	20. 119th St. & Grant (west) St.
21. 123rd St. & Blue Valley Pkwy.	22. 119th St. & Farley
23. 135th St. & U.S. 69 NB	24. 135th St. & Metcalf Ave.
25. 135th St. & U.S. 69 SB	26. 135th St. & Antioch Rd.
27. 135th St. & Hemlock	28. 135th St. & Riley St.
29. 151st St. & Metcalf Ave.	30. 151st St. & U.S. 69 NB
31. 151st St. & Antioch Rd.	32. 151st St. & U.S. 69 SB
33. 151st St. & Hardy St.	34. 151st St. & Conser/Newton
35. 151st St. & Marty St.	36. 151st St. & Lowell Ave.
37. 159th St. and Foster	38. 159th St. & Metcalf Ave.
39. 159th St. & Lowell Ave.	40. 159th St. & U.S. 69 NB
41. 167th St. & Antioch Rd.	42. 159th St. & U.S. 69 SB
43. 167th St. & U.S. 69 NB	44. 159th St. & Antioch Rd.
45. 167th St. & U.S. 69 SB	46. 167th St. & Metcalf Ave.
47. 179th St. & Metcalf Ave.	48. 179th St. & U.S. 69 NB
49. 179th St. and Antioch Rd.	50. 179th St. & U.S. 69 SB

1.3 Public Involvement

Given the scope of the project and the implications it has for the people who rely on the U.S. 69 corridor daily, a robust public engagement campaign is being undertaken to provide regular updates to the public. The following engagement platforms are being utilized to inform the public:

1. Project Website
2. Social Media Pages on Facebook and Twitter
3. Print Advertisements
4. Newspaper, Broadcast and Radio Outlets

Thus far, the project team has hosted a variety of public meetings other opportunities for engagement including:

1. Project Information Meeting #1: 1/20/2021
2. Virtual Open House #1: 1/18/2021 – 2/1/2021
3. Virtual Open House #2: 4/16/2021 – 4/30/2021
4. Project Information Meeting #2: 4/20/2021
5. Project Information Meeting #3: 12/8/2021
6. Advisory Group Meetings: 7 meetings
7. Community / Stakeholder Presentations: 24 presentations
8. Elected Official Meetings: 14 meetings

Additional engagement activities are planned during future phases of the project. The numbers shown above are valid up to the point the following report is finalized. A summary of the public meetings will be provided as part of the Environmental Assessment documentation. More information can be found at http://www.69express.org/

1.4 Purpose and Need

1.4.1 Purpose of the Proposed Project

The purpose of the U.S. 69 Express project is to provide the traveling public with an efficient and cost-effective transportation facility for all users of U.S. 69 that improves safety, reduces congestion, promotes sustainability, provides flexible choices, and supports local and regional growth.

The proposed project is consistent with the identified needs and goals of KDOT's Kansas Long-Range Transportation Plan and the Mid America Regional Council's (MARC) metropolitan transportation plan, *Connected KC 2050*.

1.4.2 Need for Proposed Project

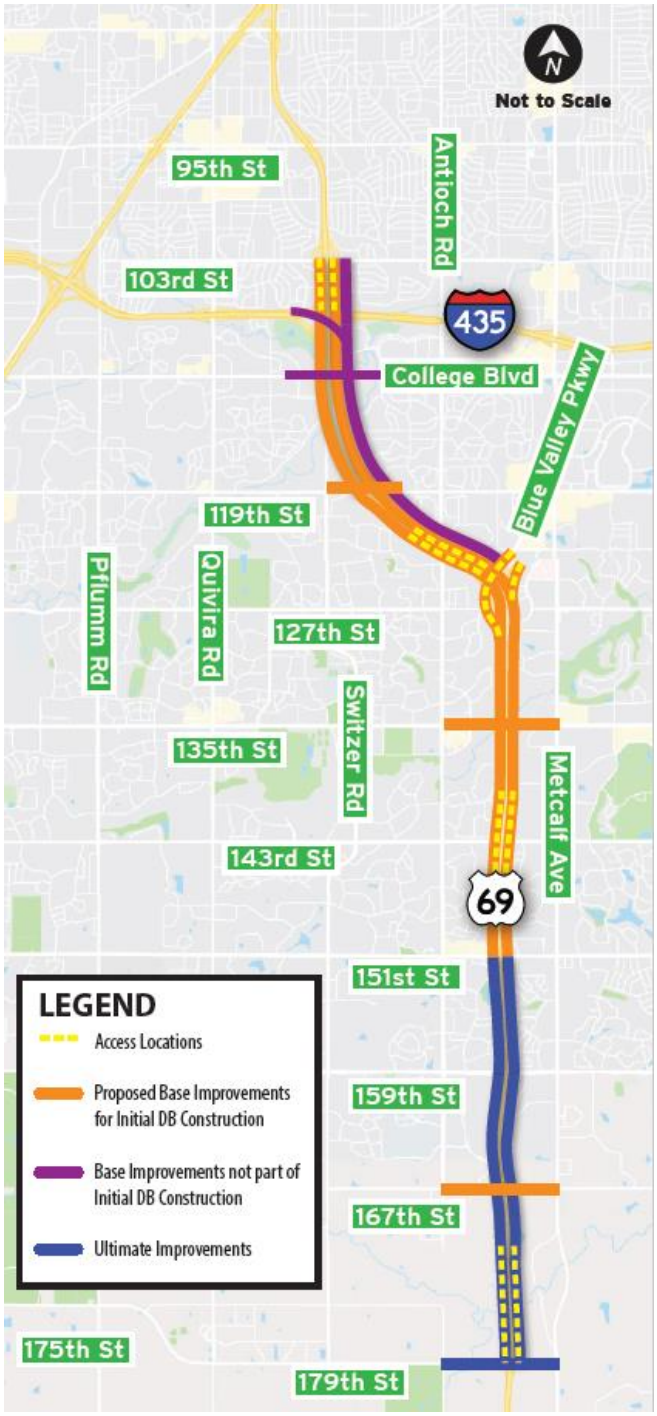
The proposed project is needed to:

- ***Improve safety*** to address crash frequency and congestion related crashes within the corridor;
- ***Reduce congestion*** and improve traffic operations to meet existing and future travel demands;
- ***Promote sustainability*** by addressing infrastructure condition and ongoing operations and maintenance needs, supporting environmental stewardship, as well as improving long-term traveler reliability;
- ***Provide flexible choices*** by promoting a transportation system that accommodates the needs for all users and modes; and
- ***Support local and regional growth*** through coordinated transportation improvements consistent with planned and proposed community land use.

1.5 Summary of Build Alternative

The Build Alternative includes adding an express toll lane in each direction on U.S. 69 that would manage congestion through pricing and access. This alternative also includes reconstruction of interchanges, bridges and pavement in the corridor. For the purposes of the following BIA, Build Alternative traffic operations and safety will be analyzed in the years 2040 and 2050. These will be known as the Base (2040) and Ultimate (2050) Improvements, as shown in **Figure 2**. The Base Improvements include all construction expected to occur in the Study Area up until the year 2040. The Ultimate Improvements to the corridor consist of anything that is proposed to be constructed after 2040.The operational results for the Base and the Ultimate Improvements are summarized in separate subsections of **Chapter 3**.

Figure 2: Base and Ultimate Improvements on U.S. 69/I-435



Source: KDOT

Base Improvements affecting I-435 and U.S. 69 include the following:

- Reconstruct the northbound and southbound U.S. 69 pavement, inclusive of all acceleration and deceleration lanes, from the northern limits of the 151st Street ramp gores to 103rd Street.
- Provide two general purpose lanes in each direction on U.S. 69 with auxiliary lanes and entrance and exit lanes.
- Provide one Express Toll Lane (ETL) in each direction of U.S. 69 with access points (ingress, egress, ingress merge lane, weave lanes, or direct-connect ramps). The Express Toll Lanes will extend continuously from the access locations north of 151st Street to the access locations at 103rd Street.
- Reconstruct the 167th Street interchange and ramps to provide the following:
    - Reconstruct the interchange to a full-service interchange by adding south-facing ramps
    - New northbound and southbound U.S. 69 bridges over 167th Street
    - Reconstruct 167th Street to four lanes (2 thru lanes in each direction)
    - Signalize ramp terminals
- Improve the 135th Street interchange and ramps to provide the following:
    - New northbound and southbound U.S. 69 bridges over 135th Street
    - New northbound and southbound U.S. 69 bridges over Tomahawk Creek.
    - New 135th Street to southbound U.S. 69 Ramp bridge over Tomahawk Creek
    - New southbound U.S. 69 to 135th Street Ramp bridge over Tomahawk Creek
- Reconstruct the Blue Valley Parkway interchange and ramps to provide the following:
    - Right-hand entrance for southbound Blue Valley Parkway to southbound U.S. 69 general purpose lanes.
    - Direct connect access ramps for the northbound (one lane) and southbound (one lane) U.S. 69 ETL to and from Blue Valley Parkway using grade separated structures.
- Provide a direct connect access ramp (one lane) for the southbound U.S. 69 ETL to 135th Street.
- Reconstruct the 119th Street interchange and ramps to the following:
    - Improve the southbound U.S. 69 ramp to 119th Street
    - New northbound and southbound U.S. 69 bridges over 119th Street
    - Reconstruct 119th Street pavement
- Reconstruct the College Boulevard interchange and ramps and add new northbound and southbound U.S. 69 bridges over College Boulevard[1]
- Provide new northbound and southbound U.S. 69 bridges over I-435.
- Reconstruction/replacement of various bridges on the U.S. 69 mainline or spanning the U.S. 69 mainline.
- Lane modifications at 119th Street east terminal
- Reduce the southbound College and 119th Street exit to a single lane
- Modify eastbound to northbound right turn lanes at 135th Street to U.S. 69 northbound
- Extend the storage for the 119th Street northbound off-ramp
- Add roundabout at 167th Street and Antioch

[1] Improvements to the College Boulevard interchange, northbound C/D road from College Boulevard to I-435, northbound flyover from U.S. 69 to I-435 westbound, and northbound auxiliary lane from Blue Valley Parkway to 119th Street will be included in the initial construction phase if funding is available. If funding is not available they will be constructed at a later date, but prior to 2040.

The improvements described above are all elements expected to be completed in the initial design-build (DB) phase of construction. Due to funding constraints, there are other improvements to the corridor, programmed in the Mid-America Regional Council's (MARC) Long-Range Transportation Plan (LRTP), that are not scheduled to be completed until the 2030 decade. These will also be accounted for in the analysis as part of the Base Improvements. The projects to be included are:

- Removal of the northbound U.S. 69 to westbound I-435 loop ramp and replace with a two-lane flyover ramp.
- Construct CD road for northbound U.S. 69 traffic to access flyover ramp beginning just south of College Boulevard, and reconstruct existing I-435 eastbound ramp from U.S. 69 to tie-in from CD road system.
- Add directional ramps from College Boulevard to have direct access to CD road system described in above bullet.
- Widen 151st Street from Antioch Road to Metcalf Avenue from four lanes to six lanes.
- Widen 175th / 179th Street from Lackman Road to Metcalf Avenue from two lanes to four and upgrade ramp intersections to signalized.
- Extension of a general-purpose auxiliary lane along northbound US-69 from the Blue Valley Parkway off-ramp to the 119th Street off-ramp. US-69 NB exit to Blue Valley Parkway becomes a 2-lane exit with an option-lane.

For the purpose of the BIA, it is assumed that the Ultimate Build of the U.S. 69 Modernization and Expansion Project will not be completed until after 2040. The Ultimate Buildout, includes the following elements:

- Extension of the ETL facility to the 179th Street interchange.
- Improve U.S. 69 and 151st Street Interchange
- Add extra westbound left turn lane at 159th Street and Lowell
- Upgrade intersection of 159th Street and Marty to signalized
- Modify the 167th Street and Metcalf Avenue roundabout
- Add ramp metering for the southbound on-ramp at Blue Valley Parkway to the general-purpose lanes
- Add roundabout at 179th Street and Antioch
- Add roundabout at 167th Street and Antioch

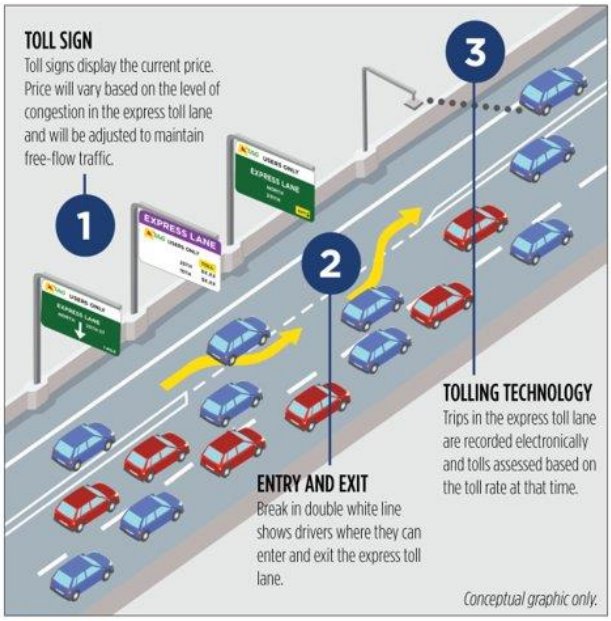
The proposed design of the Base and Ultimate Improvements can be found in **Appendix C.**

With the Express Toll Lanes Alternative, the two lanes in each direction that exist today would remain free of any tolls as required by state law. The additional express toll lane would be added in each direction by utilizing the current median of the corridor. Locations where travelers can enter or exit the express toll

lanes would be buffer separated and indicated with a break in double stripe lines and on overhead messaging signs.

A toll would be charged only to motorists who choose to enter and use the express toll lane. The toll price charged would vary depending on the time of day, length of the trip and the amount of traffic congestion on the corridor. The more traffic congestion there is along the corridor, the higher the toll to help manage the reliability of the trip in the express toll lanes. Typically, that would mean that the highest tolls would be charged during morning and evening rush hours, lower tolls during less busy times of day.

Figure 3: Express Toll Configuration



Source: KDOT

The express toll lanes would operate at typical highway speeds and be all electronic with no stopping to pay cash at toll plazas along the corridor, shown in **Figure 3**. Tolls would be assessed electronically either by reading a toll tag – such as K-TAG – or by reading the vehicle's license plate and charging through video tolling.

2.0 Existing and Future No-Build

The following subsections describe the existing I-435, U.S. 69 and arterial roadway network configuration, the existing traffic and safety operations and the traffic and safety operations by the year 2050 assuming no improvements to the corridor are made other than what is already programmed by KDOT and the City of Overland Park. The datasets, programs and assumptions used in developing the results shown below can be found in the "Break-In-Access Methodology and Assumptions" Technical Memorandum in **Appendix A.**

2.1 Network Configuration - Existing

U.S. 69 is a north/south freeway that includes 10 service interchanges and one system interchange within the analysis area limits. It is an eight-lane, barrier separated freeway from north of 95th Street to 103rd Street. From 103rd Street to south of 179th Street, U.S. 69 is a four-lane, divided freeway with a grass median. The southbound U.S. 69 exit to 103rd Street is a combined exit for traffic also exiting to I-435. This exit begins the collector/distributor (C/D) system that runs along southbound U.S. 69 from 103rd Street to 119th Street and includes the U.S. 69 interchanges with I-435 and College Boulevard. Auxiliary lanes are included between some of the interchanges when spacing between acceleration and deceleration lanes are insufficient for entering and exiting the freeway. Auxiliary lanes are in the following locations:

- Northbound, between 167th St on-ramp and 159th St off-ramp
- Northbound, between 159th St on-ramp and 151st St off-ramp
- Northbound, between College westbound on-ramp and I-435 eastbound Frontage off-ramp
- Northbound, I-435 loop ramps
- Northbound, between 103rd on-ramp and 95th off-ramp
- Southbound, between 151st St on-ramp and 159th St off-ramp
- Southbound, between 159th St on-ramp and 167th St off-ramp
- Southbound, between 95th St on-ramp and 103rd St off-ramp
- Southbound, between Blue Valley on-ramp and 135th St off-ramp

I-435 between Quivira Road and Antioch Road is an eight lane, barrier separated, east/west highway. This portion of the highway contains a C/D system in both directions and a system-to-system interchange with U.S. 69. This interchange is a modified cloverleaf with loop ramps in all quadrants except the southwest. To accommodate the southbound U.S. 69 to eastbound I-435 movement, the interchange includes a direct connect fly-over ramp.

Brief descriptions of the roadways that cross I-435 and U.S. 69 that are subject to analysis are below.

I-435 Corridor

- Quivira Road is a six-lane, divided arterial to the north and south of the I-435 interchange. The interchange is configured as a standard diamond.

- Antioch is a four-lane divided arterial to the north of the I-435 interchange and a six-lane, divided arterial south of the interchange. The interchange is a standard diamond configuration.

U.S. 69 Corridor

- 95th Street is a four-lane divided arterial east of the U.S. 69 interchange and a six-lane divided arterial west of the interchange. The 95th Street interchange with U.S. 69 is a standard diamond configuration.

- 103rd Street between Nieman Road and Mastin Road is a four-lane, divided east/west arterial. The 103rd Street and U.S. 69 interchange is a folded diamond configuration with all four ramps on the north side of the interchange.

- College Boulevard between Switzer Road and Mastin Road is a six-lane, divided east/west arterial. The College Boulevard and U.S. 69 interchange is a combination of two interchange types, as a result of U.S. 69 southbound being improved in 2013. The ramps that serve southbound U.S. 69 traffic consist of a partial SPUI configuration. The ramps that serve northbound U.S. 69 traffic consist of a partial cloverleaf design with a loop ramp in the southeast quadrant of the interchange

serving eastbound College Boulevard to northbound U.S. 69 traffic. Westbound College Boulevard traffic has a free-flow ramp to enter northbound U.S. 69. All northbound U.S. 69 traffic exits at one ramp which intersects College Boulevard at a signal.

- 119th Street between Switzer Road and the U.S. 69 interchange is a four-lane, divided arterial and between the U.S. 69 interchange and Antioch Road it is a six-lane divided arterial. The 119th Street and U.S. 69 interchange is a standard diamond configuration.

- The Blue Valley Parkway and U.S. 69 interchange is a directional interchange with northbound and southbound Blue Valley Parkway merging/diverging from U.S. 69. The southbound Blue Valley Parkway on-ramp connects to U.S. 69 as an add lane on the left side of the freeway.

- 135th Street between Antioch Road and Metcalf Avenue is a six-lane, divided east/west arterial. It is a combination of two interchange types with the ramps that serve southbound U.S. 69 traffic being a diamond configuration, and the ramps that serve northbound U.S. 69 traffic being a partial cloverleaf design. There is a loop ramp in the southeast quadrant of the interchange that serves eastbound 135th Street to northbound U.S. 69 traffic. Westbound 135th Street traffic has a free-flow ramp to enter northbound U.S. 69. All northbound U.S. 69 traffic exits at one ramp which intersects 135th Street at a signal.

- 151st Street between Antioch Road and Metcalf Avenue is four-lane, divided east/west arterial. The 151st Street and U.S. 69 interchange is a tight diamond configuration with the signalized ramp terminal intersections along 151st street spaced approximately 400 feet apart.

- 159th Street between Antioch Road and Metcalf Avenue is a four-lane, divided east/west arterial. The U.S. 69 and 159th Street interchange is a tight diamond interchange with approximately 400 feet between the signalized ramp terminal intersections along 159th Street. Due to right-of-way constraints at this location, the southbound U.S. 69 ramps are pulled close to the southbound U.S. 69 mainline lanes.

- 167th Street between Antioch Road and Metcalf Avenue is an east/west unimproved two-lane road. The 167th Street and U.S. 69 interchange is a partial interchange that does not provide access to 167th Street from northbound U.S. 69 or access to southbound U.S. 69 from 167th Street.

- 179th Street between Antioch Road and Metcalf Avenue is an east/west two-lane, undivided arterial road. The 179th Street and U.S. 69 interchange is a modified diamond interchange with approximately 475 feet between the ramp terminal intersections.

2.2 Anticipated Improvements to Account for in No-Build

When developing the Future No-Build traffic models, some additional improvements were included to represent the expected network conditions in 2050. The improvements come from the Mid-America Regional Council's (MARC) fiscally constrained regional transportation plan for the Kansas City metro area: "Connected KC 2050". This plan identifies roadway improvements for the next 30 years. The expected improvements that are included in the 2050 Future No-Build model is listed below in **Table 2**.

Table 2: No-Build Committed Overland Park Improvements

Source	Roadway	Limits From	Limits to	Description	Opening Year	2040 Project Build	2050 Future Build
RTP/MARC	Antioch Rd.	119th St.	135th St.	Widen from 4 to 6 lanes	2030-2039	✓	✓
RTP/MARC	Antioch Rd.	135th St.	167th St.	Widen from 4 to 6 lanes	2040-2049	✗	✓
MARC	Antioch Rd.	167th St.	179th St.	Widen from 2 to 4 lanes	2040-2049	✗	✓
MARC/RTP	Metcalf Ave.	119th St.	135th St.	Widen from 4 to 6 lanes	2030-2039	✓	✓
MARC/RTP	Metcalf Ave.	135th St.	159th St.	Widen from 4 to 6 lanes	2030-2039	✓	✓
RTP	167th St.	Switzer Rd.	Antioch Rd.	Widen from 2 to 4 lanes	2040-2049	✗	✓
RTP	167th St.	Antioch Rd.	Metcalf Ave.	Widen from 2 to 4 lanes	2020-2029	✓	✓
MARC	119th St.	Pflumm Rd.	U.S.-69	Widen from 4 to 6 lanes	2030-2039	✓	✓
MARC	151st St.	Antioch Rd.	Metcalf Ave.	Widen from 4 to 6 lanes	2030-2039	✓	✓
RTP/MARC	175th/179th St.	Lackman Rd.	Metcalf Ave.	Widen from 2 to 4 lanes	2030-2039	✓	✓

Notes: RTP – Regional Transportation Plan; TIP – Transportation Improvement Plan; MARC – Mid-American Regional Council

✗ Not included in traffic analysis

✓ Included in traffic analysis

There are additional upgrades and maintenance improvements that are not reflected in "Connected KC 2050" that can be assumed in the No-Build model such as upgrading the ramp terminals along 167th Street and 179th Street to signalized and updating existing signalized intersections to reflect the optimal cycle length in the future.

2.3 Future No-Build Traffic Forecast

The existing 2019 traffic volumes were projected to the future year 2050 No-Build using traffic volume growth rates. These growth rates were developed through traffic forecasts graphs. The forecast graphs were created using available information along the corridor, including historical count data, MARC Travel Demand Model (TDM), Overland Park's TDM, and previous studies. Growth rates were established at six locations along U.S. 69 and along the arterial cross streets. These are shown in **Table 3**.

Table 3: Future No-Build Traffic Growth Rates

Segment	Location	Growth Rate
Freeway	South of 95th Street	0.58%
	South of College Boulevard	0.85%
	South of 119th Street	0.95%
	South of Blue Valley Parkway	0.93%
	South of 135th Street	1.29%
	South of 167th Street	2.68%
Arterials	Arterials north of 119th Street	0.60%
	Arterials north of 151st Street	0.75%
	Blue Valley Parkway	0.75%
	159th Street	2.75%
	167th Street	5.50%
	179th Street	5.50%

Source: 69Express Traffic Forecasting

For detailed information about the future traffic development, see **Appendix A**.

2.4 Existing 2019 Peak Period Traffic Operations

A VISSIM analysis was conducted to understand the existing operations in the a.m. and p.m. peak hours (7:30 to 8:30 a.m. and 4:45 to 5:45 p.m.) on a typical weekday. VISSIM operational results in the corridor are shown in terms of level of service, density, speed, and queuing.

Level of Service (LOS) is a simplified method of describing how a corridor or intersection is performing operationally. The LOS thresholds are displayed in **Table 4**. A LOS A or B means traffic is free flowing, whereas a LOS E or F indicates that the demand on a roadway segment equals or exceeds its capacity, resulting in congestion.

Table 4: Peak Hour Level of Service Thresholds

LOS	Freeways Mainline max Density (pc/mi/ln)	Freeways Merge/Diverge max Density (pc/mi/ln)	Freeways Weaving Segment (pc/mi/ln)	Signalized Interchanges Avg. Delay (sec/veh)	Signalized Intersections Avg. Delay (sec/veh)	Unsignalized Intersections Avg. Delay (sec/veh)
A	<11	<10	<10	<15	<10	<10
B	>11-18	>10-20	>10-20	>15-30	>10-20	>10-15
C	>18-26	>20-28	>20-28	>30-55	>20-35	>15-25
D	>26-35	>28-35	>28-35	>55-85	>35-55	>25-35
E	>35-45	>35	>35	>85-120	>55-80	>35-50
F	>45 Demand Exceeds Capacity	Demand Exceeds Capacity	>43 Demand Exceeds Capacity	>120	>80	>50

Source: HCM 6
Note: pc – passenger cars, mi – mile, ln – lane, sec – second, veh - vehicle

Once the VISSIM models are calibrated and operational results are extracted, the model was then used in the creation of the 2050 No-Build models. The sections below provide a detailed summary of the operations in the analysis area. The raw results spreadsheets for all links and intersections in the corridor that the summaries are based on can be found in **Appendix A**.

2.4.1 A.M. Peak Period Operational Results

Exhibits 1 through 3 show the a.m. peak period operational results. The I-435 eastbound and westbound as well as the U.S. 69 southbound mainlines all operate at an acceptable LOS through the traffic analysis area. Northbound U.S. 69 operates at LOS F from 151st Street up to the 135th Street merge ramp. The mainline then operates at a LOS E and D approaching the Blue Valley Parkway diverge. Continuing northbound, traffic operates at acceptable LOS, but then deteriorates again to a LOS F at 119th Street. The mainline approaching College Boulevard improves to a LOS D, then operates at acceptable LOS around College Boulevard before falling back to LOS D through the I-435 interchange. Traffic then operates at acceptable levels past the I-435 interchange. Speeds between 151st Street and Blue Valley Parkway routinely fluctuate between 20 to 40 mph due to:

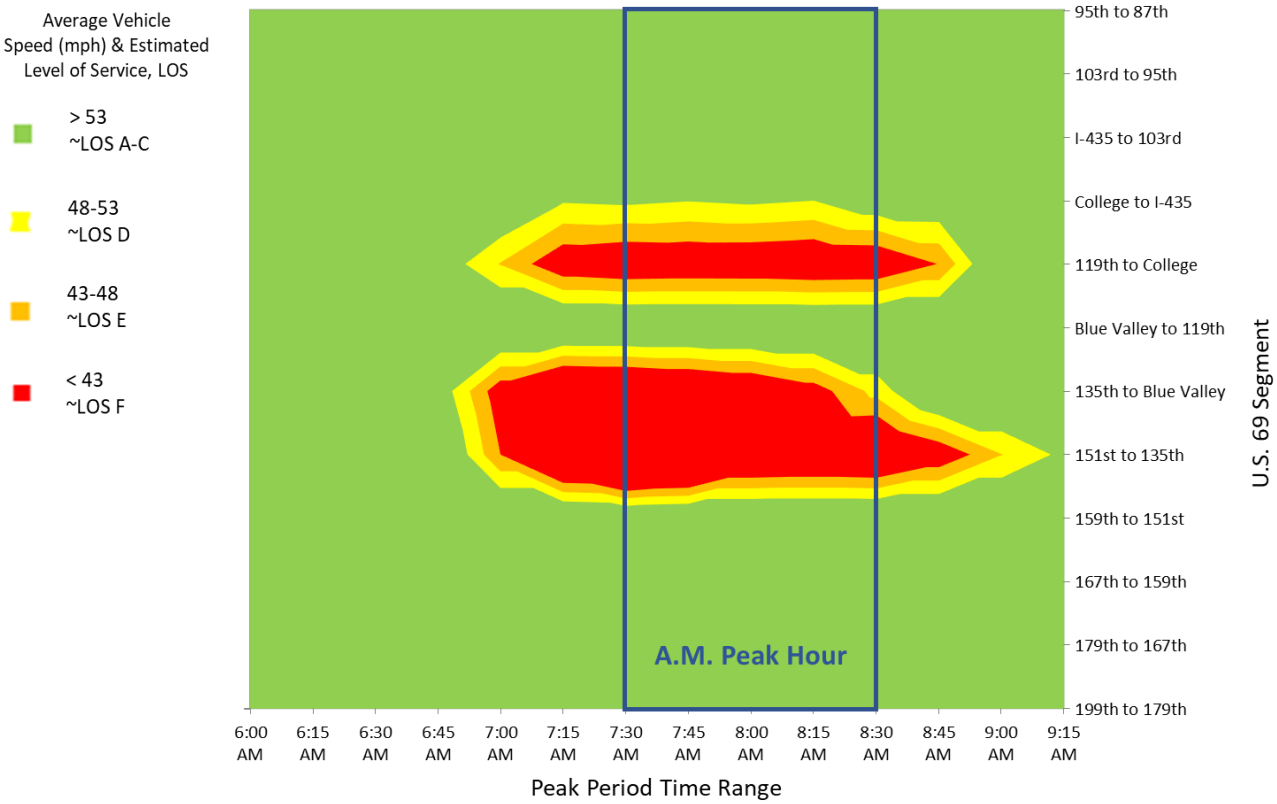
- The high volume of entering vehicles from both the westbound 135th and the eastbound 135th Street U.S. 69 on-ramps, particularly the traffic from the low-speed eastbound to northbound loop ramp;

- The congested mainline lanes of northbound U.S. 69 between 135th Street and Blue Valley Parkway; and
- The high volume of weaving vehicles exiting to Blue Valley Parkway.

Figure 4 shows northbound U.S. 69 speeds in the corridor relative to the length of time they exist during the a.m. peak period. Because density is the measurement used to determine LOS on highway segments, not speed, the figure approximates the LOS relative to a speed range. This graphic shows that not only are speeds poor in multiple segments of the corridor, but they remain throughout most of the peak period (nearly 2 hours).

The ramp terminal intersections of northbound U.S. 69 at 119th Street and eastbound I-435 at Antioch Road are the only intersections in the analysis area that operate at LOS F, with the average delay of 104 and 88 seconds per vehicle, respectively. Heavy traffic volume on eastbound and westbound 119th Street is reason for increased delay on those legs of the intersection. The delay at Antioch is concentrated on the southbound left turn movement onto eastbound I-435. The ramp terminal at U.S. 69 and 151st Street also operates poorly at a LOS E with an average delay of 61 seconds per vehicle. In this instance, delay from the U.S. 69 mainline has caused the left and right turning movements onto the northbound ramp of U.S. 69 to queue.

Figure 4: Northbound U.S. 69 A.M. Speed Profile in Existing Conditions



Source: VISSIM

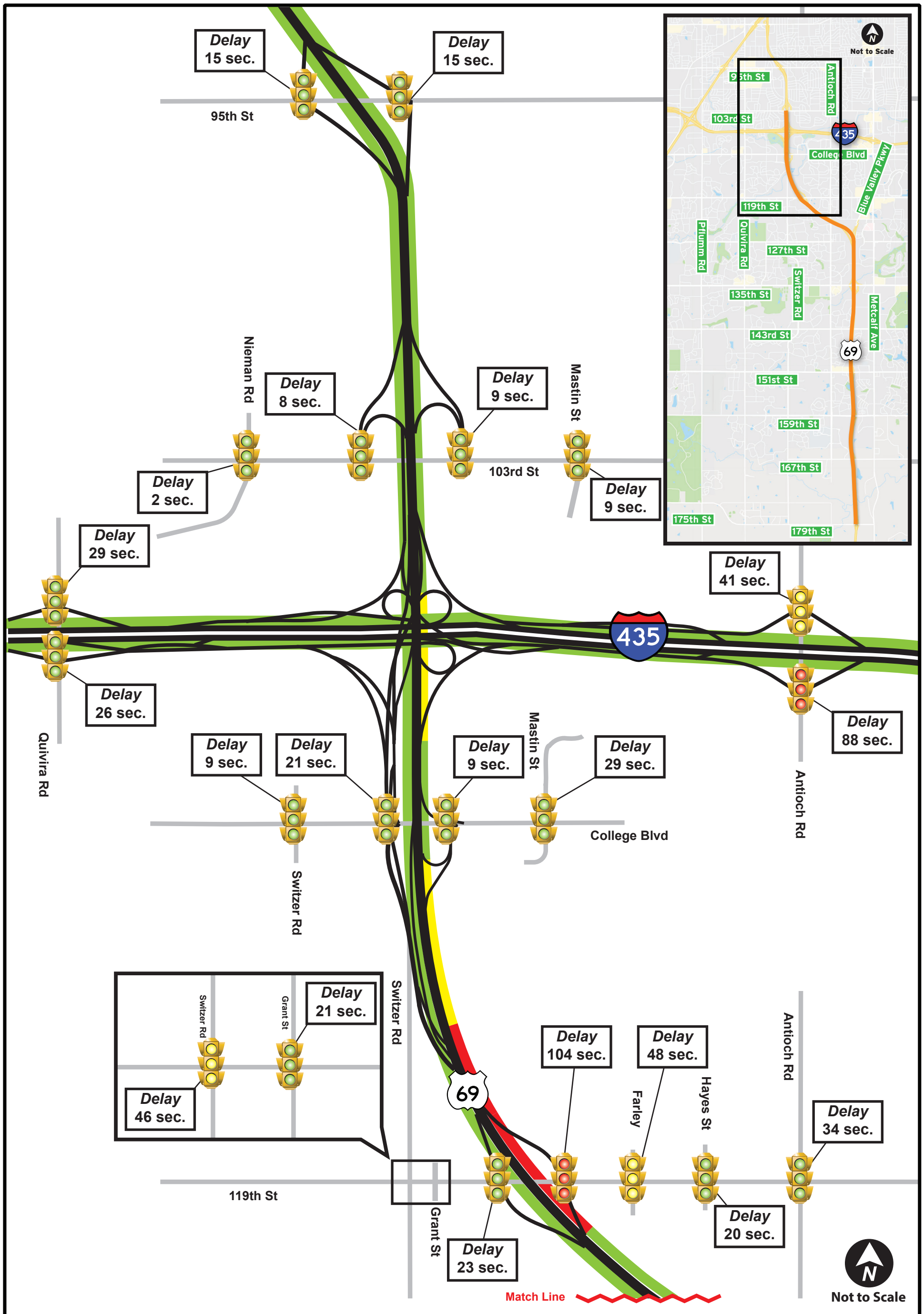


EXHIBIT 1	**U.S. 69 Break-in-Access Level of Service 2019 Existing AM**	Mainline Level of Service Intersection Level of Service Delay (In sec.) A, B or C D E F Delay XX sec.	**U.S. 69 Modernization and Expansion Project** 69 EXPRESS October, 2021

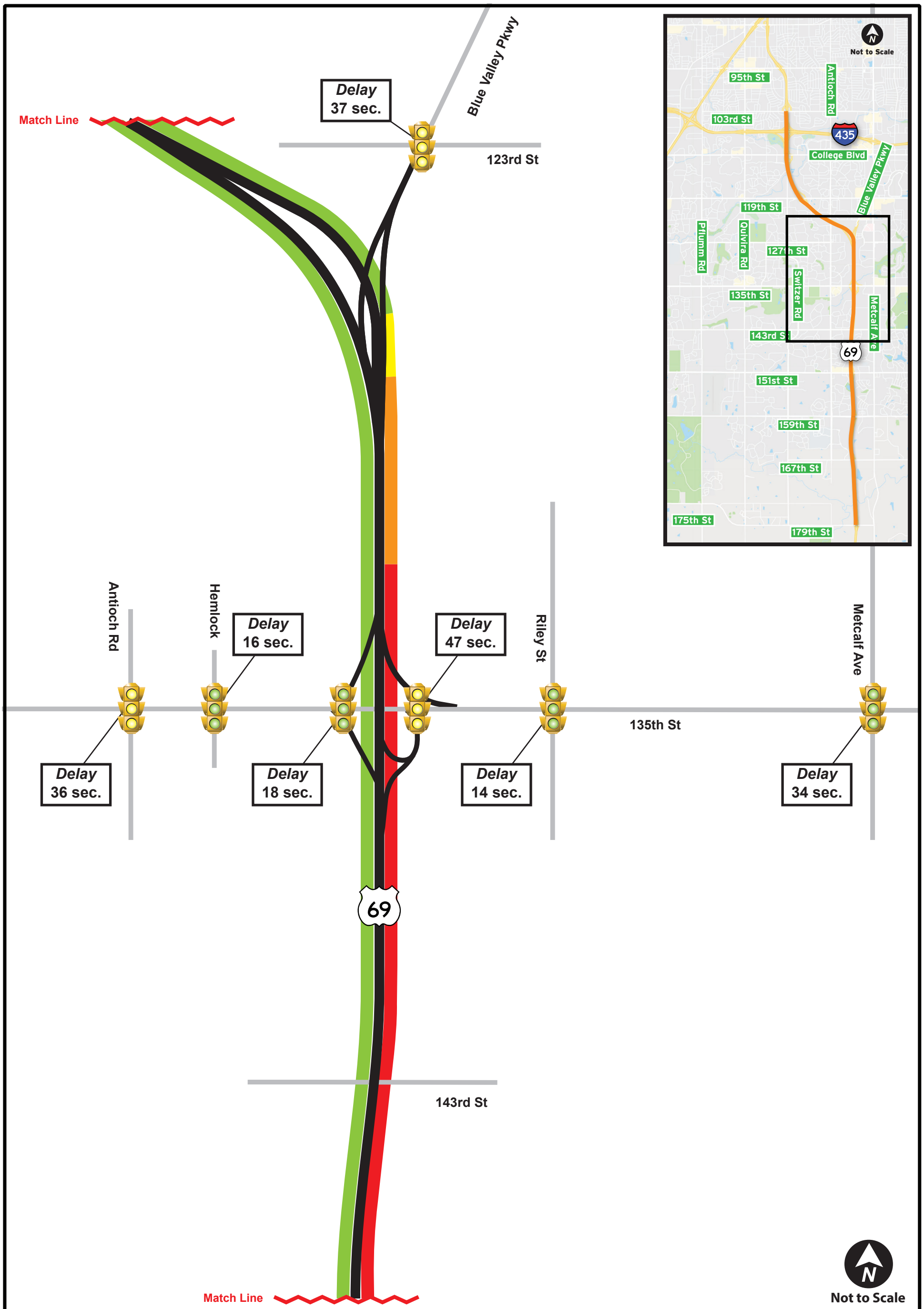


EXHIBIT 2

U.S. 69 Break-in-Access Level of Service 2019 Existing AM

Mainline Level of Service

Intersection Level of Service

- STOP A, B or C
- STOP D
- STOP E
- STOP F

Delay (In sec.)

Delay XX sec.

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Match Line

Not to Scale

151st St

159th St

167th St

179th St

Antioch Ave

Hardy St

Lowell Ave

Newton St

Marty St

Foster

Metcalf Ave

Delay 26 sec.

Delay 13 sec.

Delay 23 sec.

Delay 39 sec.

Delay 61 sec.

Delay 49 sec.

Delay 6 sec.

Delay 32 sec.

Delay 14 sec.

Delay 13 sec.

Delay 15 sec.

Delay 17 sec.

Delay 19 sec.

Delay 17 sec.

Delay 11 sec.

Delay 7 sec.

Delay 2 sec.

Delay 2 sec.

Delay 13 sec.

Delay 11 sec.

Delay 15 sec.

Delay 12 sec.

STOP

YIELD

69

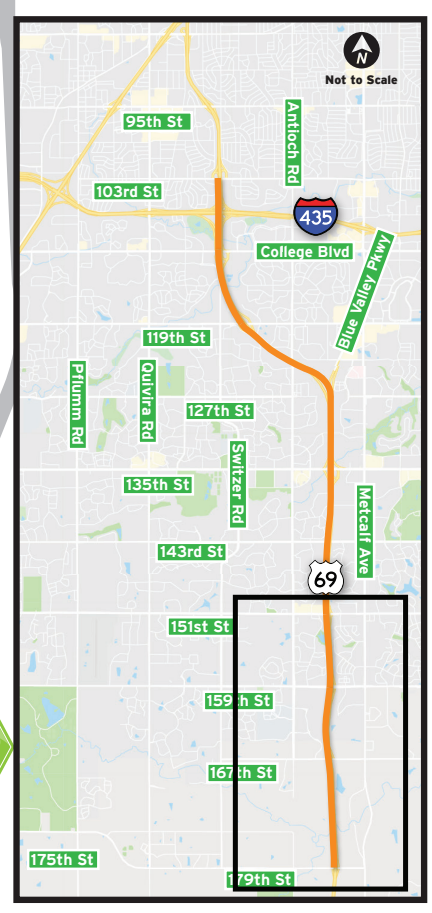

EXHIBIT 3

U.S. 69 Break-in-Access Level of Service 2019 Existing AM

Mainline Level of Service

Intersection Level of Service

- A, B or C
- D
- E
- F

Delay (In sec.)

Delay XX sec.

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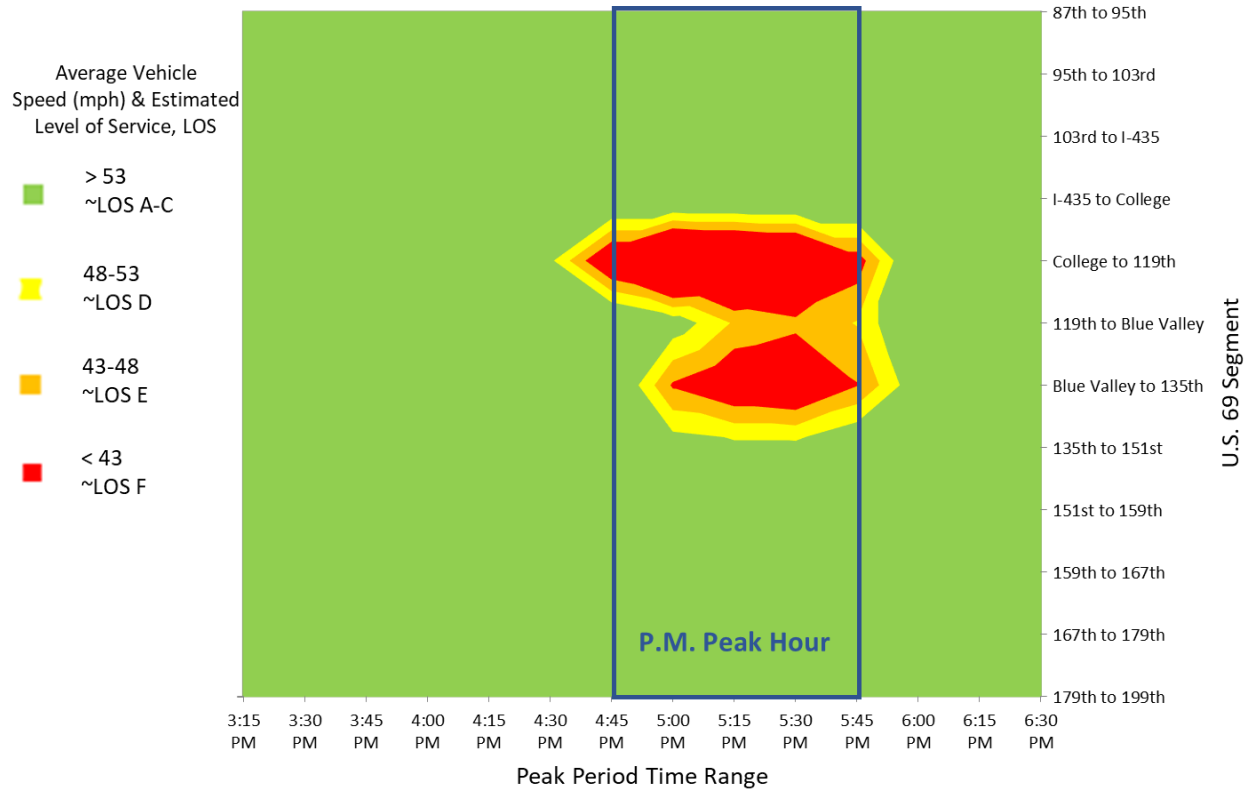
2.4.2 P.M. Peak Period Operational Results

Shown in **Exhibits 4 –6**, eastbound and westbound segments of I-435 operate at acceptable levels through the analysis area. However, operations on U.S. 69 have segments in both northbound and southbound directions with poor LOS. Southbound from College to 135th Street, operations range from LOS E and F throughout the peak hour. South of 135th Street, a combination of LOS D and E extend to the 151st Street diverge. **Figure 5**, below show that the poor operations exist mainly in the peak hour. This is a result of:

- The high volume of entering vehicles originating from Blue Valley Parkway;
- The left entrance from Blue Valley Parkway and the weave with traffic exiting to 135th Street;
- The high volume of traffic exiting to 135th Street;
- The already congested mainline lanes of U.S. 69 in this segment;
- The lane continuity of southbound U.S. 69 where the outside lane drops at 135th Street.

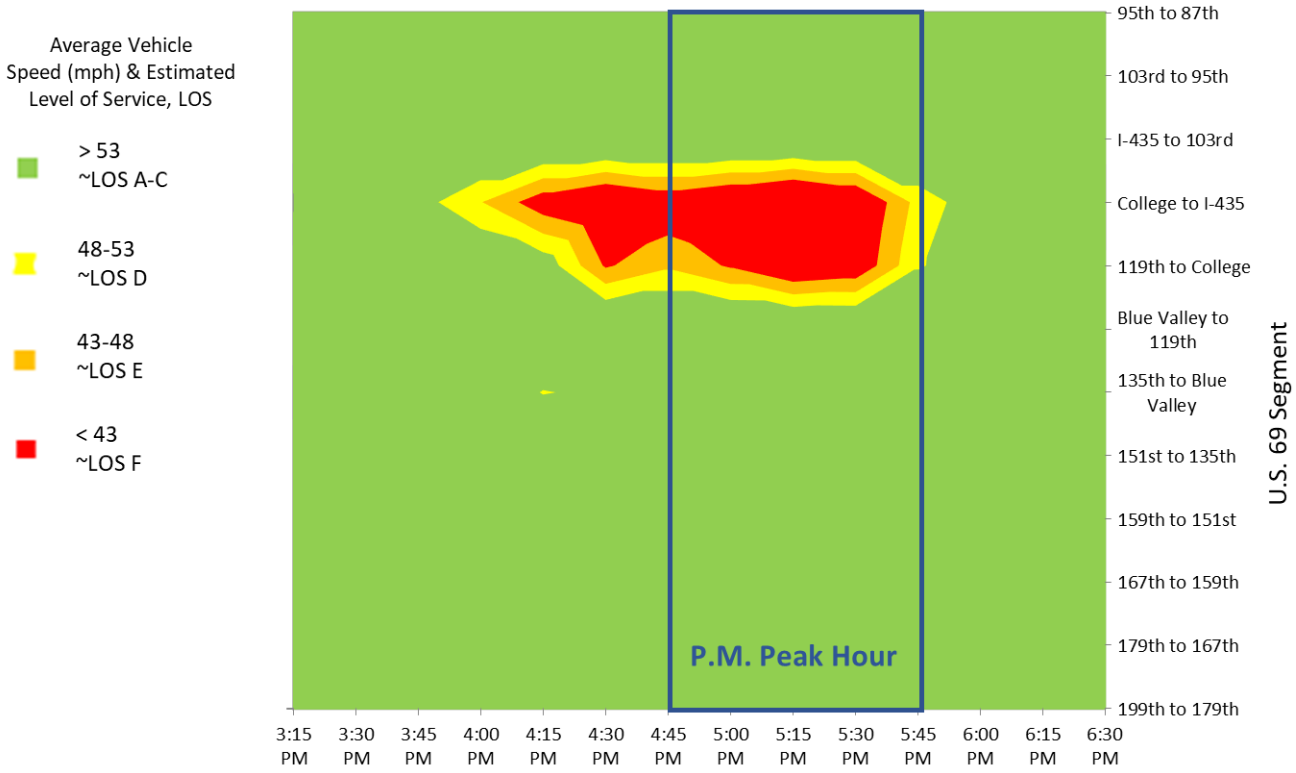
Figure 5: Southbound U.S. 69 P.M. Speed Profile in Existing Conditions



Source: VISSIM

Levels of service E and F extend from the 119th Street ramp merge to the I-435 eastbound ramp diverge on northbound U.S. 69. The speed profile seen in **Figure 6** shows that speeds are well below free flow prior to and through the duration of the peak hour. The poor LOS is attributed to slow movements on the U.S. 69 northbound to I-435 westbound loop ramp and the weaving occurring between I-435 and College Boulevard on-ramps. While not severe, LOS D operations do occur northbound between 135th Street to the Blue Valley Parkway diverge as well as a segment surrounding the 119th Street interchange.

Figure 6: Northbound P.M. Speed Profile in Existing Conditions



Source: VISSIM

There are no intersections operating at a LOS F in the p.m. peak period. Eastbound I-435 at Antioch operates at a LOS E, with an average delay of 80 seconds per vehicle, primarily due to the southbound to eastbound turning movement. This is the same movement that caused the ramp terminal to operate at a LOS F in the a.m. peak. Two intersections on 135th Street operate at LOS E: the first is the U.S. 69 southbound ramp terminal (average delay of 76 seconds per vehicle) and the other is at Hemlock (average delay of 63 seconds per vehicle). Poor operations at these two adjacent intersections are a result of heavy eastbound congestion.

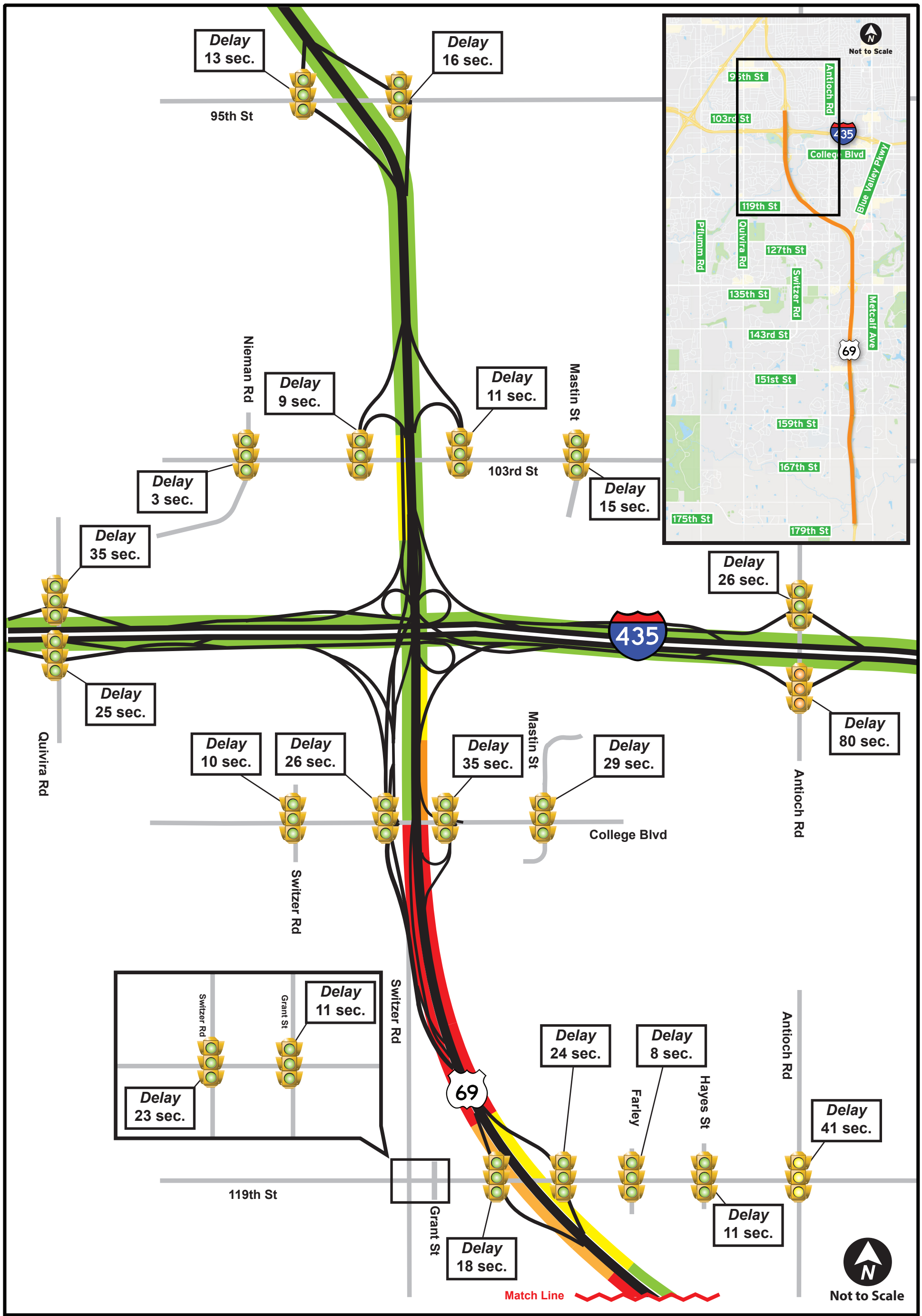


EXHIBIT 4

U.S. 69 Break-in-Access Level of Service 2019 Existing PM

Mainline Level of Service	Intersection Level of Service	Delay (In sec.)
	A, B or C	Delay XX sec.
	D	
	E	
	F	

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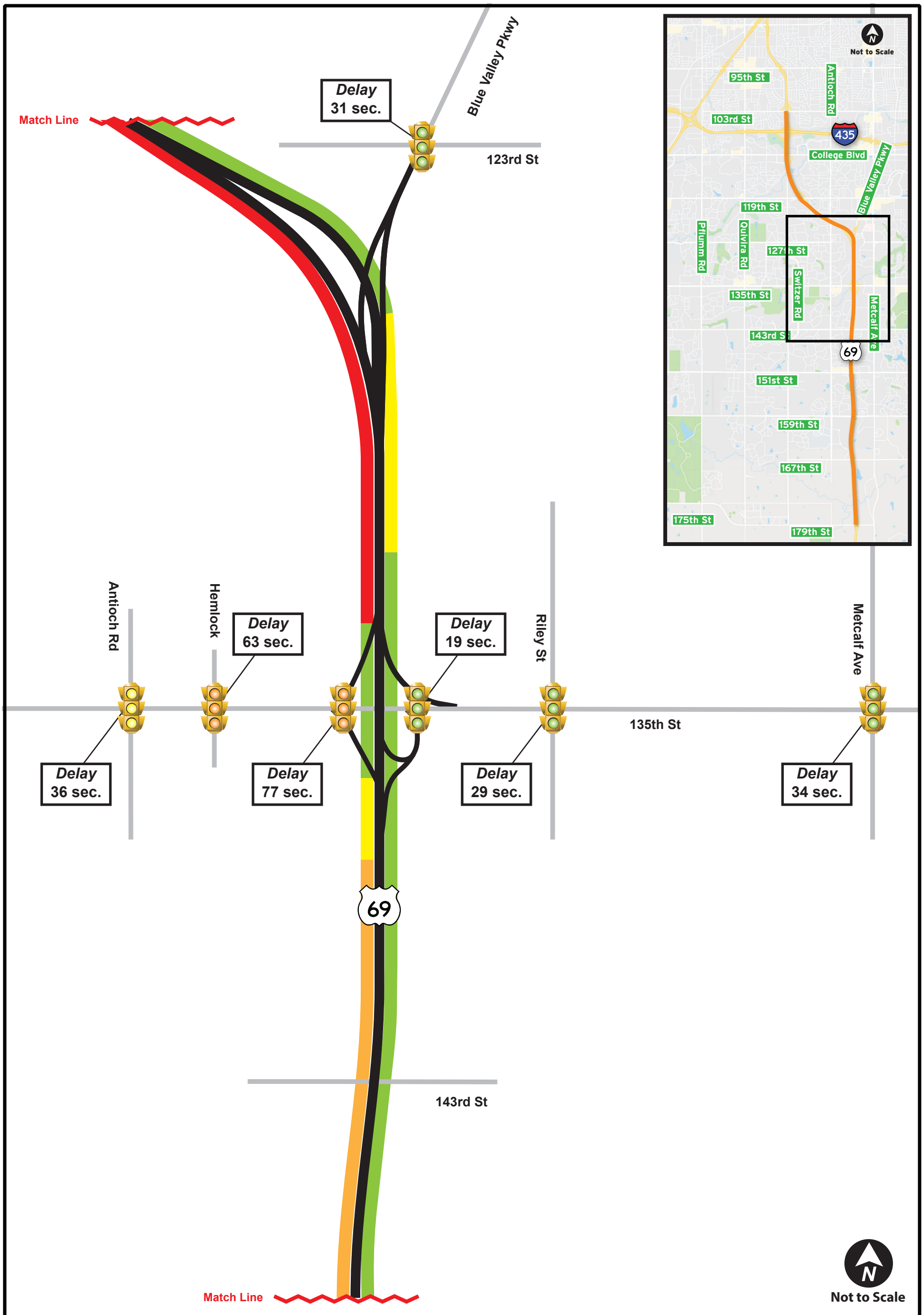

EXHIBIT 5	U.S. 69 Break-in-Access Level of Service 2019 Existing PM	Mainline Level of Service / Intersection Level of Service / Delay (In sec.): A, B or C; D; E; F — Delay XX sec.	U.S. 69 Modernization and Expansion Project — 69 EXPRESS — October, 2021

Match Line

Not to Scale

151st St

159th St

167th St

179th St

Hardy St

Lowell Ave

Newton St

Marty St

Foster

Metcalf Ave

Antioch Ave

Delay 30 sec.

Delay 7 sec.

Delay 12 sec.

Delay 19 sec.

Delay 43 sec.

Delay 17 sec.

Delay 11 sec.

Delay 38 sec.

Delay 19 sec.

Delay 14 sec.

Delay 18 sec.

Delay 16 sec.

Delay 17 sec.

Delay 18 sec.

Delay 12 sec.

Delay 10 sec.

Delay 2 sec.

Delay 3 sec.

Delay 12 sec.

Delay 11 sec.

Delay 13 sec.

Delay 13 sec.

STOP

YIELD

69

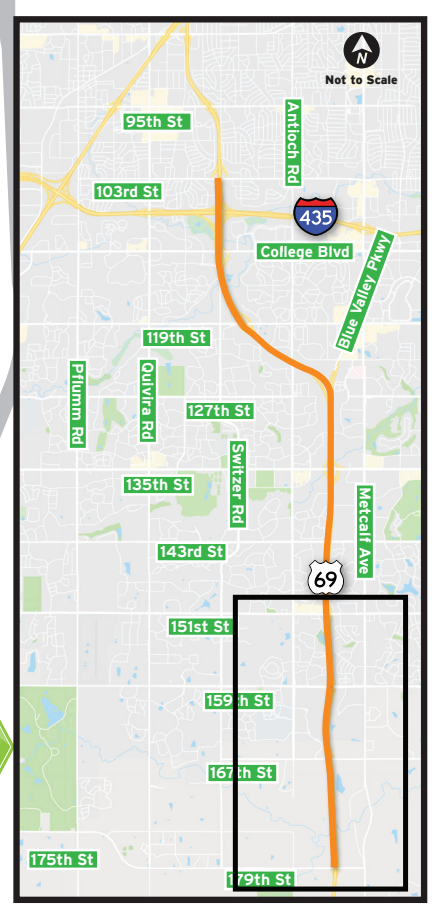

EXHIBIT 6

U.S. 69 Break-in-Access Level of Service 2019 Existing PM

Mainline Level of Service

Intersection Level of Service

- STOP A, B or C
- STOP D
- STOP E
- STOP F

Delay (In sec.)

Delay XX sec.

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2.5 No-Build 2050 Peak Period Traffic Operations

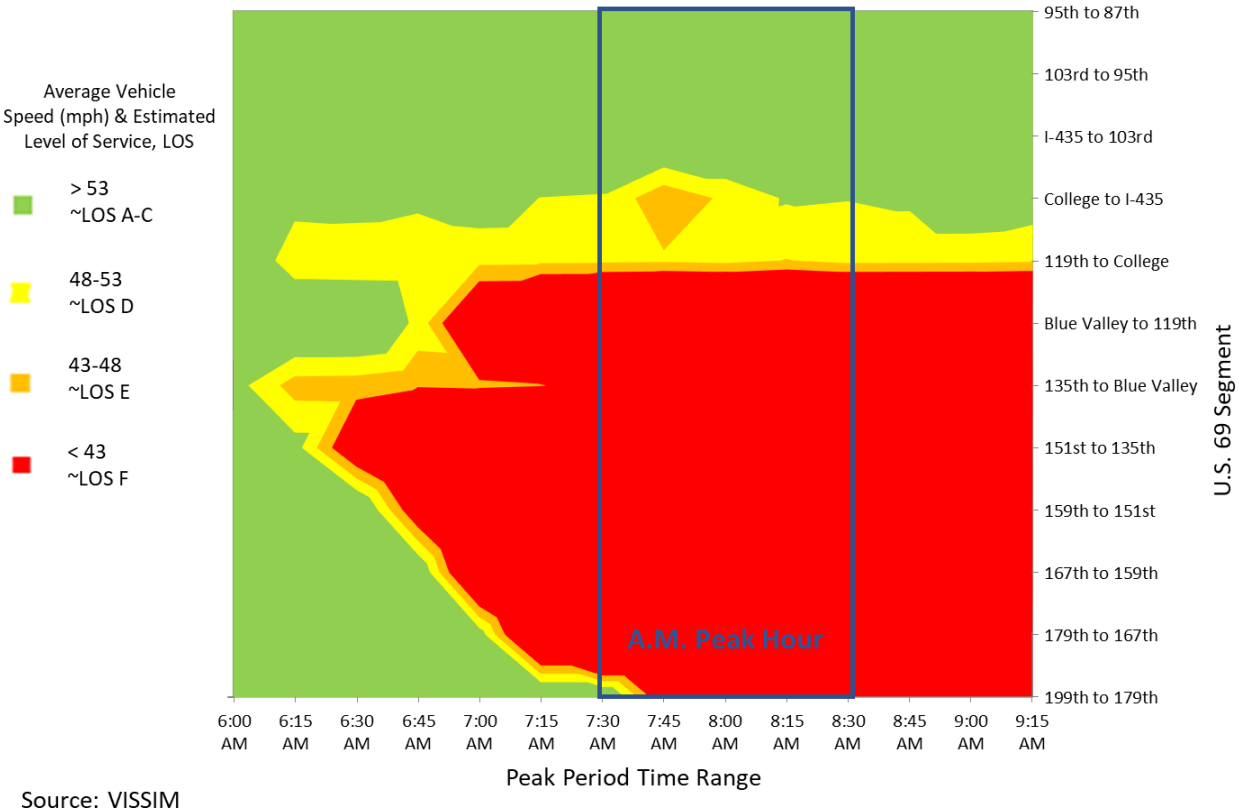
Assuming that there are no improvements made to the corridor other than what is described in **Section 2.2**, operations on the corridor in 2050 are projected to have significant deterioration. **Exhibits 7 – 12** display the forecasted LOS for the analysis area assuming no changes on I-435 and U.S. 69.

2.5.1 A.M. Peak Period Operational Results

Interstate 435 eastbound from U.S. 69 to the eastern limits of the analysis area operate at a LOS F. This is a result of increased traffic volumes merging onto I-435 from U.S. 69 and weaving between Antioch and Metcalf. Interstate 435 westbound is expected to still operate at acceptable levels.

Southbound U.S. 69 is expected to operate at LOS C or better within the study area limits. However, nearly nine miles of northbound U.S. 69 operates at a LOS F from the southern limits of the analysis area up to the merge ramp at 119th Street. Figure 7 shows that the significant speed reduction extends beyond the a.m. peak period. This can be attributed to the substantial growth this area is expected to see over the next 30 years.

Figure 7: Northbound A.M. Speed Profile in Future No-Build Conditions



Source: VISSIM

The significant growth in the area is also expected to have a substantial impact on the arterial roadways. Multiple intersections on 119th Street, 151st Street, 159th Street and 179th Street have LOS operations E or F. Twenty intersections in the analysis area, shown in **Exhibits 7 – 9**, operate at a LOS F. Six additional signals operate at a LOS E.

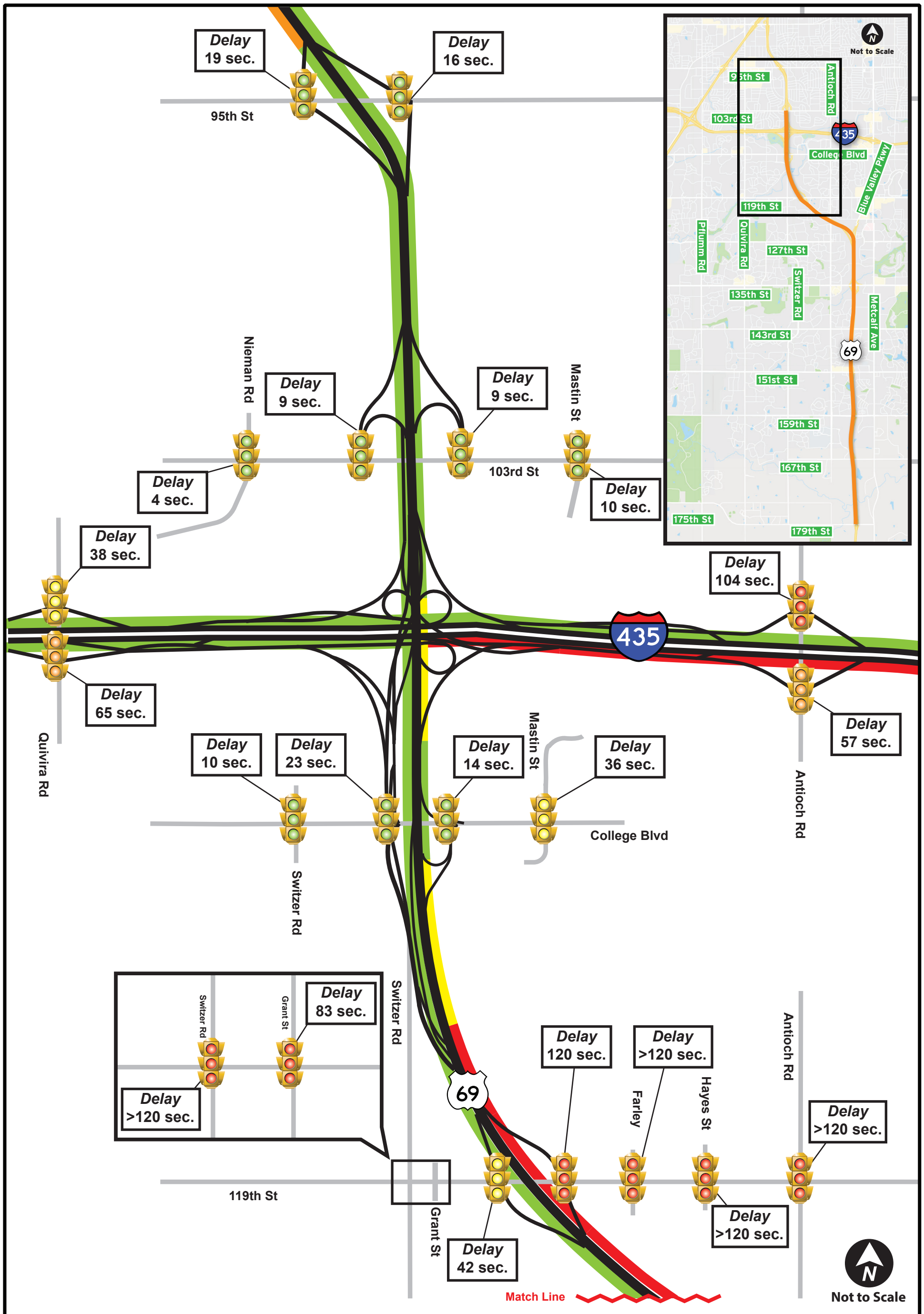


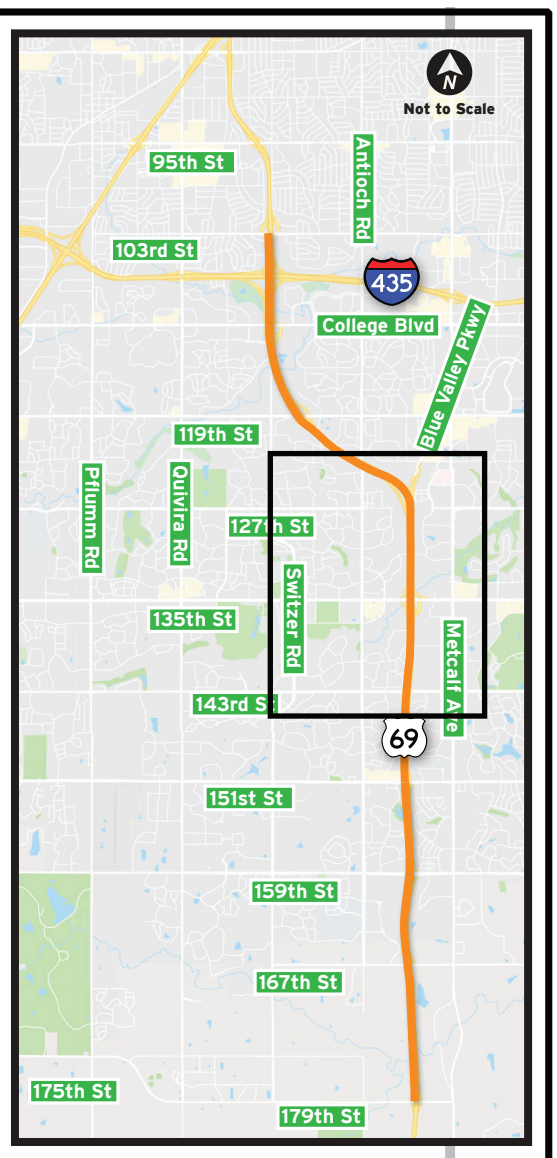
EXHIBIT 7	**U.S. 69 Break-in-Access Level of Service 2050 No-Build AM**	Mainline Level of Service Intersection Level of Service Delay (In sec.) A, B or C D E F Delay XX sec.	**U.S. 69 Modernization and Expansion Project** 69 EXPRESS October, 2021

Match Line

Delay
38 sec.

Blue Valley Pkwy

123rd St



Antioch Rd

Hemlock

Delay
19 sec.

Delay
19 sec.

Riley St

Metcalf Ave

135th St

Delay
41 sec.

Delay
32 sec.

Delay
15 sec.

Delay
72 sec.

69

143rd St

Match Line

N
Not to Scale

EXHIBIT 8	U.S. 69 Break-in-Access Level of Service 2050 No-Build AM	Mainline Level of Service / Intersection Level of Service / Delay (In sec.): A, B or C; D; E; F — Delay XX sec.	U.S. 69 Modernization and Expansion Project — 69 EXPRESS — October, 2021

Match Line

Not to Scale

151st St

159th St

167th St

179th St

Antioch Ave

Hardy St

Lowell Ave

Newton St

Marty St

Foster

Metcalf Ave

Delay >120 sec.

Delay >120 sec.

Delay >120 sec.

Delay 79 sec.

Delay >120 sec.

Delay >120 sec.

Delay 92 sec.

Delay >120 sec.

Delay >120 sec.

Delay >120 sec.

Delay 78 sec.

Delay 41 sec.

Delay 66 sec.

Delay 25 sec.

Delay 11 sec.

Delay 5 sec.

Delay 7 sec.

Delay 15 sec.

Delay >120 sec.

Delay >120 sec.

Delay >120 sec.

Delay >120 sec.

STOP

YIELD

69

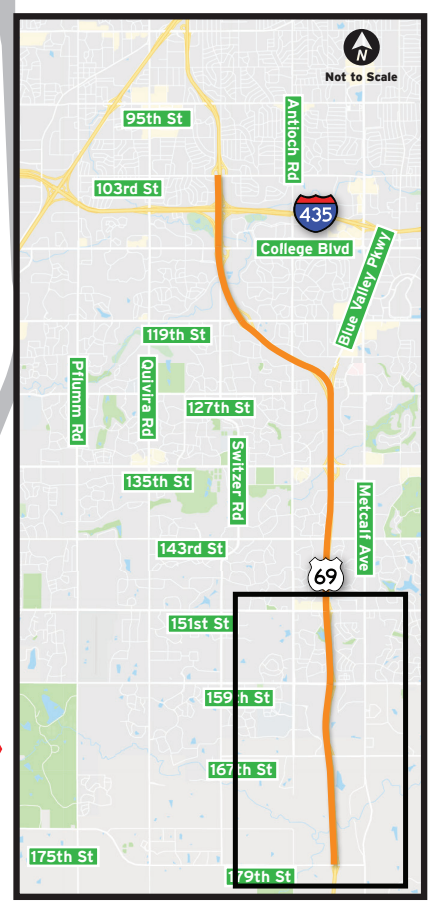


EXHIBIT 9

U.S. 69 Break-in-Access Level of Service 2050 No-Build AM

Mainline Level of Service

Intersection Level of Service

- A, B or C
- D
- E
- F

Delay (In sec.)

Delay XX sec.

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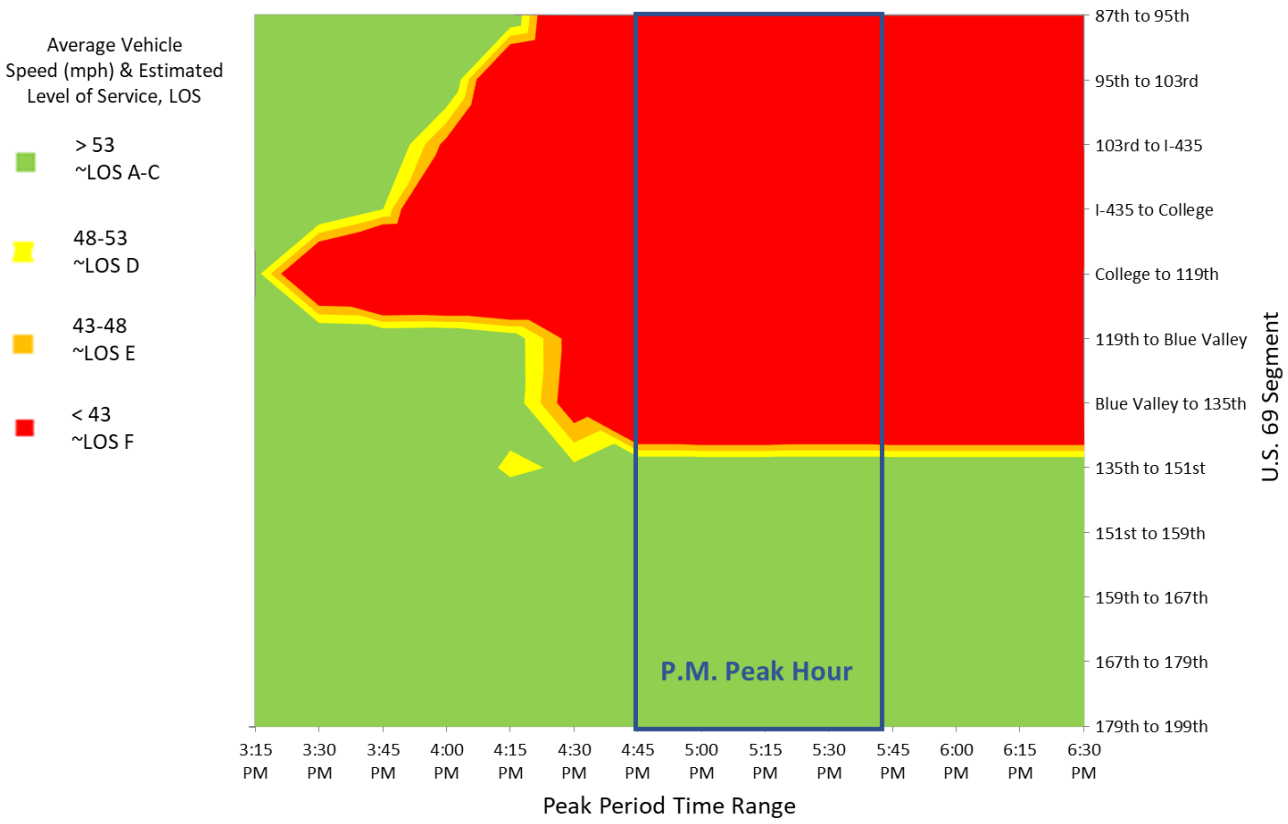
2.5.2 P.M. Peak Period Operational Results

During the p.m. peak, I-435 is expected to operate at acceptable levels with the exception of the eastbound lanes in the western-most portion of the analysis area at the U.S. 69 CD diverge. These operations can be directly attributed to the poor mainline LOS on U.S. 69 southbound that slow traffic on the CD ramps and back onto I-435.

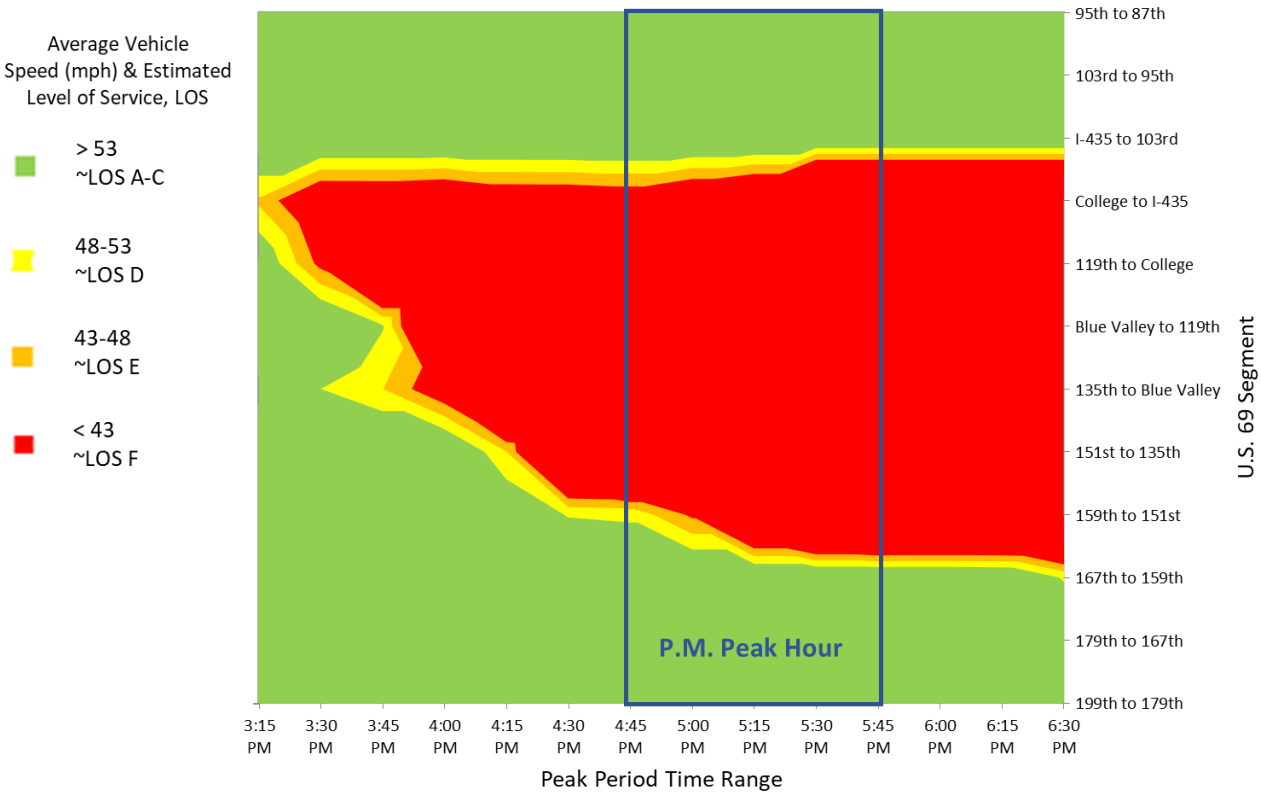
Southbound U.S. 69 is expected to perform at LOS F from the northern-most limits of the analysis area down to the 135th Street off-ramp. Northbound lanes operate at LOS F from 159th Street up to the I-435 interchange. **Figures 8 and 9** both show that poor speeds and LOS in both directions are expected to last the entirety of the peak period and beyond. The substantial projected growth in the corridor contributes to the poor operations during the peak period.

Figure 8: Southbound P.M. Speed Profile in Future No-Build Conditions



Source: VISSIM

Figure 9: Northbound P.M. Speed Profile in Future No-Build Conditions



Source: VISSIM

Arterial roadways will see significant delays due to the lack of intersection upgrades. LOS E and F can be expected at multiple intersections on College Boulevard, 119th Street, 123rd Street, 135th Street, 151st Street, 167th Street and 179th Street. Of the 50 intersections shown in **Exhibits 10 – 12**, half (25 intersections) are forecasted to operate at a LOS F. Three intersections operate at LOS E.

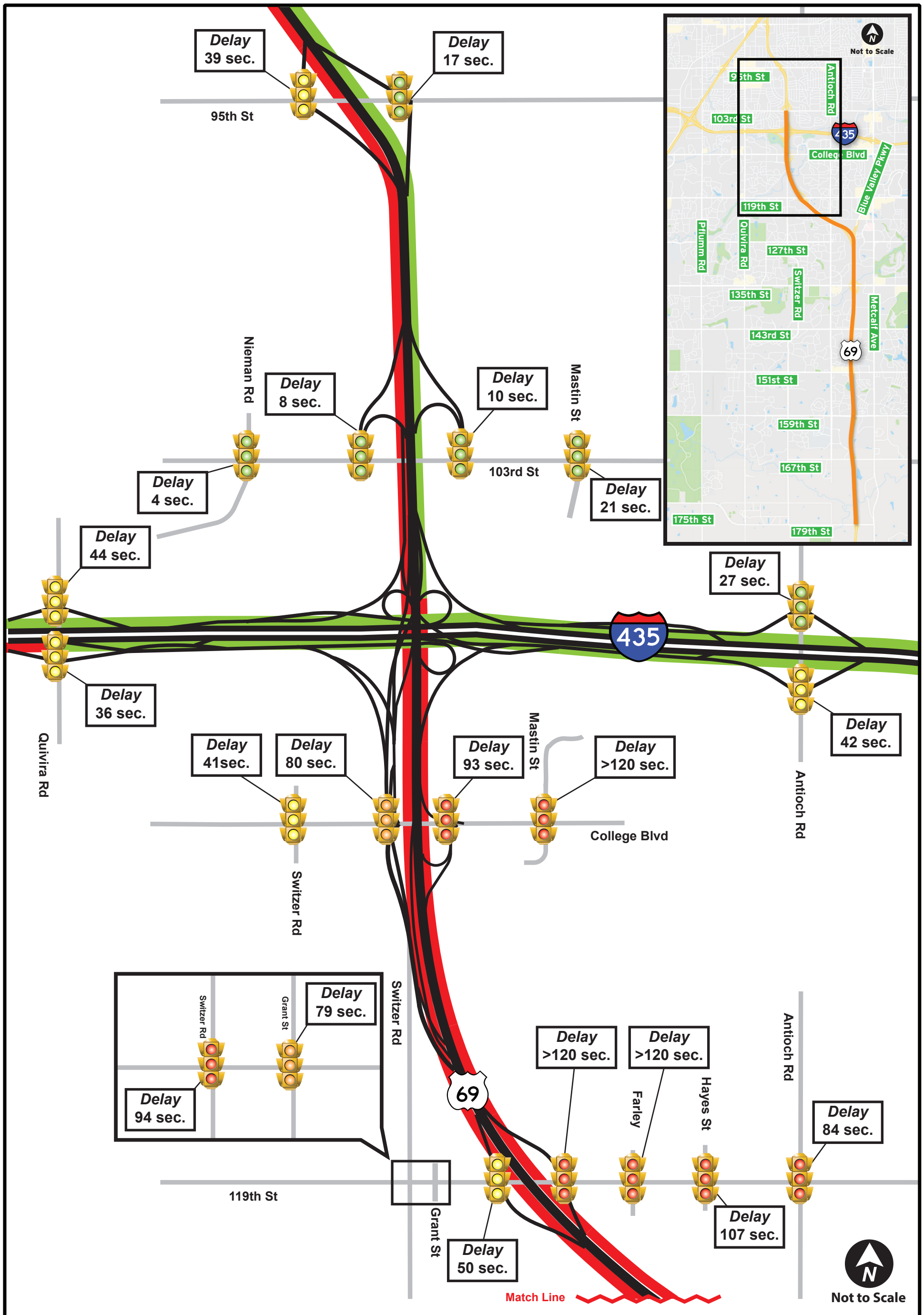
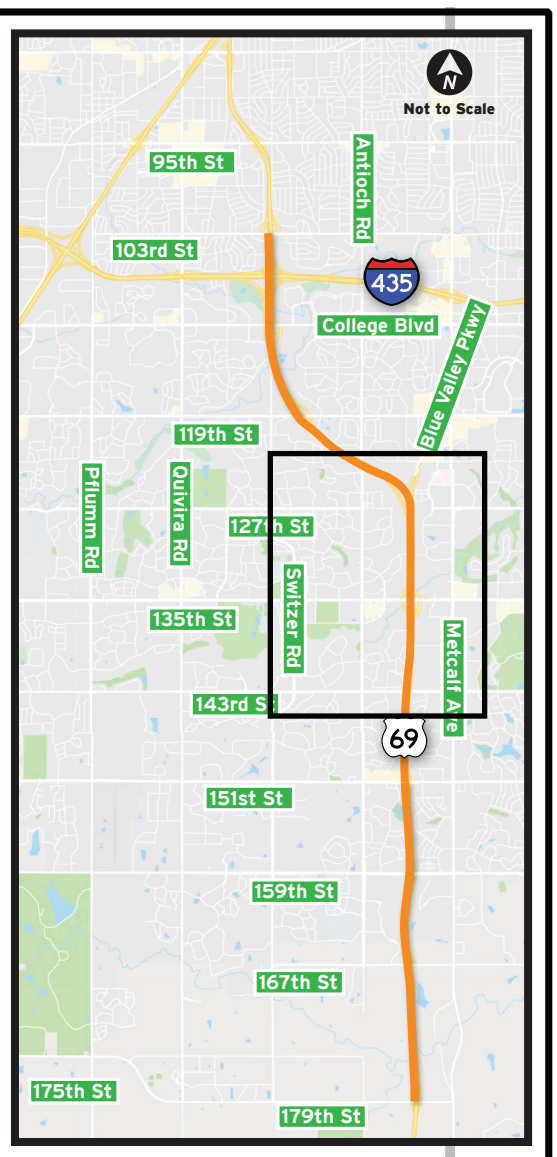


EXHIBIT 10	**U.S. 69 Break-in-Access Level of Service 2050 No-Build PM**	Mainline Level of Service / Intersection Level of Service: STOP A, B or C; STOP D; STOP E; STOP F. Delay (In sec.): Delay XX sec.	**U.S. 69 Modernization and Expansion Project** 69 EXPRESS October, 2021



Match Line

Blue Valley Pkwy

Delay >120 sec.

123rd St

Antioch Rd

Hemlock

Delay >120 sec.

Delay >120 sec.

Riley St

Metcalf Ave

135th St

Delay >120 sec.

Delay >120 sec.

Delay >120 sec.

Delay >120 sec.

69

143rd St

Match Line

Not to Scale

EXHIBIT 11

U.S. 69 Break-in-Access Level of Service 2050 No-Build PM

Mainline Level of Service	Intersection Level of Service	Delay (In sec.)
	STOP A, B or C	*Delay* XX sec.
	STOP D	
	STOP E	
	STOP F	

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Match Line

Not to Scale

Hardy St

Newton St

Marty St

Lowell Ave

Foster

Metcalf Ave

Antioch Ave

151st St

159th St

167th St

179th St

Delay 89 sec.

Delay 64 sec.

Delay >120 sec.

Delay 101 sec.

Delay >120 sec.

Delay 117 sec.

Delay >120 sec.

Delay >120 sec.

Delay 28 sec.

Delay 51 sec.

Delay 29 sec.

Delay 32 sec.

Delay 49 sec.

Delay 45 sec.

Delay 28 sec.

Delay 22 sec.

Delay 19 sec.

Delay 93 sec.

Delay 120 sec.

Delay 107 sec.

Delay 32 sec.

Delay >120 sec.

STOP

YIELD

69

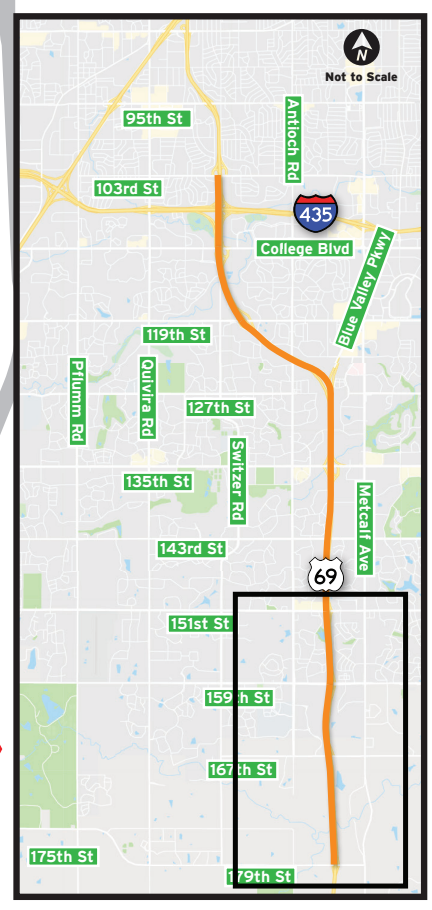


EXHIBIT 12	U.S. 69 Break-in-Access Level of Service 2050 No-Build PM	Mainline Level of Service / Intersection Level of Service / Delay (In sec.): A, B or C; D; E; F; Delay XX sec.	U.S. 69 Modernization and Expansion Project — 69 EXPRESS — October, 2021

2.6 Safety Analysis

2.6.1 Existing Conditions

Existing safety conditions within the project study limits were evaluated using crash data obtained from the Kansas Department of Transportation (KDOT) and evaluated for the most current complete five-year period: 2015-2019. The safety limits follow the same limits as the operational analysis. For this analysis, freeway and arterial segments were evaluated independently of each other.

Geographically located crash data was obtained from the KDOT Crash Database. This data included crash characteristics such as crash type, severity, weather conditions, surface conditions, time of day, vehicle type, and driver condition. For this study, the existing analysis evaluated crashes occurring on the U.S. 69 and I-435 freeways and on arterials at interchanges intersecting the U.S. 69 and I-435 freeways. Details further explaining the methodology can be found in the U.S. 69 Safety Report in **Appendix A**.

Approximately 16 miles of roadway was evaluated on the U.S. 69 and I-435 freeway corridors. Of the 16 miles of roadway evaluated, the corridor was broken into 13 individual segments: three segments on I-435 and 11 segments on U.S. 69. For the purposes of this study, these 13 roadway segments were evaluated collectively and will be referred to as the freeway.

During the five-year evaluation period, 2,817 crashes were reported on the freeway, resulting in six fatalities. Approximately 79% of all reported incidents resulted in property damage only, and nearly 21% of all incidents causing some form of injury to vehicle occupants (**Figure 10**). Rear-end vehicle collisions accounted for approximately 50% of all reported freeway crash types, while 29% were single vehicle crashes primarily resulting from drivers colliding with fixed objects (**Figure 11**).

Figure 10: Crash Type - Freeway

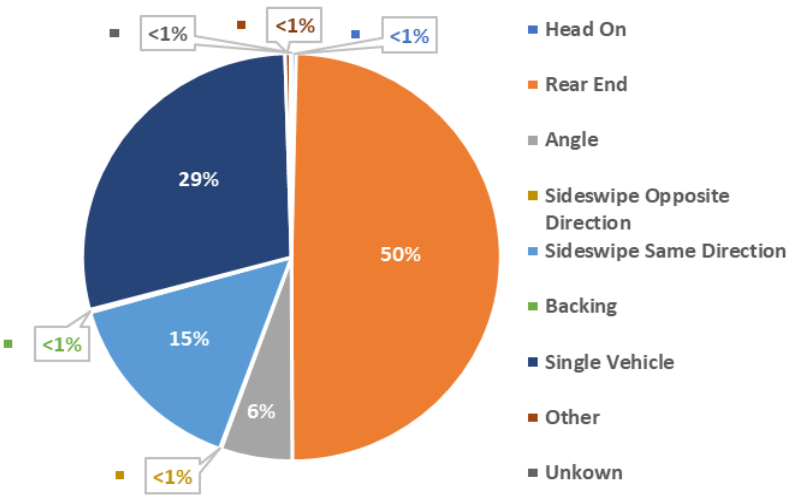
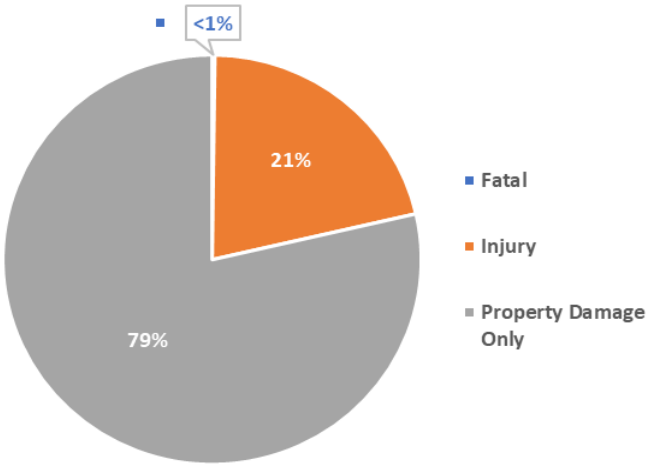


Figure 11: Crash Severity - Freeway



When looking at crashes on the U.S. 69 corridor only during the five-year period, 1,719 crashes were reported, resulting in four fatalities. This equals almost one crash per day on average over the five-year period on U.S. 69. Crashes reported on the U.S. 69 freeway primarily resulted in property damage only (80%), while approximately 20% of all reported crashes resulted in some form of injury to vehicle occupants (**Figure 12**). Rear-end collisions were the leading crash type, accounting for roughly 51% of all reported crash types on the corridor (**Figure 13**).

Figure 12: Crash Severity - U.S. 69

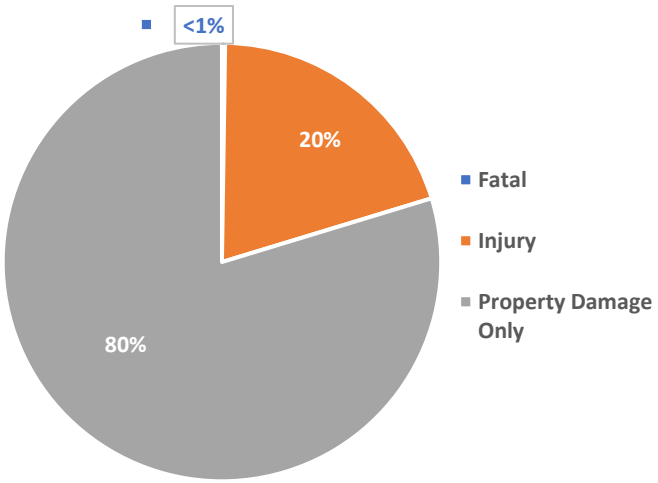
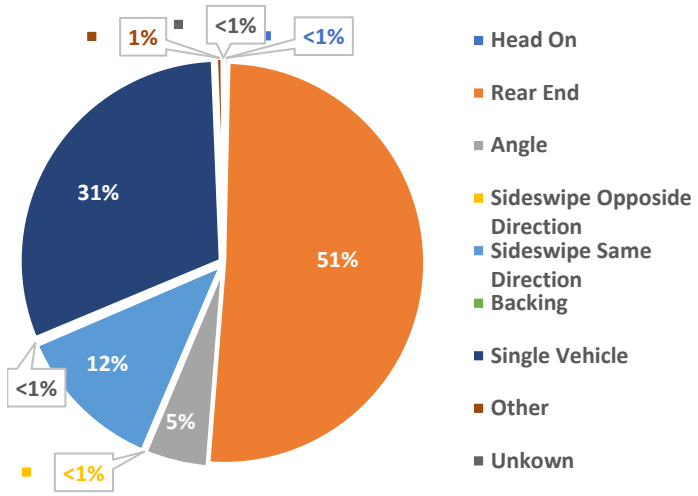


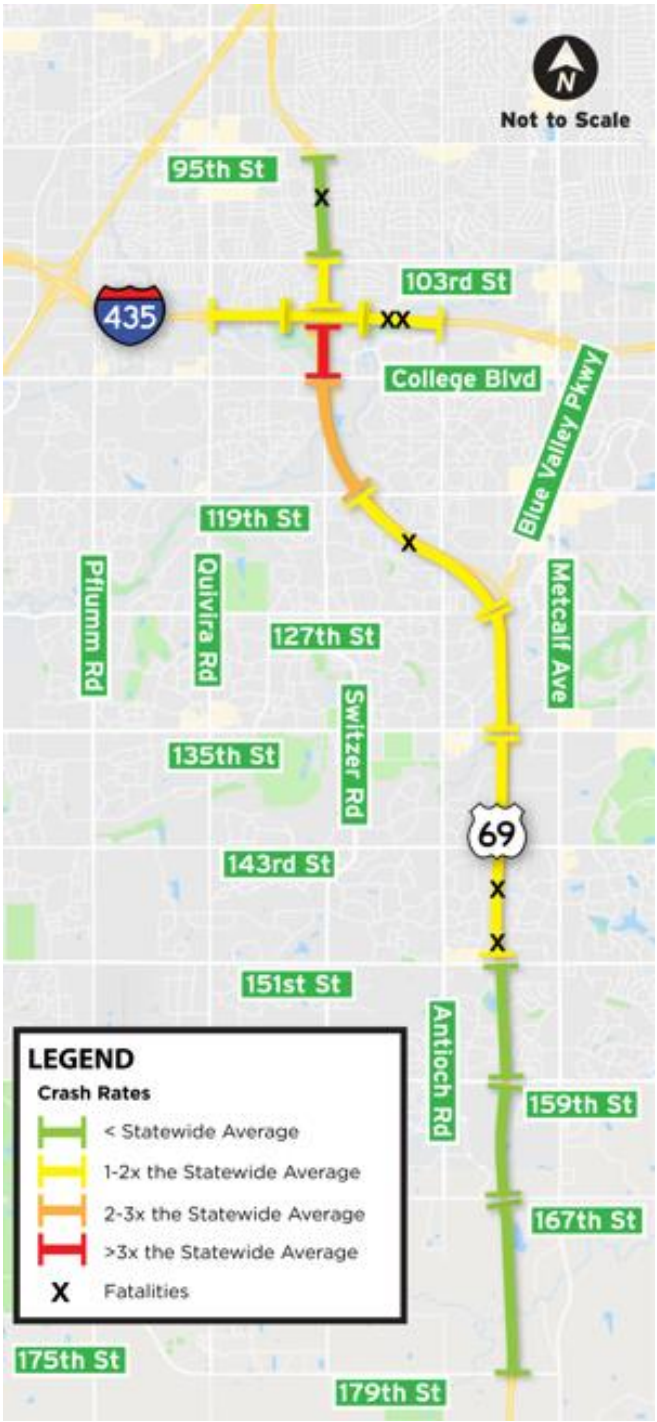
Figure 13: Crash Type - U.S. 69



Freeway Crash Rates

Statewide, 4-lane divided urban highways in Kansas, such as U.S. 69, saw average crash rates of 1.034 crashes per million vehicle miles traveled (MVMT) and 0.223 fatalities per hundred million vehicle miles traveled (HMVMT) between 2015 and 2019. Eight-lane divided urban highways in Kansas, such as I-435, saw average crash rates of 1.840 crashes per MVMT and 0.653 fatalities per HMVMT during the same period. When statewide averages are compared to the 13 identified roadway segments on the U.S. 69 and I-435 corridors, six segments on U.S. 69 and all three segments on I-435 surpassed at least one of Kansas's statewide total crash or fatal crash averages. However, one segment of I-435, from the I-435 WB to U.S. 69 NB off-ramp to Antioch Road, is noted to be the only segment to surpass both of Kansas's statewide crash averages. Of the six segments on U.S. 69 that surpassed Kansas statewide crash or fatal averages, crashes experienced on each segment primarily resulted in property damage only from rear-end or single vehicle collisions. All three segments on I-435 shared similarities in crash severity and crash type. Crashes occurring on these three segments primarily resulted in property damage only from rear-end collisions. **Figure 14** shows the location of the nine freeway segments that surpassed statewide crash averages.

Figure 14: Areas of Concern - Freeway



Tables 5 and 6 compare total crash and fatal crash rates for the 13 segments evaluated on the U.S. 69 and I-435 corridors to Kansas's statewide crash averages.

Table 5: U.S. 69 Crash Rates

U.S. 69 Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
95th St to 103rd St	90,300	39.4	0.2	0.534	0.271
103rd St to I-435	71,250	20.6	0.0	1.200*	0.000
I-435 to College Blvd	65,950	45.8	0.0	3.523*	0.000
College Blvd to 119th St	61,200	56.0	0.0	2.321*	0.000
119th St to 127th St	60,100	39.6	0.2	1.143*	0.577
127th St to 135th St	91,100	54.0	0	1.608*	0.000
135th St to 151st St	62,700	47.8	0.4	1.034*	0.865*
151st St to 159th St	45,600	12.2	0	0.726	0.000
159th St to 167th St	36,700	7.8	0	0.582	0.000
167th St to 179th St	33,700	19.2	0	0.924	0.000
		Kansas Statewide Average		**1.034**	**0.653**

[1]Kansas Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2015-2019) for a 4 lane/divided/full access/urban facility.
*Denotes segments with crash rates equal to or higher than statewide averages

Table 6: I-435 Crash Rates

I-435 Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
Quivira Rd to SB Ramps	107,650	85.4	0	2.470*	0.000
I-435/U.S. 69 Interchange - Between Ramps	105,400	51.2	0	2.182*	0.000
NB Ramp to Antioch Rd	122,650	83	0.4	1.994*	0.961*
		Kansas Statewide Average		**1.840**	**0.223**

[1]Kansas Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2015-2019) for an 8 lane/divided/full access/urban facility.
*Denotes segments with crash rates higher than statewide averages

Arterial Crash Analysis

In addition to the mainline analysis, crashes occurring on a collective 8-miles of arterial roadway comprised of nine arterial streets, were evaluated for the 2015-2019 analysis period.

Arterial Crash Severity and Type

During the analysis period, 1,272 crashes were experienced on arterials, including five fatal, on all studied arterials. Of the 1,272 crashes reported, approximately 78% of crashes resulted in property damage only, 22% of all crashes caused some form of injury to vehicle occupants, and less than 1% (five crashes) resulted in a fatality. Crashes experienced on arterial streets, primarily consisted of rear end collisions (49%) followed by angle collisions (30%). Overall 135th Street, 151st Street and 119th Street respectively have the highest numbers of crashes under the existing analysis. **Figure 15** and **Figure 16** summarize crash severity and type for all arterial streets.

Figure 15: Crash Severity - Arterials

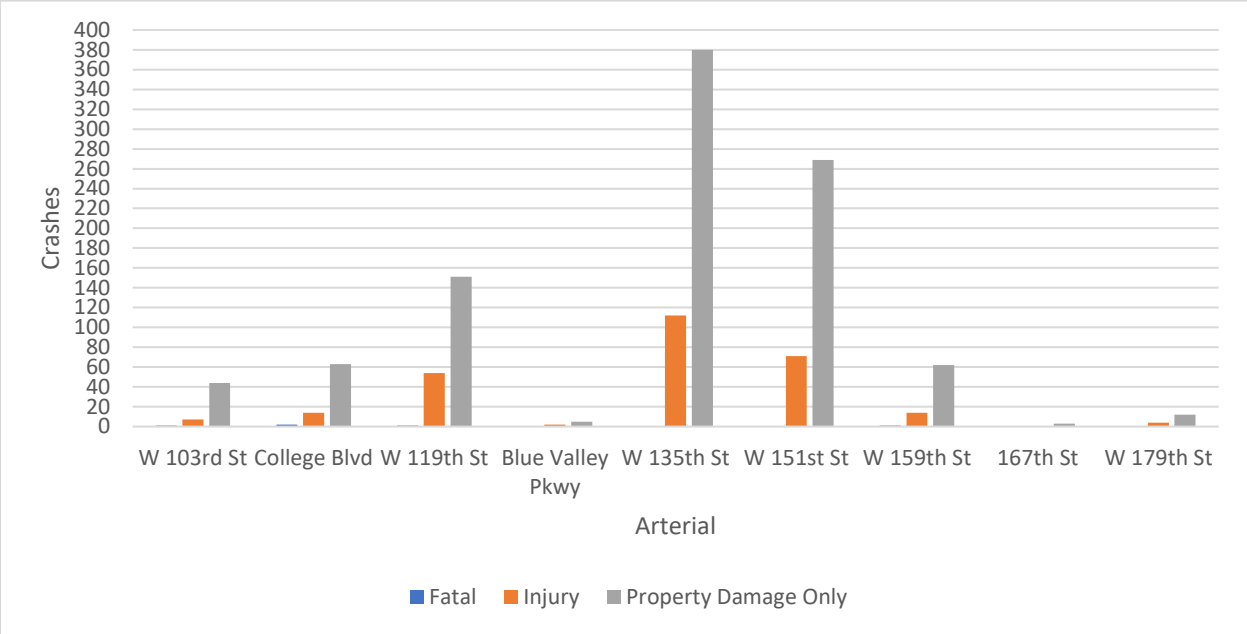
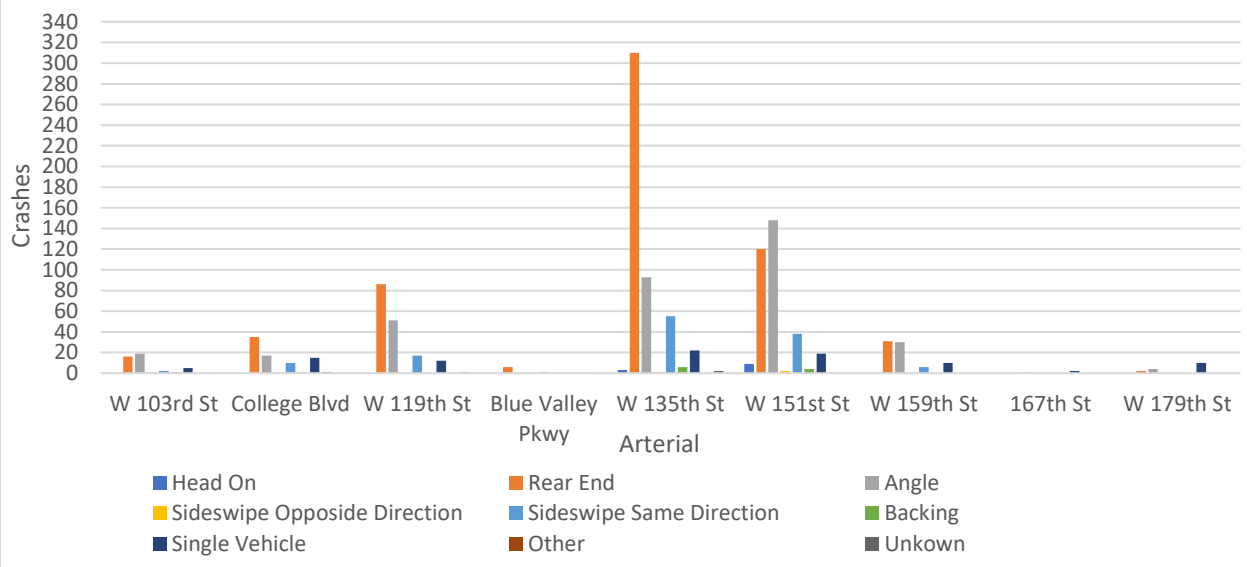


Figure 16: Crash Type - Arterials



Arterial Crash Rates

Crash rates for all arterial segments evaluated can be seen in **Table 7.** However, unlike highway facilities, KDOT and Overland Park do not report statewide crash averages for arterial streets. Crash rates were calculated for arterials to illustrate the magnitude of crashes and serve as a way to compare all arterials even though they could not be compared to statewide averages.

Table 7: Arterial Crash Rates

Arterial Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
103rd St - Barton St to Nieman Rd	14,600	0.0	0.0	0.00	0.00
103rd St - Nieman Rd to SB Ramp	16,900	3.0	0.0	1.68	0.00
103rd St -Between Ramps	19,200	3.8	0.0	2.85	0.00
103rd St - NB Ramp to Mastin St	19,500	1.0	0.0	1.56	0.00
103rd St - Mastin St to Farley St	16,500	2.6	0.2	3.32*	25.55*
College Blvd - 109th St to SB Ramp	29,700	6.0	0.2	1.84	6.15
College Blvd - Between Ramps	30,750	5.8	0.2	3.23*	11.14*
College Blvd - NB Ramp to Mastin St.	31,800	4.0	0.0	1.38	0.00
119th St - Grant St. to SB Ramp	40,900	9.4	0.0	4.84*	0.00
119th St - Between Ramps	42,550	11.6	0.0	4.15*	0.00
119th St - NB Ramp to Farley St	42,000	1.6	0.0	0.80	0.00
119th St - Farley St to Grant St	41,200	5.6	0.2	1.62	5.78*
119th St - Grant St to Antioch Rd	39,700	13.0	0.0	3.32*	0.00
Blue Valley Pkwy - Lowell Ave to 127th St	31,000	1.4	0.0	0.33	0.00
135th St - Antioch Rd to N Hemlock St	36,600	27.4	0.0	5.86*	0.00
135th St - N Hemlock St to SB Ramp	47,650	15.2	0.0	4.37*	0.00
135th St - Between Ramps	53,000	15.8	0.0	4.30*	0.00
135th St - NB Ramp to Riley St	58,500	17.4	0.0	5.09*	0.00
135th St - Riley St to Metcalf Ave	51,200	22.6	0.0	2.47	0.00
151st St - Antioch Rd to Hardy St	29,870	13.6	0.0	2.90	0.00
119th St - NB Ramp to Farley St	42,000	1.6	0.0	0.80	0.00
119th St - Farley St to Grant St	41,200	5.6	0.20	1.62	5.78*
119th St - Grant St to Antioch Rd	39,700	13.0	0.00	3.32*	0.00
135th St - Antioch Rd to N Hemlock St	36,600	27.4	0.00	5.86*	0.00
135th St - N Hemlock St to SB Ramp	47,650	15.2	0.00	4.37*	0.00
135th St - Between Ramps	53,000	15.8	0.00	4.30*	0.00
135th St - NB Ramp to Riley St	58,500	17.4	0.00	5.09*	0.00
135th St - Riley St to Metcalf Ave	51,200	22.6	0.00	2.47	0.00
151st St - Antioch Rd to Hardy St	29,870	13.6	0.00	2.90	0.00

Arterial Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
151st St - Hardy St to Lowell Ave	32,600	8.6	0.0	7.23*	0.00
151st St - Lowell Ave to SB Ramp	381,00	3.2	0.0	2.30	0.00
151st St - Between Ramps	40,050	9.0	0.0	7.70*	0.00
151st St - NB Ramp to Newton Dr	42,000	6.6	0.0	3.08	0.00
151st St - Newton Dr to Marty St	39,800	15.2	0.0	4.98*	0.00
151st St - Marty St to Metcalf Ave	38,400	11.8	0.0	5.61*	0.00
159th St - Antioch Rd to Lowell Ave	15,400	1.4	0.0	1.31	0.00
159th St - Lowell Ave to SB Ramp	18,750	2.0	0.2	0.97	9.74*
159th St - Between Ramps	18,050	4.4	0.0	8.35*	0.00
159th St - NB Ramp to Foster St	17,400	0.8	0.0	0.90	0.00
159th St - Foster St to Metcalf Ave	13,300	6.8	0.0	3.42*	0.00
167th St - Antioch Rd to SB Ramp	5,100	0.2	0.0	0.24	0.00
167th St - Between Ramps	4,800	0.2	0.0	1.14	0.00
167th St - NB Ramp to Metcalf Ave	4,500	0.2	0.0	0.29	0.00
179th St - Antioch Rd to SB Ramp	9,400	1.6	0.0	0.86	0.00
179th St - Between Ramps	7,300	1.0	0.0	4.17*	0.00
179th St - NB Ramp to Metcalf Ave	5,200	0.6	0.0	0.88	0.00
			Average Crash Rates	**3.05**	**1.39**

*Denotes segments with crash rates higher than the average

When arterial crash rates for each segment evaluated are averaged, arterials streets within the project study area averaged a total crash rate of 3.05 per MVMT and a fatal crash rate of 1.39 crashes per HMVMT. Comparing arterial roadway segments against this total crash average, the five roadway segments listed below experienced the highest total crash rates. When looking at crash rates, it's important to note that shorter study segments, such as roadways between ramp terminals, have the potential to skew crash rate results.

1. **159th Street between Interchange Ramps** - A 0.08 mi segment of the 159th Street, experienced 22 crashes during the five-year evaluation period. This is approximately 7-times higher than the average arterial crash rate for the study area. Of the 22 crashes reported, approximately 77% of crashes resulted in property damage only and no fatalities were reported. Crashes occurring on this segment primarily consisted of angle collisions, which account for approximately 63% of all reported crash types.
2. **151st Street Between Interchange Ramps** - A 0.08 mi segment on the 151st St., experienced 45 crashes and no fatalities. This is approximately 15-times higher than the average arterial crash rate for the study area. Crashes on this segment primarily consisted of property damage only (82%). Angle collisions accounted for roughly 51% of all crash types reported on the segment.
3. **151st Street Lowell Ave to U.S 69 SB Ramp Terminal** - A 0.10 mi segment, experienced 16 crashes and no fatalities. This is approximately 5-times higher than the average arterial crash rate for the

study area. Crashes on this segment primarily consisted of property damage only (82%). Rear-end collisions accounted for roughly 63% of all crash types reported on the segment.

4. **135th Street Antioch Rd to N Hemlock Street** - A 0.35 mi segment, experienced 137 crashes and no fatalities. This is approximately 45-times higher than the average arterial crash rate for the study area. Crashes on this segment primarily consisted of property damage only (75%). Rear-end collisions accounted for roughly 69% of all crash types reported on the segment.
5. **135th Street NB Ramp to Riley Street** - A 0.16 mi segment on the 135th Street corridor, experienced 87 crashes and no fatalities. This is approximately 29-times higher than the average arterial crash rate for the study area. Crashes on this segment primarily consisted of property damage only (72%). Rear-end collisions accounted for roughly 60% of all crash types reported on the segment.

2.6.2 No-Build Predicted Crashes

A future 2050 predictive crash analysis was conducted using the Interactive Highway Safety Design Model (IHSDM) version 16.0.0 software, developed by the Federal Highway Administration (FHWA). The IHSDM implements methodology from the Highway Safety Manual (HSM) to predict crashes based on traffic volumes, roadway geometry, and other basic roadway characteristics such as barrier and shoulder widths. The IHSDM predictive crash analysis evaluated Existing 2019, Future 2050 No-Build, and 2050 Build conditions. Analysis limits of the IHSDM predictive analysis can be seen in **Table 8**.

Table 8: IHSDM Study Limits

Roadway	Limits
U.S. 69 Mainline and Ramps	95th Street south facing ramps to ~1100ft south of 179th Street
I-435 Mainline and Ramps	Quivira Road to Antioch Road
103rd Street	Goddard to Mastin Street
College Boulevard	109th Street to Mastin Street
119th Street	Grant Street to Farley Street
135th Street	Hemlock Street to Riley Street
151st Street	Lowell Avenue to Newton Drive
159th Street	Shawnee Drive to Foster Street
167th Street	475' west of SB Terminal to 400' east of NB Terminal
179th Street	950' west of SB Terminal to 550' east of NB Terminal

Source: HNTB, KDOT

Due to limitations of the Highway Safety Manual (HSM), a predicative crash assessment of the U.S. 69 mainline could not be conducted for the 2050 Build scenario, as the freeway will be constructed as a buffer separated managed lane facility. The HSM can only perform a barrier separated managed lane safety analysis. However, a qualitative assessment for how future Build conditions may affect existing crash patterns along the freeway can be seen in **Section 3.5** of this report.

2.6.3 Existing (2019) and No-Build (2050) Comparison

With the corridor improvements described in **Section 2.2** accounted for in the 2050 Future No-Build IHSDM analysis, **Table 9** provides a comparison of the IHSDM modeled Existing 2019 and 2050 Future No-Build predictive crash results for one year.

Table 9: Crash Comparison – Existing and No-Build

Segment	Delta (Existing to FNB)			Percent Change		
	Total Crashes	F+I Crashes	PDO	Total Crashes	F+I Crashes	PDO
U.S. 69	83.78	22.22	62.15	65%	52%	73%
I-435	3.99	1.02	2.97	13%	10%	14%
103rd St. (Goddard to Mastin St.)	2.43	0.71	1.72	15%	10%	19%
College Blvd. (109th St. to Mastin St.)	8.96	3.47	5.48	33%	32%	33%
119th St. (Grant St. to Farley St.)	11.06	5.63	5.43	24%	27%	22%
135th St. (Hemlock St. to Riley St.)	39.97	19.21	20.75	35%	39%	32%
151st St. (Lowell Ave. to Newton Dr.)	11.75	6.09	5.65	43%	50%	37%
159th St. (Shawnee Dr. to Foster St.)	4.83	4.42	0.41	32%	83%	4%
167th St. (475' west of SB Terminal to 400' east of NB Terminal)	3.97	1.24	2.74	567%	539%	583%
179th St. (950' west of SB Terminal to 550' east of NB Terminal)	34.62	16.24	18.38	962%	1365%	766%
Total	205.36	80.25	125.68	45%	42%	47%

Crash results presented are based on the difference in crashes predicted by the IHSDM for the year 2019 and 2050
Source: FHWA's IHSDM

As depicted in **Table 9**, results from the predictive analysis shows that under 2050 Future No-Build conditions, crashes are predicted to increase along all analyzed mainline and arterial roadways. With roadway geometry and other basic roadway characteristics being consistent between the Existing 2019 and 2050 Future No-Build IHSDM, this predicted increase in crashes can be attributed to projected increases in traffic volumes, as this is the only non-consistent variable.

With Overland Park projected to continually grow to the south, arterials such as 167th Street and 179th Street were considered as arterials with the most growth potential, as traffic volumes are projected to increase by more than 350%. For this reason, when looking at **Table 9**, the percent change in crashes predicted between Existing 2019 and 2050 Future No-Build appear relatively high. As volumes increase along these arterials, it should be expected that the number of crashes experienced would increase as well.

2.7 Summary of Existing and Future No-Build Safety Analysis

A VISSIM analysis of existing conditions established that segments on northbound U.S. 69 operate at LOS E and F during the morning peak period. During the afternoon peak period, both northbound and southbound directions have segments that operate at LOS E and F. The I-435 mainline, as it exists today, operates at acceptable levels of speed and density. If no changes are made to the corridor, operations in the year 2050 are forecasted to be gridlock conditions in both directions of U.S. 69, causing I-435 to also

have poor speeds and LOS. Most arterial intersections are also anticipated to have unacceptable LOS F operations during both peak periods.

When the 13 identified freeway segments on the U.S. 69 and I-435 corridors are compared to Kansas statewide crash averages, six segments on U.S. 69 and all three segments on I-435 had crash rates that surpassed at least one of Kansas's statewide total crash or fatal crash averages for similar freeway facilities (**Figure 17**). Crashes experienced on the freeway predominately consisted of rear-end collisions, however, a significant number of single-vehicle collisions did occur. Collectively, these two crash types represent roughly 79% of all crashes experienced on the freeway within the 5-year study period. Due to the nature of crashes experienced on the freeway, crashes can be attributed to elevated levels of congestion, as rear-end collisions are usually indicative of highly congested areas and are typically attributed to lower speed crashes. Single vehicle crashes are a result of substandard roadway geometry, a vehicle losing control, or being run off the road.

Figure 17: Existing Safety Areas of Concern

When crashes occurring on the nine evaluated arterial streets within the study are compared on a crash per-mile biases, two arterials (135th St. and 151st St.) experienced the highest frequency of crashes (**Figure 17**). Both the 135th and 151st St. corridors are considered major urban arterials providing drivers access to a number of commercial, recreational, and residential facilities. Crashes occurring on these two major arterials reflect similar vehicle crash patterns seen on all arterials evaluated as a part of this analysis. Collectively, crashes occurring on the nine evaluated arterial streets primarily resulted in property damage only from either rear-end or angle collisions. Due to the nature of the crashes experienced, crashes can be attributed to an abundance of conflict points at intersections and driveways on the arterials and elevated levels of congestion.

Results from the predictive analysis shows that for 2050 Future No-Build conditions, crashes are predicted to increase along all analyzed mainline and arterial roadways. The predicted increase in crashes is attributed to projected increases in traffic volumes and congestion.

3.0 Policy Point One: Preferred (Build) Alternative

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

3.1 Traffic Forecast (2040 & 2050)

Similar to the traffic forecasting used to develop the No-Build volumes, 2040 Base and 2050 Ultimate volumes for the proposed Build Alternative were calculated and balanced for the entire study area. **Table 10** shows the generalized forecasted growth rates for the 2040 Base and 2050 Ultimate Build Alternatives with general purpose lanes and general-purpose lanes plus ETLs.

Table 10: 2040 Base and 2050 Ultimate Build Alternative Growth Rates

Segment	Location	FNB	2040 Base Build GP	2040 Base Build GP+ETL	2050 Ultimate Build GP	2050 Ultimate Build GP+ETL
Freeway	South of 95th Street	0.58%	1.16%	1.16%	0.96%	0.96%
	South of College Boulevard	0.85%	1.06%	1.52%	0.90%	1.20%
	South of 119th Street	0.95%	1.56%	2.09%	1.23%	1.60%
	South of Blue Valley Parkway	0.93%	1.11%	1.85%	0.96%	1.42%
	South of 135th Street	1.29%	0.69%	1.82%	1.05%	1.40%
	South of 167th Street	2.68%	3.22%	3.22%	1.89%	2.40%
Arterials	Arterials north of 119th Street	0.60%	0.58%	0.58%	0.62%	0.62%
	Arterials north of 151st Street	0.75%	1.08%	1.08%	0.83%	0.83%
	Blue Valley Parkway	0.75%	1.37%	1.37%	1.04%	1.04%
	159th Street	2.75%	3.90%	3.90%	2.77%	2.77%
	167th Street	5.50%	8.09%	8.09%	5.74%	5.74%
	179th Street	5.50%	7.57%	7.57%	5.29%	5.29%

Source: U.S. 69 Express Traffic Forecasting

The technical memorandum "Anticipated Travel Changes with Express Toll Lanes" (see **Appendix A**) describes how traffic is anticipated to move within the study area with the addition of ETL's compared to the No-Build. In summary:

- East/west arterials crossing the U.S. 69 corridor are expected to see an increase in daily traffic while the north/south arterials are expected to see a decrease in daily traffic as the U.S. 69 corridor becomes an attractive corridor for motorists to use.
- The peak period traffic characteristic is most significant during the A.M. peak where the largest north/south traffic decreases range from -11% to -13.3% on parallel north south arterial streets.
- Changes in traffic demand at the three I-435 service interchanges near U.S. 69 indicate that when the U.S. 69 ETL alternative is implemented, traffic volumes are expected to decrease during each time period analyzed, with the A.M. peak period experiencing the largest decrease at the Quivira Interchange (-0.9%), Antioch Interchange (-3.6%) and Metcalf Interchange (-2%).

See **Appendix A** to review the methodology and traffic projections for the years 2040 and 2050.

3.2 Base Build 2040 Peak Period Traffic Operations

The following subsections detail the forecasted traffic operations of the I-435 and U.S. 69 corridors within the analysis area with the proposed Base Improvements to U.S. 69 and supporting arterials through the year 2040 have been built (see **Section 1.5**). The Build Alternative with proposed improvements through 2040 primarily consists of ETL's on U.S. 69 from 103rd Street to north of 151st Street, construction of a flyover ramp from northbound U.S. 69 to I-435 westbound and reconstruction of the 167th Street Interchange.

The subsections also account for performance on the ETL facility. Express toll lane facilities should always operate at a higher standard than general purpose lanes. However, limitations to the HCM do not allow for direct comparisons to be made between ETLs and general purpose lanes in terms of level of service (LOS). The Project team is evaluating performance on the ETLs in terms of speed. If an ETL is not operating near or at free flow speed, it is determined to have poor operations. As a for the other highway segments, LOS thresholds are different in ETL corridors than non-ETL corridors. The following LOS thresholds are the agreed upon standards for which the facilities in the corridor should operate to be considered acceptable.

- **U.S. 69 Highway Corridor –** General purpose lanes goal is to operate at LOS E or better in the peak 15-minute period of the peak hour. Because LOS cannot be analyzed for the ETL using Highway Capacity Manual, the goal is to achieve a travel speed of 50 mph or greater in the peak hour.
- **I-435 Highway Corridor -** General purpose lanes goal is to operate at LOS D or better in the peak 15-minute period of the peak hour. The LOS of I-435 is different than U.S. 69 because I-435 does not have an express toll lane.
- **Arterial Roadways –** Arterial intersections goal is to operate at LOS D or better for the entire intersection in the peak 15-minute period of the peak hour.

Exhibits 13 through 18 show a visual representation of the operational results in the corridor for the Base Improvements in the year 2040.

3.2.1 A.M. Peak Period Operational Results

The proposed improvements to the corridor through 2040 results in acceptable a.m. peak period traffic operations through the year 2040. Operations on I-435 eastbound and westbound show LOS C or better in the analysis area. Average link speeds in both directions range from 60 to 71 MPH, with the slowest speed coming at the eastbound diverge to the southbound U.S. 69 Frontage Road.

U.S. 69 has acceptable operations on all segments of the corridor. The southbound exit to 95th Street is the worst performing segment, operating at a LOS D. All other segments operate at LOS C or better. The LOS calculations include operations on the ETL as well as the two general purpose lanes. Since there is no HCM-approved way to show LOS operations on an ETL only, speeds are being used as the basis for determining effective operations on U.S. 69. With this understanding, both directions on the ETL's show speeds over 63 MPH throughout.

Most arterial intersections operate acceptably at LOS D or better, however there is a clear operational issue on 151st Street by 2040. Five of the eight intersections analyzed on 151st Street operate at a LOS F, and one operates at a LOS E. The northbound ramp onto U.S. 69 merges from two lanes to one prior to tying-in with the U.S. 69 mainline. This is one of the contributors to the poor operations on 151st Street. Higher traffic volumes than available capacity is another contributor. There are slightly higher volumes projected on 151st Street in 2040 compared to 2050. Higher volumes on 151st Street are expected because the ETL begins and ends just north of 151st Street, making 151st Street more desirable for vehicles wanting to utilize the ETL from its southern-most entry point. Since the Base Improvements on U.S. 69 only extend to just north of 151st Street, updates to the 151st Street northbound on-ramp and 151st Street arterial are not included but the operational analysis shows that they are needed before 2040.

One other LOS F occurs at 179th and Antioch, which by 2040 has been upgraded from an unsignalized intersection to a roundabout. The City of Overland Park should monitor performance at this intersection and may need to take additional steps to improve the operations prior to 2040.

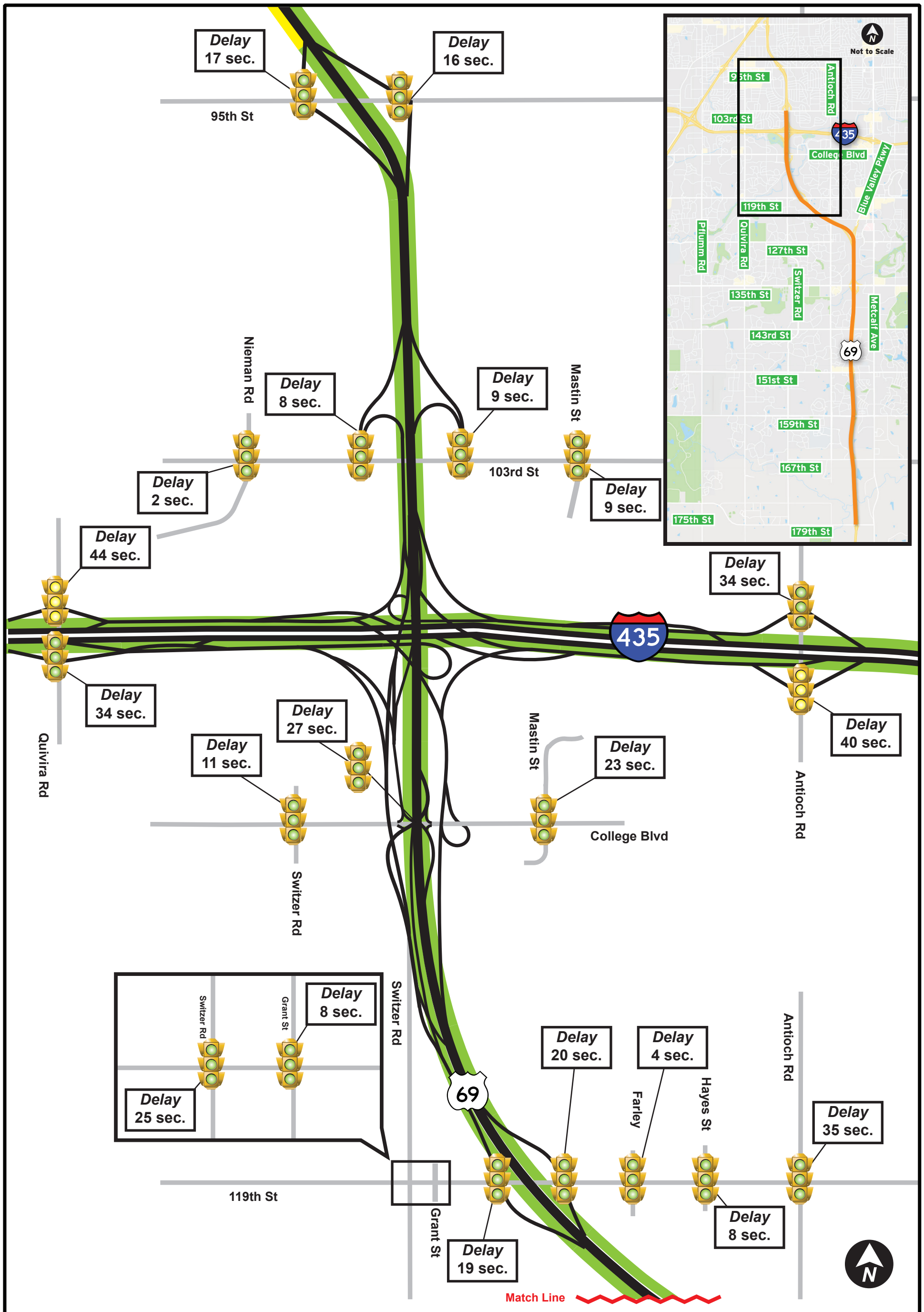


EXHIBIT 13	**U.S. 69 Break-in-Access Level of Service 2040 Future-Build AM**	Mainline Level of Service Intersection Level of Service Delay (In sec.) A, B or C D E F Delay XX sec.	**U.S. 69 Modernization and Expansion Project** 69 EXPRESS October, 2021

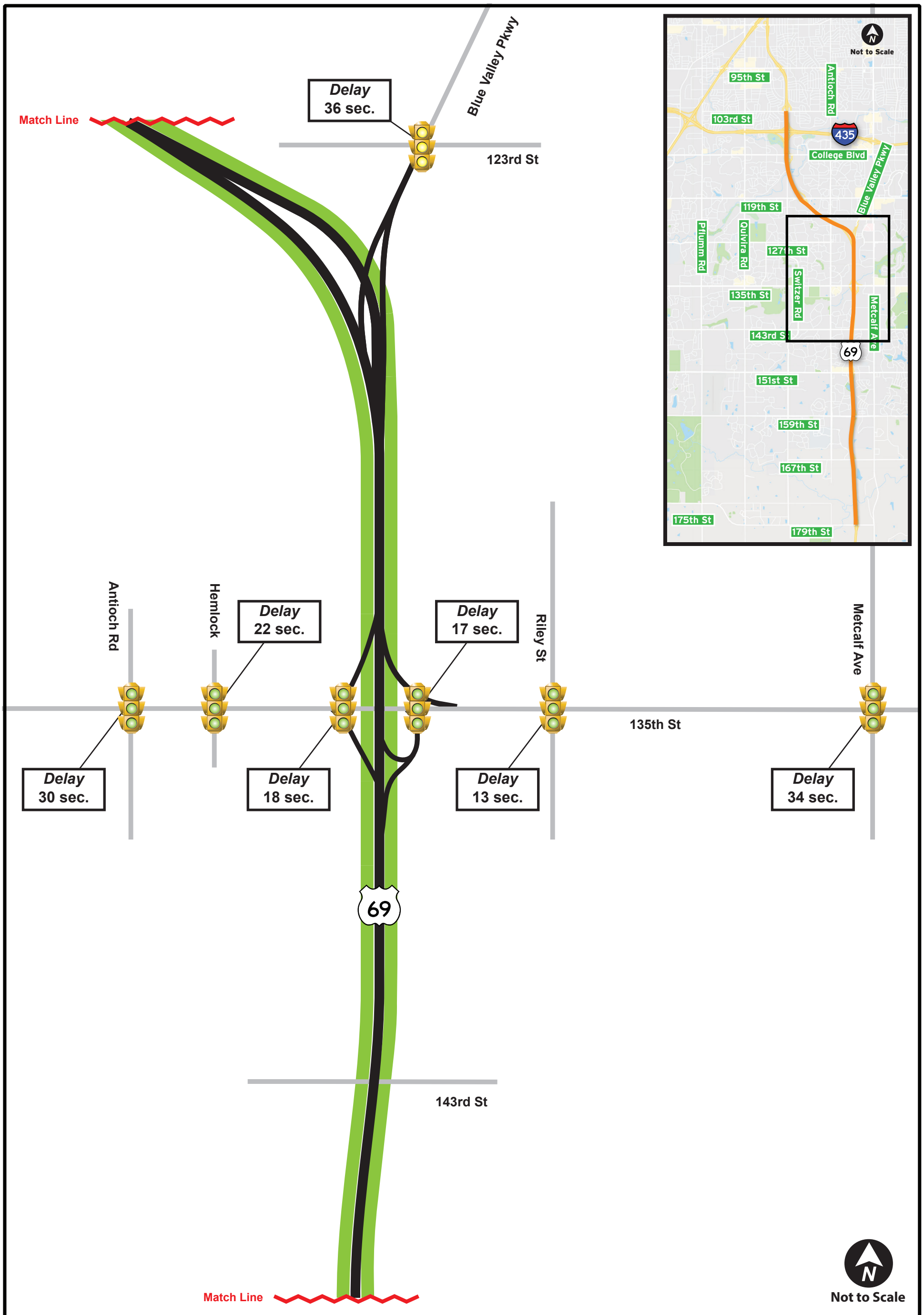


EXHIBIT 14	U.S. 69 Break-in-Access Level of Service 2040 Future-Build AM	Mainline Level of Service / Intersection Level of Service / Delay (In sec.)	U.S. 69 Modernization and Expansion Project
		STOP A, B or C — Delay XX sec.	69 EXPRESS
		STOP D	October, 2021
		STOP E	
		STOP F	

Match Line

Not to Scale

151st St

159th St

167th St

179th St

Antioch Ave

Hardy St

Lowell Ave

Shawnee Dr

Newton St

Marty St

Foster

Marty

Metcalf Ave

69

Delay >120 sec.

Delay 64 sec.

Delay 49 sec.

Delay 37 sec.

Delay 117 sec.

Delay >120 sec.

Delay 84 sec.

Delay >120 sec.

Delay 21 sec.

Delay 20 sec.

Delay 11 sec.

Delay 31 sec.

Delay 22 sec.

Delay 18 sec.

Delay 17 sec.

Delay 37 sec.

Delay 3 sec.

Delay 8 sec.

Delay 4 sec.

Delay 4 sec.

Delay 59 sec.

Delay 21 sec.

Delay 24 sec.

Delay 8 sec.

YIELD

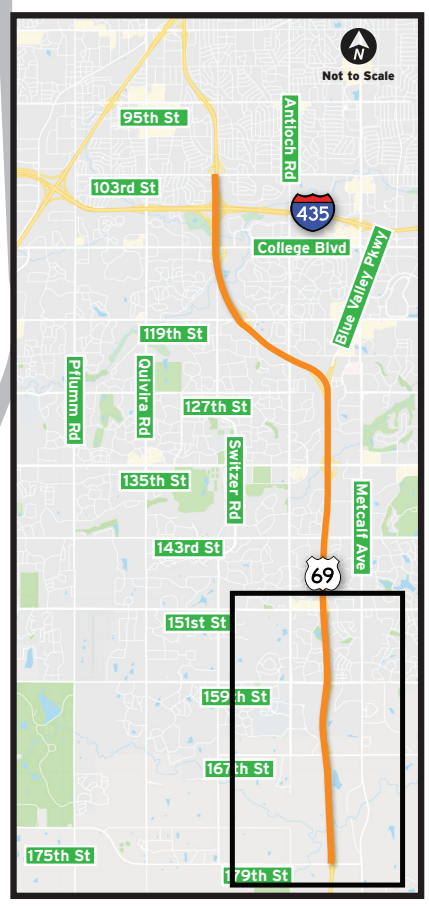


EXHIBIT 15

U.S. 69 Break-in-Access Level of Service 2040 Future-Build AM

Mainline Level of Service

Intersection Level of Service

- A, B or C
- D
- E
- F

Delay (In sec.)

Delay XX sec.

U.S. 69 Modernization and Expansion Project

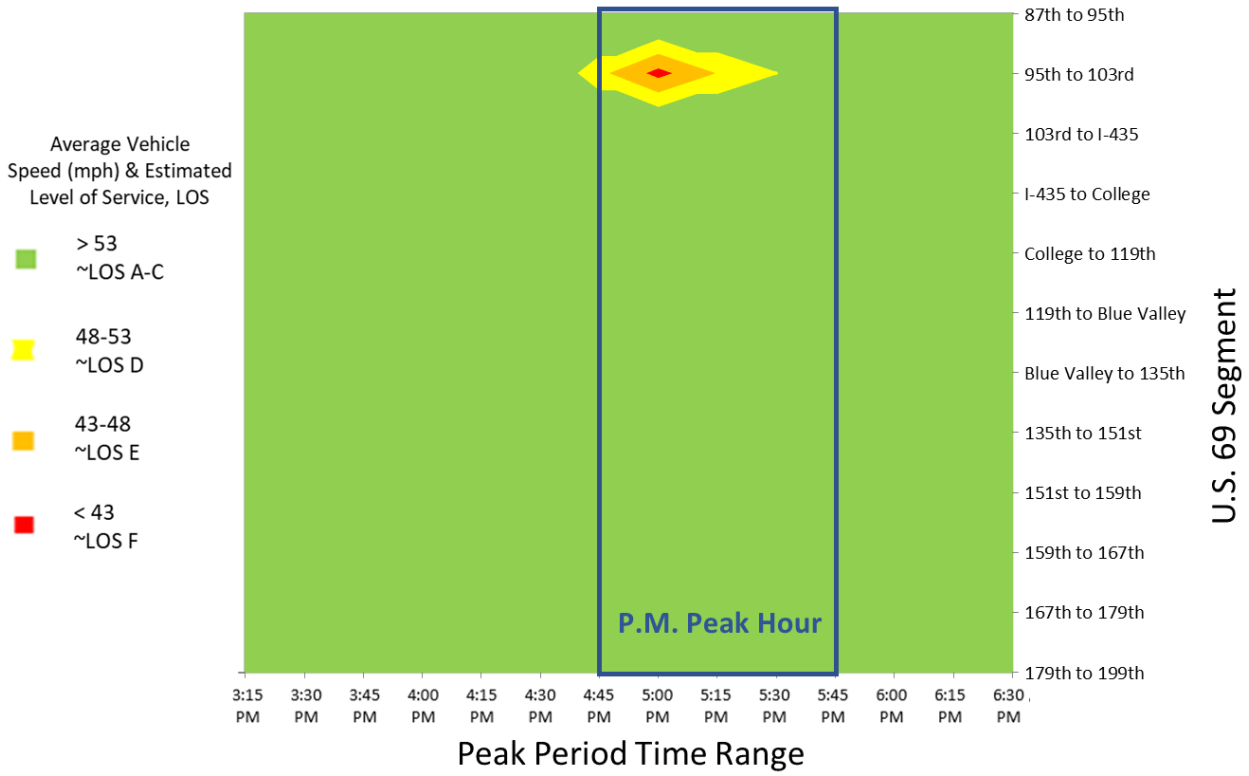
69 EXPRESS

October, 2021

3.2.2 P.M. Peak Period Operational Results

Interstate 435 operates at acceptable levels throughout the p.m. peak period. As for U.S. 69, one segment operates at a LOS F while all other segments experience satisfactory operations. The LOS F segment, 95th Street to 103rd Street (weave), experiences average speeds around 44 MPH during the worst 15-minute period of the peak hour. **Figure 18** shows the length of time in which speeds are reduced. The VISSIM results show that LOS F only exists during one 15-minute span of the peak period. The performance over the peak hour is due to capacity constraints since proposed improvements begin at 103rd Street and do not extend north. Currently there are three lanes of U.S. 69 capacity after the I-35 southbound to U.S. 69 southbound two-lane flyover ramp. If KDOT chooses to not widen the I-35 flyover ramp to three lanes over I-35, then southbound volumes will not be as high as forecasted. If KDOT chooses to widen the I-35 southbound flyover ramp to three lanes in the future, then forecasted volumes could be realized by 2050 and southbound traffic would be metered entering the project. This latter is what has been modeled in both 2040 and 2050 Build scenarios.

Figure 18: Southbound U.S. 69 P.M. Speed Profile in 2040 Build Conditions



Source: VISSIM

Two intersections in the p.m. peak period operate at a LOS E or F:

- 119th Street and Antioch Road – LOS E
- 179th Street and Antioch Road – LOS F

The 179th Street and Antioch Road intersection has been upgraded from unsignalized to a roundabout in the VISSIM traffic model, but still shows poor LOS. The 119th Street and Antioch Road signal may need improved signal timing or lane alignment adjustments to minimize delay in the future. The City of Overland Park should monitor performance at these intersections and may need to take additional steps to improve their operations prior to 2040.

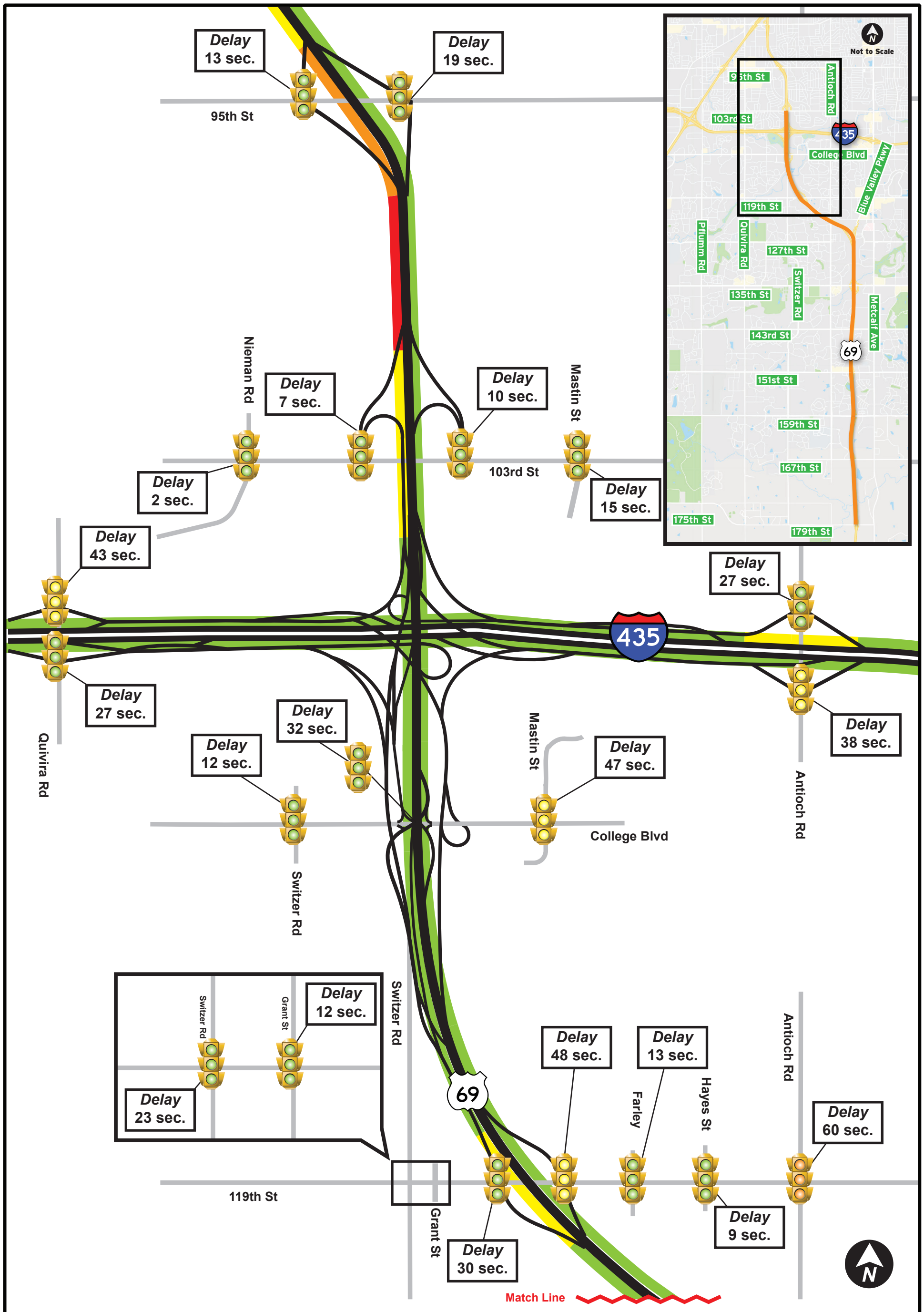


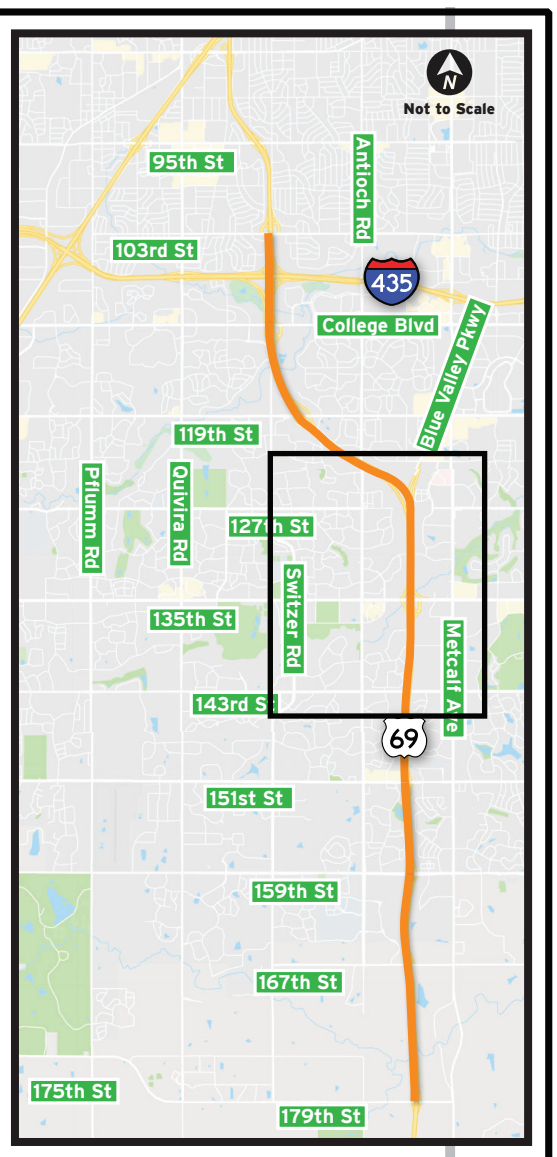
EXHIBIT 16	U.S. 69 Break-in-Access Level of Service 2040 Future-Build PM	Mainline Level of Service / Intersection Level of Service / Delay (In sec.): A, B or C; D; E; F — Delay XX sec.	U.S. 69 Modernization and Expansion Project — 69 EXPRESS — October, 2021

Match Line

Delay
28 sec.

Blue Valley Pkwy

123rd St



Antioch Rd

Hemlock

Delay
31 sec.

Delay
15 sec.

Riley St

Metcalf Ave

135th St

Delay
35 sec.

Delay
35 sec.

Delay
24 sec.

Delay
37 sec.

69

143rd St

Match Line

Not to Scale

EXHIBIT 17	**U.S. 69 Break-in-Access Level of Service 2040 Future-Build PM**	Mainline Level of Service Intersection Level of Service A, B or C D E F Delay (In sec.) Delay XX sec.	**U.S. 69 Modernization and Expansion Project** 69 EXPRESS October, 2021

Match Line

Not to Scale

151st St

Hardy St

Lowell Ave

Newton St

Marty St

Delay 20 sec.

Delay 10 sec.

Delay 16 sec.

Delay 37 sec.

Delay 30 sec.

Delay 14 sec.

Delay 6 sec.

Delay 36 sec.

159th St

Delay 30 sec.

Delay 25 sec.

Lowell Ave

Delay 14 sec.

Delay 28 sec.

Shawnee Dr

Delay 23 sec.

Delay 21 sec.

Foster

Marty

Delay 15 sec.

Delay 35 sec.

Metcalf Ave

167th St

Antioch Ave

Delay 4 sec.

YIELD

Delay 22 sec.

Delay 9 sec.

69

Delay 21 sec.

YIELD

179th St

Antioch Ave

Delay 59 sec.

YIELD

Delay 49 sec.

Delay 23 sec.

Delay 8 sec.

YIELD

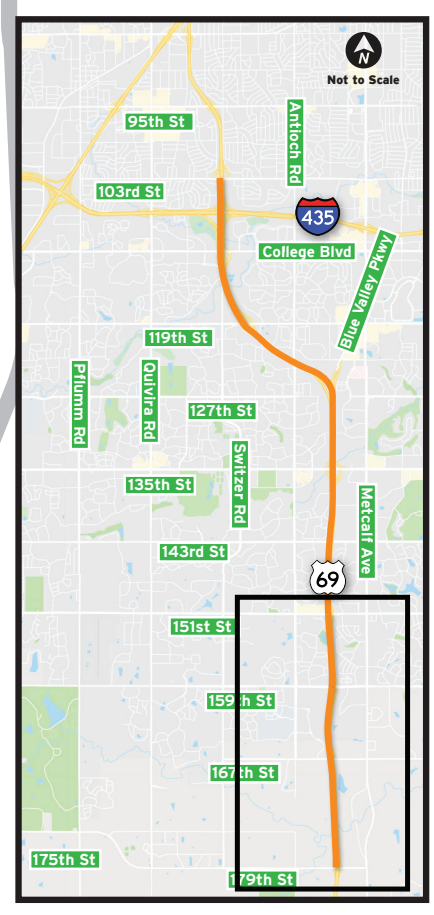


EXHIBIT 18

U.S. 69 Break-in-Access Level of Service 2040 Future-Build PM

Mainline Level of Service

Intersection Level of Service

- A, B or C
- D
- E
- F

Delay (In sec.)

Delay XX sec.

U.S. 69 Modernization and Expansion Project

69 EXPRESS

October, 2021

3.3 Ultimate Build 2050 Peak Period Traffic Operations

The following subsections detail the forecasted traffic operations of the I-435 and U.S. 69 corridors within the analysis area in the year 2050 assuming that all of the proposed changes (see **Section 1.5**) have been built. **Exhibits 19 through 24** show a visual representation of the operational results in the corridor. **Tables 11 and 12,** at the end of this section, display the density, speed and LOS for all scenarios summarized in this report: 2019 Existing, 2050 No-Build, 2040 Base Build, and 2050 Ultimate Build.

3.3.1 A.M. Peak Period Operational Results

The addition of one ETL in each direction between 103rd Street and 179th Street, plus the inclusion of other ramp modifications, such as the northbound U.S. 69 to westbound I-435 flyover, will keep a.m. peak period traffic operations at acceptable levels through the year 2050. Operations on I-435 eastbound and westbound show LOS at a D or better in the analysis area. Average link speeds in both directions range from 52 to 71 MPH, with the slowest speed coming at the eastbound diverge to the southbound U.S. 69 Frontage Road. If that movement is excluded, speeds throughout I-435 in both directions would be between 58 and 71 MPH.

Northbound and southbound directions of U.S. 69 are forecasted to have mainline operations of LOS C or better throughout most of the study area. The two locations where there are LOS D operations in the general purpose lanes are a half-mile segment between the northbound 119th Street ramps and the northbound segment between 151st and 135th Street. Both of these locations still meet acceptable performance thresholds as described at the beginning of **Section 3.2**. Stated in the previous section, the LOS calculations include operations on the ETL as well as the two general purpose lanes. Since there is no HCM-approved way to show LOS operations on an ETL only, speeds are being used as the basis for determining effective operations on U.S. 69. Both directions on the ETL's show free-flow speed (over 63 MPH) throughout.

One intersection operates at a LOS F: 179th Street and Antioch Road. This intersection was upgraded in the 2040 VISSIM analysis from unsignalized to a roundabout and continues to show poor LOS in 2050. One signalized intersection operates at a LOS E: 135th Street and Metcalf. With an average delay of nearly 60 seconds, this intersection is on the lower end of the range for LOS E qualification, which is between 55 and 80 seconds of average delay. The City of Overland Park should monitor performance at these intersections and may need to take additional steps to improve their operations prior to 2050.

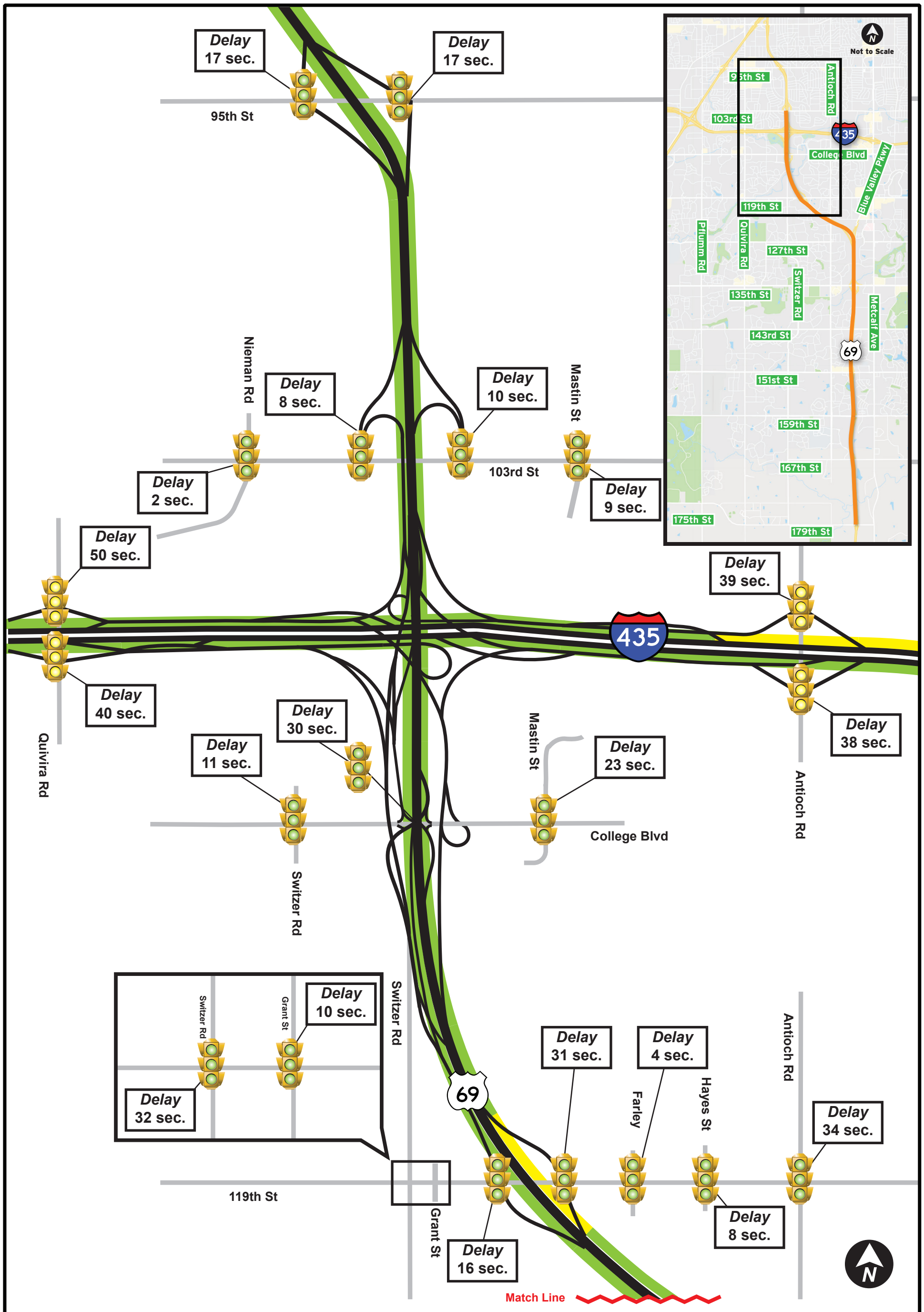


EXHIBIT 19	U.S. 69 Break-in-Access Level of Service 2050 Future-Build AM	Mainline Level of Service / Intersection Level of Service / Delay (In sec.): A, B or C; D; E; F — Delay XX sec.	U.S. 69 Modernization and Expansion Project — 69 EXPRESS — October, 2021

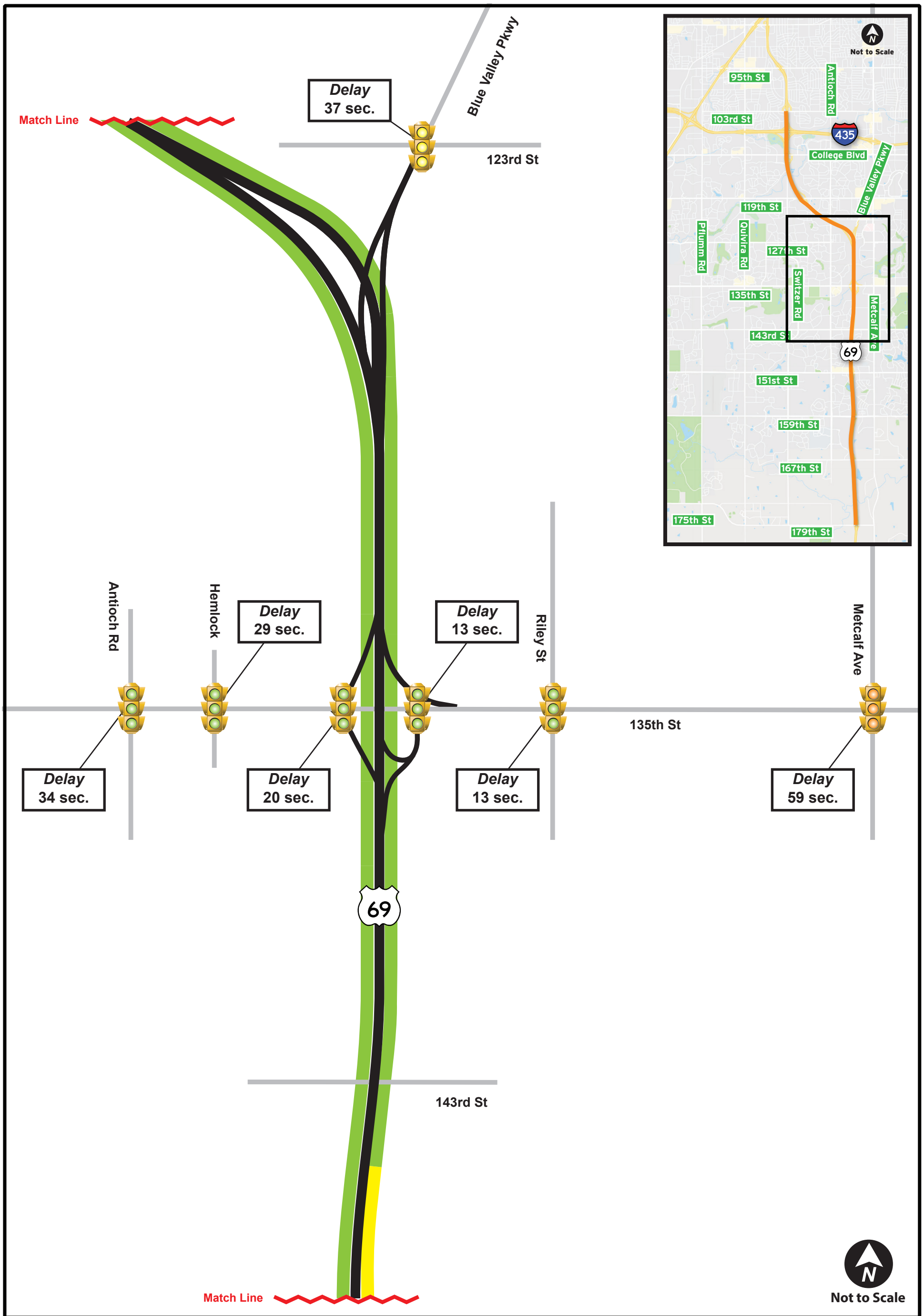


EXHIBIT 20	U.S. 69 Break-in-Access Level of Service 2050 Future-Build AM	Mainline Level of Service / Intersection Level of Service / Delay (In sec.)	U.S. 69 Modernization and Expansion Project
		STOP A, B or C STOP D STOP E STOP F Delay XX sec.	69 EXPRESS October, 2021

Match Line

Not to Scale

151st St

Hardy St

Lowell Ave

Newton St

Marty St

Delay 27 sec.

Delay 34 sec.

Delay 27 sec.

Delay 33 sec.

Delay 35 sec.

Delay 18 sec.

Delay 3 sec.

Delay 33 sec.

159th St

Delay 21 sec.

Lowell Ave

Shawnee Dr

Foster

Marty

Delay 6 sec.

Delay 17 sec.

Delay 20 sec.

Delay 29 sec.

Delay 18 sec.

Delay 33 sec.

Delay 21 sec.

167th St

Antioch Ave

Metcalf Ave

Delay 3 sec.

Delay 8 sec.

Delay 5 sec.

Delay 4 sec.

YIELD

69

179th St

Delay 74 sec.

Delay 19 sec.

Delay 24 sec.

Delay 9 sec.

YIELD

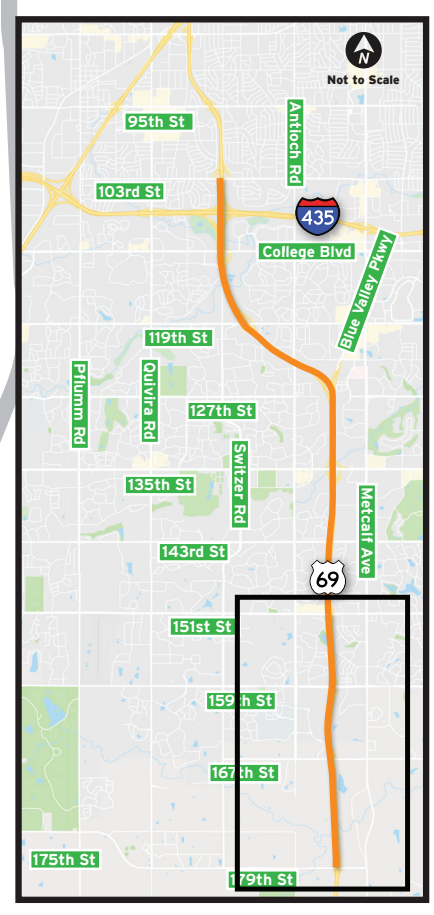


EXHIBIT 21	**U.S. 69 Break-in-Access Level of Service 2050 Future-Build AM**	Mainline Level of Service Intersection Level of Service Delay (In sec.) A, B or C D E F Delay XX sec.	**U.S. 69 Modernization and Expansion Project** 69 EXPRESS October, 2021

3.3.2 P.M. Peak Period Operational Results

Overall, the p.m. peak period is forecasted to operate considerably better than the No-Build, however there are still segments that operate at LOS F on U.S. 69. Interstate 435 operates at acceptable levels on all segments.

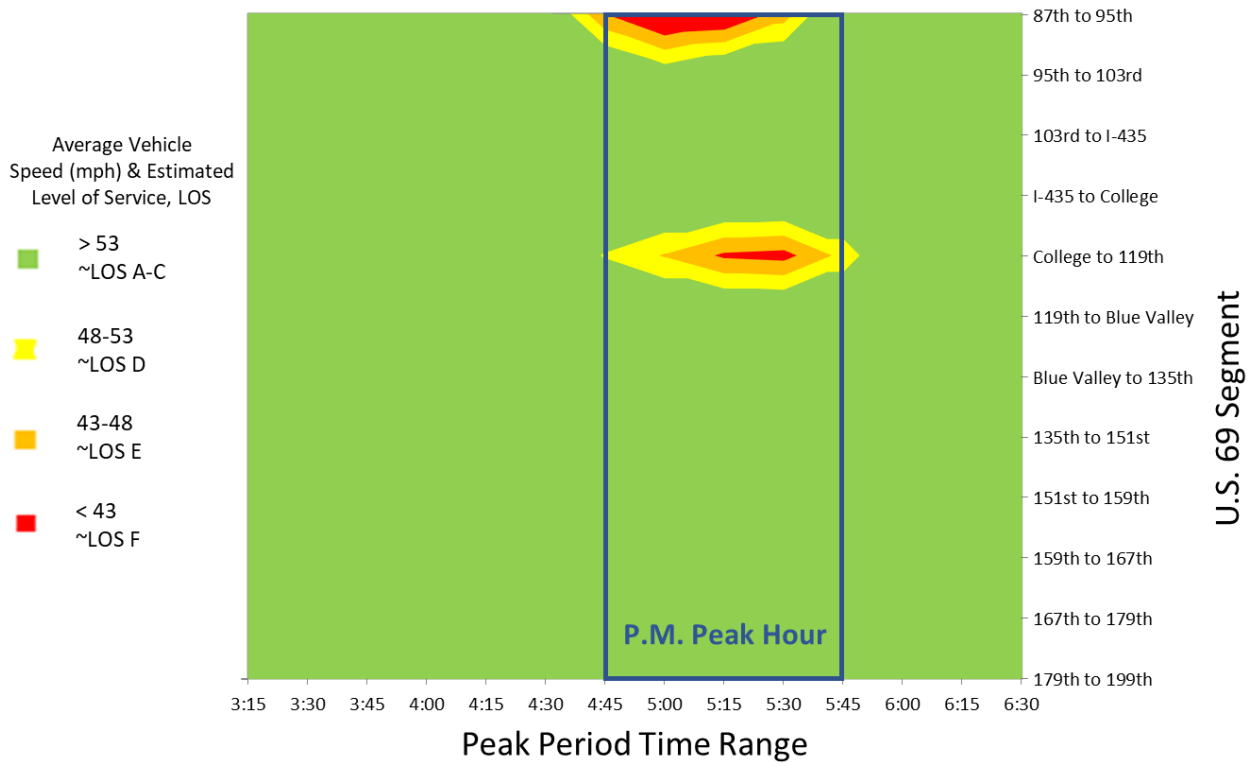
The northbound direction of U.S. 69 operates at acceptable levels. The northbound average link speeds during the peak hour range between 54 and 71 MPH with the lower end of the range occurring around the I-435 interchange. Southbound, there are two segments that operate at F:

- Northern edge of the analysis limits to 95th Street
- Frontage Road merge to the 119th Street merge

Figure 19 shows the southbound U.S. 69 speed and estimated LOS at 95th Street. As previously stated in **Section 3.2**, the poor operations is due to capacity constraints since proposed improvements begin at 103rd Street and do not extend north. Currently the there are three lanes of U.S. 69 capacity after the I-35 southbound to U.S. 69 southbound two-lane flyover ramp. If KDOT chooses to not widen the I-35 flyover ramp to three lanes over I-35, then southbound volumes will not be as high as forecasted. If the KDOT chooses to widen the I-35 southbound flyover ramp to three lanes in the future, then forecasted volumes could be realized by 2050 and southbound traffic would be metered entering the project. This latter is what has been modeled in both 2040 and 2050 Build scenarios.

The southbound Frontage Road merge delivers significant volume onto the U.S. 69 mainline with vehicles from I-435, 103rd Street and College Boulevard all merging at this point. The volume increases the density of vehicles per lane per mile from 24 just upstream from the merge to 75 at the merge during the peak 15-minute interval. This translates into speeds going from nearly free flow just upstream from the merge, down to a low of 21 MPH at the merge. As shown in **Figure 19**, slower speeds are noticeable in the peak hour, but greater than 53 MPH during the other portions of the peak period.

Figure 19: Southbound U.S. 69 P.M. Speed Profile in 2050 Build Conditions



Source: VISSIM

The same two intersections that operate at a LOS E or F in 2040 will continue to operate poorly in 2050:

- 119th Street and Antioch Road – LOS E;
- 179th Street and Antioch Road – LOS F.

As stated in the previous section, the 179th Street and Antioch Road intersection has been upgraded from unsignalized to a roundabout in the VISSIM traffic model, but still shows poor LOS. The 119th Street and Antioch Road signal may need timing or lane alignment adjustments to minimize delay in the future. The City of Overland Park should monitor performance at these intersections and may need to take additional steps to improve their operations prior to 2050.

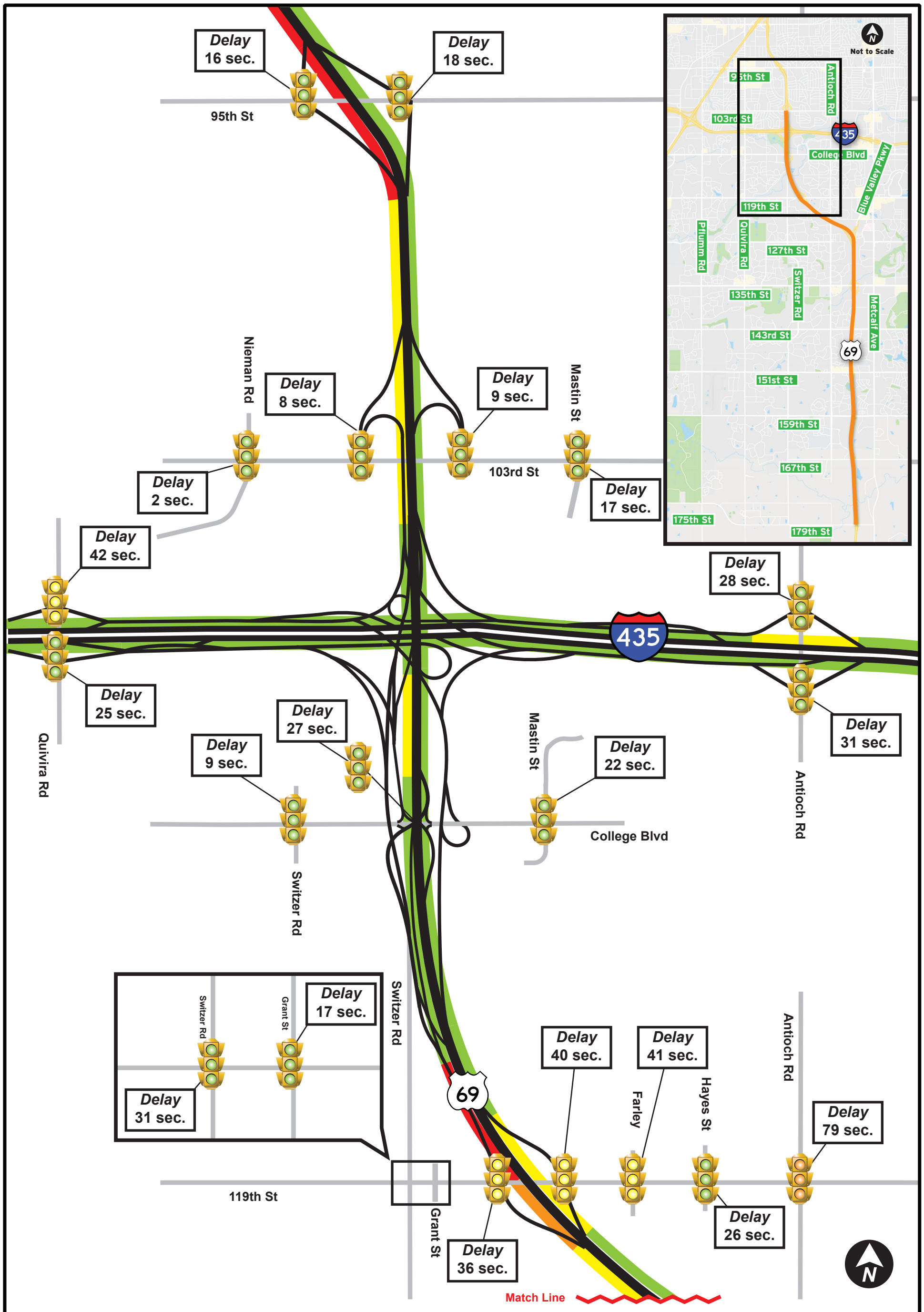


EXHIBIT 22

U.S. 69 Break-in-Access Level of Service 2050 Future-Build PM

Mainline Level of Service	Intersection Level of Service	Delay (In sec.)
	A, B or C	Delay XX sec.
	D	
	E	
	F	

U.S. 69 Modernization and Expansion Project

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October, 2021

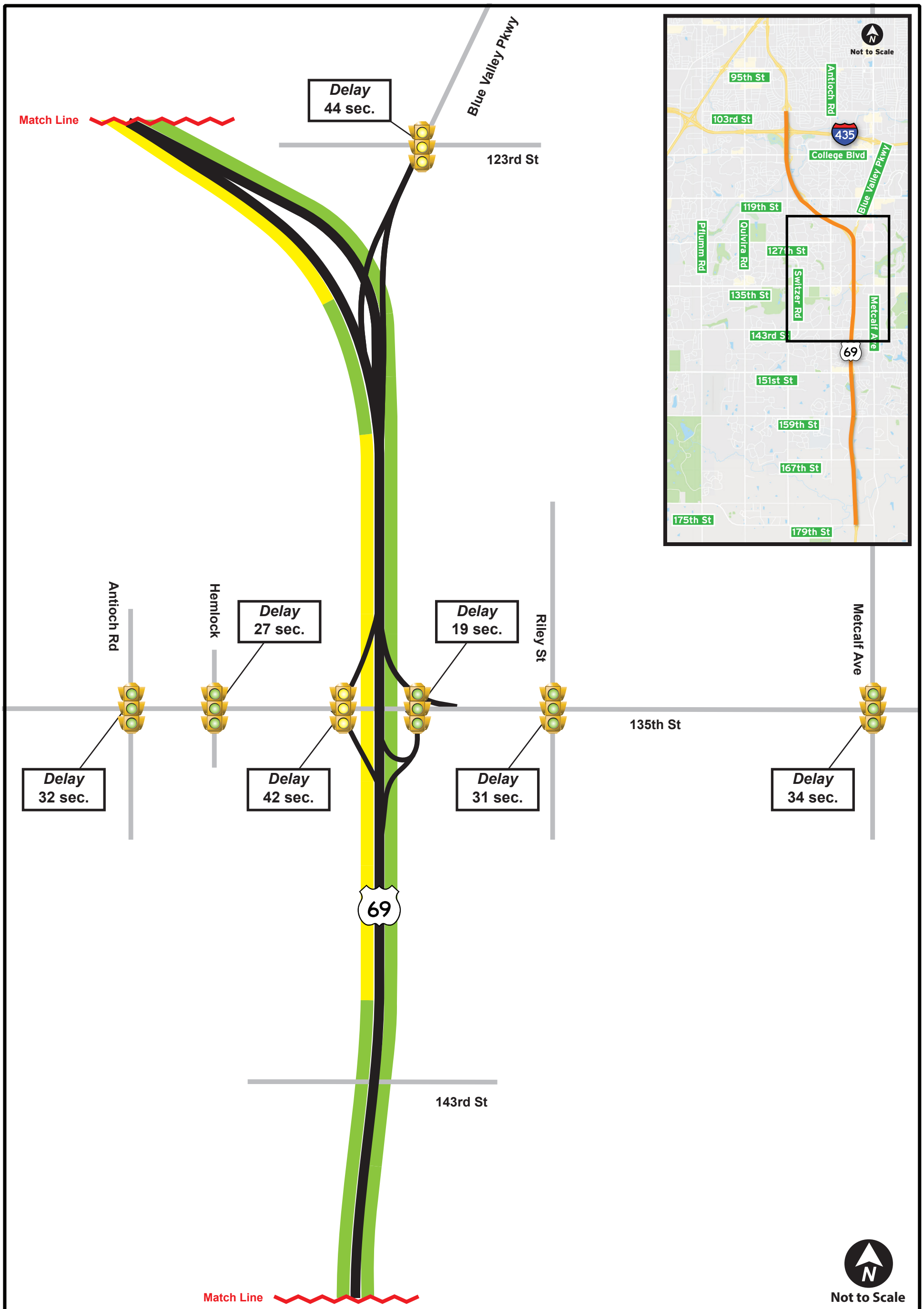

EXHIBIT 23

U.S. 69 Break-in-Access Level of Service 2050 Future-Build PM

Mainline Level of Service

Intersection Level of Service

- STOP A, B or C
- STOP D
- STOP E
- STOP F

Delay (In sec.)

Delay XX sec.

U.S. 69 Modernization and Expansion Project

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Match Line

Not to Scale

151st St

159th St

167th St

179th St

Antioch Ave

Hardy St

Lowell Ave

Shawnee Dr

Newton St

Marty St

Foster

Marty

Metcalf Ave

69

Delay 33 sec.

Delay 31 sec.

Delay 33 sec.

Delay 36 sec.

Delay 16 sec.

Delay 20 sec.

Delay 8 sec.

Delay 48 sec.

Delay 29 sec.

Delay 25 sec.

Delay 14 sec.

Delay 32 sec.

Delay 19 sec.

Delay 25 sec.

Delay 10 sec.

Delay 34 sec.

Delay 6 sec.

Delay 19 sec.

Delay 6 sec.

Delay 26 sec.

Delay 67 sec.

Delay 18 sec.

Delay 7 sec.

Delay 4 sec.

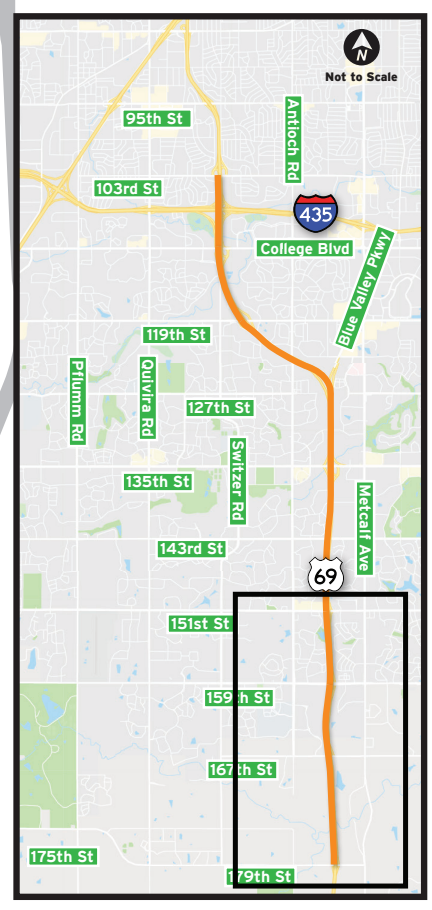


EXHIBIT 24	**U.S. 69 Break-in-Access Level of Service 2050 Future-Build AM**	Mainline Level of Service Intersection Level of Service Delay (In sec.) A, B or C D E F Delay XX sec.	**U.S. 69 Modernization and Expansion Project** 69 EXPRESS October, 2021

Table 11: Traffic Operation Comparisons – Southbound Mainline U.S. 69

		AM												PM											
		2019 Existing			2050 Fututre No-Build			2040 Build			2050 Future Build			2019 Existing			2050 Fututre No-Build			2040 Build			2050 Future Build		
Segement	Type	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS
Southbound U.S. 69																									
Between 95th Ramps	basic	16.3	60.7	B	21.4	58.7	C	21.2	59.2	C	20.7	63.3	C	20.8	67.8	C	228.8	1.0	F	41.6	53.8	E	46.0	39.9	F
95th St Entrance to 103rd Exit	weave	14.2	63.4	B	18.6	62.4	B	18.4	61.9	B	19.3	62.1	B	18.7	68.0	B	222.7	1.3	F	45.6	44.0	F	29.5	57.2	D
103rd to College Frontage Rd (Begin ETL)	basic	12.7	63.3	B	17.1	62.1	B	17.5	62.4	B	17.7	62.6	B	17.4	67.9	B	223.0	1.3	F	28.4	61.7	D	26.5	65.7	D
103th to College Frontage Rd (After ETL Exit)	basic	19.1	63.1	C	25.5	62.3	C	24.7	62.2	C	25.4	62.3	C	26.1	67.9	D	212.0	1.9	F	30.9	65.5	D	30.8	67.2	D
College Frontage Rd Exit	diverge	15.5	63.2	B	20.4	62.7	C	19.3	62.7	B	20.4	62.7	C	21.1	68.0	C	173.8	3.9	F	23.5	66.2	C	25.0	67.2	C
College Frontage Rd Exit to 119th Frontage Rd Exit	basic	14.7	63.4	B	19.5	62.9	C	19.0	63.0	C	19.7	63.1	C	22.2	68.3	C	216.5	1.5	F	24.9	67.6	C	26.2	67.8	D
College Frontage Rd Exit to 119th Frontage Rd Exit (lane add)	basic	9.7	63.8	A	12.9	63.6	B							14.7	68.5	B	149.9	7.7	F						
119th Frontage Rd Exit	diverge	9.7	63.9	A	12.8	63.7	B	19.3	62.1	B	19.3	63.0	B	17.0	60.5	B	150.5	14.3	F	25.0	67.8	C	25.0	66.8	C
119th Frontage Rd Exit to College Fronage Rd Entrance	basic	9.7	63.9	A	13.1	63.8	B	12.9	63.8	B	13.2	63.9	B	61.0	27.7	F	224.3	1.1	F	19.3	68.7	C	24.4	60.3	C
College Frontage Rd Entrance	merge	10.4	63.5	B	13.1	63.1	B	13.3	63.6	B	12.9	63.3	B	72.9	16.1	F	204.6	1.7	F	24.0	58.9	C	74.7	21.3	F
College Frontage Rd Entrance to 119th Entrance	basic	13.0	62.5	B	16.5	61.5	B	16.3	63.0	B	17.0	63.0	B	42.2	30.6	E	174.6	2.3	F	29.1	59.5	D	43.3	43.8	E
College Frontage Rd Entrance to 119th Entrance (lane drop)	basic	19.5	62.2	C	24.8	61.3	C							44.7	42.0	E	160.5	3.7	F						
119th Entrance	merge	18.1	61.0	B	23.4	58.7	C	14.6	61.9	B	15.2	61.7	B	35.9	50.7	E	159.3	4.5	F	24.1	63.7	C	29.0	56.7	D
119th Entrance to Blue Valley Entrance before ETL Ingress only	basic	20.5	62.5	C	26.3	61.5	D	17.6	62.7	B	18.3	62.6	C	52.1	43.7	F	183.0	4.3	F	29.1	64.7	D	32.2	61.8	D
ETL Ingress only	diverge							17.5	63.2	B	18.3	62.9	B							28.6	65.5	D	30.4	65.6	D
119th Entrance to Blue Valley Entrance (Continue)	basic							13.8	63.3	B	14.5	63.2	B							22.4	66.8	C	24.0	66.8	C
Blue Valley Entrance to 135th Exit	weave	15.4	63.5	B	19.9	62.7	B	13.3	63.4	B	14.2	63.3	B	52.9	37.1	F	150.4	9.9	F	28.7	61.0	D	29.8	62.8	D
Between 135th St Ramps	basic	10.0	64.1	A	14.1	63.8	B	11.4	63.9	B	12.5	63.8	B	23.4	64.2	C	14.5	64.4	B	33.6	61.6	D	32.5	64.8	D
135th St Entrance	basic	10.5	61.2	B	16.0	59.1	B	10.5	58.7	B	10.8	61.6	A	30.8	52.3	D	16.4	61.7	B	31.8	60.0	D	28.1	64.0	D
135th Entrance to ETL Weave	basic	12.2	62.6	B	18.2	61.6	C	10.1	60.9	A	10.6	63.2	A	35.4	55.0	E	17.9	65.0	B	34.1	54.1	D	27.4	65.6	D
ETL Weave	weave							9.4	63.7	A	8.2	63.9	A							31.5	55.4	D	23.2	63.4	C
151st Exit	basic	10.9	62.3	B	16.0	61.6	B	9.3	63.4	A	12.6	62.0	B	29.1	56.3	D	16.9	64.0	B	34.9	51.9	D	32.3	59.0	D
Between 151st Ramps	basic	6.3	64.3	A	10.8	63.9	A	11.3	63.4	B	10.8	63.2	A	15.5	68.4	B	11.3	68.8	B	31.3	61.0	D	21.4	66.1	C
151st Entrance to 159th Exit	weave	5.0	64.1	A	8.0	63.8	A	8.4	63.7	A	7.7	63.9	A	11.5	68.6	B	10.6	68.0	B	20.4	66.2	C	14.5	66.6	B
Between 159th Ramps	basic	5.3	64.4	A	7.7	64.0	A	8.4	64.1	A	7.4	64.2	A	11.3	69.0	B	11.0	69.0	B	19.8	67.3	C	11.8	67.0	B
159th Entrance to 167th Exit	weave	4.2	64.2	A	6.9	63.6	A	7.6	64.3	A	6.8	63.6	A	8.5	68.9	A	9.9	68.3	A	15.1	67.5	B	9.5	66.9	A
Between 167th Ramps	basic	4.8	68.6	A	7.8	68.3	A	9.3	65.1	A	8.5	63.8	A	9.0	70.6	A	11.3	70.5	B	15.9	67.6	B	8.2	67.5	A
167th St Entrance	merge							7.2	69.2	A	7.2	67.7	A							13.5	69.2	B	7.6	69.2	A
167th entrance to 179th exit	basic							8.9	71.0	A	8.8	70.8	A							16.9	70.9	B	9.3	71.3	A
Egress zone (End ETL)	basic										6.1	71.1	A										11.8	71.3	B
179th Exit	diverge	4.4	69.2	A	7.8	66.8	A	7.3	70.1	A	5.4	70.3	A	8.2	69.9	A	12.3	67.0	B	13.8	70.8	B	10.7	69.2	B
Between 179th Ramps	basic	3.4	70.6	A	4.5	70.0	A	5.4	70.5	A	5.3	70.2	A	7.1	71.2	A	8.3	70.5	A	12.0	71.1	B	12.2	70.3	B

Source: VISSIM

Table 11 (Cont'd): Traffic Operation Comparisons – Northbound Mainline U.S. 69 and Eastbound and Westbound I-435

		AM												PM											
		2019 Existing			2050 Fututre No-Build			2040 Build			2050 Future Build			2019 Existing			2050 Fututre No-Build			2040 Build			2050 Future Build		
Segement	Type	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS
Norththbound U.S. 69																									
Between 179th Ramps	basic	7.1	71.5	A	189.5	2.0	F	13.6	71.3	B	14.6	71.2	B	4.7	71.7	A	8.4	71.1	A	8.9	71.5	A	8.7	71.5	A
179th Entrance	merge	8.3	70.1	A	186.4	2.5	F	15.8	67.1	B	13.0	67.7	B	5.5	70.0	A	9.5	69.6	A	12.7	66.5	B	8.4	68.9	A
179th Entrance to Start ETL	basic										14.2	69.0	B										9.0	71.1	A
179th entrance to 167th exit	basic	9.5	71.4	A	186.1	2.6	F	17.1	70.9	B	13.0	70.7	B	6.4	69.6	A	11.0	69.3	A	13.6	70.6	B	10.8	71.2	A
167th exit	diverge							14.4	71.1	B	10.9	71.2	B							11.4	70.9	B	9.1	71.2	A
Between 167th Ramps	basic							16.3	70.7	B	12.3	70.9	B							12.6	64.6	B	10.2	64.8	A
167th Entrance to 159th Exit	weave	8.1	69.5	A	106.7	6.4	F	14.1	69.2	B	10.3	69.9	B	5.5	63.8	A	9.6	63.3	A	10.0	63.5	A	8.4	63.2	A
Between 159th Ramps	basic	10.4	71.1	A	182.1	3.1	F	17.7	69.7	B	12.2	70.4	B	7.1	63.9	A	12.1	60.4	B	11.8	63.6	B	9.3	63.5	A
159th Entrance to 151st Exit	weave	14.8	61.4	B	89.1	9.4	F	18.6	66.0	B	14.6	67.8	B	11.9	59.8	B	100.6	14.6	F	12.1	63.2	B	10.7	63.4	B
Between 151st Ramps	basic	67.5	22.6	F	163.5	4.7	F	23.6	64.4	C	17.2	68.9	B	8.1	64.0	A	169.3	4.1	F	13.3	63.0	B	11.0	63.7	A
151st Entrance	merge	109.2	12.3	F	141.5	7.4	F	21.0	64.3	C	21.8	58.6	C	13.7	61.6	B	168.9	5.1	F	14.8	61.2	B	13.9	59.3	B
151st Entrance to ETL Weave	basic	77.1	18.4	F	99.5	11.9	F	18.1	68.9	C	27.3	58.9	D	15.8	63.4	B	162.6	5.6	F	13.2	63.5	B	16.2	63.9	B
ELT Weave Zone	weave										18.1	68.3	B										11.5	64.0	B
ETL Weave to 135th Exit	basic							16.4	68.9	B	23.8	61.5	C							12.4	63.8	B	12.0	63.9	B
135th Exit	diverge	57.8	27.4	F	92.9	14.1	F	16.7	68.4	B	27.2	55.2	C	15.0	61.6	B	154.5	6.0	F	12.4	63.7	B	12.1	63.6	B
135th Exit to 135th EB Entrance	basic	75.9	31.4	F	144.0	10.8	F	18.3	70.6	C	25.0	66.9	C	12.4	63.4	B	176.3	5.8	F	12.9	63.9	B	13.2	63.8	B
135th EB Entrance	merge	67.1	30.1	F	128.6	12.1	F	16.7	68.9	B	21.1	68.4	C	15.3	61.8	B	177.1	5.8	F	16.7	62.7	B	17.1	62.6	B
135th WB Entrance	merge	60.2	31.3	F	78.5	21.3	F							23.4	57.0	C	136.1	8.5	F						
135th WB Entrance to Blue Valley Exit	weave	35.3	56.4	E	66.3	30.0	F	18.4	68.4	B	23.4	66.1	C	30.5	58.6	D	118.8	10.8	F	17.8	62.7	B	18.7	62.3	B
Blue Valley Exit	diverge	33.4	57.3	D	72.4	27.1	F							29.3	58.1	D	121.8	10.4	F						
Blue Valley Exit to 119th Exit	basic	21.0	67.1	C	102.3	13.5	F	20.5	69.9	C	24.8	69.3	C	21.6	62.3	C	141.3	6.9	F	20.4	63.3	C	20.7	63.3	C
ETL Weave Zone	weave							16.9	69.1	B	20.0	67.6	C							16.1	63.3	B	16.6	63.1	B
Blue Valley Exit to 119th Exit (Continue)	basic							19.6	68.6	C	23.9	66.1	C							18.6	63.1	C	19.1	62.9	C
119th Exit	diverge	18.7	67.9	B	96.3	13.3	F	20.0	67.5	B	27.4	59.4	C	24.7	58.3	C	139.4	6.4	F	18.8	62.4	B	19.5	61.7	B
Between 119th Ramps	basic	49.4	32.1	F	113.3	11.6	F	25.0	69.1	C	31.9	64.3	D	33.7	51.6	D	164.6	5.1	F	25.3	62.8	C	26.3	62.4	D
119th Entrance to I-435 Exit	weave	64.3	36.5	F	65.1	36.5	F	19.8	68.1	B	23.4	66.8	C	55.1	39.6	F	156.3	7.0	F	22.1	62.4	C	22.8	62.2	C
College Exit	diverge	31.6	62.2	D	33.0	59.6	D	13.5	67.3	B	15.6	66.7	B	68.4	33.3	F	153.8	6.9	F	16.2	63.5	B	16.4	62.5	B
Between College ramps	basic	30.0	61.4	D	29.6	60.9	D	14.5	70.0	B	15.2	70.0	B	66.6	28.8	F	133.6	8.2	F	17.1	64.5	B	17.5	64.3	B
College EB Entrance	merge	21.9	63.0	C	24.3	59.9	C							61.2	23.4	F	109.3	11.2	F						
College entrance to I-435 EB Frontage exit to I-435 loop ramp	merge	20.2	55.7	C	25.7	47.2	C	15.3	60.8	B	17.2	59.7	B	37.3	32.2	E	113.3	10.1	F	18.9	55.9	B	19.4	56.2	B
I-435 EB Frontage Exit to I-435 Loop Ramps	basic	30.4	58.3	D	33.6	54.9	D							29.4	53.1	D	123.4	24.1	F						
I-435 EB loop ramp	merge	28.0	54.8	D	30.2	53.7	D	22.4	55.6	C	22.5	55.4	C	24.6	53.9	C	98.7	32.2	F	26.4	52.5	C	25.1	53.6	C
I-435 Loop Ramps to I-435 WB Frontage Entrance	basic	22.9	63.5	C	24.8	62.9	C							18.8	61.9	C	18.2	62.1	C						
I-435 WB Frontage Entrance to 103rd Exit	merge	18.0	67.6	B	19.2	67.6	B	22.9	58.8	C	24.1	57.1	C	16.8	62.3	B	16.4	62.9	B	25.7	54.6	C	27.9	53.5	C
Between 103rd Ramps	basic	16.3	64.8	B	17.4	64.8	B	22.9	62.0	C	23.9	61.9	C	13.4	64.1	B	13.4	64.2	B	22.5	61.7	C	23.7	61.5	C
103rd Entrance to 95th Exit	weave	15.3	62.3	B	17.0	60.8	B	20.3	63.0	C	21.2	62.8	C	12.1	62.7	B	12.5	62.0	B	19.2	63.0	B	20.2	63.0	C
Between 95th Ramps	basic	16.2	63.4	B	17.8	63.0	B	22.3	62.5	C	23.2	62.5	C	11.8	63.8	B	12.1	63.7	B	19.7	63.0	C	20.5	62.9	C
Eastbound I-435																									
Quivira Exit to US 69 SB Frontage Rd Exit	diverge	17.7	70.0	B	17.6	69.7	B	23.8	59.6	C	28.2	52.1	D	15.6	71.1	B	92.9	52.1	F	21.9	61.0	C	25.3	55.5	C
US 69 SB Frontage Rd Exit to Quivira Entrance	basic	19.0	70.7	C	20.0	70.5	C	22.4	67.1	C	23.7	64.4	C	14.2	71.3	B	14.3	71.1	B	17.3	68.3	B	18.0	66.9	B
Quivira Entrance to Antioch Frontage Rd Exit	weave	17.7	70.8	B	19.4	69.8	B	20.2	70.0	C	20.9	69.2	C	14.1	71.1	B	15.2	71.1	B	16.6	70.7	B	17.3	70.4	B
Antioch Frontage Rd Exit to US 69 Frontage Rd Entrance	basic	19.9	70.9	C	47.6	43.4	F	22.2	70.7	C	23.1	70.4	C	16.1	71.2	B	17.6	71.2	B	19.1	71.0	C	19.5	70.9	C
US 69 Frontage Rd Entrance	merge	15.3	68.1	B	52.9	23.1	F	21.9	68.6	C	24.4	67.4	C	17.0	65.7	B	14.5	68.3	B	22.9	69.6	C	25.7	67.6	C
Westbound I-435																									
Antioch Exit to US 69 Frontage Rd Exit	diverge	23.2	70.0	C	22.7	70.6	C	26.3	69.2	C	28.3	68.2	D	25.2	70.0	C	26.8	69.7	C	30.8	68.0	D	32.5	66.3	D
US 69 Frontage Rd Exit to Antioch Frontage Rd Entrance	basic	18.4	69.8	C	17.8	70.2	B	22.1	69.2	C	23.0	68.2	C	16.6	70.2	B	17.6	67.8	B	19.1	69.7	C	20.1	69.6	C
Antioch Frontage Rd Entrance to Quivira Frontage Rd Exit	weave	15.7	70.3	B	15.4	71.2	B	18.5	69.5	B	19.1	69.5	B	15.8	70.0	B	16.7	70.4	B	17.9	69.7	B	18.8	70.0	B
Quivira Frontage Rd Exit to US 69 Frontage Rd Entrance	basic	15.8	70.7	B	14.5	71.3	B	17.3	70.5	B	18.2	70.4	C	15.3	71.0	B	16.5	70.9	B	17.7	70.9	B	18.8	70.7	C
US 69 Frontage Rd Entrance	merge	10.5	70.0	B	9.8	70.1	A	12.4	68.1	B	13.5	67.4	B	11.9	69.6	B	11.3	69.9	B	15.2	67.0	B	16.0	66.5	B
US 69 Frontage Rd Entrance to Quivira Entrance	basic	16.5	71.0	B	15.5	71.2	B	18.4	70.9	C	19.9	70.7	C	16.4	71.0	B	16.9	71.0	B	20.1	70.8	C	21.1	70.7	C

Table 12: Traffic Operation Comparisons - Intersections

				AM								PM							
				2019 Existing		2050 FNB		2040 Build		2050 Future Build		2019 Existing		2050 FNB		2040 Build		2050 Future Build	
Intersection Name	**Existing Control Type**	**FNB Control Type**	**Build Control Type**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**	**Delay (s)**	**LOS**
95th and US 69 SB	Signalized	Signalized	Signalized	14.2	B	18.5	B	16.5	B	16.8	B	12.4	B	38.6	D	13.1	B	16.0	B
95th and US 69 NB	Signalized	Signalized	Signalized	14.5	B	15.8	B	16.0	B	17.4	B	16.0	B	16.1	B	18.6	B	18.2	B
103rd & Neiman	Signalized	Signalized	Signalized	1.8	A	3.2	A	2.1	A	2.3	A	2.4	A	4.0	A	2.4	A	2.3	A
103rd and US 69 SB	Signalized	Signalized	Signalized	7.5	A	8.2	A	7.7	A	8.0	A	8.6	A	7.5	A	7.2	A	7.7	A
103rd and US 69 NB	Signalized	Signalized	Signalized	8.2	A	8.1	A	9.3	A	10.2	B	10.2	B	9.9	A	10.0	A	9.2	A
103rd and Mastin	Signalized	Signalized	Signalized	8.3	A	9.9	A	9.4	A	9.3	A	14.4	B	20.1	C	15.1	B	17.1	B
119th and Switzer	Signalized	Signalized	Signalized	45.8	D	269.9	F	24.5	C	32.1	C	22.2	C	93.7	F	23.0	C	31.4	C
119th and Grant	Signalized	Signalized	Signalized	20.7	C	82.4	F	7.8	A	9.6	A	10.3	B	78.9	E	11.9	B	16.5	B
119th and SB US-69	Signalized	Signalized	Signalized	22.4	C	41.6	D	19.4	B	16.3	B	17.8	B	49.5	D	30.2	C	36.0	D
119th and NB US-69	Signalized	Signalized	Signalized	104.0	F	119.6	F	20.2	C	30.7	C	24.0	C	153.2	F	47.5	D	40.0	D
119th and 3 Lakes Parkway	Signalized	Signalized	Signalized	47.1	D	203.3	F	4.1	A	3.8	A	7.7	A	133.2	F	13.3	B	40.7	D
119th and Hayes Street	Signalized	Signalized	Signalized	19.3	B	188.2	F	8.2	A	7.9	A	10.4	B	106.2	F	9.3	A	25.5	C
119th and Antioch	Signalized	Signalized	Signalized	33.1	C	180.3	F	35.0	C	33.7	C	40.8	D	83.7	F	59.9	E	79.3	E
College and Switzer	Signalized	Signalized	Signalized	8.1	A	9.9	A	10.5	B	10.7	B	9.3	A	40.4	D	11.8	B	8.9	A
College and US 69 SB	Signalized	Signalized	-	21.0	C	22.2	C	-	-	-	-	26.0	C	79.3	E	-	-	-	-
College and US 69 NB	Signalized	Signalized	-	9.0	A	13.3	B	-	-	-	-	34.5	C	93.0	F	-	-	-	-
College SPUI	-	-	Signalized	-	-	-	-	26.7	C	30.3	C	-	-	-	-	31.8	C	26.9	C
College and Mastin	Signalized	Signalized	Signalized	28.1	C	35.8	D	23.3	C	22.5	C	28.4	C	176.5	F	47.3	D	22.2	C
123rd St and Blue Valley	Signalized	Signalized	Signalized	36.3	D	37.4	D	35.8	D	36.6	D	31.0	C	272.8	F	27.7	C	44.3	D
135th and Antioch	Signalized	Signalized	Signalized	35.6	D	41.0	D	29.9	C	33.8	C	35.6	D	168.2	F	34.6	C	31.8	C
135th and Hemlock	Signalized	Signalized	Signalized	15.1	B	18.2	B	21.9	C	29.1	C	63.2	E	296.4	F	31.0	C	27.1	C
135th and US 69 SB	Signalized	Signalized	Signalized	18.0	B	31.5	C	18.0	B	20.2	C	76.2	E	265.8	F	35.3	D	41.8	D
135th and US-69 NB	Signalized	Signalized	Signalized	46.4	D	18.5	B	17.4	B	13.1	B	18.1	B	126.3	F	15.2	B	18.6	B
135th and Riley	Signalized	Signalized	Signalized	13.2	B	14.5	B	12.5	B	13.4	B	28.8	C	211.3	F	24.3	C	30.8	C
135th and Metcalf	Signalized	Signalized	Signalized	34.0	C	71.8	E	34.3	C	59.0	E	33.7	C	128.6	F	37.4	D	34.4	C
151st and Antioch	Signalized	Signalized	Signalized	25.5	C	229.3	F	125.9	F	27.1	C	29.7	C	88.8	F	20.4	C	32.9	C
151st and Hardy Street	Signalized	Signalized	Signalized	12.2	B	172.3	F	64.0	E	33.9	C	6.6	A	130.3	F	9.7	A	31.3	C
151st and Lowell	Signalized	Signalized	Signalized	22.4	C	190.9	F	48.8	D	27.1	C	11.1	B	116.8	F	16.4	B	33.2	C
151st and US 69 SB	Signalized	Signalized	Signalized	38.7	D	78.8	E	36.6	D	33.4	C	18.8	B	63.5	E	36.5	D	36.4	D
151st and US 69 NB	Signalized	Signalized	Signalized	61.0	E	158.0	F	117.3	F	34.7	C	42.2	D	203.9	F	30.2	C	15.6	B
151st and Newton	Signalized	Signalized	Signalized	49.0	D	244.9	F	240.9	F	18.4	B	16.1	B	239.1	F	14.0	B	20.3	C
151st and Marty Street	Signalized	Signalized	Signalized	5.4	A	91.8	F	83.8	F	3.1	A	10.2	B	100.5	F	5.6	A	7.9	A
151st and Metcalf	Signalized	Signalized	Signalized	31.8	C	215.3	F	148.5	F	33.2	C	37.9	D	157.4	F	36.2	D	48.2	D
159th and Antioch	Signalized	Signalized	Signalized	13.4	B	171.7	F	20.8	C	20.6	C	18.9	B	27.9	C	29.9	C	28.9	C
159th and Lowell	Signalized	Signalized	Signalized	12.2	B	146.1	F	20.4	C	21.1	C	13.6	B	48.2	D	24.5	C	25.0	C
159th and US 69 SB	Signalized	Signalized	Signalized	14.7	B	78.0	E	30.8	C	17.2	B	17.4	B	50.9	D	28.1	C	32.2	C
159th and US 69 NB	Signalized	Signalized	Signalized	16.6	B	40.3	D	21.9	C	20.3	C	15.2	B	29.0	C	22.6	C	19.4	B
159th and Foster	Signalized	Signalized	Signalized	18.4	B	65.2	E	18.4	B	29.2	C	16.8	B	44.5	D	20.7	C	25.4	C
159th and Marty	Unsignalized	Unsignalized	Signalized	11.3	B	69.0	F	17.3	B	17.6	B	12.8	B	42.3	E	14.7	B	9.8	A
159th and Metcalf	Signalized	Signalized	Signalized	17.0	B	24.7	C	37.3	D	33.1	C	18.0	B	31.1	C	34.7	C	33.5	C
159th and Shawnee Dr	Unsignalized	Unsignalized	Signalized	11.4	B	1386.9	F	10.7	B	5.6	A	21.9	C	1166.1	F	14.4	B	14.1	B
167th and Antioch	Unsignalized	Unsignalized	Roundabout	10.7	B	14.3	B	2.8	A	2.9	A	11.1	B	27.2	D	3.6	A	6.0	A
167th and US 69 SB	Unsignalized	Unsignalized	Signalized	6.2	A	10.1	B	8.3	A	8.2	A	9.8	A	22.0	C	22.2	C	18.6	B
167th and US 69 NB	Unsignalized	Unsignalized	Signalized	2.0	A	4.7	A	3.9	A	4.9	A	1.4	A	18.6	C	8.5	A	6.3	A
167th and Metcalf	Roundabout	Roundabout	Roundabout	1.5	A	6.1	A	4.0	A	3.6	A	2.4	A	92.2	F	20.4	C	25.7	D
179th and US 69 SB	Unsignalized	Signalized	Signalized	10.4	B	120.8	F	21.2	C	19.1	B	10.6	B	106.1	F	49.2	D	18.2	B
179th and US 69 NB	Unsignalized	Signalized	Signalized	14.2	B	149.2	F	24.0	C	23.9	C	13.0	B	31.1	C	22.9	C	7.1	A
179th and Metcalf	Unsignalized	Unsignalized	Roundabout	11.7	B	228.6	F	7.8	A	9.1	A	12.2	B	236.7	F	8.1	A	4.3	A
179th and Antioch	Unsignalized	Unsignalized	Roundabout	12.7	B	1550.3	F	58.7	F	73.8	F	11.9	B	2281.9	F	58.7	F	67.1	F
Quivira and I-435 WB	Signalized	Signalized	Signalized	28.6	C	37.6	D	43.8	D	50.1	D	34.7	C	43.8	D	43.1	D	41.9	D
Quivira and I-435 EB	Signalized	Signalized	Signalized	25.5	C	64.3	E	33.9	C	40.1	D	24.6	C	35.2	D	27.2	C	24.8	C
Antioch and I-435 WB	Signalized	Signalized	Signalized	40.3	D	103.1	F	34.2	C	39.4	D	25.8	C	26.2	C	27.4	C	27.8	C
Antioch and I-435 EB	Signalized	Signalized	Signalized	88.0	F	57.0	E	39.8	D	37.2	D	79.2	E	41.7	D	37.5	D	30.8	C

*Unsignalized intersections report worst movement Delay/LOS

Source: VISSIM

3.4 Base Build 2040 Safety Analysis

In addition to the future predictive safety analysis for the 2050 No-Build and the 2050 Build Alternatives, a future predictive safety analysis was conducted for 2040 , which evaluated proposed Base Year Improvements. **Section 1.5** provides a summary of all the Base Improvements.

Due to limitations of the Highway Safety Manual discussed with the study partners, a predicative crash assessment of the U.S. 69 mainline and along College Boulevard could not be conducted for the 2040 Base Build scenario, as the freeway will be constructed as a buffer separated managed lane facility and the interchange at College Boulevard is being converted to a Single-Point Urban Interchange (SPUI). The FHWA has been made aware of these limitations and has acknowledged a quantitative HSM evaluation of these two roadways is not possible and a qualitative assessment could be provided. Because the qualitative assessment for U.S. 69 and College Boulevard is the same between both 2040 and 2050, there is not a summary in this section. Rather, the qualitative assessment can be found in **Section 3.5**.

However, a predictive crash analysis was performed to evaluate 2040 Base Build conditions along the remaining segments identified within the study limits. **Table 13** shows the results of the 2040 Base analysis when compared to the No-Build. Given the marginal traffic increases in forecasted volumes between the 2050 No-Build and the 2040 Base Improvements, a comparative analysis was deemed suitable.

Table 13: Study Area U.S. 69 and I-435 Crash Comparison – 2050 No-Build and 2040 Base Build

Highway/Ramp/Intersection	Total Crashes			Fatal and Injury Crashes			Property Damage Only		
	FNB	Base	Difference	FNB	Base	Difference	FNB	Base	Difference
I-435 Mainline	35.79	33.33	-2.46	10.91	10.28	-0.63	24.88	23.05	-1.83
I435 EB - CD- US 69 Off Ramp	5.11	5.02	-0.09	1.91	1.86	-0.05	3.20	3.16	-0.04
I435 EB College Blvd Off Ramp	0.39	0.34	-0.05	0.18	0.15	-0.03	0.22	0.19	-0.03
US 69 NB - I435 EB Off Ramp	1.22	1.16	-0.06	0.50	0.47	-0.03	0.72	0.69	-0.03
I435 EB - US 69 NB On Ramp	2.13	1.91	-0.22	0.85	0.76	-0.09	1.28	1.15	-0.13
I435 EB CD Off Ramp	0.75	0.74	-0.01	0.32	0.32	0.00	0.43	0.42	-0.01
I435 WB CD Off Ramp (Mainline)	0.71	1.89	1.18	0.31	0.92	0.61	0.40	0.97	0.57
I435 WB - US 69 NB Off Ramp	3.78	3.43	-0.35	1.56	1.38	-0.18	2.22	2.06	-0.16
I435 WB CD Off Ramp	10.07	0.60	-9.47	4.59	0.25	-4.34	5.48	0.34	-5.14
US 69 NB - I435 WB Off Ramp	2.67	6.38	3.71	1.12	2.49	1.37	1.56	3.90	2.34
I435 WB - US 69 SB Off Ramp	1.68	1.59	-0.09	0.70	0.66	-0.04	0.98	0.94	-0.04
US 69 SB - I435 WB Off Ramp	1.27	1.25	-0.02	0.60	0.59	-0.01	0.67	0.66	-0.01
US 69 SB - CD - I435 EB Off Ramp	7.85	7.35	-0.50	3.11	2.89	-0.22	4.74	4.46	-0.28
US 69 NB 179th St. Off Ramp	0.22	0.18	-0.04	0.10	0.08	-0.02	0.12	0.10	-0.02
US 69 SB 179th St. On Ramp	0.16	0.17	0.01	0.06	0.06	0.00	0.10	0.11	0.01
179th St. (950' west of SB Terminal to 550' east of NB Terminal)	38.22	13.47	-24.75	17.43	5.52	-11.91	20.78	7.94	-12.84
US 69 NB 179th St. On Ramp	0.18	0.32	0.14	0.07	0.13	0.06	0.11	0.19	0.08
US 69 SB 179th St. Off Ramp	0.20	0.42	0.22	0.08	0.17	0.09	0.12	0.25	0.13
US 69 NB 167th St On Ramp	0.18	0.20	0.02	0.07	0.09	0.02	0.10	0.11	0.01
US 69 SB 167th St Off Ramp	0.16	0.23	0.07	0.07	0.11	0.04	0.09	0.12	0.03

Highway/Ramp/Intersection	Total Crashes			Fatal and Injury Crashes			Property Damage Only		
	FNB	Base	Difference	FNB	Base	Difference	FNB	Base	Difference
167th St. (475' west of SB Terminal to 400' east of NB Terminal)	4.67	10.98	6.31	1.47	5.68	4.21	3.21	5.31	2.10
167th St - US 69 SB On Ramp	-	0.04	0.04	-	0.02	0.02	-	0.03	0.03
US 69 NB - 167th St Off Ramp	-	0.10	0.10	-	0.04	0.04	-	0.06	0.06
US 69 NB 151st St Off Ramp	0.51	0.47	-0.04	0.25	0.17	-0.08	0.26	0.3	0.04
US 69 SB 151st St On Ramp	0.41	0.35	-0.06	0.16	0.12	-0.04	0.25	0.24	-0.01
151st St. (Lowell Ave. to Newton Dr.)	39.33	30.12	-9.21	18.30	14.26	-4.04	21.02	15.86	-5.16
US 69 NB 151st St On Ramp	0.99	1.12	0.13	0.37	0.38	0.01	0.62	0.74	0.12
US 69 SB 151st St Off Ramp	0.76	0.72	-0.04	0.39	0.34	-0.05	0.37	0.38	0.01
US 69 NB 135th St Off Ramp	1.13	0.85	-0.28	0.43	0.32	-0.11	0.71	0.53	-0.18
US 69 SB 135th St On Ramp	0.58	1.16	0.58	0.23	0.46	0.23	0.35	0.71	0.36
US 69 NB 135th St On Ramp (loop)	1.77	2.18	0.41	0.66	0.80	0.14	1.12	1.39	0.27
135th St. (Hemlock St. to Riley St.)	154.39	72.58	-81.81	68.20	32.99	-35.21	86.19	39.60	-46.59
US 69 NB 135th On Ramp	2.13	2.17	0.04	0.76	0.82	0.06	1.37	1.34	-0.03
US 69 SB 135th St Off Ramp	2.13	1.60	-0.53	0.90	0.76	-0.14	1.24	0.83	-0.41
US 69 NB 119th St Off Ramp	0.22	0.46	0.24	0.09	0.19	0.10	0.13	0.27	0.14
US 69 SB 119th St On Ramp	0.32	0.61	0.29	0.12	0.21	0.09	0.20	0.40	0.20
119th St. (Grant St. to Farley St.)	56.21	26.04	-30.17	26.41	12.95	-13.46	29.80	13.09	-16.71
US 69 NB 119th St On Ramp	1.48	2.06	0.58	0.52	0.72	0.20	0.96	1.34	0.38
US 69 SB 119th St Off Ramp	0.75	0.96	0.21	0.33	0.47	0.14	0.42	0.49	0.07

Crash results presented are based on the difference in crashes predicted by the IHSDM for the Base year 2040 and the No-Build 2050
Source: FHWA's IHSDM

Roadways with lower predicted crashes under the Base Build Alternative are highlighted in green. A reduction in crashes along a majority of the roadway segments analyzed is predicted when proposed Base Improvements are built. With the exception of the proposed flyover ramp from U.S. 69 northbound to I-435 westbound in the Build Alternative, the I-435 mainline and the surrounding roadway segments are left unimproved. As shown in **Table 13**, variations (positive or negative) in predicted crashes between the No-Build and the Build Alternative on segments outside of the area of influence of the proposed flyover ramp can be attributed to minor changes in traffic volumes between the No-Build and Build.

In the No-Build, drivers access I-435 westbound from U.S. 69 northbound via a posted 25 mph loop ramp. This loop ramp connects to the I-435 westbound C-D road by way of a 400-foot weaving segment before merging with the I-435 westbound off-ramp to Quivira Road approximately 800 feet upstream. Weaving segments require drivers to make necessary lane changes while operating within a confined space without the aid of traffic control devices. Weaving sections have the potential to lead to crashes at higher rates than would be expected during normal freeway driving conditions. When evaluating the impacts of the proposed flyover ramp from U.S. 69 northbound to I-435 westbound, results of the predictive analysis show a 34% decrease in crashes; a net reduction of five crashes per year. This predicted reduction in crashes can be attributed to the elimination of the weaving segment on the I-435 westbound C-D Road, and the redistribution of volumes on the C-D road. As an additional benefit, the proposed flyover ramp eliminates the weaving conflict on the U.S. 69 mainline, between the loop ramps, providing improved traffic flow through the interchange.

Seven arterial streets were evaluated under Build conditions (College Boulevard was excluded from the analysis due to limitations of the HSM); however, no improvements were proposed along 103rd and 159th Streets. Of the five remaining arterials where improvements were proposed, results of the predictive analysis shows that four arterials saw a predicted decrease in crashes, while one (167th Street) saw a predicted increase as a result of proposed improvements. **Table 14** provides a comparison of the No-Build and Build predictive crash results for arterial streets.

Table 14: Study Area Arterial Crash Comparison – 2050 No-Build and 2040 Base Build

Segment	Delta (FNB to Build)			Percent change		
	Total Crashes	F+I Crashes	PDO	Total Crashes	F+I Crashes	PDO
103rd St. (Goddard to Mastin St.)	No Proposed Improvements – No Change In Crashes					
119th St. (Grant St. to Farley St.)	-30.17	-13.46	-16.71	-54%	-51%	-56%
135th St. (Hemlock St. to Riley St.)*	-81.81	-35.21	-46.59	-53%	-52%	-54%
151st St. (Lowell Ave. to Newton Dr.)	-9.21	-4.04	-5.16	-23%	-22%	-25%
159th St. (Shawnee Dr. to Foster St.)	No Proposed Improvements – No Change In Crashes					
167th St. (475' west of SB Terminal to 400' east of NB Terminal)	6.31	4.21	2.10	135%	286%	65%
179th St. (950' west of SB Terminal to 550' east of NB Terminal)	-24.75	-11.91	-12.84	-65%	-68%	-62%

Crash results presented are based on the difference in crashes predicted by the IHSDM for the Base year 2040 and the No-Build 2050
*Lane configuration modified to generate results due to limitations of the IHSDM
F+I represents fatal plus injury crashes. PDO represents property damage only.
Source: FHWA's IHSDM

Under build conditions, total crashes along 167th Street are predicted to increase by 135% with the Build Alternative. In the No-Build, 167th Street is a two-lane arterial providing only partial access to the U.S. 69 mainline. With the improvements proposed under the Build Alternative, 167th Street will be widened to four-lanes (two-lanes each direction) with full access to the U.S. 69 mainline and signal control at the ramp terminals. By increasing the cross-section of the arterial and providing full access at the interchange, the number of conflicting points at the ramp terminals increases, ultimately increasing the potential for more crashes to be experienced at the ramp terminals.

3.5 Ultimate Build 2050 Safety Analysis

Mentioned in Section 3.4, due to limitations of the Highway Safety Manual, a predicative crash assessment of the U.S. 69 mainline and along College Boulevard could not be conducted for the 2050 Ultimate Build scenario, as the freeway will be constructed as a buffer separated managed lane facility and the interchange at College Boulevard is being converted to a Single-Point Urban Interchange (SPUI). The FHWA has been made aware of these limitations and has acknowledged a quantitative HSM evaluation of these two particular roadways is not possible and a qualitative assessment could be provided. However, a predictive crash analysis was performed to evaluate Build conditions along the remaining eight roadway segments identified within the study limits.

Assessment of Highways, Arterials, and Ramps

With minor deviations in traffic volumes between the 2040 and the 2050 Build, results of the predictive analysis generated fairly similar results. A detailed Highway Safety Manual assessment of the predictive crash analysis for all roadway segments evaluated within the No-Build and Build Alternatives can be seen **Table 15.** Roadways with lower predicted crashes under the Build Alternative, indicating a safety benefit, are highlighted in green.

Table 15: HSM Predicted Crashes Per Year – All Segments - No-Build and Build Alternatives

Highway/Ramp/Intersection	Total Crashes			Fatal and Injury Crashes			Property Damage Only		
	FNB	Build	Difference	FNB	Build	Difference	FNB	Build	Difference
I-435 Corridor									
I-435 Mainline	35.79	35.49	-0.30	10.91	10.84	-0.07	24.88	24.65	-0.23
I435 EB - CD- US 69 Off Ramp	5.11	5.29	0.18	1.91	1.98	0.07	3.20	3.31	0.11
I435 EB College Blvd Off Ramp	0.39	0.37	-0.02	0.18	0.17	-0.01	0.22	0.2	-0.02
US 69 NB - I435 EB Off Ramp	1.22	1.23	0.01	0.50	0.5	0.00	0.72	0.73	0.01
I435 EB - US 69 NB On Ramp	2.13	2.05	-0.08	0.85	0.82	-0.03	1.28	1.23	-0.05
I435 EB CD Off Ramp	0.75	0.75	0.00	0.32	0.32	0.00	0.43	0.43	0.00
I435 WB CD Off Ramp (Mainline)	0.71	1.89	1.18	0.31	0.92	0.61	0.40	0.97	0.57
I435 WB - US 69 NB Off Ramp	3.78	3.70	-0.08	1.56	1.52	-0.04	2.22	2.18	-0.04
I435 WB CD Off Ramp	10.07	0.66	-9.41	4.59	0.28	-4.31	5.48	0.38	-5.10
US 69 NB - I435 WB Off Ramp	2.67	6.59	3.92	1.12	2.57	1.45	1.56	4.01	2.45
I435 WB - US 69 SB Off Ramp	1.68	1.71	0.03	0.70	0.71	0.01	0.98	1.00	0.02
U.S. 69 Corridor									
US 69 SB - I435 WB Off Ramp	1.27	1.25	-0.02	0.60	0.59	-0.01	0.67	0.66	-0.01
US 69 SB - CD - I435 EB Off Ramp	7.85	7.81	-0.04	3.11	3.10	-0.01	4.74	4.71	-0.03
US 69 NB 179th St. Off Ramp	0.22	0.18	-0.04	0.10	0.08	-0.02	0.12	0.10	-0.02
US 69 SB 179th St. On Ramp	0.16	0.18	0.02	0.06	0.06	0.00	0.10	0.12	0.02
179th St. (950' west of SB Terminal to 550' east of NB Terminal)	38.22	14.68	-23.54	17.43	6.02	-11.41	20.78	8.66	-12.12
US 69 NB 179th St. On Ramp	0.18	0.35	0.17	0.07	0.14	0.07	0.11	0.21	0.10
US 69 SB 179th St. Off Ramp	0.20	0.43	0.23	0.08	0.17	0.09	0.12	0.25	0.13
US 69 SB 167th St. On Ramp	-	0.05	0.05	-	0.02	0.02	-	0.03	0.03
US 69 NB - 167th St Off Ramp	-	0.11	0.11	-	0.04	0.04	-	0.07	0.07
167th St. (475' west of SB Terminal to 400' east of NB Terminal)	4.67	11.2	6.53	1.47	6.02	4.55	3.21	5.18	1.97
US 69 NB 167th St On Ramp	0.18	0.19	0.01	0.07	0.08	0.01	0.10	0.11	0.01
US 69 SB 167th St Off Ramp	0.16	0.24	0.08	0.07	0.11	0.04	0.09	0.12	0.03
US 69 NB 159th St Off Ramp	0.41	0.41	0.00	0.16	0.16	0.00	0.26	0.26	0.00
US 69 SB 159th St On Ramp	0.61	0.61	0.00	0.22	0.22	0.00	0.39	0.39	0.00
159th St. (Shawnee Dr. to Foster St.)	20.07	20.07	0.00	9.75	9.75	0.00	10.32	10.32	0.00
US 69 NB 159th St On Ramp	0.57	0.57	0.00	0.23	0.23	0.00	0.34	0.34	0.00
US 69 SB 159th St Off Ramp	0.91	0.91	0.00	0.41	0.41	0.00	0.50	0.5	0.00
US 69 NB 151st St Off Ramp	0.51	0.49	-0.02	0.25	0.18	-0.07	0.26	0.32	0.06
US 69 SB 151st St On Ramp	0.41	0.37	-0.04	0.16	0.12	-0.04	0.25	0.25	0.00
151st St. (Lowell Ave. to Newton Dr.)	39.33	30.96	-8.37	18.30	14.68	-3.62	21.02	16.28	-4.74
US 69 NB 151st St On Ramp	0.99	1.13	0.14	0.37	0.38	0.01	0.62	0.75	0.13
US 69 SB 151st St Off Ramp	0.76	0.73	-0.03	0.39	0.35	-0.04	0.37	0.39	0.02
US 69 NB 135th St Off Ramp	1.13	0.88	-0.25	0.43	0.33	-0.10	0.71	0.55	-0.16
US 69 SB 135th St On Ramp	0.58	1.19	0.61	0.23	0.47	0.24	0.35	0.72	0.37
US 69 NB 135th St On Ramp (loop)	1.77	2.27	0.50	0.66	0.83	0.17	1.12	1.44	0.32

Highway/Ramp/Intersection	Total Crashes			Fatal and Injury Crashes			Property Damage Only		
	FNB	Build	Difference	FNB	Build	Difference	FNB	Build	Difference
135th St. (Hemlock St. to Riley St.)	154.39	75.30	-79.09	68.20	34.25	-33.95	86.19	41.05	-45.14
US 69 NB 135th On Ramp	2.13	2.24	0.11	0.76	0.85	0.09	1.37	1.39	0.02
US 69 SB 135th St Off Ramp	2.13	1.67	-0.46	0.90	0.8	-0.10	1.24	0.87	-0.37
US 69 NB 119th St Off Ramp	0.22	0.48	0.26	0.09	0.20	0.11	0.13	0.28	0.15
US 69 SB 119th St On Ramp	0.32	0.63	0.31	0.12	0.22	0.10	0.20	0.41	0.21
119th St. (Grant St. to Farley St.)	56.21	26.65	-29.56	26.41	13.24	-13.17	29.80	13.41	-16.39
US 69 NB 119th St On Ramp	1.48	2.09	0.61	0.52	0.73	0.21	0.96	1.36	0.40
US 69 SB 119th St Off Ramp	0.75	0.99	0.24	0.33	0.48	0.15	0.42	0.51	0.09
103rd St. (Goddard to Mastin St.)	18.20	18.2	0.00	7.48	7.48	0.00	10.72	10.72	0.00
US 69 NB - 103rd St Off Ramp	0.87	0.87	0.00	0.36	0.36	0.00	0.51	0.51	0.00
US 69 SB - CD - 103rd St On Ramp	0.80	0.8	0.00	0.32	0.32	0.00	0.49	0.49	0.00
US 69 SB - CD - 103rd St Off Ramp	0.57	0.57	0.00	0.26	0.26	0.00	0.31	0.31	0.00
US 69 NB - 103rd St On Ramp	0.56	0.56	0.00	0.24	0.24	0.00	0.32	0.32	0.00

Due to HSM methodology and how IHSDM performs calculations Total Crashes, F+I and PDO crashes are separate calculations. Due to this and rounding F+I and PDO might not add up to the Total Crashes Per Year.

*Denotes road segments where no improvements were proposed in the Build Alternative

Source: IHSDM 2021

As previously stated in the 2040 analysis, with the exception of the proposed flyover ramp from U.S. 69 northbound to I-435 westbound in the Build Alternative, the I-435 mainline and the surrounding roadway segments were left unimproved. As shown in **Table 15**, variations (positive or negative) in predicted crashes between the No-Build and the Build Alternative on segments outside of the area of influence of the proposed flyover ramp can be attributed to minor changes in traffic volumes between the No-Build and Build.

When evaluating the impacts of the proposed flyover ramp from U.S. 69 northbound to I-435 westbound, results of the predictive analysis show a 32% decrease in crashes; a net reduction of 4 crashes per year. As previously stated, the predicted reduction in crashes can be attributed to the elimination of the weaving segment on the I-435 westbound C-D Road, and the redistribution of volumes on the C-D road. As an additional benefit, the proposed flyover ramp eliminates the weaving conflict on the U.S. 69 mainline, between the loop ramps, providing improved traffic flow through the interchange.

Crash results for arterials are similar to what is shown in **Section 3.4**. Seven arterial streets were evaluated under Build conditions (College Boulevard was excluded from the analysis due to limitations of the HSM); however, no improvements were proposed along 103rd and 159th Streets. Of the five remaining arterials where improvements were proposed, results of the predictive analysis shows that four arterials saw a predicted decrease in crashes, while one (167th Street) saw a predicted increase as a result of proposed improvements. **Table 16** provides a comparison of the No-Build and Build predictive crash results for arterial streets.

Table 16: Crash Comparison - No-Build and Build

Segment	Delta (FNB to Build)			Percent change		
	Total Crashes	F+I Crashes	PDO	Total Crashes	F+I Crashes	PDO
103rd St. (Goddard to Mastin St.)	No Proposed Improvements – No Change In Crashes					
119th St. (Grant St. to Farley St.)	-29.56	-13.17	-16.39	-53%	-50%	-55%
135th St. (Hemlock St. to Riley St.)*	-79.09	-33.95	-45.14	-51%	-50%	-52%
151st St. (Lowell Ave. to Newton Dr.)	-8.37	-3.62	-4.74	-21%	-20%	-23%
159th St. (Shawnee Dr. to Foster St.)	No Proposed Improvements – No Change In Crashes					
167th St. (475' west of SB Terminal to 400' east of NB Terminal)	6.53	4.55	1.97	140%	310%	61%
179th St. (950' west of SB Terminal to 550' east of NB Terminal)	-23.54	-11.41	-12.12	-62%	-65%	-58%

Crash results presented are based on the difference in crashes predicted by the IHSDM for the year 2050
*Lane configuration modified to generate results due to limitations of the IHSDM
F+I represents fatal plus injury crashes. PDO represents property damage only.
Source: FHWA's IHSDM

Under build conditions, total crashes along 167th Street are predicted to increase by 140% with the Build Alternative. The reason for this is the same as mentioned in **Section 3.4.**

Qualitative Assessment – U.S. 69 and College Boulevard

A quantitative assessment of the U.S. 69 and College Boulevard corridors could not be performed due to limitations of the HSM, however, a qualitative evaluation of the improvements proposed under the Build Alternative was conducted.

In the No-Build, the U.S. 69 mainline is an eight-lane, barrier separated freeway from north of 95th Street to 103rd Street, and a four-lane divided freeway with a grass median from 103rd Street to south of 179th Street. Under the proposed Build Alternative, an additional travel lane in each direction will be added to the corridor from 103rd Street to 179th Street which will operate as an express toll lane.

The presence of the ETL aids in reducing congestion in the toll-free general-purpose lanes (GPL). Results of the traffic analysis showed less congestion when adding an ETL compared to the No-Build. For this reason, reductions in congested-related crashes experienced along the corridor are anticipated. The existence of ETL access points at multiple locations on the U.S. 69 corridor does pose the potential for weaving-related incidents. However, the inability to conduct a predictive analysis doesn't allow for a clear evaluation of this impact.

College Boulevard is currently a six-lane, divided arterial with access to U.S. 69 consisting of a combination of two interchange types. The ramps that serve southbound U.S. 69 traffic consist of a partial single-point urban interchange (SPUI), while the ramps that serve northbound U.S. 69 traffic consist of a partial cloverleaf design where eastbound College Boulevard traffic accesses the highway via a loop ramp and westbound College Boulevard traffic has a free-flow ramp onto U.S. 69.

Under the Build Alternative, the interchange at U.S. 69 is converted to a full SPUI. The existing loop ramp in the southeast quadrant and the free-flow ramp from westbound College Boulevard will be reconstructed to facilitate access to U.S. 69 and I-435. A SPUI improves safety by reducing the number of conflict points and advances operations by allowing more vehicles to clear the interchange in one traffic signal cycle. Opposing left turns can be made simultaneously. The presence of the SPUI eliminates the need for the northbound ramp terminal, which decreases the number of conflict points present along the arterial. It is for this reason that a reduction in crashes experienced along College Boulevard under Build condition compared to the No-Build is anticipated.

3.6 Conceptual Sign Plan and Pavement Markings (Base and Ultimate)

A conceptual signing plan with pavement markings is available in **Appendix C**. The plan shows how the corridor will be signed and marked in the year 2040 and how it will look by 2050 with the Ultimate buildout of the corridor.

3.7 Summary

A traffic operations analysis using VISSIM software shows that I-435 and U.S. 69 will have significantly better operations with the Build Alternative than the No-Build Alternative described in **Section 2.5**. Northbound and southbound U.S. 69 mainlines perform at acceptable LOS in the a.m. peak for both the 2040 Base and 2050 Ultimate. The p.m. peak shows acceptable LOS in the 2040 Base and 2050 Ultimate in the northbound and southbound direction of U.S. 69 mainlines except for select segments on southbound U.S. 69.

- In 2040, the weave from 95th Street to 103rd Street operates at LOS F. This is primarily due to the corridor improvements starting north of 103rd Street and the potential induced demand coming from I-35. The 151st Street arterial operates at LOS E and F due to the northbound entrance ramp to U.S. 69 transitioning from two lanes to one lane prior to merging onto the highway. This is the same ramp configuration as what exists today. Improvements to this ramp are not included in the 2040 Base design, however they are accounted for in 2050.

- In 2050, two locations on southbound U.S. 69 operate at LOS F: the northern portion of the analysis area to 95th Street and the southbound frontage road merge with the U.S. 69 mainline south of College Boulevard. Like in 2040, the poor operations surrounding 95th Street are due to southbound forecasted volumes being higher than capacity. Whether this comes to fruition depends on KDOT's future plans with the I-35 southbound flyover to U.S. 69. The southbound frontage road merge south of College Boulevard delivers high traffic volumes onto the U.S. 69 mainline with vehicles from I-435, 103rd Street and College Boulevard all merging at this point.

The vehicle speeds in the ETLs operate at high speeds during the a.m. and p.m. peak periods of the 2040 Base and 2050 Ultimate Improvements, indicating that they would be a reliable travel option in the

corridor in terms of providing improved traffic operations compared to the No-Build through the year 2050.

A quantitative safety analysis on I-435 and select arterial roadways revealed an overall net reduction in crashes for the Ultimate Build compared to the No-Build. The only area that is expected to see an increase in crashes is on 167th Street and associated ramps to U.S. 69. The reason for this is that 167th Street is currently a two-lane roadway with a partial interchange onto U.S. 69. Improvements to the roadway in the Build Alternative call for two lanes in each direction on 167th Street and an upgrade to a full interchange, increasing traffic volumes and conflict points, thus also increasing predicted crashes. The interchange will however relieve traffic from the adjacent interchange of 159th Street and accommodate future growth in the area.

Due to limitations of the Highway Safety Manual (HSM), a predicative crash assessment of the U.S. 69 mainline and associated ETL's and the College Boulevard arterial could not be conducted for the 2040 and 2050 Build scenarios. This is due to the freeway being constructed as a buffer separated ETL facility and the interchange at College Boulevard is being converted to a Single-Point Urban Interchange (SPUI). The FHWA has been made aware of these limitations and has acknowledged a HSM evaluation of these two roadways is not possible. A qualitative analysis of these two roadways concluded that reductions in congested- and conflict point-related crashes are anticipated in the Build Alternative.

Conceptual signing and pavement marking plans can be found in **Appendix C**.

4.0 Policy Point Two: Access, Movements and Design Standards

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

4.1 Access and Traffic Movements

Any new interchange configurations that are being constructed or modified account for all traffic movements to access the interstate. Although the network immediately surrounding the I-435 mainline is the only area subject to this standard, the project team has decided to adhere to FHWA standards on U.S. 69 within the analysis area. Drivers that choose to use the ETL as they move through a portion of the corridor will still be able to access all arterials intersecting and connecting to U.S. 69.

4.2 Design Standards and Design Exemptions

Geometric layouts of proposed interchange concepts are based on geometric controls and criteria outlined in the following documents:

- 2018 AASHTO Green Book;
- 2014 KDOT Road Manual;
- 2006 AASHTO Roadside Design Guide.

The design criteria establish basic thresholds to guide the development and evaluation of interchange concepts for this BIA. A list of the design criteria can be found in **Appendix C**. The design of the corridor will meet or exceed the standards, listed above, in most cases. There are instances where design exceptions are needed. These are listed in **Table 17**.

Table 17: Design Exceptions

Exception #	Location	Description	Criteria	Exception	Reason
1	I-435	Shoulder Width	10' (3.0m to match existing)	5.0' (median shoulder, min at pier location)	Localized to flyover bridge pier (~270'), to meet would require shifting and reconstruction/widening of all I-435 lanes including parallel ramp lanes through the U.S. 69 bridge group (~1800', 4 lanes EB, 4-5 lanes WB + ramp lane).
2	Ramp 69N-435W	Horizontal Stopping Sight Distance	Min 425' (50mph)	283' (38.0mph)	Cost prohibitive to widen bridge to obtain HSSD for 50mph. Greenbook value for lower range of allowable ramp speeds with mainline at 70mph is 35mph
3	Ramp 69N-435E	Horizontal Stopping Sight Distance	Min 425' (50mph)	350 (44.2mph)	Improvements are matching existing conditions and it's cost prohibitive to widen a retaining wall. Greenbook value for lower range of allowable ramp speeds with mainline at 70mph is 35mph
4	U.S. 69	Shoulder Width	12'	8' (median shoulder)	Existing and future I-435 flyover bridge piers restrict ability to obtain full shoulder width while also accommodating express lane buffer (~900')
5	U.S. 69	Shoulder Width	12'	8' (median shoulder)	Existing infrastructure restricts ability to obtain full shoulder width while also accommodating express lane buffer (~1200' at north end of ETL)
6	U.S. 69	Shoulder width	12'	7' (southbound outside), 11' (southbound inside)	Existing bridge piers over 132nd St., bridge is not being replaced.
7	U.S. 69	Shoulder width	12'	10' (southbound outside), 10' (southbound inside), 8' (northbound outside)	Existing bridge piers over Antioch Rd., bridge is not being replaced.
8	U.S. 69	Maximum Grade	Max 3%	4.56% (match existing)	Avoid excessive fill at Indian Creek or excessive cut at 119th.
9	Interim Ramp 69N-435W	Maximum Grade	Max 5%	6.00%	Utilized to match with existing grade (loop ramp)
10	Ramp 435E-69N	Maximum Grade	Max 5%	6.00%	Utilized to tie in with US 69N (loop ramp)
11	Ramp 69N-119th	Maximum Grade	Max 5%	6.50%	Avoid excessive grading impacts and tie into 119th St
12	Ramp 119th-69S	Maximum Grade	Max 5%	6.00%	Avoid excessive grading impacts and tie into 119th St
13	135th St.	Minimum Grade	Min 1%	0.50%	Matching existing grade
14	U.S. 69 (Northbound)	Horizontal Stopping Sight Distance	Min 730' (70mph)	567' (59.8mph)	To meet min, would need 26' inside shoulder or flatten curve & lengthen bridges substantially (ROW impacts). Meets criteria for 59mph, will be posted 65mph

FHWA Standard / KDOT Standard

Sources: 2018 AASHTO Green Book, 2014 KDOT Road Manual, 2006 AASHTO Roadside Design Guide

4.3 Special Considerations

The inclusion of ETL's on U.S. 69 will require additional wayfinding signage to inform drivers how to maneuver through the corridor if they decide to use the ETL or the general-purpose lanes. Additionally, the proposed design considers ETL entry and exit points to provide sufficient distances for a vehicle to safely maneuver from merge (ramp entry) lanes to the ETL or from the ETL to diverge (exit) lanes. Double-line white striping, clearly marked entry and exit points and wayfinding signage are included in the design to ensure that drivers can access all arterial roadways in enough time if they are using ETL's.

5.0 Conclusion

5.1 Recommendation for Safety, Operations and Engineering Acceptability

The analysis in the sections above show that the 2040 Base and 2050 Ultimate Build configuration will operate more efficiently and not increase the likelihood of total crashes compared to the No-Build Alternative. The 2040 Base and 2050 Ultimate designs adhere to current state and Federal design standards, connect to public roadways only and accommodate all traffic movements.

5.2 NEPA Considerations

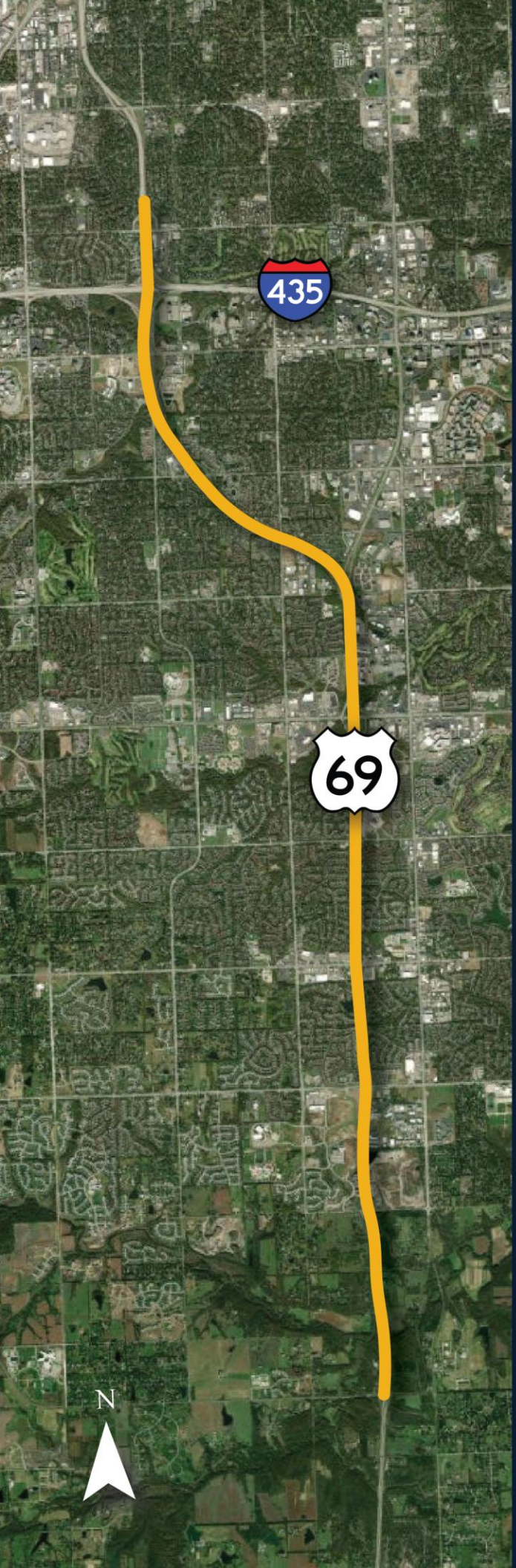
An environmental assessment (EA) is being prepared concurrent to this document. The following BIA is considered a supporting document to the EA. Per the updated 2017 FHWA guidance, policy points that were once addressed in the previous 2009 Access to the Interstate Policy are now addressed in the EA.

5.3 Next Steps

The FHWA will consider the BIA for conditional approval. Final approval of the BIA is contingent upon the approval of the EA.

Appendix A – Traffic and Safety Supporting Data

- *Existing/FNB/Build Traffic Volumes*
- *Anticipated Travel Changes with Express Toll Lanes Memorandum*
- *Safety Analysis Technical Memorandum*
- *Break-In-Access Methodology and Assumptions Technical Memorandum*
- *VISSIM Output Results – available upon request*



69 EXPRESS

US 69 EXPANSION PROJECT

2019 Existing,
2050 Future No-Build,
2040 Future Base Build and,
2050 Ultimate Build

Balanced Traffic Volumes
Daily, AM and PM Peak Hour

October 2021

FINAL

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2050 Future Year Build Balanced Peak Hour Volumes – Trucks Only 106

2019 Existing Balanced Daily Volumes and Truck Percentages

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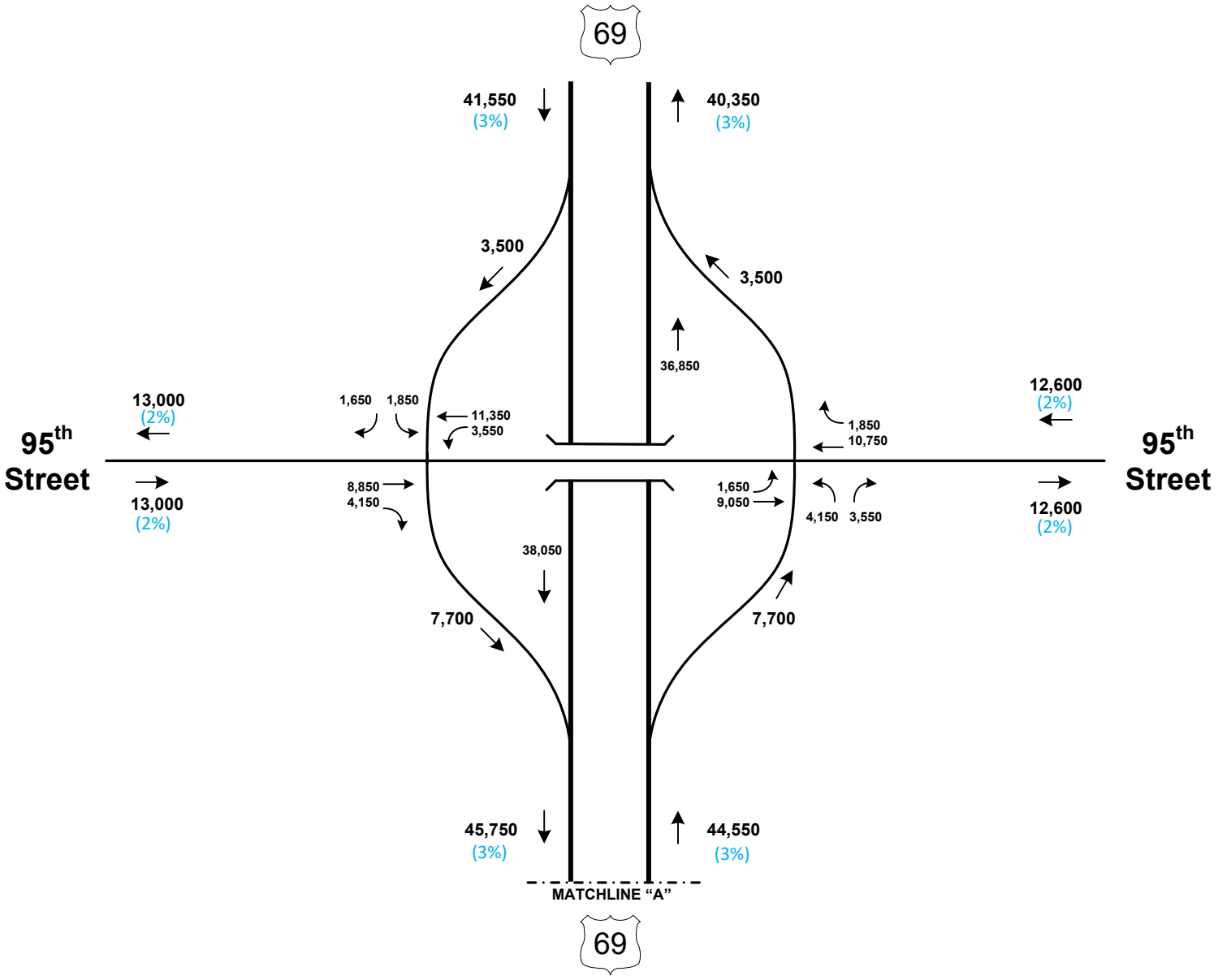

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2019 Balanced Daily Traffic Volumes

Johnson County, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 1

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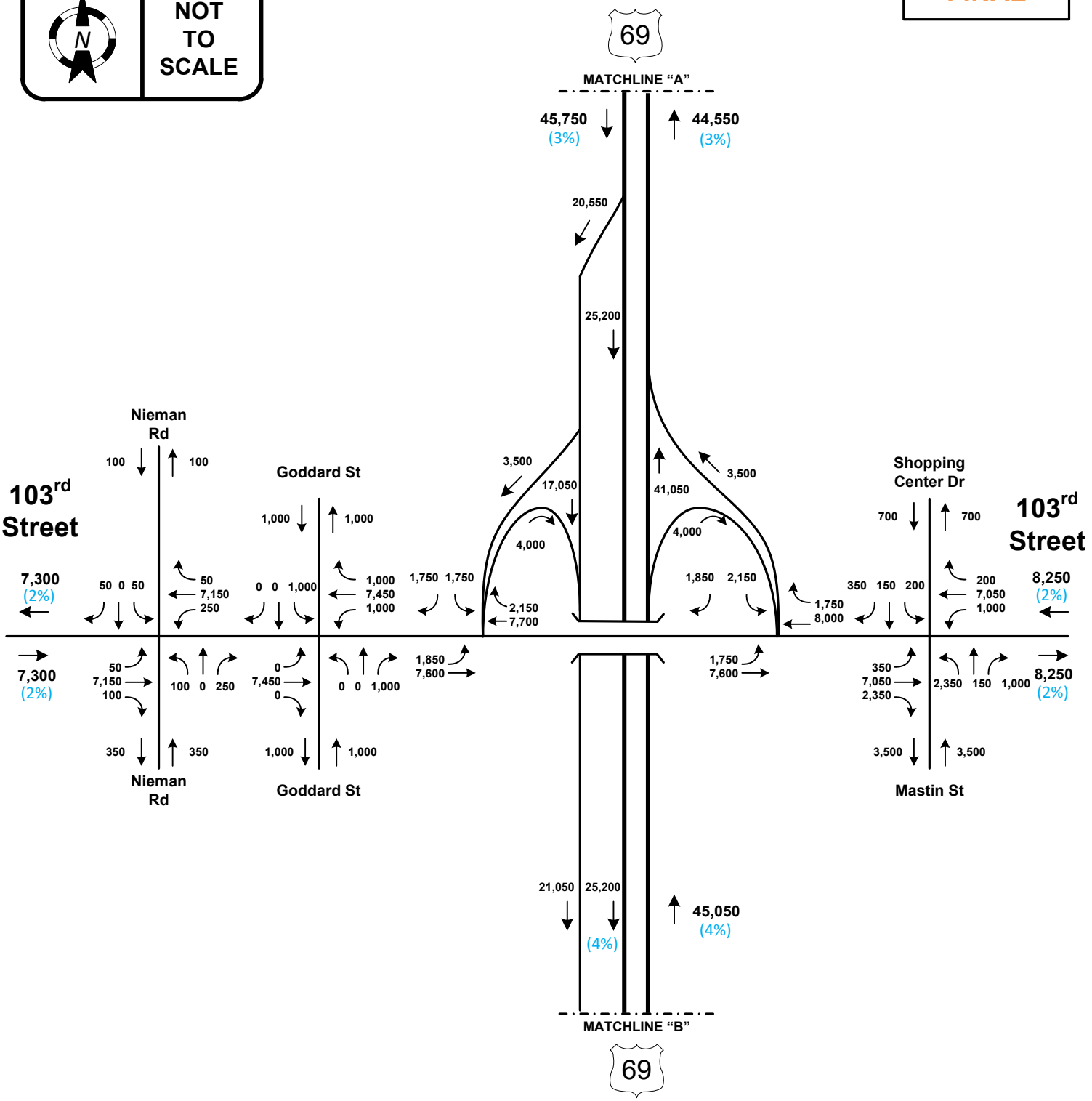

LEGEND

XX = Daily Traffic Volume Estimates

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= Bridge structure

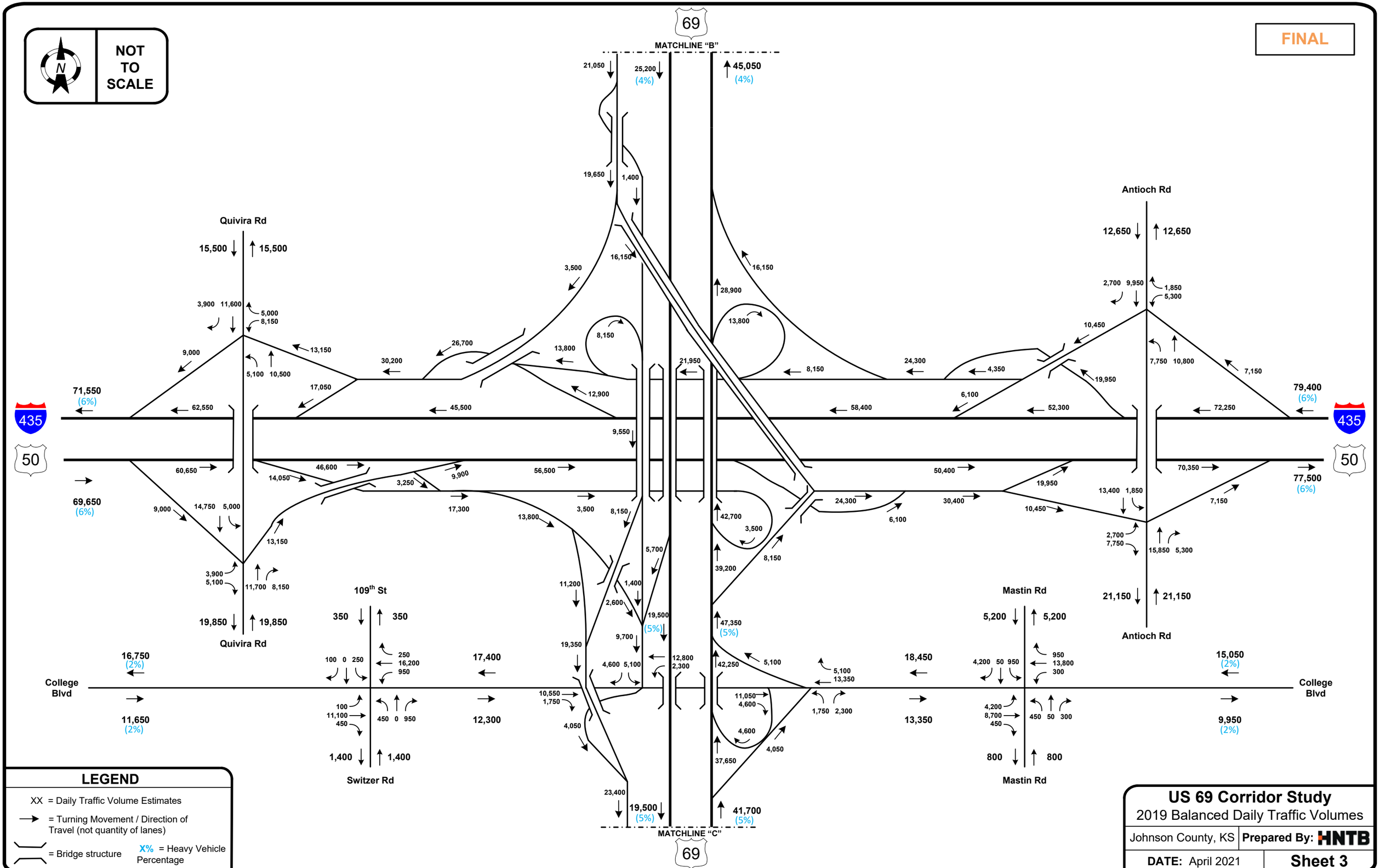
X% = Heavy Vehicle Percentage

US 69 Corridor Study

2019 Balanced Daily Traffic Volumes

Johnson County, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 2


NOT TO SCALE
FINAL
69
MATCHLINE "B"
MATCHLINE "C"
Quivira Rd
Antioch Rd
Mastin Rd
109th St
Switzer Rd
College Blvd
435
50
21,050
25,200
(4%)
45,050
(4%)
19,650
1,400
16,150
3,500
28,900
13,800
8,150
21,950
24,300
4,350
10,450
2,700
9,950
1,850
5,300
7,750
10,800
7,150
19,950
6,100
52,300
72,250
58,400
8,150
13,800
12,900
9,550
56,500
3,500
8,150
42,700
3,500
39,200
8,150
5,700
1,400
2,600
19,500
(5%)
9,700
12,800
2,300
4,600
5,100
47,350
(5%)
42,250
5,100
5,100
13,350
1,750
2,300
11,050
4,600
4,600
4,050
37,650
23,400
19,500
(5%)
41,700
(5%)
15,850
5,300
21,150
21,150
5,200
5,200
18,450
13,350
4,200
50
950
950
13,800
300
4,200
8,700
450
450
50
300
800
800
15,050
(2%)
9,950
(2%)
16,750
(2%)
11,650
(2%)
17,400
12,300
350
350
100
0
250
250
16,200
950
100
11,100
450
450
0
950
1,400
1,400
10,550
1,750
4,050
19,350
11,200
3,900
5,100
11,700
8,150
19,850
19,850
3,900
5,100
13,150
9,000
14,750
5,000
60,650
69,650
(6%)
62,550
71,550
(6%)
9,000
3,900
11,600
5,000
8,150
5,100
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13,150
17,050
30,200
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45,500
46,600
14,050
3,250
9,900
17,300
13,800
13,800
8,150
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21,950
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50,400
24,300
6,100
30,400
19,950
10,450
13,400
1,850
2,700
7,750
70,350
7,150
77,500
(6%)
79,400
(6%)
7,150
10,800
7,750
19,950
6,100
52,300
72,250
45,500
30,200
26,700
13,800
8,150
21,950
24,300
4,350
10,450
2,700
9,950
1,850
5,300
3,500
16,150
16,150
28,900
13,800
8,150
3,900
11,600
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9,000
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5,100
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4,050
11,050
4,600
4,600
4,050
1,750
2,300
4,200
8,700
450
450
50
300
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800
3,900
5,100
11,700
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19,850
5,200
5,200
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50
950
950
13,800
300
4,200
8,700
450
450
50
300
2,700
7,750
15,850
5,300
21,150
21,150
LEGEND
XX = Daily Traffic Volume Estimates
= Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure
X% = Heavy Vehicle Percentage
US 69 Corridor Study
2019 Balanced Daily Traffic Volumes
Johnson County, KS
Prepared By: HNTB
DATE: April 2021
Sheet 3

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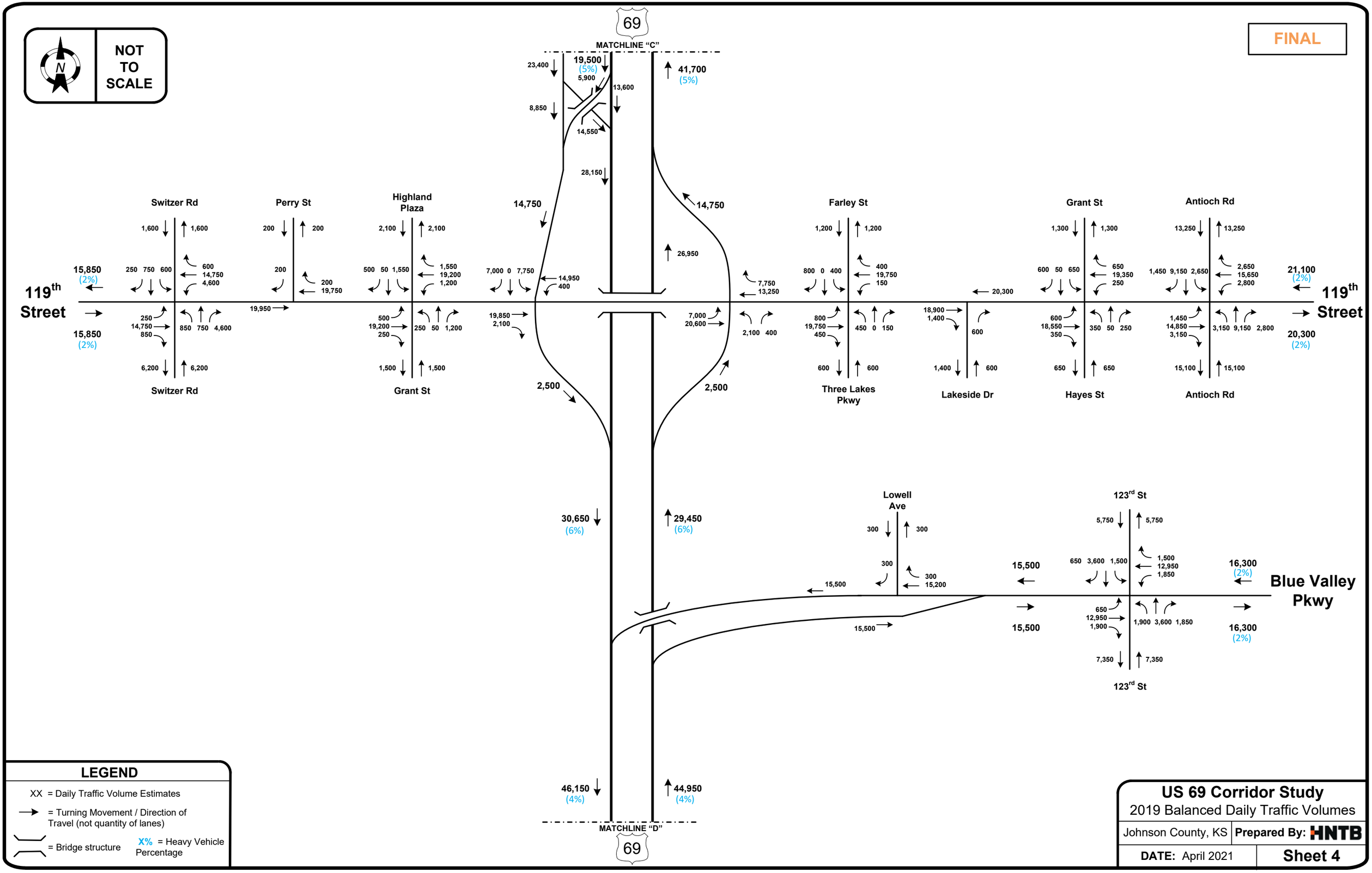

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2019 Balanced Daily Traffic Volumes

Johnson County, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 4

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FINAL

MATCHLINE "D"

69

46,150 (4%)

44,950 (4%)

21,000

13,400

25,150

31,550

135th Street

17,600 (2%)

18,300 (2%)

Antioch Rd

Overland Pointe Marketplace

B&B Theatre

Hemlock St

BP Gas Station

Riley St

Mazuma Credit Union

Metcalf Ave

21,700 (2%)

21,200 (2%)

6,800

23,950

31,950 (6%)

30,750 (6%)

13,700

17,050

23,400 (6%)

22,200 (6%)

5,150

18,250

SEE INSET A

SEE INSET B

151st Street

13,900 (2%)

13,500 (2%)

Shopping Center

McDonald's

Lowell Ave

Tay's Burger Shack

Dunkin Donuts

Ace Hardware 1

Ace Hardware 2

17,650 (2%)

17,650 (2%)

MATCHLINE "E"

69

INSET A

Walgreens

Trailwinds Center

Hardy St

Jiffy Lube

Target / Starbucks / Chipotle

INSET B

Newton Dr

USPS Driveway

Marty St

CVS Driveway

Conser St

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2019 Balanced Daily Traffic Volumes

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69

MATCHLINE "E"

159th Street

Antioch Rd

Grace Church

Lowell Ave

Shawnee Dr

Foster St

Marty St

Walmart

Metcalf Ave

Marty Ln

167th Street

APAC Driveway

179th Street

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2019 Balanced Daily Traffic Volumes

Johnson County, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 6

2019 Existing Balanced Peak Hour Volumes – All Vehicle Classes

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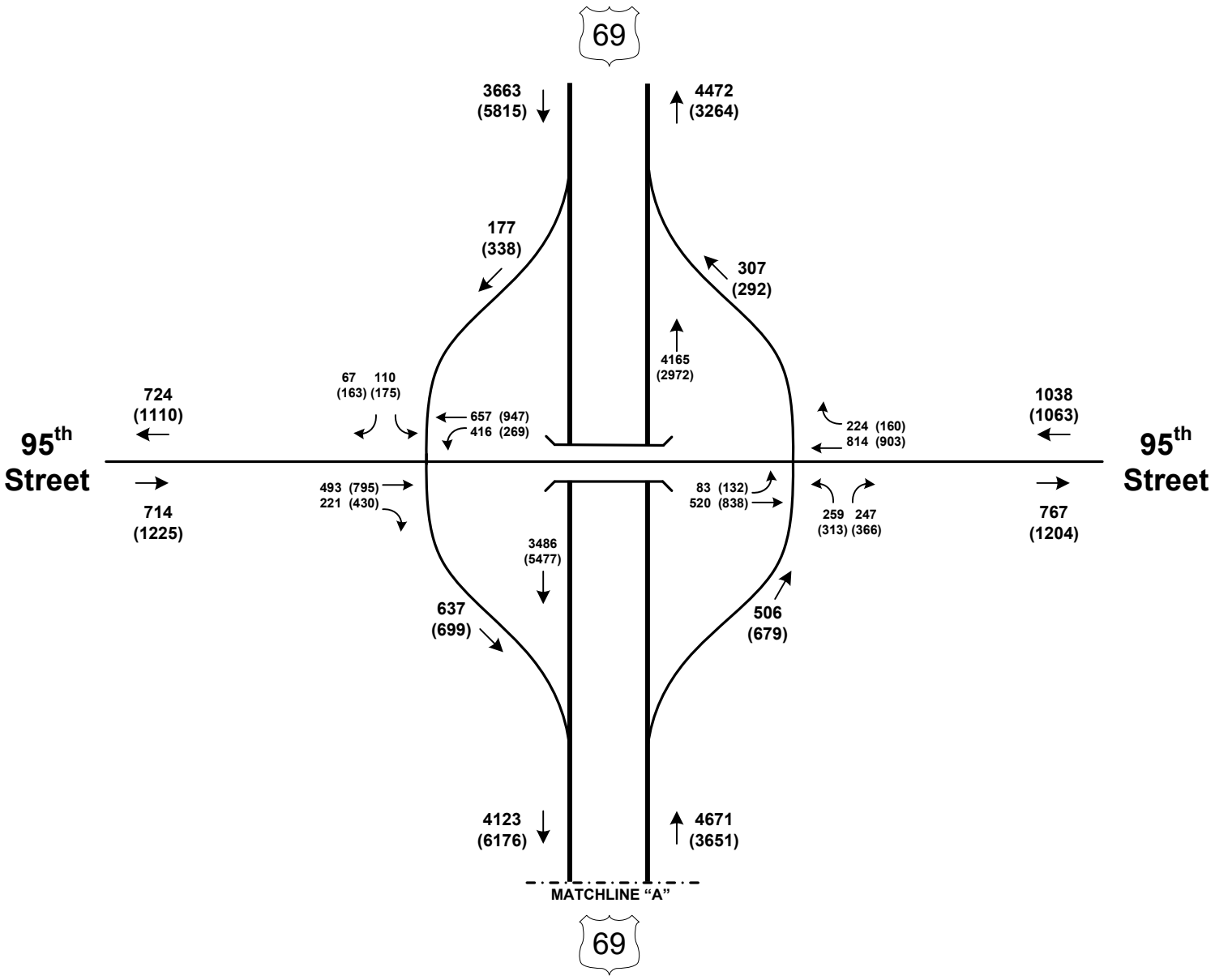


LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

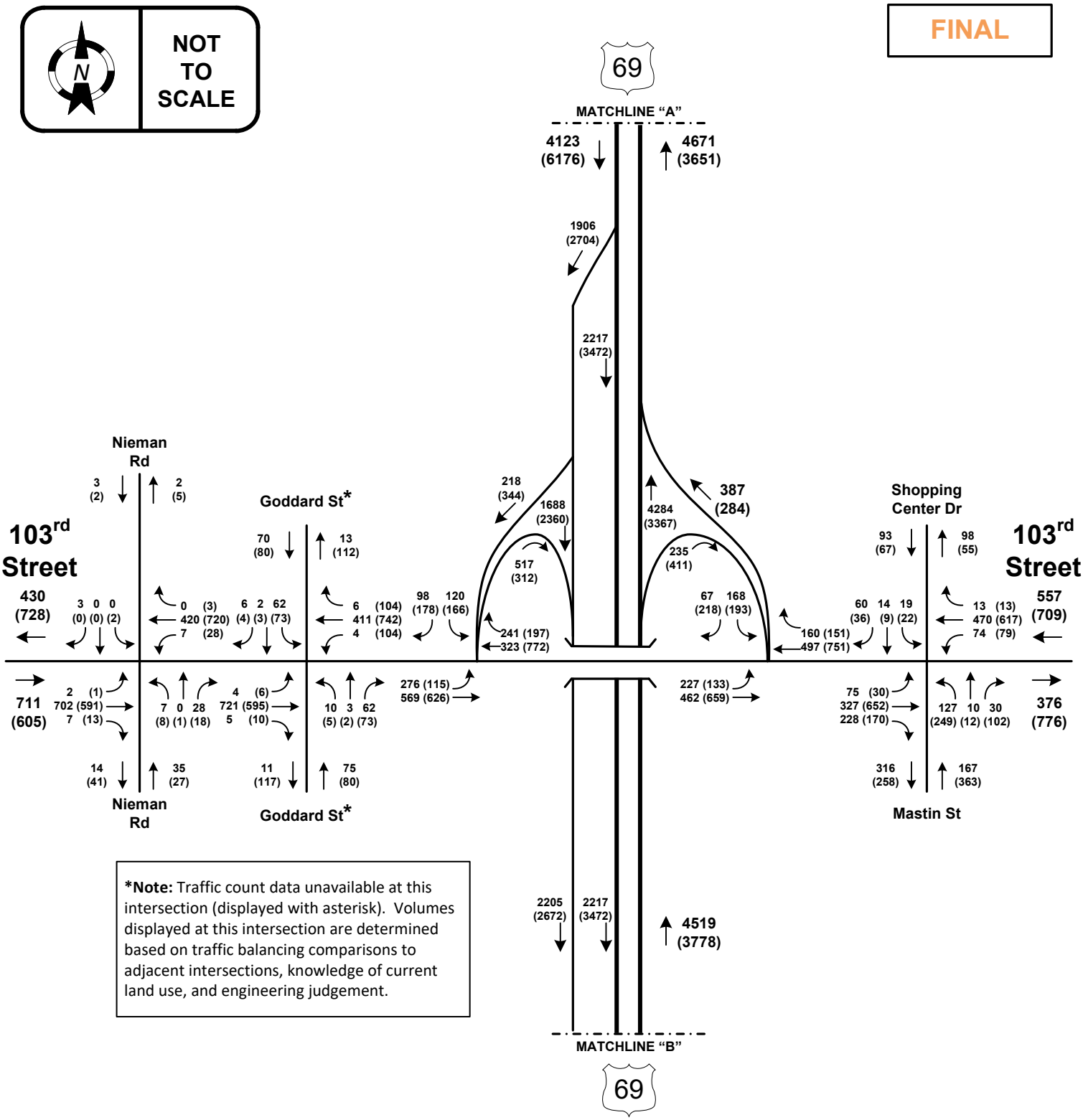
= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Volumes

Overland Park, KS | **Prepared By:** HNTB

DATE: April 2021 | **Sheet 1**


NOT TO SCALE
FINAL
69
MATCHLINE "A"
4123 (6176)
4671 (3651)
1906 (2704)
2217 (3472)
Nieman Rd
Goddard St*
103rd Street
Shopping Center Dr
103rd Street
218 (344)
1688 (2360)
4284 (3367)
387 (284)
517 (312)
235 (411)
241 (197)
323 (772)
160 (151)
497 (751)
430 (728)
557 (709)
711 (605)
376 (776)
276 (115)
569 (626)
227 (133)
462 (659)
Nieman Rd
Goddard St*
Mastin St
2205 (2672)
2217 (3472)
4519 (3778)
MATCHLINE "B"
69
*Note: Traffic count data unavailable at this intersection (displayed with asterisk). Volumes displayed at this intersection are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.
LEGEND
XX (XX) = AM (PM) Peak Hour Volumes
= Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure
US 69 Corridor Study
2019 Balanced Peak Hour Volumes
Overland Park, KS
Prepared By: HNTB
DATE: April 2021
Sheet 2

NOT TO SCALE

FINAL

69

MATCHLINE "B"

2205 (2672)
2217 (3472)
4519 (3778)
2036 (2536)
169 (136)
379 (265)
1657 (2271)
1513 (1494)
3006 (2284)
1038 (1218)
670 (873)
1083 (1258)
2217 (2422)
2596 (2687)
1753 (2131)
715 (913)
2228 (2407)
371 (403)
1857 (2004)
222 (777)
4890 (4538)
5112 (5315)
1134 (1164)
839 (1009)
3978 (4151)
6747 (6542)
7660 (7178)
6271 (6534)
5692 (5615)

Quivira Rd

992 (1430)
964 (1364)
190 (373)
802 (1057)
278 (418)
604 (805)
579 (919)
389 (546)
686 (946)
882 (1223)
1714 (1464)

Antioch Rd

1102 (867)
614 (1407)
224 (169)
878 (698)
98 (212)
815 (424)
593 (1180)
369 (1011)
516 (1195)
913 (636)

435

50

5934 (5599)
1068 (1578)
4866 (4021)
767 (250)
820 (891)
5686 (4912)
5214 (4587)
1860 (2628)
7074 (7215)
7859 (7870)
6780 (6304)
846 (705)
956 (1380)
450 (482)
1587 (1141)
1835 (1828)
384 (369)
1451 (1459)
463 (875)
4044 (3502)
384 (369)
2446 (3006)
472 (325)
2918 (3331)
1058 (703)
1309 (998)
384 (124)
785 (655)
3660 (3133)
789 (735)
134 (319)
924 (384)
751 (1887)
401 (531)
236 (331)
610 (374)
839 (1161)
1137 (659)
518 (511)
376 (134)
333 (275)
1118 (1184)
1699 (2961)
4449 (3868)
1227 (920)
1581 (2059)
760 (1515)
37 (318)
499 (573)
728 (347)
4195 (3309)
254 (559)
254 (559)
534 (1444)
1617 (862)
433 (252)
433 (252)
529 (584)
3762 (3057)
263 (389)
266 (195)
1322 (767)
80 (130)
117 (448)
1698 (2507)
1699 (2961)
4291 (3641)

Mastin Rd

2233 (1382)
1152 (2418)
91 (714)
97 (220)
58 (589)
14 (8)
19 (117)
13 (55)
603 (1372)
74 (35)
74 (164)
1582 (852)
227 (41)
127 (42)
10 (1)
30 (20)
315 (84)
167 (63)

Antioch Rd

109th St

27 (29)
29 (32)
4 (8)
0 (0)
23 (21)
7 (22)
1237 (1950)
15 (116)
19 (9)
1225 (822)
28 (57)
48 (27)
3 (1)
154 (54)
43 (173)
205 (82)

Switzer Rd

College Blvd

1289 (1985)
1272 (888)
1259 (2088)
1402 (897)
788 (2003)
1883 (1057)
690 (1462)
1631 (989)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

MATCHLINE "C"

69

US 69 Corridor Study

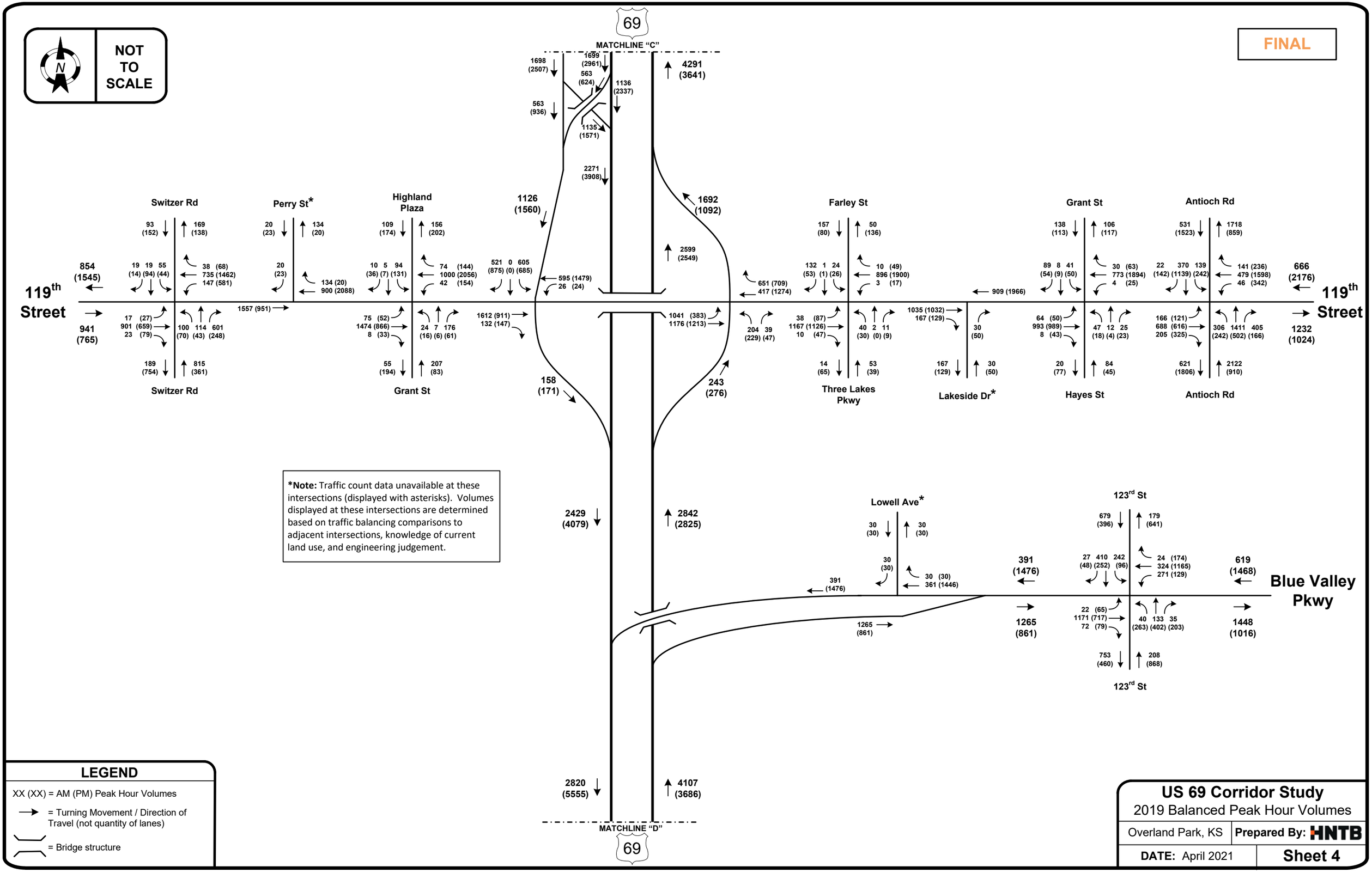
2019 Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 3

NOT TO SCALE

FINAL



***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 4

NOT TO SCALE

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FINAL

MATCHLINE "D"

69

2820 (5555)
4107 (3686)
1568 (2451)
1203 (1317)
1252 (3104)
2904 (2369)
748 (1028) 820 (1423)
857 (1308)
145 (287)
1203 (1317)
742 (1386)

135th Street

899 (1877)
1307 (1072)
1355 (1780)
1264 (1639)

Antioch Rd
440 (1083)
961 (622)
90 (250) 169 (560) 181 (273)
137 (139)
721 (1494)
85 (197)
316 (152)
941 (836)
50 (84)
88 (133) 508 (331) 63 (70)
304 (841)
659 (534)
Antioch Rd

Overland Pointe Marketplace*
57 (50)
57 (50)
943 (1830)
1155 (1129)
30 (50)
30 (50)
B&B Theatre*

Hemlock St
221 (653)
515 (468)
37 (167) 12 (141) 172 (345)
391 (329)
961 (1688)
208 (358)
82 (92)
1064 (1024)
9 (13)
2 (25) 42 (47) 287 (270)
229 (512)
331 (342)
Hemlock St

BP Gas Station*
30 (89)
75 (50)
30 (89)
75 (50)
1530 (2286)
1523 (1639)
1369 (1304)
154 (335)

Riley St
169 (382)
269 (269)
130 (277) 11 (31) 28 (74)
58 (59)
1715 (2240)
14 (54)
201 (199)
1679 (1636)
75 (281)
100 (186) 10 (11) 16 (56)
100 (366)
126 (253)
Riley St

Mazuma Credit Union*
50 (50)
50 (50)
1787 (2353)
1723 (1766)

Metcalf Ave
1422 (1444)
1157 (582)
87 (488) 115 (619) 63 (337)
126 (38)
1169 (1551)
60 (191)
395 (193)
1058 (1180)
270 (393)
581 (364) 636 (351) 143 (122)
445 (1203)
1360 (837)
Metcalf Ave

1599 (1909)
590 (818)
590 (818)
2314 (1551)
616 (416)
260 (209) 356 (207)
299 (622)

1551 (3726)
2930 (1967)
707 (1591)
1190 (954)
1740 (1013)
531 (582)
607 (1070)
659 (372)
854 (1524)
112 (199) 214 (230)
844 (2135)
192 (333)
326 (429)
1036 (2468)
2066 (1442)

151st Street

673 (1406)
842 (661)
882 (1238)
836 (1563)

SEE INSET A

Antioch Rd
262 (574)
552 (507)
53 (172) 104 (195) 105 (207)
202 (166)
568 (1152)
67 (116)
145 (79)
640 (519)
57 (63)
52 (82) 205 (262) 99 (102)
228 (374)
356 (446)
Antioch Rd

Shopping Center
115 (166)
62 (85)
27 (19) 8 (22) 80 (125)
21 (50)
764 (1545)
87 (238)
29 (22)
865 (882)
28 (32)
36 (35) 12 (13) 206 (195)
123 (292)
254 (243)
Lowell Ave

McDonald's*
10 (10)
10 (10)
10 (10)
10 (10)
862 (1823)
1151 (1202)
1074 (1054)
77 (148)

Tay's Burger Shack*
10 (10)
20 (20)
10 (10)
10 (10)
1128 (1642)
1058 (1744)
10 (10)
10 (10)
10 (10)
20 (20)
10 (10)
20 (20)
Ace Hardware 1*

Dunkin Donuts*
20 (20)
10 (10)
20 (20)
10 (10) (10)
1118 (1632)
10 (10)
20 (20)
10 (10)
Ace Hardware 2*

SEE INSET B

Metcalf Ave
384 (825)
589 (705)
163 (316) 143 (381) 78 (128)
53 (68)
656 (926)
173 (244)
226 (285)
576 (1218)
136 (87)
235 (243) 310 (352) 182 (217)
452 (712)
727 (812)
Metcalf Ave

268 (749) 439 (842)
604 (1084)
115 (185)
1074 (1054)
77 (148)
659 (372)
854 (1524)

MATCHLINE "E"

69

INSET A

Walgreens*
20 (30)
20 (30)
20 (30)
20 (30)
817 (1404)
824 (798)
20 (30)
20 (60)
20 (30)
20 (60)
Jiffy Lube*

Trailwinds Center*
105 (80)
46 (90)
55 (20) 20 (30) 30 (30)
6 (30)
752 (1384)
30 (30)
20 (30)
794 (788)
30 (40)
30 20 30
(30) (30) (60)
80 (100)
80 (120)
Target / Starbucks / Chipotle*

Hardy St
99 (177)
50 (235)
5 (27) 9 (24) 85 (126)
33 (169)
777 (1379)
17 (51)
17 (56)
832 (773)
5 (49)
6 0 5
(38) (10) (37)
31 (124)
11 (85)
Hardy St

INSET B

Newton Dr
88 (98)
121 (242)
6 (21) 7 (3) 75 (74)
50 (83)
890 (1372)
55 (97)
60 (152)
976 (1527)
32 (75)
242 11 29
(259) (7) (53)
94 (175)
282 (319)
Conser St

USPS Driveway*
10 (15)
10 (15)
10 (15)
10 (15)
985 (1537)
1080 (1654)

Marty St
25 (43)
191 (42)
12 1 12
(28) (1) (14)
64 (3)
960 (1440)
30 (42)
124 (36)
901 (1522)
55 (96)
23 3 25
(84) (3) (54)
86 (139)
51 (141)
Marty St

CVS Driveway*
10 (15)
10 (15)
10 (15)
10 (15)
1044 (1470)
938 (1590)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study
2019 Balanced Peak Hour Volumes

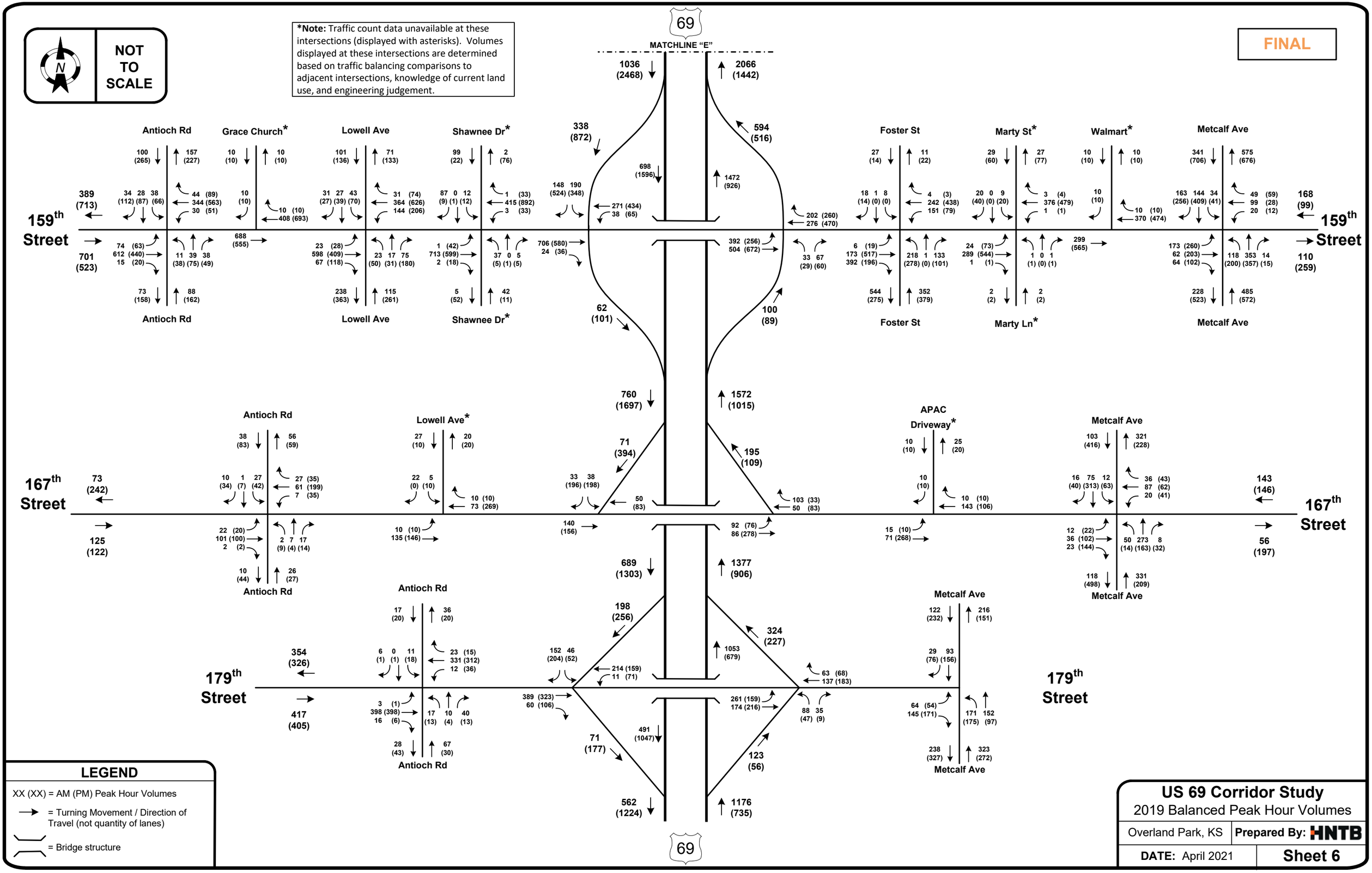
Overland Park, KS | **Prepared By:** HNTB

DATE: April 2021 | **Sheet 5**

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Volumes

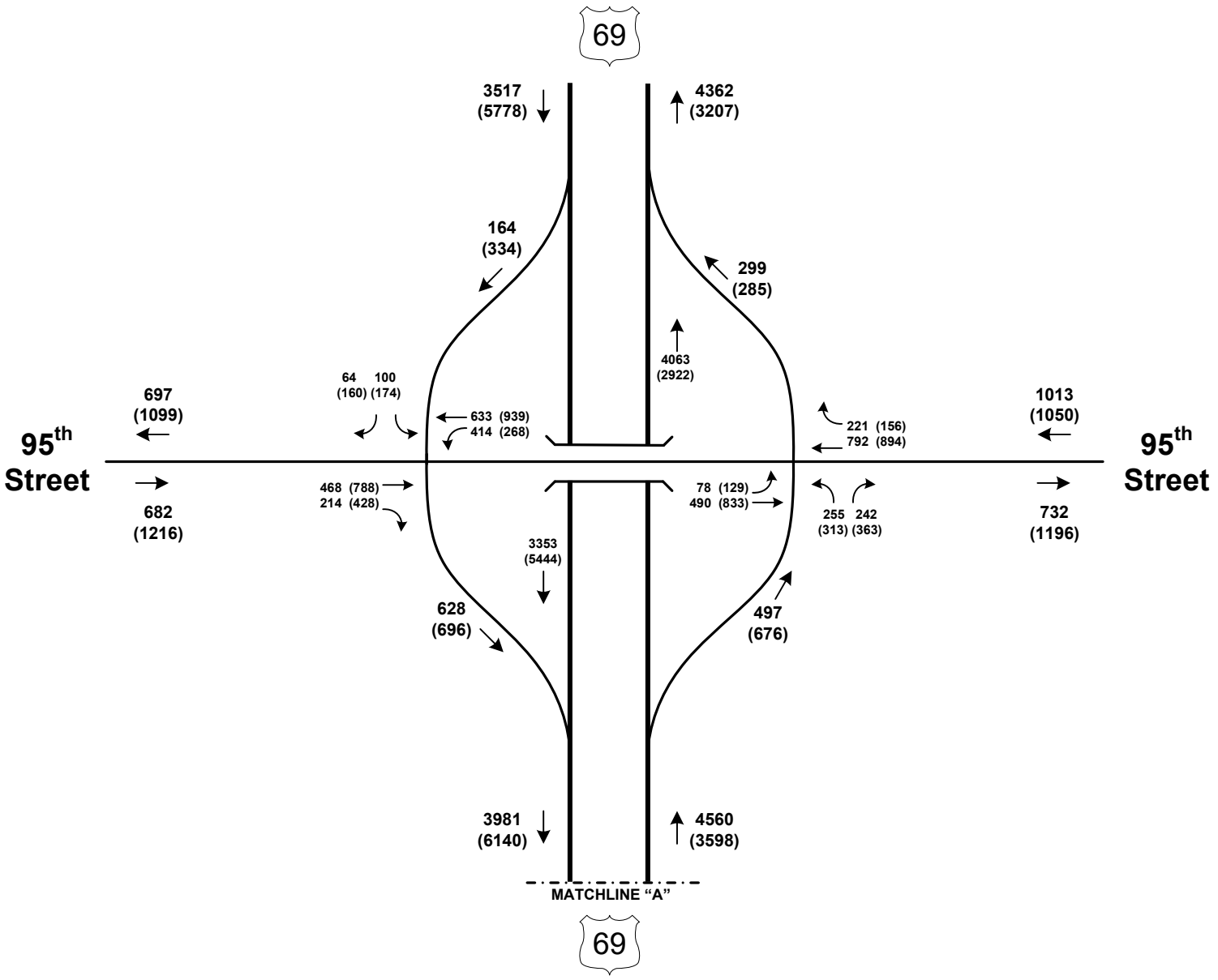
Overland Park, KS | **Prepared By:** HNTB

DATE: April 2021 | **Sheet 6**

2019 Existing Balanced Peak Hour Volumes – Autos Only

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

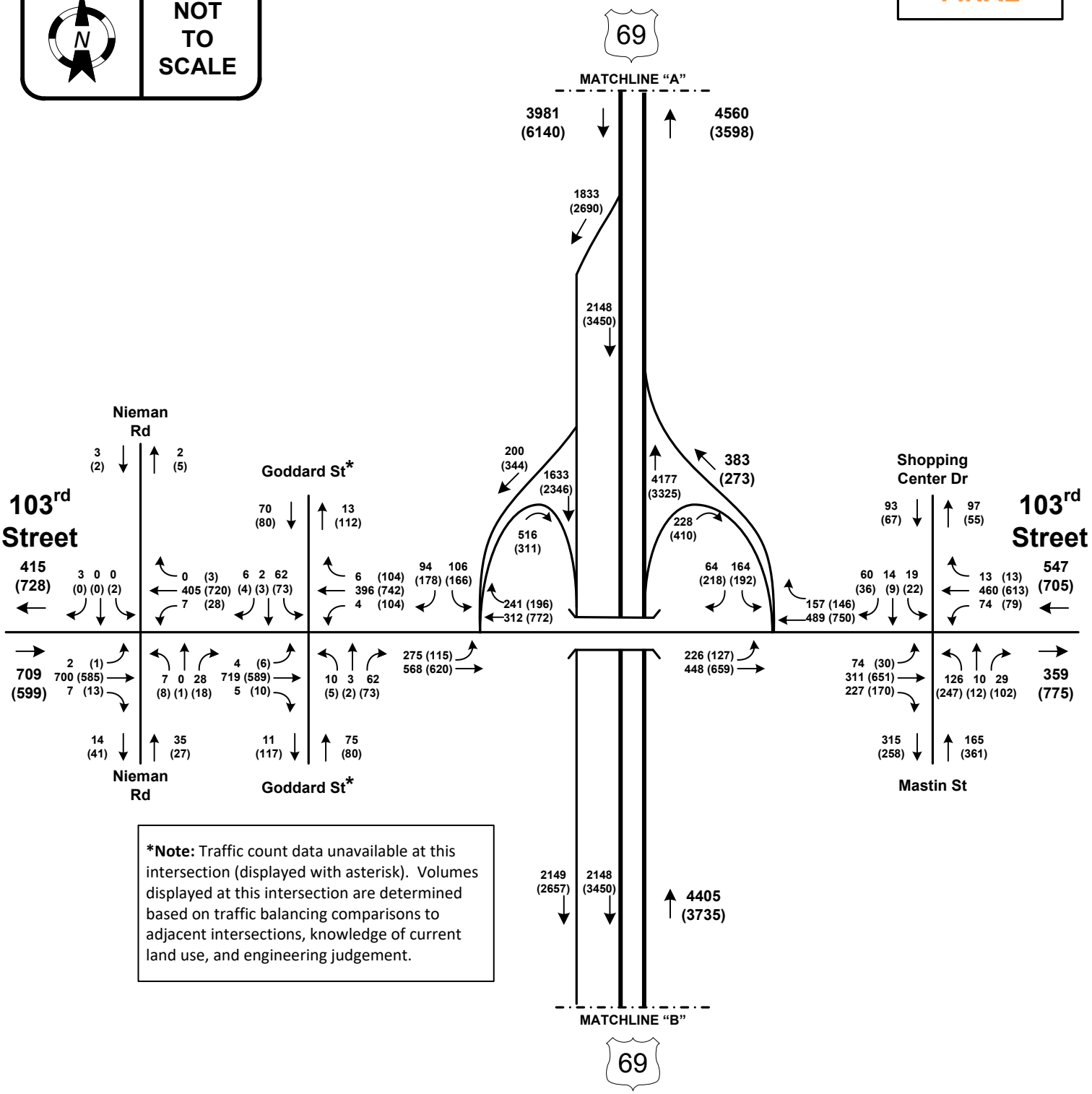
2019 Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 1

NOT TO SCALE

FINAL



***Note:** Traffic count data unavailable at this intersection (displayed with asterisk). Volumes displayed at this intersection are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 2

NOT TO SCALE

FINAL

69

MATCHLINE "B"

2149 (2657)
2148 (3450)
4405 (3735)
1981 (2525)
168 (132)
1604 (2262)
377 (263)
1477 (1473)
2928 (2262)
1003 (1173)
647 (866)
1048 (1213)
2169 (2372)
2546 (2635)
1695 (2079)
692 (906)
2169 (2379)
364 (400)
1805 (1979)
218 (775)
4512 (4296)
6317 (6275)
907 (636)
358 (1006)
493 (1189)
582 (1175)
224 (169)
874 (696)
96 (212)
811 (424)
1098 (865)
589 (1401)
Antioch Rd
Quivira Rd
979 (1418)
939 (1356)
189 (369)
790 (1049)
277 (418)
592 (800)
559 (902)
869 (1218)
370 (533)
662 (938)
1677 (1417)
5845 (6231)
5286 (5329)
3609 (3912)
1121 (1159)
815 (998)
4730 (5071)
7224 (6911)
435
50
6279 (6053)
5478 (5357)
989 (1560)
4489 (3797)
759 (249)
812 (887)
5301 (4684)
4850 (4364)
1792 (2612)
6642 (6976)
7425 (7629)
801 (696)
942 (1372)
440 (477)
1748 (1809)
1370 (1441)
378 (368)
448 (867)
2374 (2989)
2825 (3309)
1033 (697)
1302 (997)
383 (123)
783 (653)
3931 (3435)
378 (368)
451 (320)
1571 (1136)
502 (510)
770 (727)
3553 (3067)
114 (314)
919 (383)
737 (1881)
400 (530)
214 (324)
587 (372)
818 (1147)
1131 (659)
1042 (1167)
367 (131)
328 (274)
1646 (2940)
4323 (3794)
Mastin Rd
2221 (1380)
1137 (2411)
1529 (1744)
1949 (1806)
Quivira Rd
109th St
27 (27)
28 (30)
1197 (915)
1490 (2034)
4086 (3235)
237 (559)
237 (559)
524 (1439)
91 (712)
96 (218)
Antioch Rd
1253 (1976)
4 (7)
0 (0)
23 (20)
7 (21)
1202 (1942)
15 (116)
1224 (2079)
750 (1508)
37 (318)
474 (571)
723 (344)
761 (1998)
58 (587)
14 (8)
19 (117)
13 (55)
577 (1369)
74 (35)
664 (1459)
College Blvd
1307 (756)
79 (130)
1607 (849)
423 (251)
College Blvd
1250 (878)
18 (8)
1209 (813)
23 (57)
47 (27)
3 (1)
154 (53)
1386 (886)
116 (448)
423 (251)
263 (387)
266 (194)
1873 (1043)
73 (162)
1574 (841)
226 (40)
126 (42)
10 (1)
29 (20)
1622 (978)
529 (581)
3663 (2984)
38 (173)
204 (81)
314 (83)
165 (63)
Switzer Rd
Mastin Rd
1606 (2482)
1646 (2940)
4192 (3565)
MATCHLINE "C"
69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

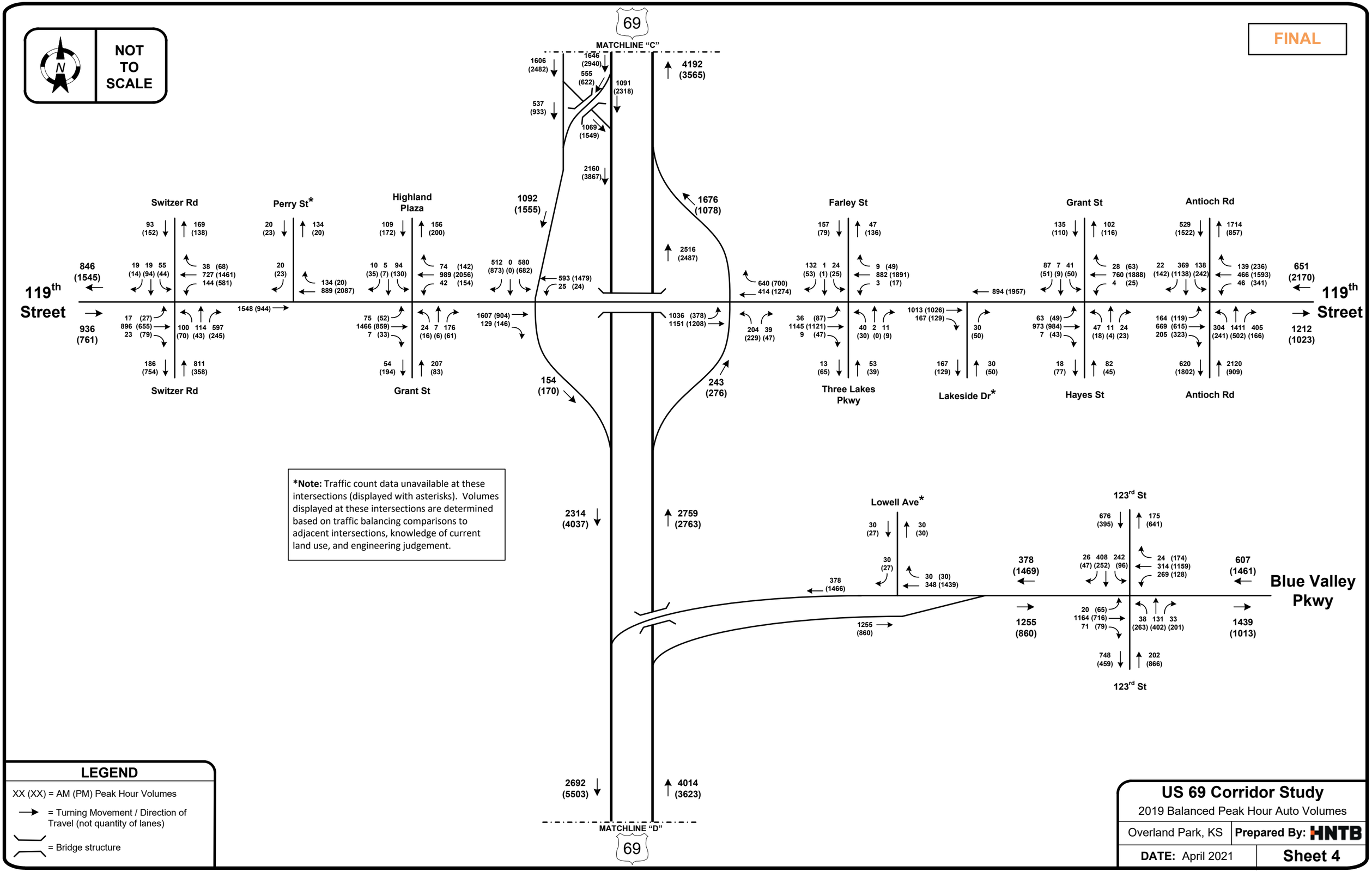
2019 Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 3

NOT TO SCALE

FINAL



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LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 4

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

69

2692 (5503)
4014 (3623)
1518 (2440)
1181 (1304)
1174 (3063)
2833 (2319)

Antioch Rd
Overland Pointe Marketplace*
Hemlock St
BP Gas Station*
Riley St
Mazuma Credit Union*
Metcalf Ave

135th Street

868 (1870)
1291 (1062)
435 (1082) 950 (620)
87 (250) 168 (559) 180 (273)
132 (138) 693 (1487) 83 (196)
315 (152) 926 (826) 50 (84)
88 (133) 503 (330) 62 (68)
301 (839) 653 (531)
57 (50) 908 (1821)
1138 (1117) 30 (50)
30 (50)
218 (650) 509 (467)
37 (166) 12 (141) 169 (343)
386 (328) 926 (1680) 205 (355)
82 (92) 1048 (1012) 8 (13)
2 (25) 41 (47) 285 (270)
225 (509) 328 (342)
30 (89) 75 (50)
30 (89)
75 (50) 1487 (2274)
1502 (1625)
740 (1024) 778 (1416)
822 (1300) 117 (282)
1356 (1292) 146 (333)
1556 (1895) 578 (813)
578 (813)
2255 (1506)
583 (411)
1181 (1304) 702 (1373)
237 (209) 346 (202)
167 (381) 267 (268)
128 (276) 11 (31) 28 (74)
58 (59) 1664 (2215) 12 (54)
199 (198) 1637 (1621) 66 (278)
100 (186) 10 (11) 16 (56)
89 (363) 117 (253)
50 (50)
50 (50) 1734 (2328)
1681 (1751)
265 (1444) 1157 (582)
87 (488) 115 (619) 63 (337)
126 (38) 1118 (1526) 59 (191)
395 (193) 1019 (1167) 267 (391)
579 (364) 636 (351) 140 (121)
441 (1201) 1355 (836)
1303 (1755)
1222 (1625)

Antioch Rd
Antioch Rd
B&B Theatre*
Hemlock St
Riley St
Metcalf Ave

263 (615)

1437 (3678)
682 (1588)
2838 (1917)
1168 (949)
1670 (968)

SEE INSET A

Shopping Center
McDonald's*
Tay's Burger Shack*
Dunkin Donuts*

SEE INSET B

Metcalf Ave

151st Street

648 (1376)
825 (658)
260 (572) 543 (504)
53 (172) 103 (194) 104 (206)
201 (166) 545 (1122) 65 (116)
140 (78) 630 (517) 55 (63)
50 (82) 202 (260) 99 (100)
223 (373) 351 (442)
113 (166) 62 (85)
25 (19) 8 (22) 80 (125)
21 (50) 739 (1535) 87 (237)
29 (22) 854 (875) 28 (32)
36 (35) 12 (13) 205 (195)
123 (291) 253 (243)
10 (10) 10 (10)
10 (10) 837 (1812)
1139 (1195)
257 (748) 425 (840)
590 (1074) 113 (184)
1064 (1050) 75 (145)
10 (10) 10 (10)
10 (10) 1096 (1618) 10 (10)
10 (10) 1106 (1628)
517 (579) 599 (1059)
104 (199) 209 (229)
10 (10) 1027 (1729) 10 (10)
1037 (1739) 10 (10)
373 (816) 580 (696)
160 (314) 136 (374) 77 (128)
51 (68) 641 (917) 169 (238)
226 (284) 561 (1216) 134 (85)
230 (240) 303 (344) 178 (212)
439 (697) 711 (796)
861 (1223)
816 (1556)

Antioch Rd
Lowell Ave
Ace Hardware 1*
Ace Hardware 2*
Metcalf Ave

188 (329)
755 (2090)
313 (428)
651 (370) 838 (1520)

943 (2419)
1983 (1396)

INSET A

Walgreens*
Trailwinds Center*
Hardy St

151st Street

20 (30) 20 (30)
20 (30) 20 (30)
813 (793) 20 (30)
20 (60)
105 (60) 46 (90)
55 20 30 (0) (30) (30)
6 (30) 726 (1374) 30 (30)
20 (30) 783 (783) 30 (40)
30 20 30 (30) (30) (60)
98 (174) 49 (235)
5 9 84 (26) (24) (124)
32 (169) 751 (1370) 17 (50)
17 (56) 822 (768) 4 (49)
6 0 5 (38) (10) (37)
20 (30) 791 (1374)
20 (30) 20 (60)
80 (100) 80 (120)
30 (123) 11 (85)

Jiffy Lube*
Target / Starbucks / Chipotle*
Hardy St

INSET B

Newton Dr
USPS Driveway*
Marty St
CVS Driveway*

84 (98) 118 (242)
10 (15) 10 (15)
25 (43) 191 (42)
10 (15) 10 (15)
4 7 73 (21) (3) (74)
47 (83) 870 (1358) 55 (97)
10 (15) 10 (15) 962 (1523)
12 1 12 (28) (1) (14)
64 (3) 937 (1426) 30 (42)
10 (15) 10 (15) 1021 (1456)
60 (152) 956 (1522) 31 (75)
242 11 29 (259) (7) (53)
1058 (1649)
124 (36) 885 (1517) 49 (96)
23 3 24 (84) (3) (54)
921 (1585)
93 (175) 282 (319)
80 (139) 50 (141)

Conser St
Marty St

MATCHLINE "E"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Auto Volumes

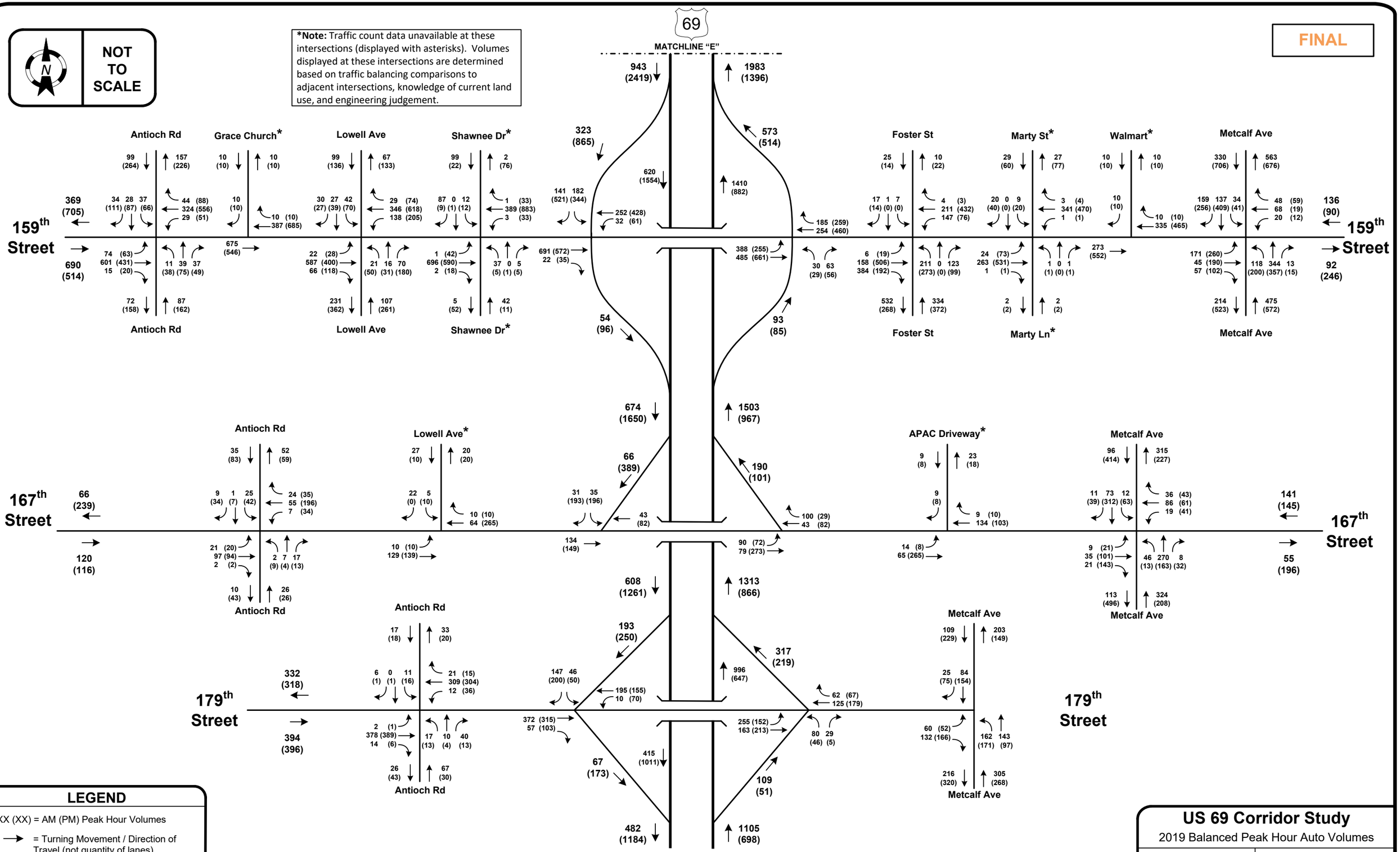
Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 5

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Auto Volumes

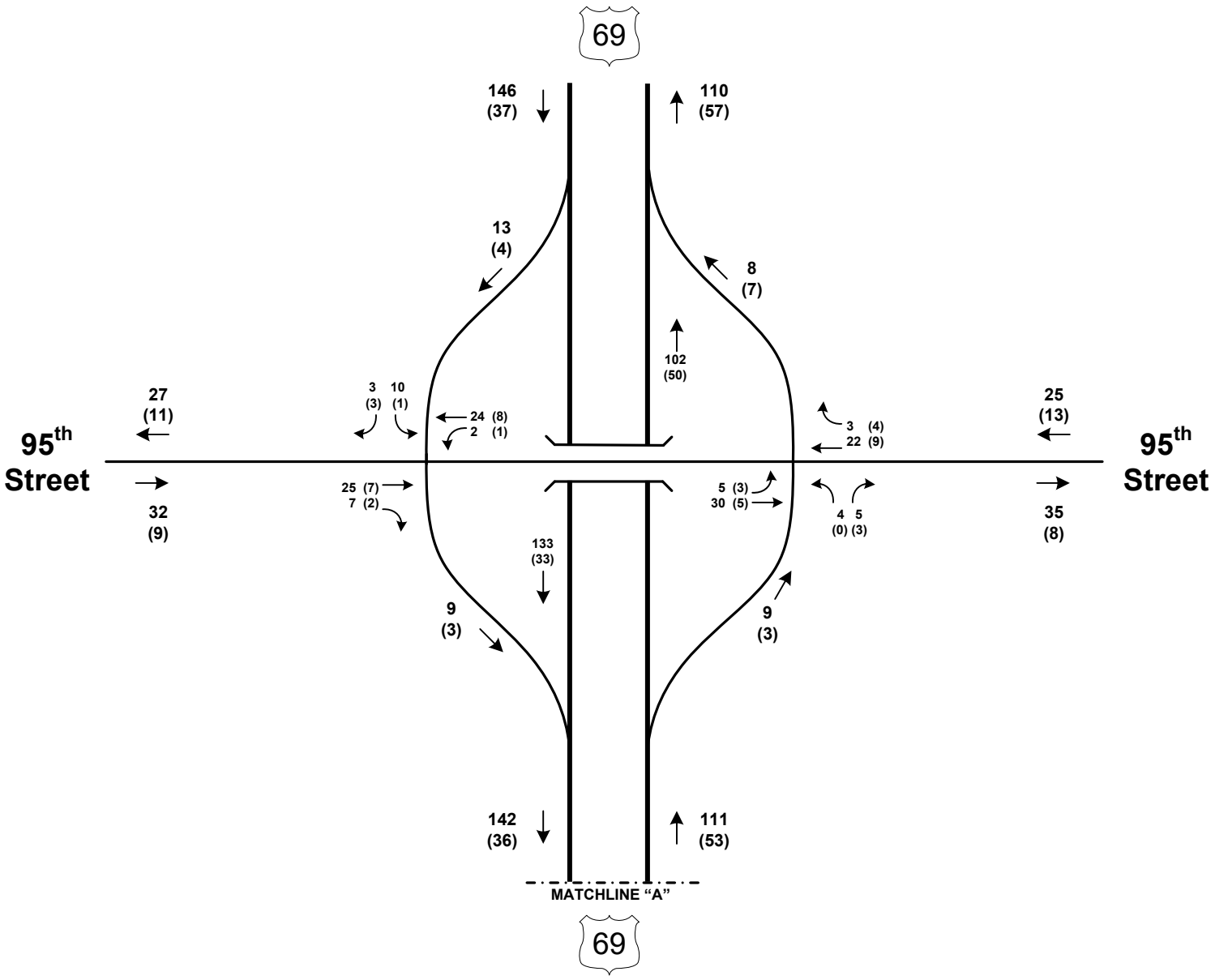
Overland Park, KS | **Prepared By:** HNTB

DATE: April 2021 | **Sheet 6**

2019 Existing Balanced Peak Hour Volumes – Trucks Only

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

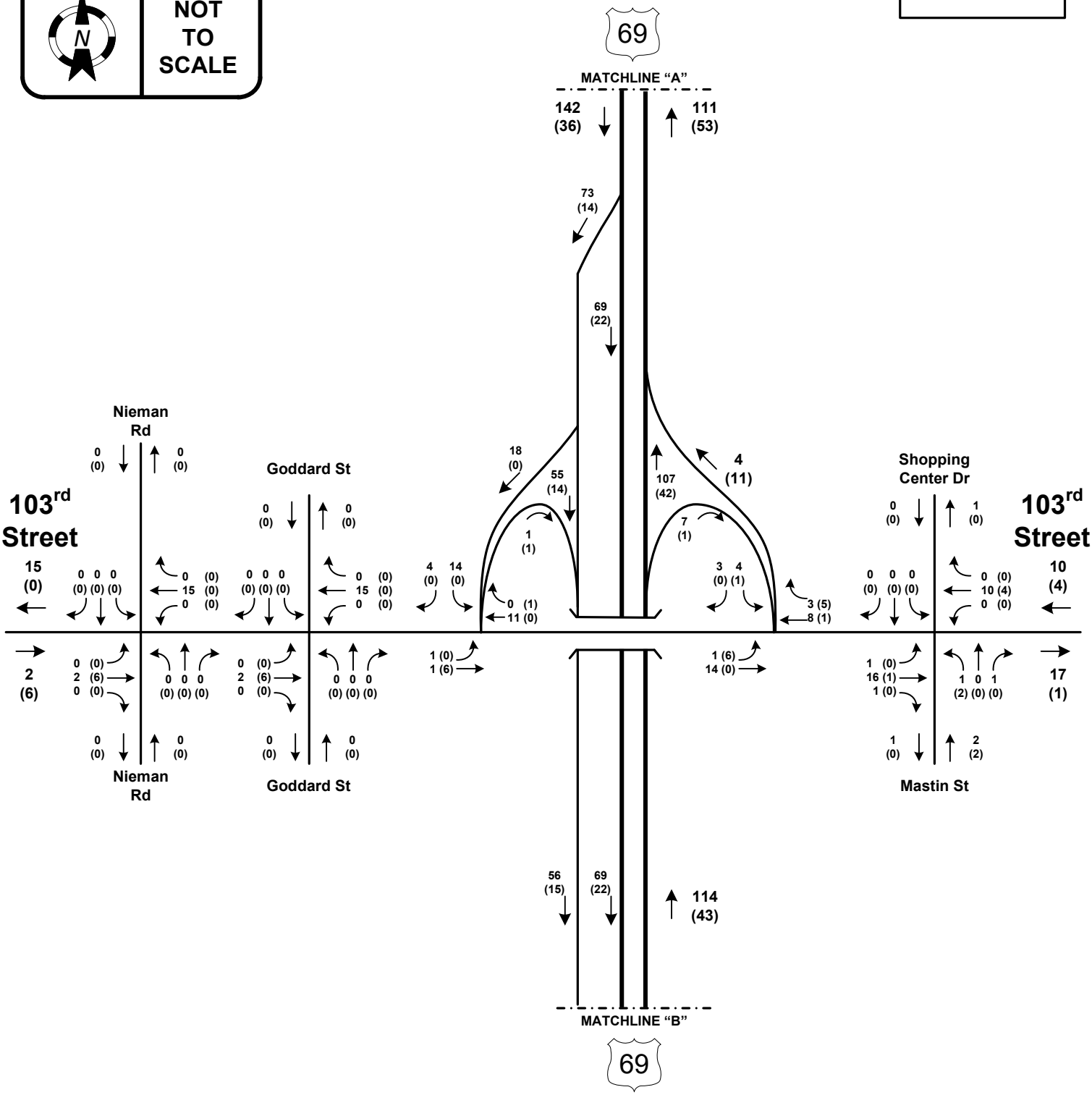
= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | **Sheet 1**



LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 2

NOT TO SCALE

FINAL

69

MATCHLINE "B"

Quivira Rd

Antioch Rd

109th St

Switzer Rd

Mastin Rd

College Blvd

435

50

MATCHLINE "C"

LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 3

NOT TO SCALE

FINAL

69

MATCHLINE "C"

119th Street

Switzer Rd

Perry St

Highland Plaza

Grant St

Farley St

Three Lakes Pkwy

Lakeside Dr

Hayes St

Antioch Rd

Grant St

Antioch Rd

119th Street

Lowell Ave

123rd St

Blue Valley Pkwy

123rd St

MATCHLINE "D"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 4

NOT TO SCALE

FINAL

MATCHLINE "D"

69

128 (52) ↓ 93 (63) ↑

50 (11) ↓ 22 (13) ↑

78 (41) ↓ 71 (50) ↑

35 (8) 28 (5) ←

22 (13) 40 (13) ←

43 (14) 12 (5) →

12 (5) ↓

59 (45) ↑ 33 (5) ↓

36 (7) ↓

114 (48) ↓ 92 (50) ↑

25 (3) ↓ 22 (5) ↑

70 (45) ↑

14 (10) 2 (1) ←

14 (3) 8 (11) ←

89 (45) ↓

4 (4) ↓ 13 (1) ↑

93 (49) ↓ 83 (46) ↑

MATCHLINE "E"

69

135th Street

31 (7) ←

16 (10) →

52 (25) ←

42 (14) →

42 (15) →

21 (14) →

17 (12) 0 (0) →

13 (12) 8 (2) →

Antoch Rd

5 (1) ↓ 11 (2) ↑

3 (0) 1 (1) 1 (0) ↓

5 (1) 28 (7) 2 (1) ←

1 (0) 15 (10) 0 (0) →

0 5 1 (0) (1) (2) ←

3 (2) ↓ 6 (3) ↑

Overland Pointe Marketplace

0 (0) ↑

0 (0) 35 (9) ←

0 (0) ↓

B&B Theatre

Hemlock St

3 (3) ↓ 6 (1) ↑

0 0 3 (1) (0) (2) ↓

5 (1) 35 (8) 3 (3) ←

0 (0) 16 (12) 1 (0) →

0 1 2 (0) (0) (0) ←

4 (3) ↓ 3 (0) ↑

BP Gas Station

0 (0) ↓ 0 (0) ↑

0 (0) ↓

0 (0) 43 (12) ←

8 (4) 42 (7) ↓

Riley St

2 (1) ↓ 2 (1) ↑

2 0 0 (1) (0) (0) ↓

0 (0) 51 (25) 2 (0) ←

2 (1) 42 (15) 9 (3) →

9 0 0 (0) (0) (0) ←

11 (3) ↓ 9 (0) ↑

Mazuma Credit Union

0 (0) ↑

0 (0) 53 (25) ←

Metcalf Ave

0 (0) ↓ 0 (0) ↑

0 0 0 (0) (0) (0) ↓

0 (0) 51 (25) 1 (0) ←

0 (0) 39 (13) 3 (2) →

2 0 3 (0) (0) (1) ←

4 (2) ↓ 5 (1) ↑

151st Street

25 (10) ←

17 (3) →

21 (15) ←

20 (7) →

12 (7) →

10 (4) 2 (3) →

14 (3) 8 (11) ←

8 (2) 16 (4) →

8 5 (0) (1) ←

Antoch Rd

2 (2) ↓ 9 (3) ↑

0 1 1 (0) (1) (1) ↓

1 (0) 23 (10) 2 (0) ←

5 (1) 10 (2) 2 (0) →

2 3 0 (0) (2) (2) ←

5 (1) ↓ 5 (4) ↑

SEE INSET A

Shopping Center

2 (0) ↓ 0 (0) ↑

2 0 0 (0) (0) (0) ↓

0 (0) 25 (10) 0 (1) ←

0 (0) 11 (7) 0 (0) →

0 1 0 (0) (0) (0) ←

0 (1) ↓ 1 (0) ↑

McDonald's

0 (0) ↓ 0 (0) ↑

0 (0) ↓

0 (0) 25 (11) ←

11 (1) 14 (2) ↓

Lowell Ave

Tay's Burger Shack

0 (0) ↓ 0 (0) ↑

0 (0) ↓

0 (0) 22 (14) ←

0 (0) 21 (5) 0 (0) →

0 (0) ↓

Ace Hardware 1

Dunkin Donuts

0 (0) ↓ 0 (0) ↑

0 (0) ↓

0 (0) 22 (14) 0 (0) ←

21 (5) 0 (0) →

0 (0) ↓

Ace Hardware 2

SEE INSET B

Metcalf Ave

11 (9) ↓ 9 (9) ↑

3 7 1 (2) (7) (0) ↓

2 (0) 15 (9) 4 (6) ←

0 (1) 15 (2) 2 (2) →

5 7 4 (3) (8) (5) ←

13 (15) ↓ 16 (16) ↑

Metcalf Ave

INSET A

Walgreens

0 (0) ↓ 0 (0) ↑

0 (0) ↓

0 (0) 26 (10) ←

11 (5) 0 (0) →

0 (0) ↓

Jiffy Lube

Trailwinds Center

0 (0) ↓ 0 (0) ↑

0 0 0 (0) (0) (0) ↓

0 (0) 26 (10) 0 (0) ←

0 (0) 11 (5) 0 (0) →

0 0 0 (0) (0) (0) ←

0 (0) ↓ 0 (0) ↑

Target / Starbucks / Chipotle

Hardy St

1 (3) ↓ 1 (0) ↑

0 0 1 (1) (0) (2) ↓

1 (0) 26 (9) 0 (1) ←

0 (0) 10 (5) 1 (0) →

0 0 0 (0) (0) (0) ←

1 (1) ↓ 0 (0) ↑

Hardy St

INSET B

Newton Dr

4 (0) ↓ 3 (0) ↑

2 0 2 (0) (0) (0) ↓

3 (0) 20 (14) 0 (0) ←

0 (0) 20 (5) 1 (0) →

0 0 0 (0) (0) (0) ←

1 (0) ↓ 0 (0) ↑

Conser St

USPS Driveway

0 (0) ↓ 0 (0) ↑

0 (0) ↓

0 (0) 23 (14) ←

22 (5) →

Marty St

0 (0) ↓ 0 (0) ↑

0 0 0 (0) (0) (0) ↓

0 (0) 23 (14) 0 (0) ←

0 (0) 16 (5) 6 (0) →

0 0 1 (0) (0) (0) ←

6 (0) ↓ 1 (0) ↑

Marty St

CVS Driveway

0 (0) ↓ 0 (0) ↑

0 (0) ↓

0 (0) 23 (14) ←

17 (5) →

LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

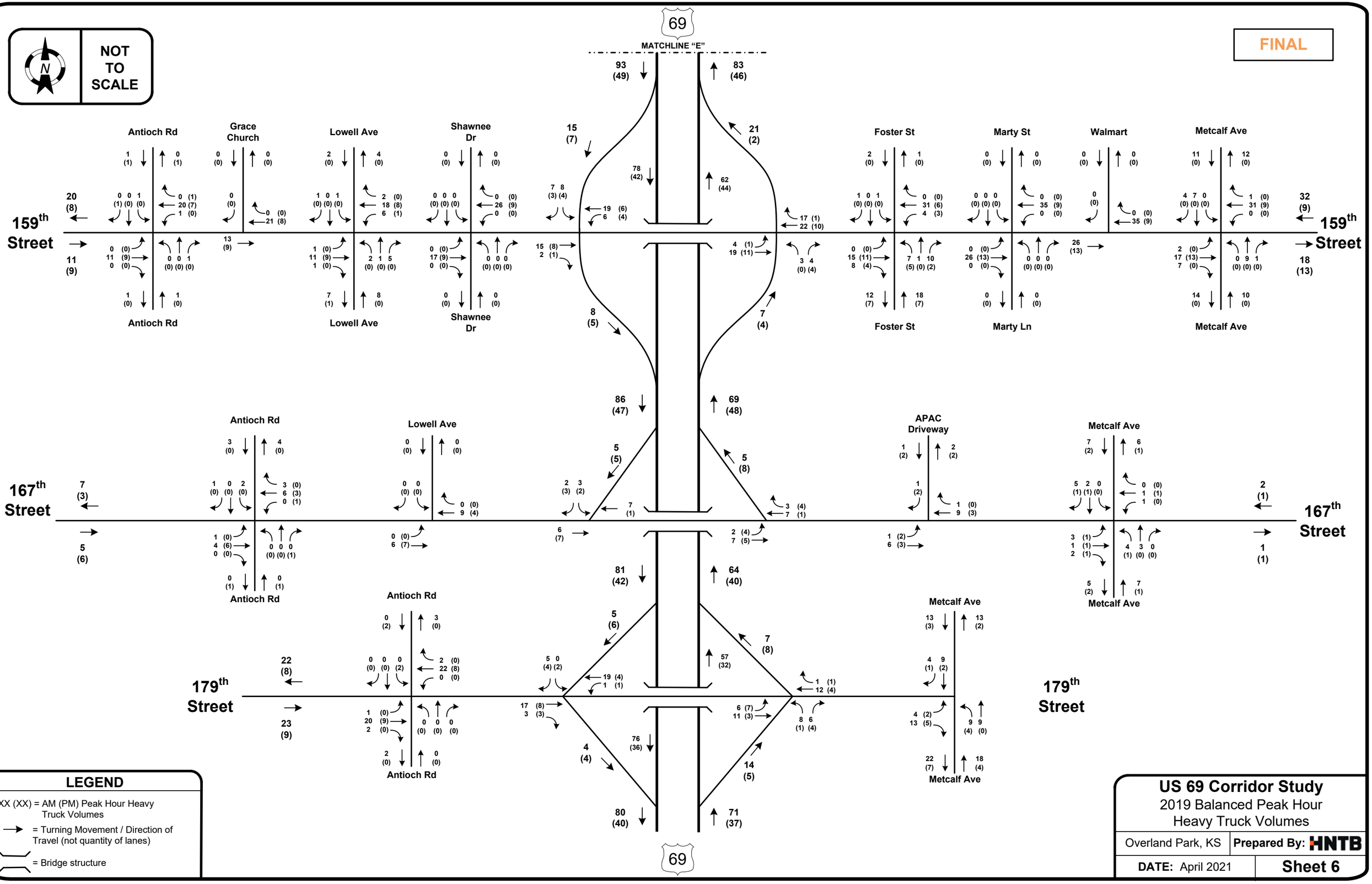
US 69 Corridor Study

2019 Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS	**Prepared By:** HNTB
DATE: April 2021	**Sheet 5**

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2019 Balanced Peak Hour Heavy Truck Volumes

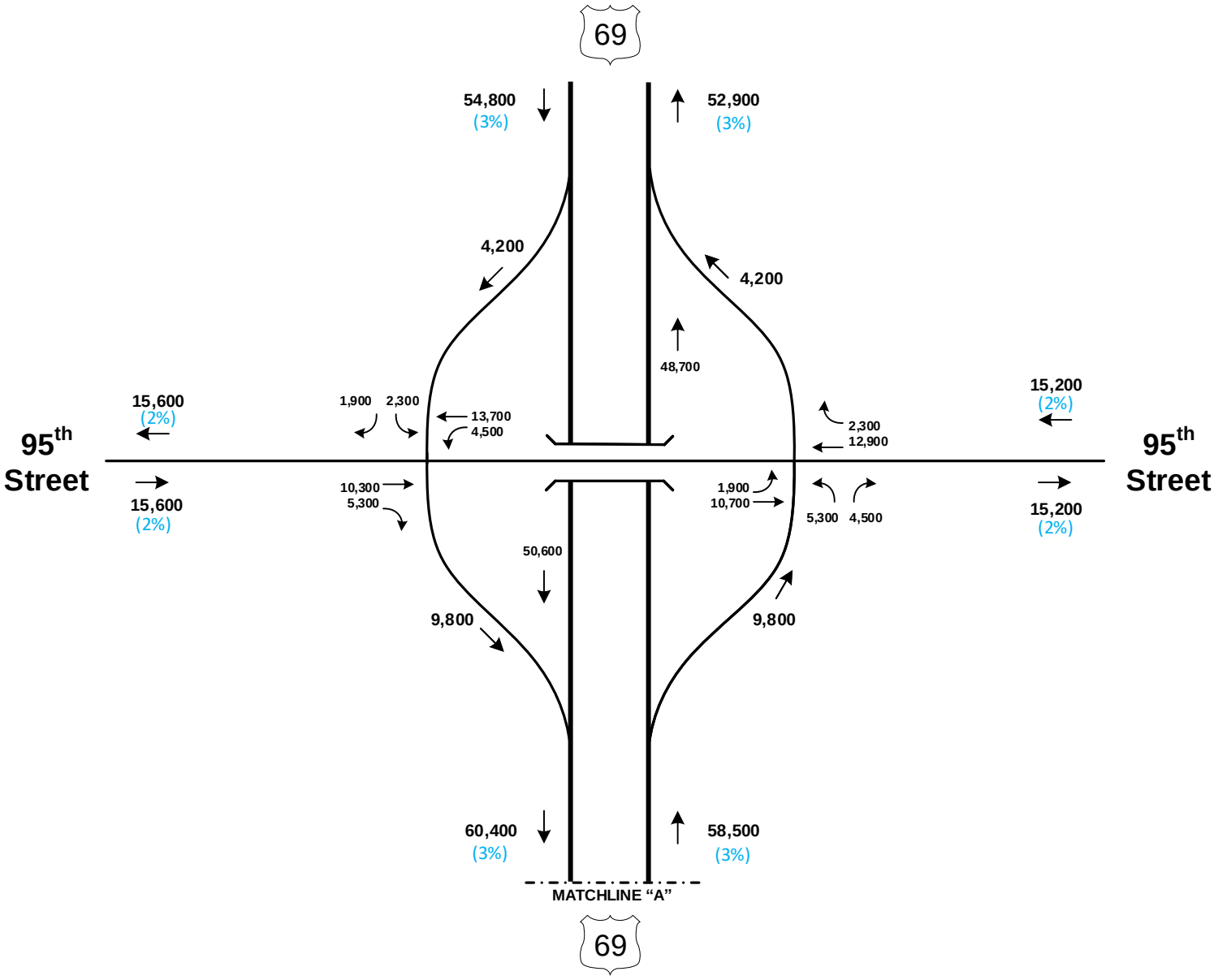
Overland Park, KS | Prepared By: HNTB

DATE: April 2021 | Sheet 6

2050 Future Year No-Build Balanced Daily Volumes and Truck Percentages

NOT TO SCALE

FINAL



LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

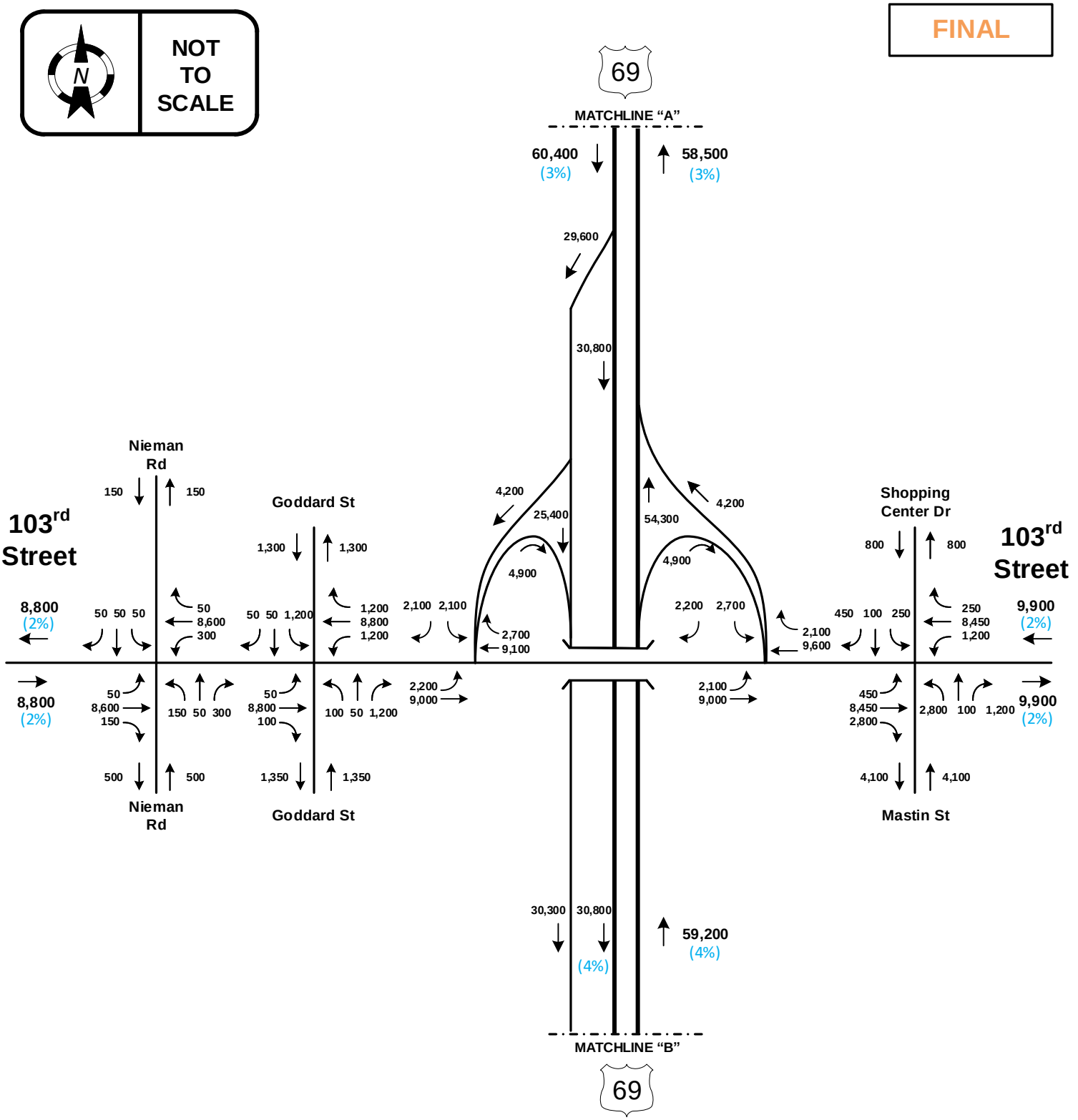
US 69 Corridor Study

2050 FYNB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | **Sheet 1**

FINAL



LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2050 FYNB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | **Sheet 2**

FINAL

NOT TO SCALE

69

MATCHLINE "B"

30,300 | 30,800 (4%) | 59,200 (4%)

28,600 | 1,700

Quivira Rd

17,700 | 17,700

4,700 | 13,000 | 6,200 | 9,900

11,000 | 16,100 | 6,300 | 11,500 | 23,300

83,900 (6%) | 72,900 | 39,400 | 34,500 | 4,900 | 23,700 | 19,700 | 10,000 | 14,800 | 29,700 | 10,000 | 33,700 | 5,200 | 28,500 | 7,500 | 94,100 (6%)

49,600 | 64,400 | 56,900 | 85,400

11,700

Antioch Rd

15,200 | 15,200

3,300 | 11,900 | 2,300 | 6,400

12,700 | 9,400 | 12,900 | 8,700

435 | 435

50 | 50

81,600 (6%) | 70,600 | 49,400 | 21,200 | 3,400 | 12,700 | 62,100 | 24,600 | 4,900 | 19,700 | 10,000 | 6,400 | 55,200 | 4,900 | 50,300 | 10,000 | 54,600 | 33,700 | 7,500 | 41,200 | 28,500 | 12,700 | 16,000 | 2,300 | 3,300 | 9,400 | 19,000 | 6,400 | 83,100 | 8,700 | 91,800 (6%)

11,000 | 16,700 | 6,200 | 16,100 | 4,700 | 6,300 | 13,100 | 9,900

Quivira Rd

23,000 | 23,000

109th St

450 | 450

100 | 50 | 300 | 300 | 19,750 | 1,150

100 | 13,650 | 550 | 550 | 50 | 1,150

1,750 | 1,750

Switzer Rd

16,200 | 1,700 | 3,500 | 24,400 (5%) | 26,200 | 11,600 | 5,500 | 6,100 | 15,700 | 4,150 | 11,350 | 3,750 | 7,900 | 34,100 | 24,400 (5%)

Mastin Rd

25,400 | 25,400

Antioch Rd

6,250 | 6,250

5,050 | 50 | 1,150 | 1,150 | 16,600 | 350

5,050 | 10,500 | 550 | 550 | 50 | 350

950 | 950

Mastin Rd

60,300 (5%) | 54,200 | 6,100 | 6,100 | 16,100 | 3,750 | 4,150 | 11,950 | 5,500 | 5,500 | 7,900 | 48,700 | 56,600 (5%)

College Blvd

20,400 (2%) | 14,300 (2%) | 21,200 | 15,100 | 22,200 | 16,100 | 18,100 (2%) | 12,000 (2%)

College Blvd

MATCHLINE "C"

69

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2050 FYNB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 3

NOT TO SCALE

FINAL

69

MATCHLINE "C"

34,100 ↓ | 24,400 (5%) ↓ | 6,800 | 17,600 | 56,600 (5%) ↑

10,200 ↓ | 23,900 ↘

41,500 ↓

17,000 ↓ | 17,000 ↑ | 39,600 ↑

119th Street

19,950 (2%) ←

25,200 →

9,000 ← 17,500

25,600 ←

26,650 (2%) ←

19,950 (2%) →

25,550 (2%) →

Switzer Rd

2,050 ↓ | 2,050 ↑

300 950 800 → | 800 ← 18,600 | 5,800 ←

300 → | 18,600 | 1,050 → | 1,050 950 5,800 ←

7,800 ↓ | 7,800 ↑

Perry St

300 ↓ | 300 ↑

300 → | 300 ← 24,900

Highland Plaza

2,650 ↓ | 2,650 ↑

600 100 1,950 → | 1,950 ← 24,250 | 1,500 ←

600 → | 24,250 | 350 → | 350 100 1,500 ←

1,950 ↓ | 1,950 ↑

8,000 0 9,000 → | 19,700 ← | 950 ←

24,550 → | 3,150 →

8,000 → | 25,550 →

3,150 950 ←

4,100 ↓

4,100 ↑

Farley St

1,550 ↓ | 1,550 ↑

1,000 50 500 → | 500 ← 24,900 | 200 ←

1,000 → | 24,900 | 600 → | 600 50 200 ←

850 ↓ | 850 ↑

Three Lakes Pkwy

23,800 → | 1,800 ↓

700 ←

1,800 ↓ | 700 ↑

Lakeside Dr

Grant St

1,600 ↓ | 1,600 ↑

750 50 800 → | 800 ← 24,400 | 350 ←

750 → | 23,300 | 450 → | 450 50 350 ←

850 ↓ | 850 ↑

Hayes St

Antioch Rd

16,700 ↓ | 16,700 ↑

1,850 11,500 3,350 → | 3,350 ← 19,750 | 3,550 ←

1,850 → | 18,650 | 3,950 → | 3,950 11,500 3,550 ←

19,000 ↓ | 19,000 ↑

Antioch Rd

45,600 (6%) ↓

43,700 (6%) ↑

65,100 (4%) ↓

63,200 (4%) ↑

MATCHLINE "D"

69

Lowell Ave

400 ↓ | 400 ↑

19,500 ←

400 → | 400 ← 19,100

19,500 →

123rd St

7,300 ↓ | 7,300 ↑

800 4,600 1,900 → | 1,900 ← 16,200 | 2,300 ←

800 → | 16,200 | 2,500 → | 2,500 4,600 2,300 ←

9,400 ↓ | 9,400 ↑

123rd St

19,500 ←

20,400 (2%) ←

19,500 →

20,400 (2%) →

Blue Valley Pkwy

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

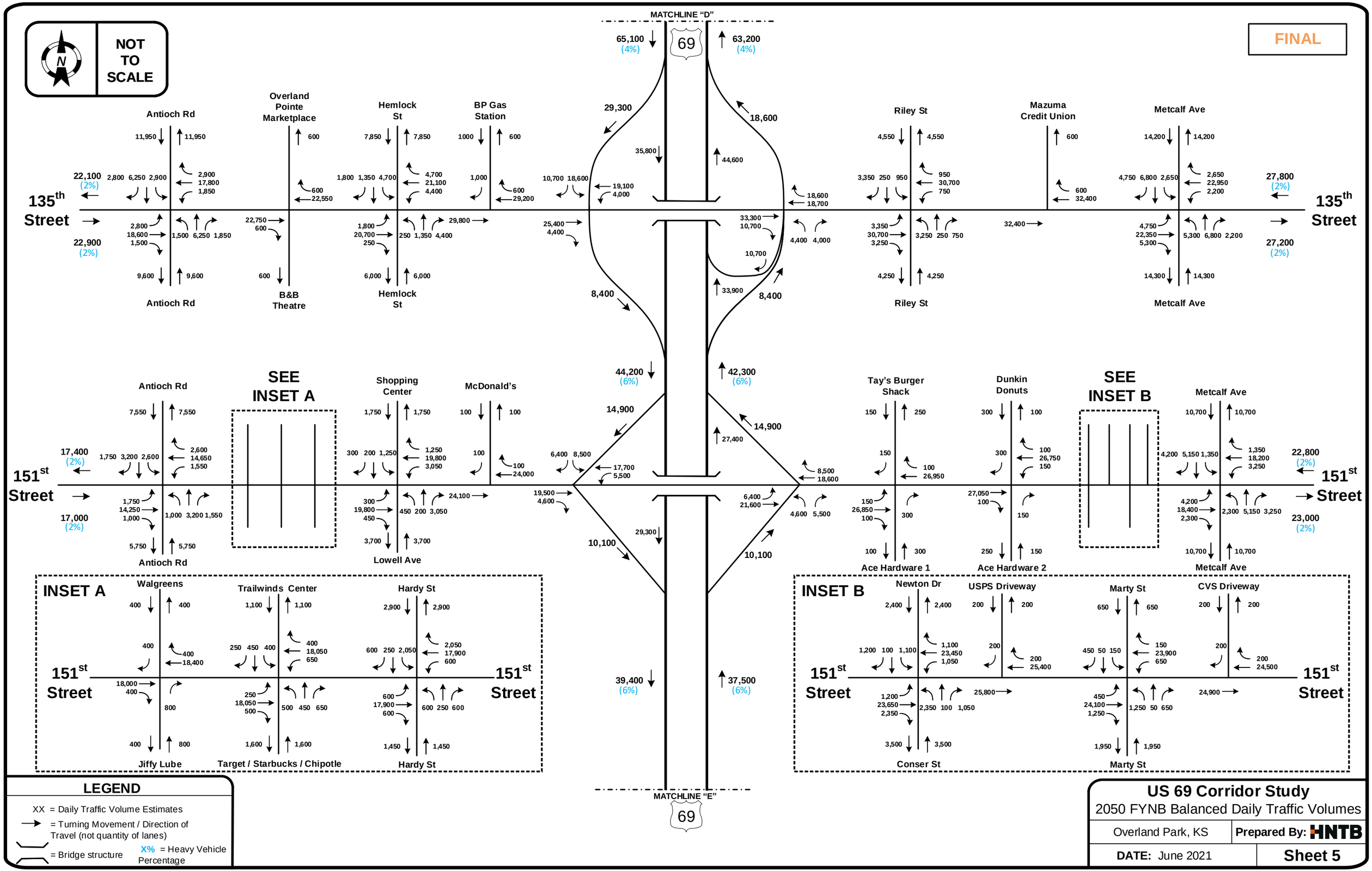
X% = Heavy Vehicle Percentage

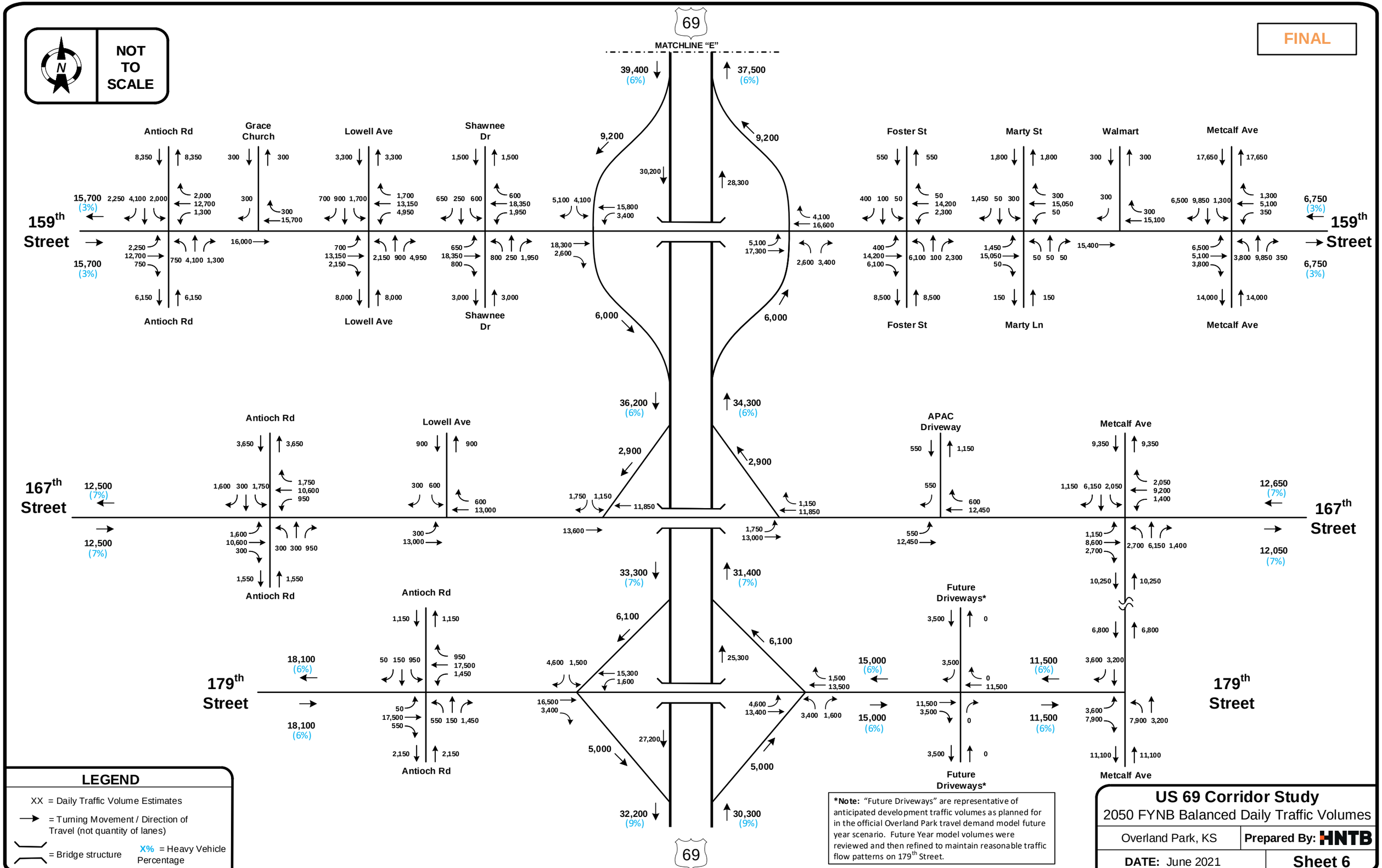
US 69 Corridor Study

2050 FYNB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 4

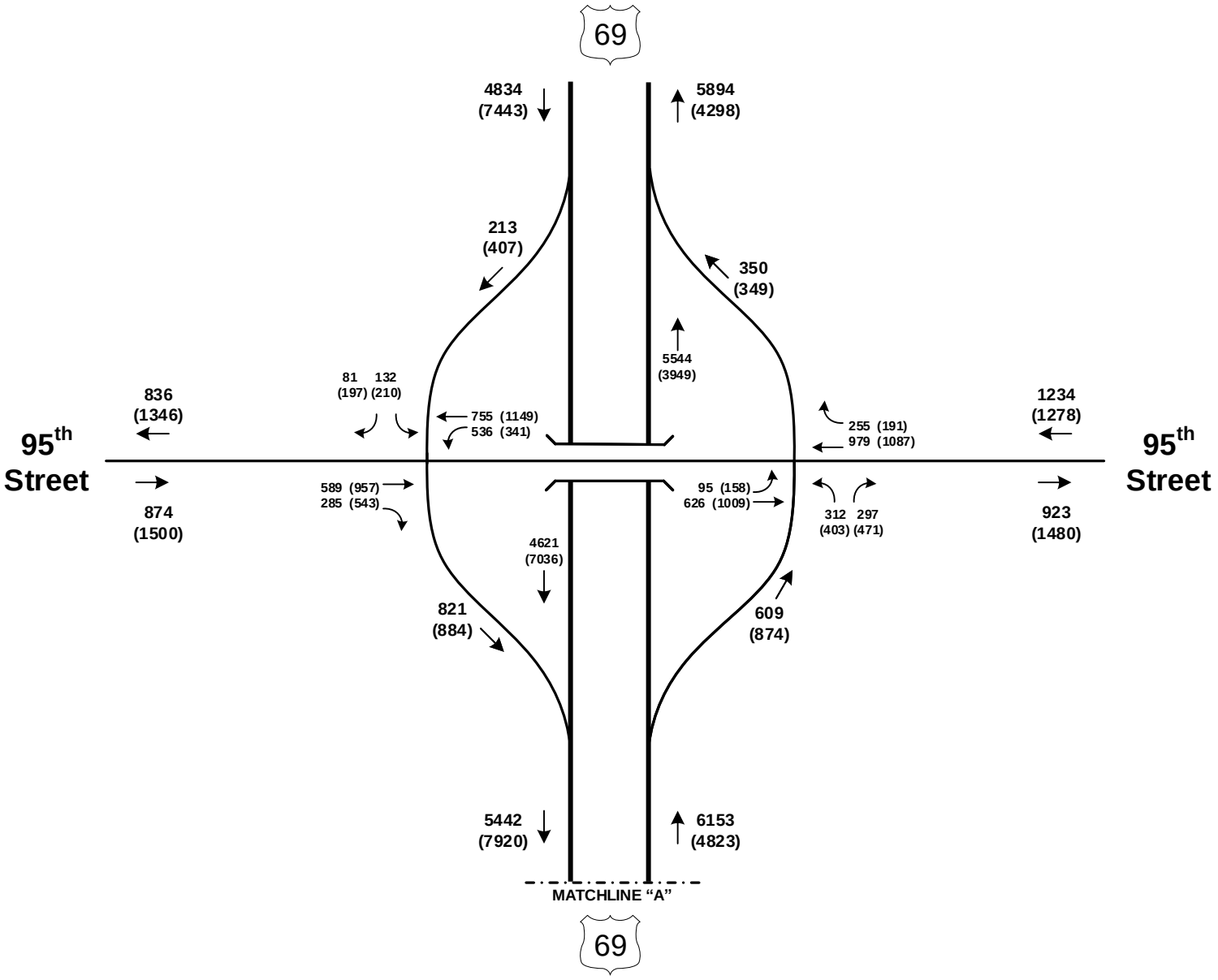

NOT TO SCALE
FINAL
MATCHLINE "D"
MATCHLINE "E"
69
135th Street
151st Street
Antioch Rd
Overland Pointe Marketplace
B&B Theatre
Hemlock St
BP Gas Station
Riley St
Mazuma Credit Union
Metcalf Ave
SEE INSET A
Shopping Center
McDonald's
Lowell Ave
Tay's Burger Shack
Dunkin Donuts
Ace Hardware 1
Ace Hardware 2
SEE INSET B
INSET A
Walgreens
Trailwinds Center
Hardy St
Jiffy Lube
Target / Starbucks / Chipotle
INSET B
Newton Dr
USPS Driveway
Marty St
CVS Driveway
Conser St
LEGEND
XX = Daily Traffic Volume Estimates
= Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure
X% = Heavy Vehicle Percentage
US 69 Corridor Study
2050 FYNB Balanced Daily Traffic Volumes
Overland Park, KS
Prepared By: HNTB
DATE: June 2021
Sheet 5


NOT TO SCALE
FINAL
69
MATCHLINE "E"
159th Street
167th Street
179th Street
Antioch Rd
Grace Church
Lowell Ave
Shawnee Dr
Foster St
Marty St
Walmart
Metcalf Ave
Marty Ln
APAC Driveway
Future Driveways*
39,400 (6%)
37,500 (6%)
36,200 (6%)
34,300 (6%)
33,300 (7%)
31,400 (7%)
32,200 (9%)
30,300 (9%)
15,700 (3%)
6,750 (3%)
12,500 (7%)
12,650 (7%)
12,050 (7%)
18,100 (6%)
15,000 (6%)
11,500 (6%)
9,200
6,000
2,900
6,100
5,000
LEGEND
XX = Daily Traffic Volume Estimates
= Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure
X% = Heavy Vehicle Percentage
*Note: "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street.
US 69 Corridor Study
2050 FYNB Balanced Daily Traffic Volumes
Overland Park, KS
Prepared By: HNTB
DATE: June 2021
Sheet 6

2050 Future Year No-Build Balanced Peak Hour Volumes – All Vehicle Classes

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

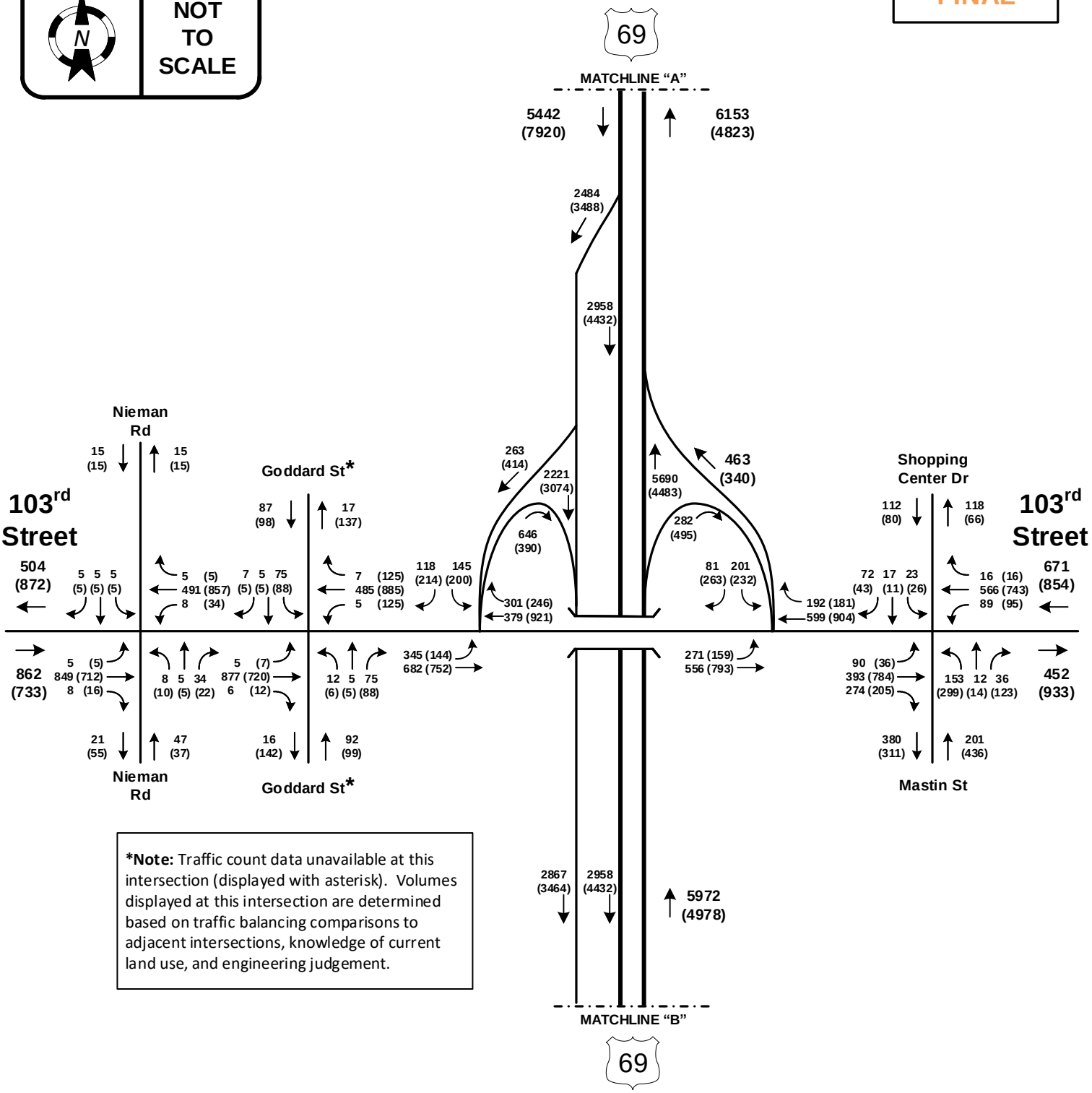
2050 FYNB Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | **Sheet 1**

NOT TO SCALE

FINAL



***Note:** Traffic count data unavailable at this intersection (displayed with asterisk). Volumes displayed at this intersection are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Volumes

Overland Park, KS | **Prepared By:** HNTB

DATE: June 2021 | **Sheet 2**

NOT TO SCALE

FINAL

69

MATCHLINE "B"

Quivira Rd

Antioch Rd

109th St

Mastin Rd

College Blvd

Switzer Rd

435

50

2867 (3464)
2958 (4432)
5972 (4978)
2507 (3109)
360 (355)
1160 (1686)
1240 (1566)
487 (341)
2020 (2768)
1810 (1787)
4162 (3191)
1333 (1675)
1327 (1043)
737 (1688)
273 (206) 1054 (837)
117 (254)
978 (509)
722 (1438)
244 (479) 916 (1207)
457 (486)
990 (937)
871 (1135)
743 (1180)
1447 (1423)
2707 (3047)
3194 (3388)
1412 (1717)
2283 (2852)
950 (1177)
2760 (2964)
444 (465)
449 620 (1232) (1434)
1095 (763)
499 783 (701) (1080)
1747 (1965)
2316 (2499)
7425 (8292)
6682 (7112)
4935 (5147)
1295 (1330)
6230 (6477)
278 (973)
5952 (5504)
8268 (8003)
9363 (8766)
1231 (1490)
7002 (6820)
5868 (4836)
1134 (1984)
985 (321)
1053 (1144)
6921 (5980)
6355 (5590)
2400 (3210)
8755 (8800)
9711 (9598)
7968 (7625)
966 (805)
1328 (1525) 578 (619)
2038 (1465)
2119 (2305)
461 (442)
1658 (1863)
778 (1328)
3104 (3664)
3670 (4054)
1564 (1195) 468 (151)
956 (798)
1270 (844)
566 (390)
5495 (4866)
461 (442)
1084 (896)
161 (383)
1109 (461)
908 488 (2283) (647)
623 (615)
5034 (4424)
269 (378)
697 (427)
1013 1460 (1403) (846)
1257 (1533)
453 (162)
401 (330)
2335 (3817)
2673 (1656)
1396 (2930)
2025 (1952)
2473 (2249)
38 (39)
36 (42)
6118 (5320)
110 (860)
117 (268)
1794 (2527)
5 5 28 (9) (5) (25)
8 (26)
1731 (2485)
18 (140)
2035 (2861)
1477 (1107)
601 876 (689) (418)
1757 (2651)
1156 (1962)
48 (413)
5814 (4648)
304 (672)
947 (2410)
70 17 23 (709) (10) (141)
16 (66)
724 (1650)
89 (42)
829 (1758)
304 (672)
643 (1738)
1590 (922)
104 (169)
1946 (1038)
520 (302)
561 224 (637) (197)
1538 (1081)
23 (11)
1481 (1001)
34 (69)
58 5 185 (33) (5) (65)
1694 (1091)
152 (582)
520 (302)
2170 (1235)
89 (197)
1808 (989)
273 (49)
153 12 36 (51) (5) (24)
1867 (1154)
785 (834)
57 (214)
248 (103)
5294 (4346)
379 (101)
201 (80)
2187 (3443)
2335 (3817)
6079 (5180)

MATCHLINE "C"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

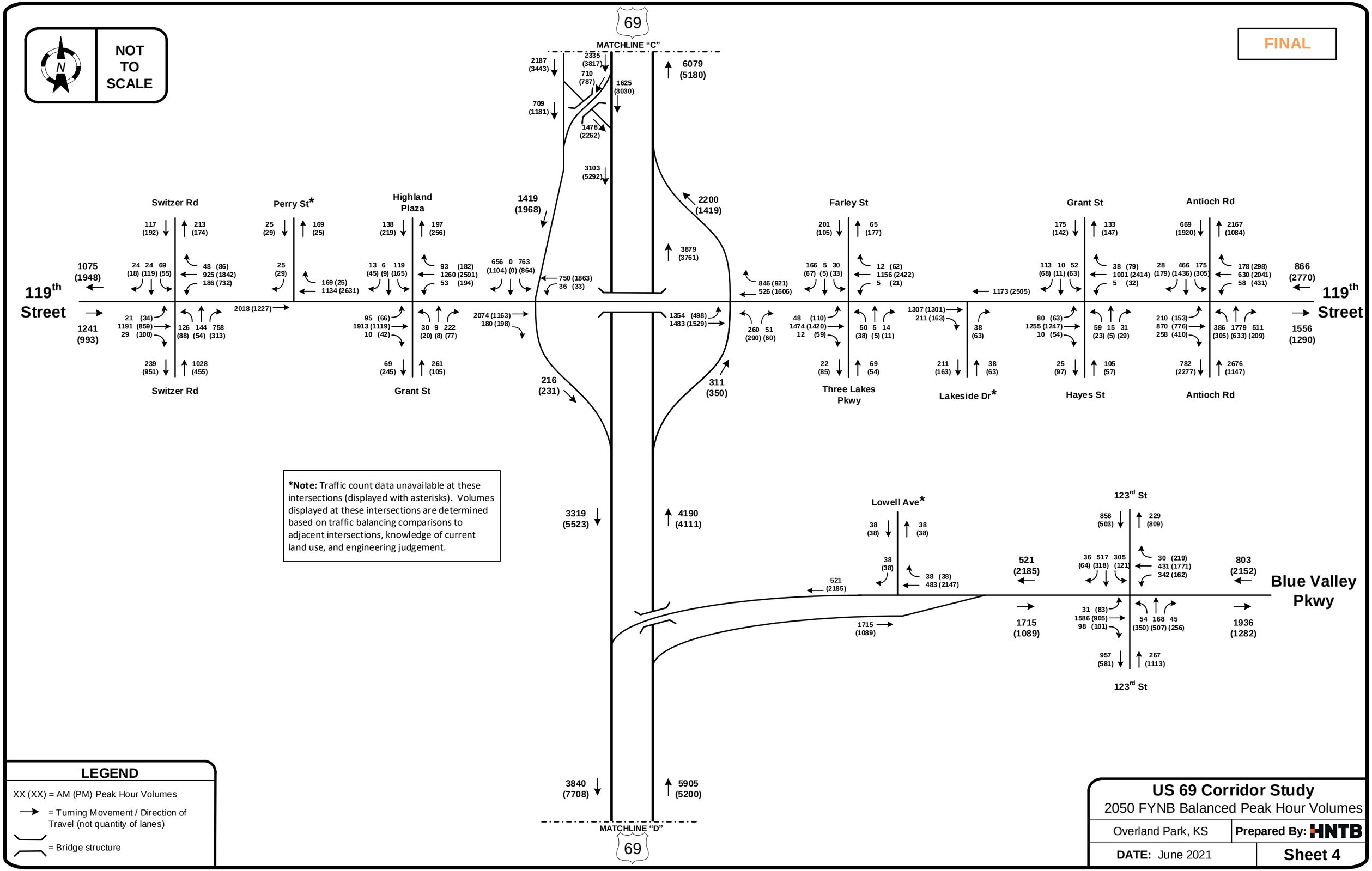
2050 FYNB Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 3

NOT TO SCALE

FINAL



***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 4

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

69

3840 (7708)

5905 (5200)

1977 (3090)

1603 (1754)

1863 (4618)

4302 (3446)

943 1034 (1296) (1794)

1080 (1649) 216 (427)

1603 (1754) 940 (1790)

1973 (2348) 786 (1090)

786 (1090)

3516 (2356)

844 (570)

445 (925)

2308 (5543)

4360 (2926)

892 (2006)

1630 (1307)

2730 (1619)

782 (1337) 218 (402)

903 (510) 1076 (1921)

1416 (3537)

367 (728)

680 (843)

1783 (4265)

3410 (2462)

727 (797) 765 (1349)

1425 (1369) 149 (326)

1574 (1695)

1954 (2142)

1725 (1644) 229 (498)

338 554 (944) (1062)

13 (13) 1107 (2268)

Antioch Rd

Overland Pointe Marketplace*

Hemlock St

BP Gas Station*

Riley St

Mazuma Credit Union*

Metcalf Ave

135th Street

555 (1365)

1210 (784)

279 (823)

649 (589)

38 (112)

95 (63)

72 (63)

1191 (2307)

1136 (2367)

114 213 228 (315) (706) (344)

172 (175) 911 (1884) 108 (248)

47 15 217 (210) (178) (435)

493 (414) 1211 (2128) 262 (452)

38 (112)

95 (63) 1928 (2882)

1798 (2381)

213 (481)

340 (339)

164 14 35 (349) (39) (93)

73 (74) 2253 (2961) 18 (68)

63 (63)

2344 (3103)

334 (1820)

1459 (733)

110 145 79 (615) (780) (425)

159 (48) 1564 (2092) 75 (241)

1489 (1499) 38 (63)

103 (116) 1375 (1367) 11 (16)

5 53 362 (32) (59) (340)

1681 (1427)

398 (192) 1220 (1129) 63 (106)

111 640 79 (168) (417) (89)

2168 (2191)

498 (243) 1329 (1452) 341 (496)

733 802 180 (459) (442) (154)

1588 (2031)

384 (1060)

830 (674)

38 (63)

288 (646)

420 (431)

254 (251) 2113 (2027) 94 (354)

126 13 20 (234) (14) (71)

126 (461)

159 (319)

561 (1517)

1715 (1055)

356 488 (286) (284)

Antioch Rd

B&B Theatre*

Hemlock St

Riley St

Metcalf Ave

SEE INSET A

SEE INSET B

Shopping Center

McDonald's*

Tay's Burger Shack*

Dunkin Donuts*

Metcalf Ave

151st Street

330 (724)

695 (639)

146 (210)

78 (107)

13 (13)

13 (13)

871 (1723)

67 131 132 (217) (246) (261)

254 (209) 738 (1403) 85 (146)

35 10 101 (24) (28) (158)

26 (63) 984 (1918) 110 (300)

13 (13)

13 (13) 1107 (2268)

13 (13)

26 (26)

13 (13)

25 (25)

13 (13)

484 (1040)

743 (889)

206 180 98 (399) (480) (161)

67 (86) 885 (1232) 218 (308)

1170 (1626)

1184 (1010)

182 (99) 930 (832) 72 (79)

66 259 125 (103) (331) (129)

37 (28) 1214 (1291) 35 (40)

45 15 259 (44) (16) (246)

1574 (1695)

13 (13) 1479 (2133)

1507 (2360) 13 (13)

13 (13)

285 (359) 899 (1697) 172 (110)

296 391 229 (307) (444) (273)

1226 (2131)

288 (471)

450 (563)

155 (368)

319 (306)

235 445 (390) (453)

13 (13) 1495 (2348) 13 (13)

25 (25)

570 (898)

916 (1024)

Antioch Rd

Lowell Ave

Ace Hardware 1*

Ace Hardware 2*

Metcalf Ave

INSET A

Walgreens*

Trailwinds Center*

Hardy St

25 (38)

25 (38)

132 (81)

58 (114)

124 (223)

67 (297)

25 (38)

25 (38) 1052 (1720)

69 25 38 (5) (38) (38)

8 (38) 970 (1715) 38 (38)

6 11 107 (34) (30) (159)

41 (213) 1002 (1709) 21 (64)

1162 (1184) 25 (38)

25 (76)

25 (38) 1124 (1172) 38 (50)

38 25 38 (38) (38) (76)

21 (71) 1173 (1153) 6 (62)

8 5 6 (48) (13) (47)

25 (38)

25 (76)

101 (126)

101 (152)

38 (156)

19 (108)

Jiffy Lube*

Target / Starbucks / Chipotle*

Hardy St

INSET B

Newton Dr

USPS Driveway*

Marty St

CVS Driveway*

112 (124)

153 (306)

13 (19)

13 (19)

35 (58)

242 (55)

13 (19)

13 (19)

8 9 95 (26) (5) (93)

63 (105) 1180 (1794) 69 (122)

13 (19)

13 (19) 1299 (2002)

15 5 15 (35) (5) (18)

81 (5) 1268 (1880) 38 (53)

13 (19)

13 (19) 1374 (1919)

76 (192) 1404 (2086) 40 (95)

305 14 37 (327) (9) (67)

1536 (2246)

156 (45) 1310 (2080) 70 (121)

29 5 31 (106) (5) (68)

1356 (2166)

118 (222)

356 (403)

113 (179)

65 (179)

Conser St

Marty St

MATCHLINE "E"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Volumes

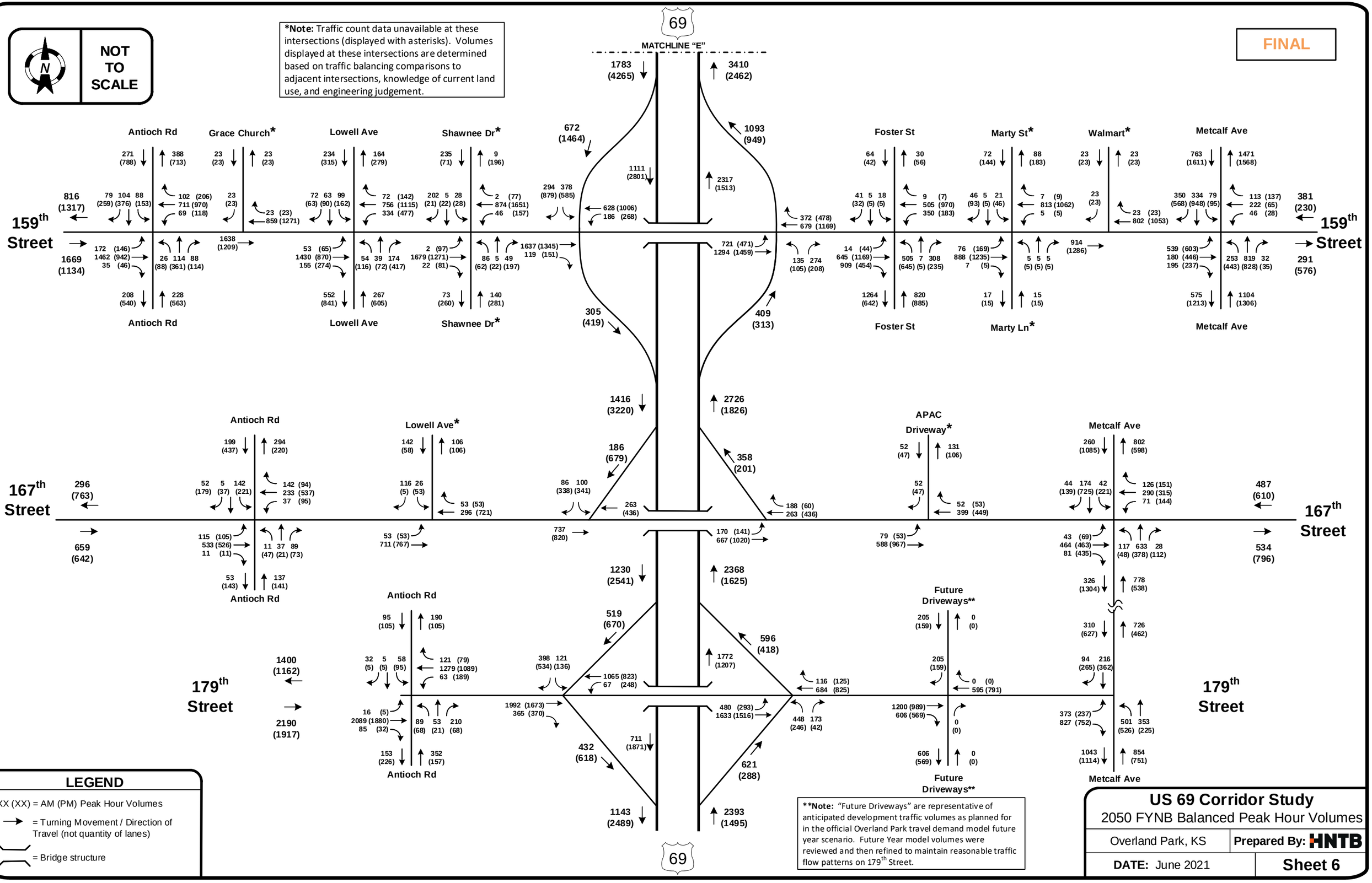
Overland Park, KS | **Prepared By:** HNTB

DATE: June 2021 | **Sheet 5**

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

****Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street.

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Volumes

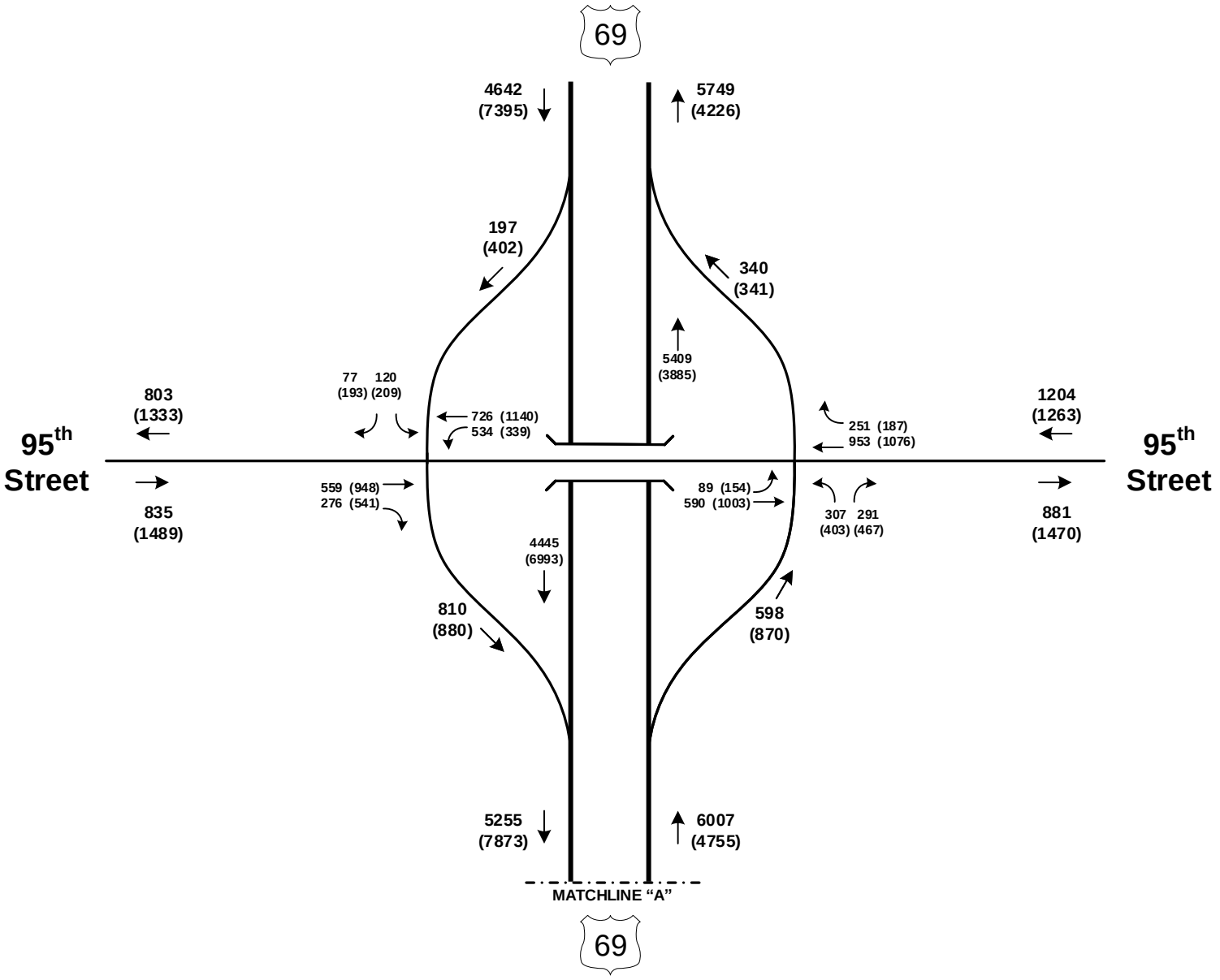
Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 6

2050 Future Year No-Build Balanced Peak Hour Volumes – Autos Only

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

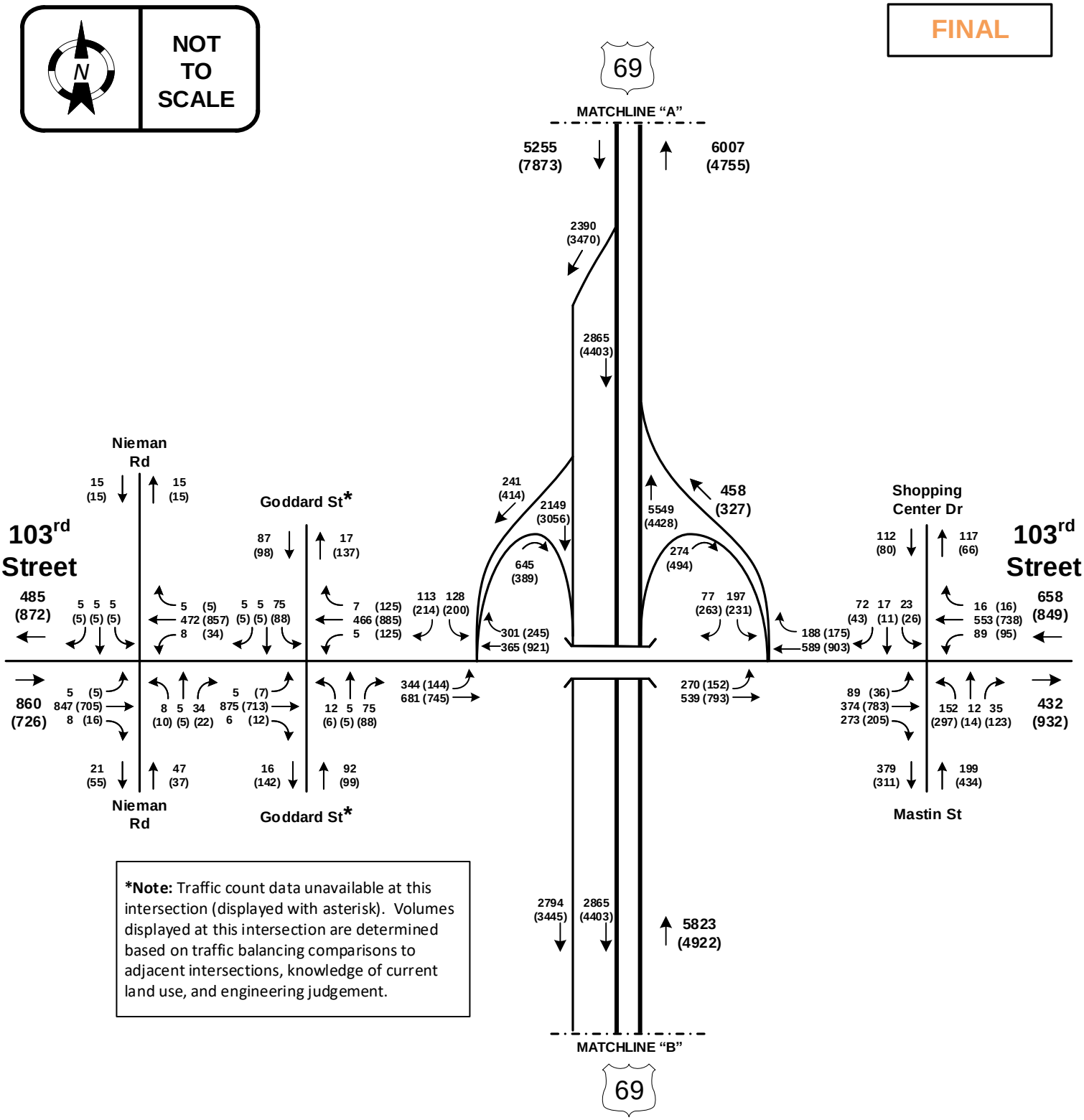
= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | **Sheet 1**


NOT TO SCALE
FINAL
69
MATCHLINE "A"
5255 (7873)
6007 (4755)
2390 (3470)
2865 (4403)
241 (414)
2149 (3056)
645 (389)
301 (245)
365 (921)
5549 (4428)
458 (327)
274 (494)
77 197 (263) (231)
188 (175)
589 (903)
Nieman Rd
103rd Street
Goddard St*
Shopping Center Dr
Mastin St
485 (872)
860 (726)
658 (849)
432 (932)
87 (98)
17 (137)
112 (80)
117 (66)
113 128 (214) (200)
344 (144)
681 (745)
270 (152)
539 (793)
72 17 23 (43) (11) (26)
16 (16)
553 (738)
89 (95)
89 (36)
374 (783)
273 (205)
152 12 35 (297) (14) (123)
379 (311)
199 (434)
21 (55)
47 (37)
16 (142)
92 (99)
2794 (3445)
2865 (4403)
5823 (4922)
MATCHLINE "B"
69
*Note: Traffic count data unavailable at this intersection (displayed with asterisk). Volumes displayed at this intersection are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.
LEGEND
XX (XX) = AM (PM) Peak Hour Volumes
= Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure
US 69 Corridor Study
2050 FYNB Balanced Peak Hour Auto Volumes
Overland Park, KS
Prepared By: HNTB
DATE: June 2021
Sheet 2

NOT TO SCALE

FINAL

69

MATCHLINE "B"

Quivira Rd

Antioch Rd

109th St

Mastin Rd

College Blvd

Switzer Rd

435

50

2794 (3445)
2865 (4403)
5823 (4922)
2439 (3095)
355 (350)
1955 (2757)
484 (338)
1767 (1762)
4056 (3160)
1288 (1614)
841 (1126)
1145 (1672)
1212 (1557)
243 902 (474) (1198)
456 (486) 976 (931)
718 (1158)
1432 (1417)
475 756 (684) (1071)
1699 (1901)
2647 (2980)
3131 (3318)
1367 (1656)
2208 (2782)
920 (1168)
2687 (2930)
436 (462)
1322 (1041)
707 (1681)
273 1049 (206) (835)
115 (254) 973 (509)
709 (1432)
436 592 (1226) (1427)
2251 (2468)
1088 (763)
6901 (7915)
6183 (6757)
4484 (4856)
1280 (1324)
1196 (1476)
5764 (6180)
273 (970)
5491 (5210)
8830 (8441)
7742 (7678)
6443 (6519)
5409 (4563)
1034 (1956)
974 (320)
1043 (1139)
6452 (5702)
5911 (5318)
2317 (3190)
8228 (8508)
7358 (7314)
915 (795)
1313 565 (1516) (613)
2017 (1459)
2008 (2276)
452 (440)
1556 (1836)
754 (1318)
3016 (3643)
3557 (4027)
1240 (837)
1555 467 (1194) (150)
954 (796)
9182 (9304)
5344 (4774)
452 (440)
541 (384)
604 (614)
4892 (4334)
1061 (886)
137 (377) 1103 (460)
891 487 (2276) (646)
244 (370) 671 (425)
987 1452 (1385) (846)
1161 (1507)
442 (158)
395 (329)
2261 (3789)
1984 (1941)
2439 (2231)
38 (37)
35 (40)
5953 (5220)
1441 (1101)
1915 (2825)
2658 (1654)
1378 (2922)
110 (858)
116 (266)
1748 (2516)
1712 (2640)
5 5 28 (8) (5) (24)
8 (25) 1686 (2475) 18 (140)
571 870 (687) (414)
1141 (1953) 48 (413)
5669 (4549)
284 (671)
284 (671) 631 (1732)
915 (2403)
70 17 23 (707) (10) (141)
16 (66) 693 (1645) 89 (42)
798 (1753)
1572 (922) 169 (169)
1934 (1022) 508 (301)
508 (301)
780 (830)
558 (634) 222 (196)
22 (10) 1462 (990) 28 (69)
57 5 185 (33) (5) (64)
151 (582)
1675 (1078)
2156 (1218)
88 (195) 1796 (975) 272 (48)
152 12 35 (51) (5) (24)
1854 (1140)
1512 (1069)
51 (214)
247 (102)
5161 (4248)
378 (100)
199 (80)
2066 (3407)
2261 (3789)
5941 (5078)

MATCHLINE "C"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

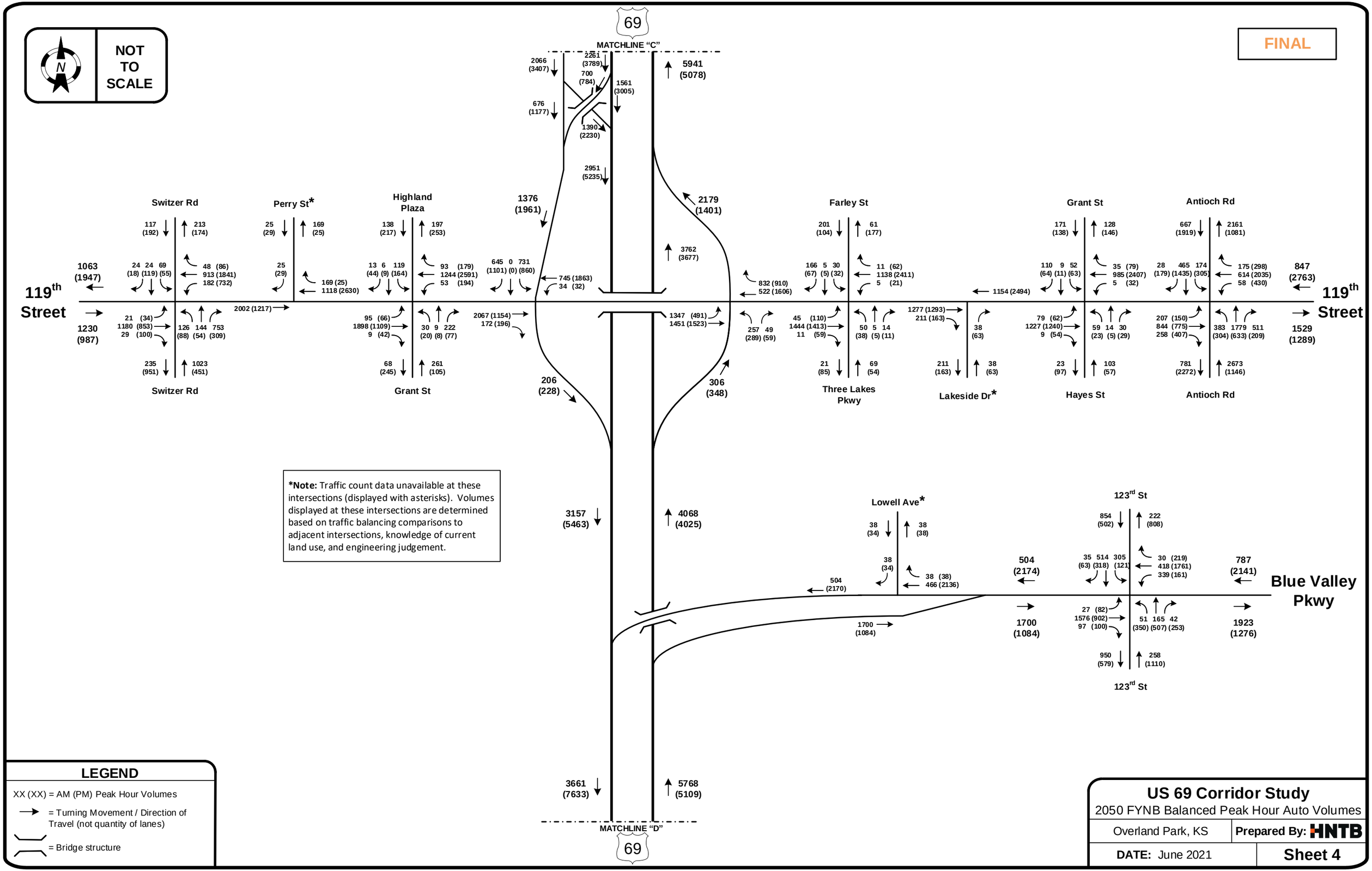
2050 FYNB Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 3

NOT TO SCALE

FINAL



***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 4

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

69

3661 (7633)
5768 (5109)
1914 (3076)
1574 (1737)
1747 (4557)
4194 (3372)
1574 (1737)
885 (1773)
933 (1291) 981 (1785)
1036 (1639)
174 (420)
95 (63)
1874 (2867)
1709 (1629)
217 (495)
1920 (2331)
770 (1083)
770 (1083)
3424 (2289)
799 (563)
391 (915)
2138 (5472)
4223 (2852)
860 (2002)
1600 (1300)
2623 (1552)
763 (1324)
208 (398)
892 (507)
1056 (1916)
1278 (3470)
346 (712)
650 (833)
1624 (4182)
3273 (2385)

135th Street

1097 (2358)
1660 (1415)
1727 (2348)
1535 (2014)
1467 (1484)
38 (63)
1926 (2124)
325 474 (286) (277)
2115 (2172)

Antoch Rd
549 (1364)
1197 (782)
110 212 227 (315) (705) (344)
166 (174)
876 (1875)
105 (247)
397 (192)
1200 (1117)
63 (106)
111 634 78 (168) (416) (86)
380 (1058)
823 (670)
Antoch Rd

Overland Pointe Marketplace*
72 (63)
72 (63)
1147 (2296)
38 (63)
B&B Theatre*

Hemlock St
275 (819)
642 (588)
47 (209) 15 (178) 213 (432)
487 (413)
1167 (2118)
258 (448)
103 (116)
1354 (1352)
10 (16)
5 52 359 (32) (59) (340)
283 (642)
416 (431)
Hemlock St

BP Gas Station*
38 (112)
95 (63)
38 (112)

Riley St
210 (480)
337 (338)
161 14 35 (348) (39) (93)
73 (74)
2183 (2928)
15 (68)
251 (250)
2060 (2008)
83 (350)
115 13 20 (234) (14) (71)
112 (457)
148 (319)
Riley St

Mazuma Credit Union*
63 (63)
63 (63)
22714 (3070)

Metcalf Ave
334 (1820)
1459 (733)
110 145 79 (615) (780) (425)
159 (48)
1494 (2059)
74 (241)
498 (243)
1280 (1436)
337 (493)
730 802 176 (459) (442) (153)
556 (1514)
1708 (1054)
Metcalf Ave

151st Street

837 (1710)
1153 (999)
1142 (1607)
1197 (2117)
708 (793)
755 (1335)
216 434 (387) (446)

Antoch Rd
328 (722)
684 (635)
67 130 131 (217) (245) (260)
253 (209)
707 (1390)
82 (146)
176 (98)
908 (822)
69 (79)
63 255 125 (103) (328) (126)
281 (470)
443 (557)
Antoch Rd

SEE INSET A

Shopping Center
143 (210)
78 (107)
32 10 101 (24) (28) (158)
26 (63)
951 (1905)
110 (299)
37 (28)
1191 (1274)
35 (40)
45 15 258 (44) (16) (246)
155 (367)
318 (306)
Lowell Ave

McDonald's*
13 (13)
13 (13)
13 (13)
13 (13)
1074 (2254)
1550 (1678)
1412 (1364)
138 (314)

Tay's Burger Shack*
13 (13)
26 (26)
13 (13)
13 (13)
1450 (2115)
13 (13)
1464 (2336)
13 (13)
13 (13)
25 (25)
Ace Hardware 1*

Dunkin Donuts*
25 (25)
13 (13)
25 (25)
13 (13)
1438 (2103)
13 (13)
1476 (2348)
13 (13)
13 (13)
26 (25)
13 (13)
Ace Hardware 2*

SEE INSET B

Metcalf Ave
470 (1028)
731 (878)
202 171 97 (396) (471) (161)
64 (86)
865 (1221)
213 (300)
285 (358)
876 (1689)
169 (107)
290 382 224 (303) (434) (267)
553 (878)
896 (1004)
Metcalf Ave

151st Street

1153 (999)
1197 (2117)
1412 (1364)
138 (314)
892 (507)
1056 (1916)
1278 (3470)
346 (712)
650 (833)
1624 (4182)
3273 (2385)

MATCHLINE "E"

69

INSET A

Walgreens*
25 (38)
25 (38)
25 (38)
25 (38)
1017 (1707)
1139 (1170)
25 (38)
25 (76)
25 (38)
25 (38)
Jiffy Lube*

Trailwinds Center*
132 (81)
58 (114)
69 25 38 (5) (38) (38)
8 (38)
935 (1702)
38 (38)
25 (38)
1101 (1158)
38 (50)
38 25 38 (38) (38) (76)
101 (126)
101 (152)
Target / Starbucks / Chipotle*

Hardy St
123 (219)
66 (297)
6 11 106 (33) (30) (156)
40 (213)
967 (1697)
21 (63)
21 (71)
1151 (1139)
5 (62)
8 5 6 (48) (13) (47)
37 (155)
19 (108)
Hardy St

INSET B

Newton Dr
106 (124)
149 (306)
5 9 92 (26) (5) (93)
59 (105)
1154 (1776)
69 (122)
76 (192)
1374 (2074)
39 (95)
305 14 37 (327) (9) (67)
117 (222)
356 (403)
Conser St

USPS Driveway*
13 (19)
13 (19)
13 (19)
13 (19)
1269 (1984)
1503 (2234)

Marty St
35 (58)
242 (55)
15 5 15 (35) (5) (18)
81 (5)
1238 (1862)
38 (53)
156 (45)
1285 (2068)
62 (121)
29 5 30 (106) (5) (68)
105 (179)
64 (179)
Marty St

CVS Driveway*
13 (19)
13 (19)
13 (19)
13 (19)
1344 (1901)
1330 (2154)

151st Street

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Auto Volumes

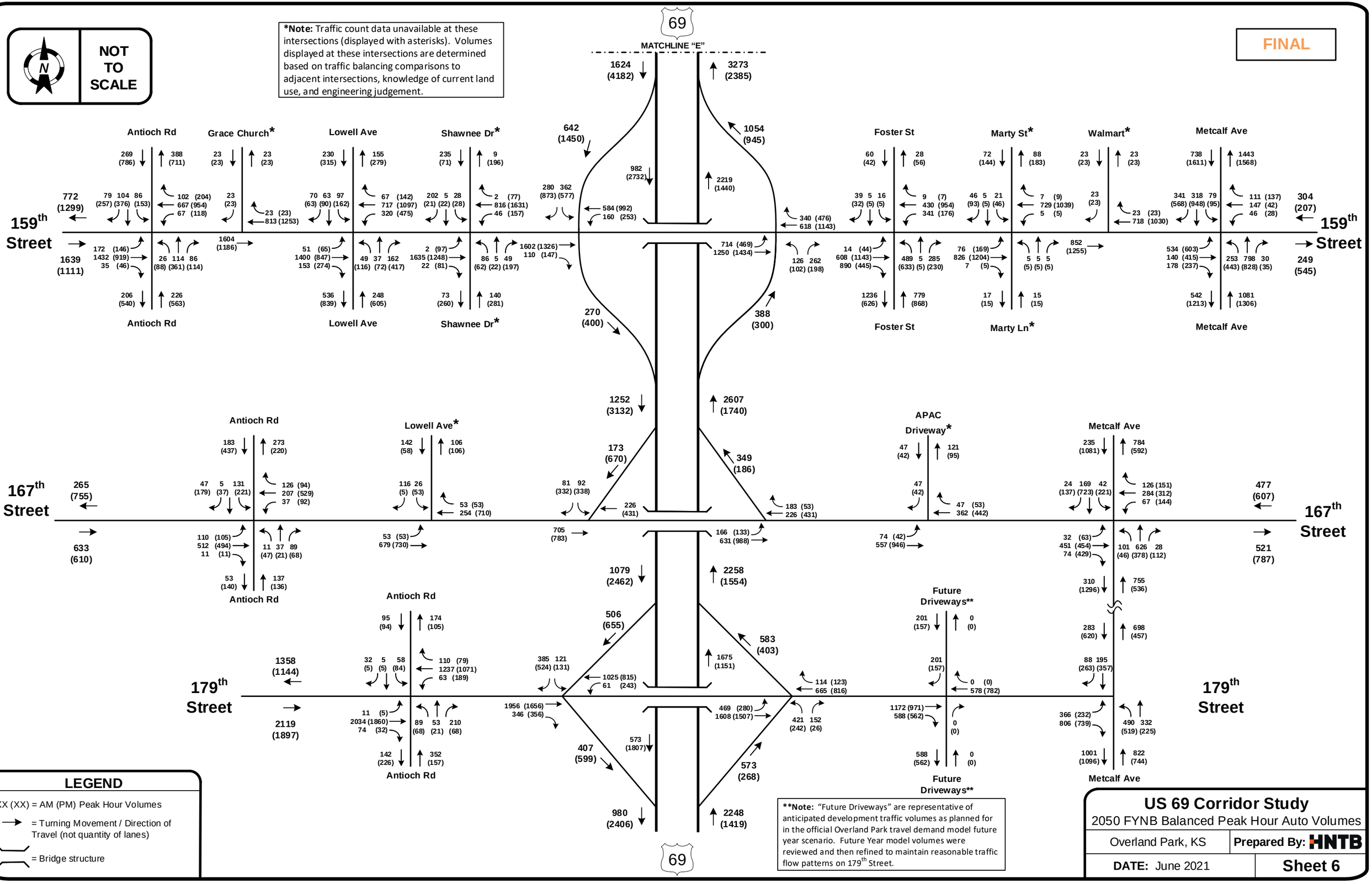
Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | **Sheet 5**

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Auto Volumes

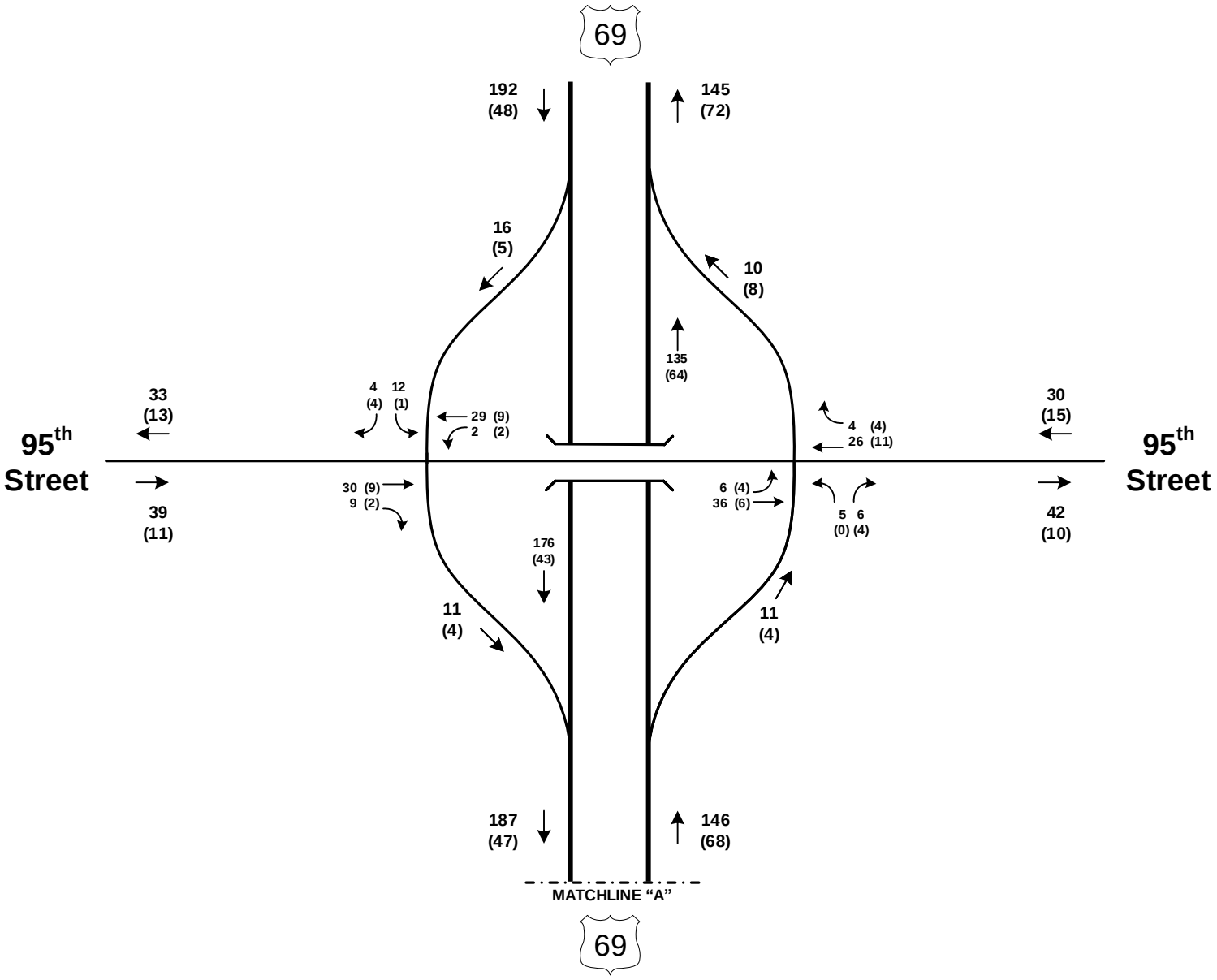
Overland Park, KS | **Prepared By:** HNTB

DATE: June 2021 | **Sheet 6**

2050 Future Year No-Build Balanced Peak Hour Volumes – Trucks Only

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

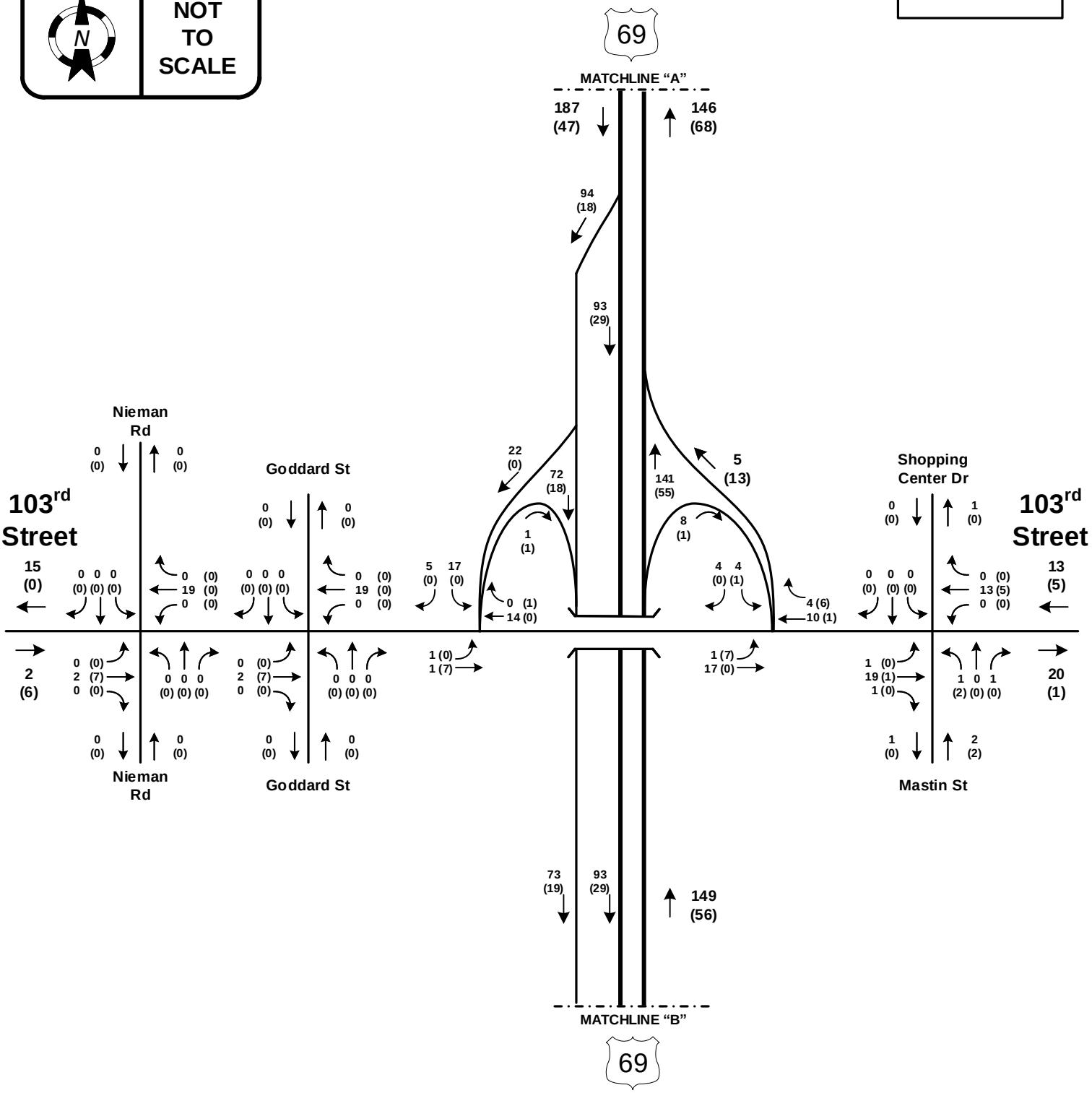
2050 FYNB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | **Sheet 1**

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | **Sheet 2**

NOT TO SCALE

FINAL

69

MATCHLINE "B"

Quivira Rd

Antioch Rd

109th St

Switzer Rd

Mastin Rd

College Blvd

435

50

MATCHLINE "C"

LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

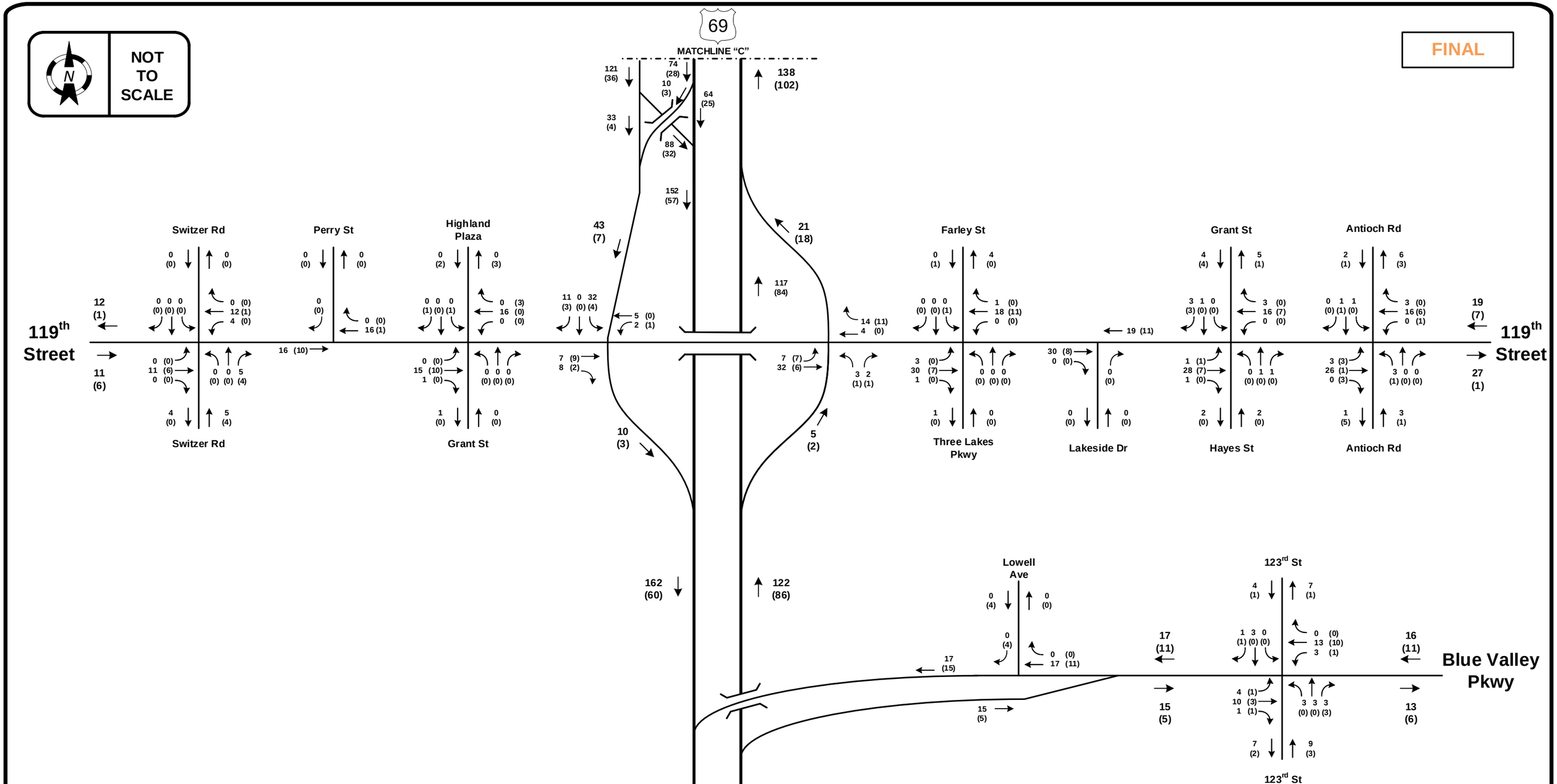
2050 FYNB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 3

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 4

NOT TO SCALE

FINAL

MATCHLINE "D"

69

179 (75)

137 (91)

63 (14)

29 (17)

116 (61)

108 (74)

10 (5) 53 (9)

44 (10) 42 (7)

29 (17) 55 (17)

53 (17) 16 (7)

16 (7)

31 (0) 14 (7)

92 (67)

45 (7)

54 (10)

16 (15) 12 (3)

28 (18)

39 (9)

21 (12)

135th Street

135th Street

71 (33)

53 (17)

53 (19)

Antioch Rd

Overland Pointe Marketplace

Hemlock St

BP Gas Station

Riley St

Mazuma Credit Union

Metcalf Ave

B&B Theatre

Hemlock St

Riley St

Metcalf Ave

Antioch Rd

6 (1) 13 (2)

4 (0) 1 (0) 1 (0) 6 (1) 35 (9) 3 (1)

1 (0) 20 (12) 0 (0) 0 (1) 6 (0) 1 (3)

4 (2) 7 (4)

0 (0) 44 (11)

22 (15) 0 (0)

0 (0)

4 (4) 7 (1)

0 (1) 0 (3) 4 6 (1) 44 (10) 4 (4)

0 21 (15) 1 (0) 0 (0) 1 (0) 3 (0) 0 (0)

5 (4) 4 (0)

0 (0) 0 (0)

0 (0) 54 (15)

0 (0) 0 (0)

3 (1) 3 (1)

3 0 0 (1) (0) (0) 0 (33) 70 3 (0)

3 (1) 53 (19) 11 (4) 11 (0) (0) 0 (0)

14 (4) 11 (0)

0 (0) 73 (33)

0 (0) 0 (0)

0 (0) 0 (0) 0 (0) 0 (33) 70 1 (0)

0 (0) 49 (16) 4 (3) 3 0 4 (0) (0) (1)

5 (3) 7 (1)

Antioch Rd

SEE INSET A

Shopping Center

McDonald's

Tay's Burger Shack

Dunkin Donuts

SEE INSET B

Metcalf Ave

170 (71)

137 (74)

32 (4)

30 (7)

107 (67)

14 18 (1) (3)

19 (13) 10 (4)

19 (4) 10 (14)

11 (3) 20 (5)

19 11 (3) (7)

138 (67)

21 (16)

30 (10)

24 (17)

13 (5) 11 (12)

34 (13)

31 (11)

151st Street

151st Street

28 (19)

29 (14)

2 (2) 11 (4)

0 1 1 (0) (1) (1) 1 (0) 31 (13) 3 (0)

6 (1) 22 (10) 3 (0) 3 4 0 (0) (3) (3)

7 (1) 7 (6)

3 (0) 0 (0)

3 0 0 (0) (0) (0) 0 (0) 33 (13) 0 (1)

0 (0) 23 (17) 0 (0) 0 (0) 0 1 (0) (0) (0)

0 (1) 1 (0)

0 (0) 33 (14)

0 (0)

0 (0) 0 (0)

0 (0) 0 (0)

0 (0) 0 (0)

0 (0) 29 (18) 0 (0)

0 (0) 31 (12) 0 (0) 0 (0)

0 (0) 0 (0)

0 (0) 29 (18)

0 (0) 0 (0)

0 (0) 0 (0)

14 (12) 12 (11)

4 9 1 (3) (9) (0) 3 (0) 20 (11) 5 (8)

0 (1) 23 (8) 3 (3) 6 9 5 (4) (10) (6)

17 (20) 20 (20)

Antioch Rd

Lowell Ave

Ace Hardware 1

Ace Hardware 2

Metcalf Ave

159 (83)

137 (77)

MATCHLINE "E"

69

INSET A

Walgreens

Trailwinds Center

Hardy St

0 (0) 0 (0)

0 (0) 35 (13)

23 (14) 0 (0) 0 (0)

0 (0) 23 (14) 0 (0) 0 0 0 (0) (0) (0)

0 (0) 22 (14) 1 (0) 0 0 0 (0) (0) (0)

0 (0) 0 (0)

0 0 0 (0) (0) (0) 0 (0) 35 (13) 0 (0)

0 0 1 (1) (0) (3) 1 (0) 35 (12) 0 (1)

1 (4) 1 (0)

1 (0) 1 (1)

151st Street

151st Street

Jiffy Lube

Target / Starbucks / Chipotle

Hardy St

INSET B

Newton Dr

USPS Driveway

Marty St

CVS Driveway

6 (0) 4 (0)

3 0 3 (0) (0) (0) 4 (0) 26 (18) 0 (0)

0 (0) 30 (12) 1 (0) 0 0 0 (0) (0) (0)

1 (0) 0 (0)

0 (0) 0 (0)

0 (0) 30 (18)

0 (0) 0 (0)

0 0 0 (0) (0) (0) 0 (0) 30 (18) 0 (0)

0 (0) 25 (12) 8 (0) 0 0 1 (0) (0) (0)

8 (0) 1 (0)

0 (0) 0 (0)

0 (0) 30 (18)

151st Street

151st Street

Conser St

Marty St

LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS	Prepared By: HNTB
DATE: June 2021	**Sheet 5**

NOT TO SCALE

FINAL

69

MATCHLINE "E"

159th Street

167th Street

179th Street

Antioch Rd

Grace Church

Lowell Ave

Shawnee Dr

Foster St

Marty St

Marty Ln

Walmart

Metcalf Ave

APAC Driveway

Future Driveways*

LEGEND

XX (XX) = AM (PM) Peak Hour Heavy Truck Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

*Note: "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street.

US 69 Corridor Study

2050 FYNB Balanced Peak Hour Heavy Truck Volumes

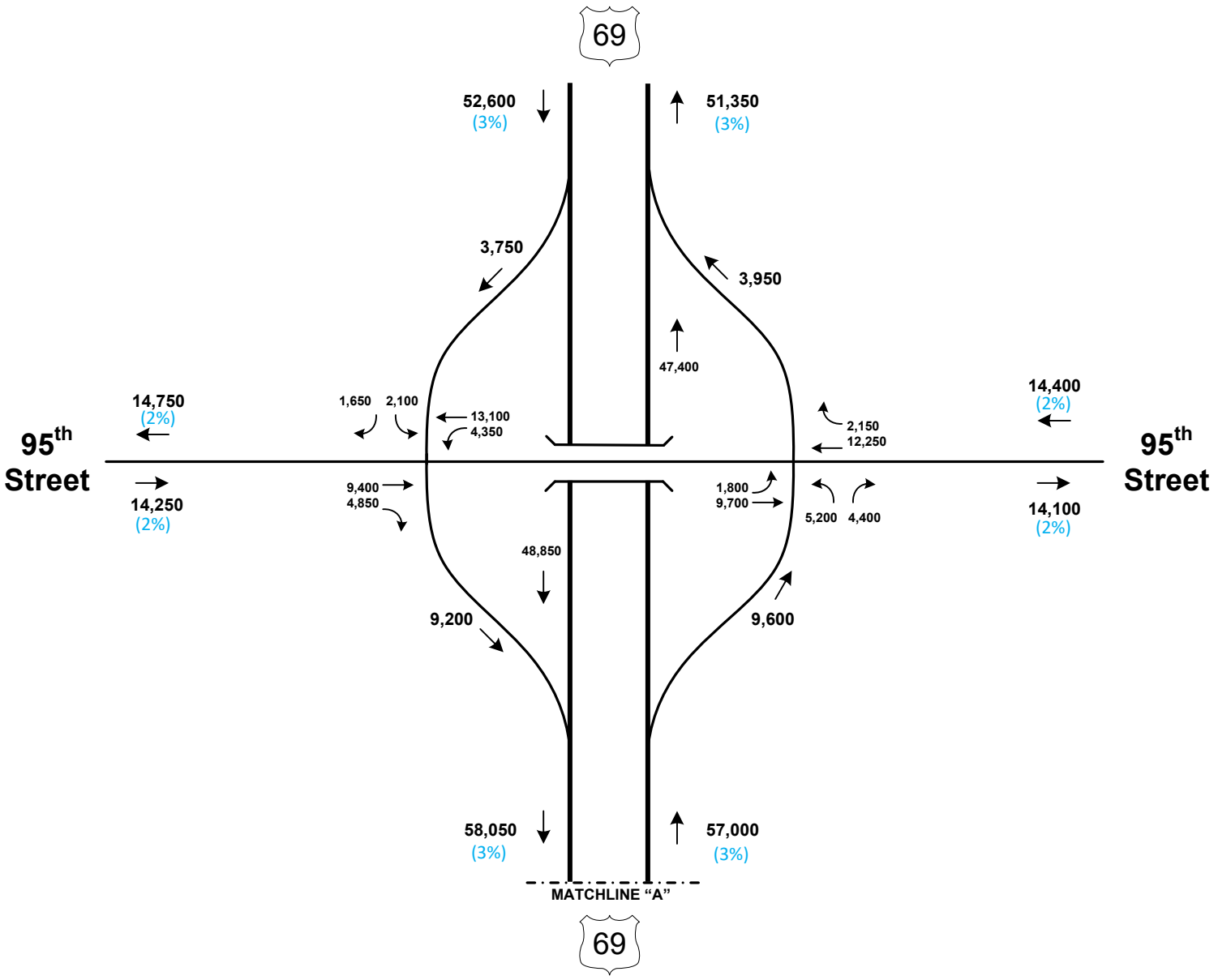
Overland Park, KS | Prepared By: HNTB

DATE: June 2021 | Sheet 6

2040 Base Year Build Balanced Daily Volumes and Truck Percentages

NOT TO SCALE

FINAL



LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

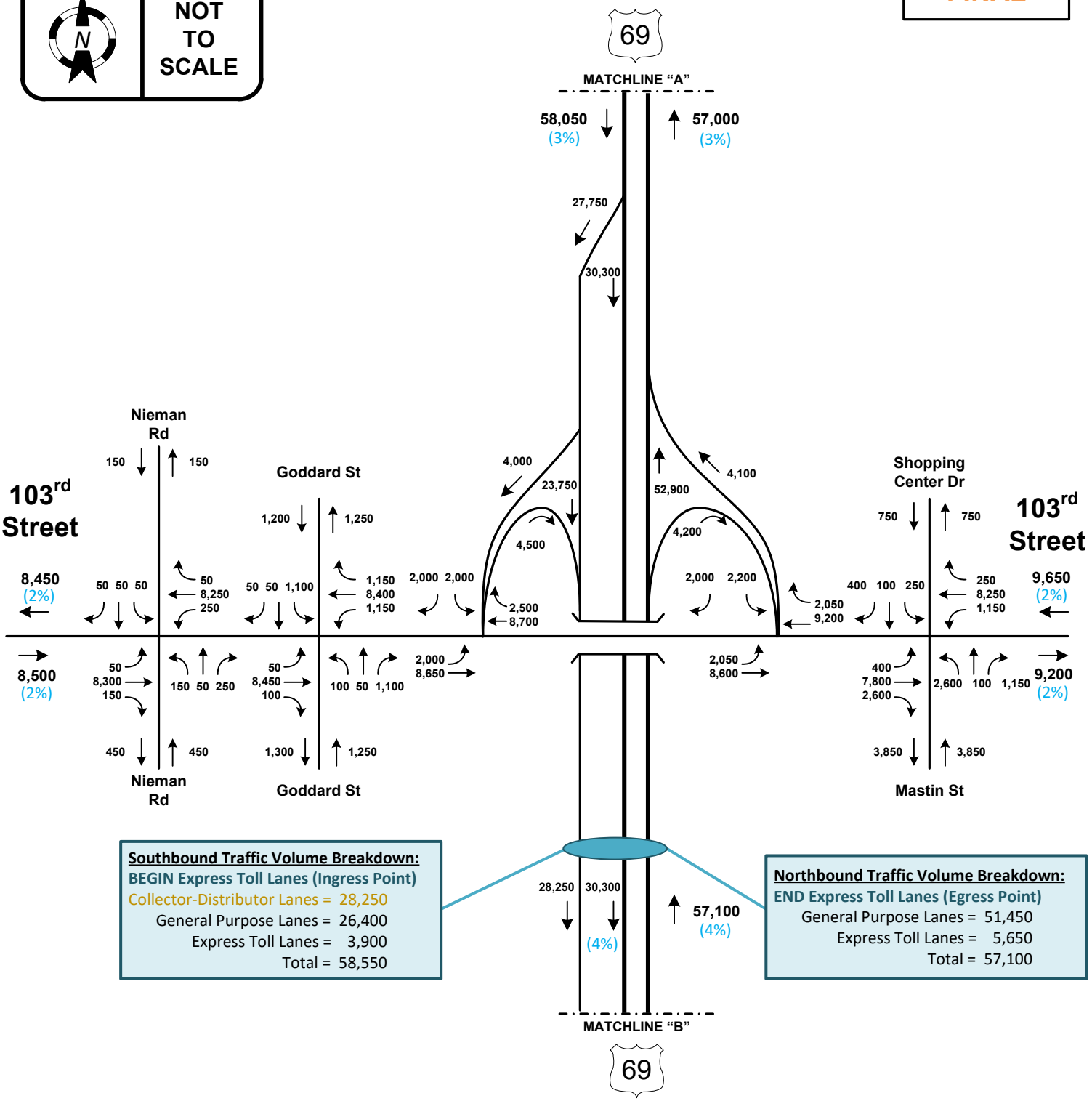
US 69 Corridor Study

2040 Interim Year Build Balanced Daily Traffic Volumes

Overland Park, KS	Prepared By: HNTB
DATE: October 2021	Sheet 1

NOT TO SCALE

FINAL



Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 28,250
General Purpose Lanes = 26,400
Express Toll Lanes = 3,900
Total = 58,550

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 51,450
Express Toll Lanes = 5,650
Total = 57,100

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2040 Interim Year Build Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 2

FINAL

NOT TO SCALE

69

MATCHLINE "B"

Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 28,250
General Purpose Lanes = 26,400
Express Toll Lanes = 3,900
Total = 58,550

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 51,450
Express Toll Lanes = 5,650
Total = 57,100

28,250 | 30,300 (4%) | 57,100 (4%)

26,550 | 1,700

Quivira Rd

16,950 | 16,950

4,500 | 12,450 | 5,950 | 9,450

10,550 | 15,400 | 6,050 | 11,000

80,400 (6%) | 69,850 | 23,550 | 38,950 | 14,950 | 24,000 | 19,200 | 46,300

4,800 | 21,750 | 14,700 | 250 | 9,350 | 11,050

21,800 | 35,300 | 9,600 | 31,400 | 61,000

Antioch Rd

14,300 | 14,300

3,100 | 11,200 | 2,150 | 6,050

11,950 | 8,850 | 12,150 | 8,200 | 26,600 | 4,800 | 7,150 | 53,850 | 80,450 | 88,650

435 | 435

50 | 50

67,400 | 46,800 | 20,600 | 2,900 | 12,500 | 23,500 | 59,300 | 4,200 | 19,300 | 9,600 | 4,200 | 51,900 | 31,800 | 7,400 | 39,200 | 27,250 | 11,950 | 79,150 | 8,200 | 87,350 (6%)

77,950 (6%)

10,550 | 15,950 | 5,950 | 15,400

15,100 | 2,150 | 3,100 | 8,850 | 17,900 | 6,050

4,500 | 6,050 | 12,550 | 9,450

22,000 | 22,000

Quivira Rd

109th St

400 | 400

100 | 50 | 250 | 250 | 18,650 | 1,100

100 | 12,300 | 500 | 500 | 50 | 1,100

1,650 | 1,650

Switzer Rd

Mastin Rd

5,900 | 5,900

1,100 | 15,750 | 350

4,750 | 50 | 1,100

4,750 | 9,700 | 500 | 500 | 50 | 350

900 | 900

Mastin Rd

23,950 | 23,950

Antioch Rd

16,450 | 6,100 | 1,450 | 2,850 | 24,200 (5%) | 10,400 | 5,550 | 4,850 | 26,050 | 3,650 | 6,300 | 3,700 | 7,850 | 33,900 | 24,200 (5%)

31,100 (5%) | 19,200 | 8,250 | 4,600 | 11,300 | 4,150 | 3,850 | 3,900 | 7,750 | 30,600 | 58,100 (5%)

10,050 | 29,250 | 28,300 | 950 | 950 | 20,050 | 800 | 27,500

19,250 (2%) | 12,900 (2%) | 20,000 | 13,650 | 21,000 | 14,950 | 17,200 (2%) | 11,150 (2%)

College Blvd | College Blvd

MATCHLINE "C"

69

LEGEND

XX = Daily Traffic Volume Estimates

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

Single Point Urban Interchange (SPUI)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2040 Interim Year Build Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 3

NOT TO SCALE

FINAL

69

MATCHLINE "C"

119th Street

Switzer Rd

Perry St

Highland Plaza

Farley St

Grant St

Antioch Rd

Three Lakes Pkwy

Lakeside Dr

Hayes St

Lowell Ave

123rd St

Blue Valley Pkwy

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 43,000
Express Toll Lanes = 3,900
Total = 46,900

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 40,150
Express Toll Lanes = 5,650
Total = 45,800

Northbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	6,100
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	3,350
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	2,900
Express Toll Lanes – TOTAL =	5,650

Southbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	3,900
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	450
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	2,550
Express Toll Lanes – TOTAL =	6,000

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	6,000
Express Toll Lanes – ENTERING from Blue Valley Pkwy =	3,500
Express Toll Lanes – TOTAL=	9,500

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	9,650
Express Toll Lanes – EXITING to Blue Valley Pkwy =	3,550
Express Toll Lanes – TOTAL=	6,100

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 57,850
Express Toll Lanes = 9,500
Total = 67,350

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 56,950
Express Toll Lanes = 9,650
Total = 66,600

LEGEND

XX = Daily Traffic Volume Estimates

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2040 Interim Year Build Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 4

NOT TO SCALE

FINAL

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 57,850
Express Toll Lanes = 9,500
Total = 67,350

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 56,950
Express Toll Lanes = 9,650
Total = 66,600

67,350 (4%) ↓ | 66,600 (4%) ↑

69

29,650 ↓ | 37,700 ↓ | 19,200 ↘ | 47,400 ↑

Antioch Rd | Overland Pointe Marketplace | Hemlock St | BP Gas Station | Riley St | Mazuma Credit Union | Metcalf Ave

135th Street

21,200 (2%) → | 21,850 (2%) ←

10,300 ↓ 10,750 ↑ | 2,400 4,850 3,050 → 3,250 17,550 1,950 ← | 2,600 18,600 650 → 1,250 4,900 1,600 ← | 7,450 ↓ 7,750 ↑

550 ↑ | 550 22,750 ← | 22,700 550 → | 550 ↓

7,250 ↓ 7,250 ↑ | 1,650 1,250 4,350 → 4,350 21,400 4,100 ← | 1,650 20,800 250 → 250 1,250 4,100 ← | 5,600 ↓ 5,600 ↑

950 ↓ 550 ↑ | 950 ← 550 28,900 ← | 29,250 →

10,200 19,450 → 19,250 3,900 ← | 24,200 5,050 ↓

19,200 17,900 ←

4,200 ↓ 4,200 ↑ | 3,050 250 900 → 900 31,050 700 ← | 3,050 29,950 3,000 → 3,000 250 700 ← | 3,950 ↓ 3,950 ↑

550 ↑ | 550 32,650 ← | 31,550 →

13,200 ↓ 12,800 ↑ | 4,050 6,000 3,150 → 2,350 23,900 2,100 ← | 4,700 21,800 5,050 → 5,250 5,750 2,100 ← | 13,150 ↓ 13,100 ↑

28,350 (2%) ← | 27,050 (2%) →

32,250 → 11,400 ↓ | 11,400 ↓ | 36,000 ↑ | 5,250 3,750 ←

8,950 ↓ | 9,000 ↘

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 37,150
Express Toll Lanes = 9,500
TOTAL = 46,650

Northbound Traffic Volume Breakdown
BEGIN Express Toll Lanes (Ingress Point)
General Purpose Lanes = 35,350
Express Toll Lanes = 9,650
Total = 45,000

46,650 (6%) ↓ | 45,000 (6%) ↑

Antioch Rd | SEE INSET A | Shopping Center | McDonald's | Tay's Burger Shack | Dunkin Donuts | SEE INSET B | Metcalf Ave

151st Street

16,500 (2%) → | 16,750 (2%) ←

6,400 ↓ 6,500 ↑ | 1,400 2,550 2,450 → 2,550 14,150 1,450 ← | 1,450 14,350 950 → 950 2,500 1,600 ← | 4,950 ↓ 5,050 ↑

1,650 ↓ 1,650 ↑ | 300 200 1,150 → 1,150 19,050 2,850 ← | 300 19,700 400 → 400 200 2,850 ← | 3,450 ↓ 3,450 ↑

100 ↓ 100 ↑ | 100 ← 100 22,950 ← | 23,700 →

16,350 ↓ | 7,000 9,350 → 16,050 5,000 ← | 19,550 4,150 ↓

17,150 ↘ | 27,850 ↑ | 9,950 16,600 ← | 7,200 21,700 ↓ | 4,450 5,100 ←

150 ↓ 250 ↑ | 150 ← 100 26,400 ← | 150 26,550 100 → 300 ↑ | 100 ↓ 300 ↑

300 ↓ 100 ↑ | 300 ← 100 26,200 150 ← | 26,750 100 → 150 ↑ | 250 ↓ 150 ↑

9,900 ↓ 9,950 ↑ | 3,950 4,700 1,250 → 1,250 18,050 3,000 ← | 3,850 18,600 2,300 → 2,300 4,850 3,000 ← | 10,000 ↓ 10,150 ↑

22,300 (2%) ← | 22,850 (2%) →

30,300 ↓ | 9,150 ↘ | 9,550 ↘

39,450 (6%) ↓ | 37,400 (6%) ↑

MATCHLINE "E"

69

INSET A

Walgreens | Trailwinds Center | Hardy St

151st Street

350 ↓ 350 ↑ | 350 ← 350 17,800 ← | 18,050 350 → 750 ↑ | 350 ↓ 750 ↑

1,000 ↓ 1,000 ↑ | 250 400 350 → 350 17,450 600 ← | 250 18,100 450 → 450 400 600 ← | 1,450 ↓ 1,450 ↑

2,700 ↓ 2,700 ↑ | 550 250 1,900 → 1,900 17,300 550 ← | 550 17,950 550 → 550 250 550 ← | 1,350 ↓ 1,350 ↑

Jiffy Lube | Target / Starbucks / Chipotle | Hardy St

INSET B

Newton Dr | USPS Driveway | Marty St | CVS Driveway

151st Street

2,200 ↓ 2,200 ↑ | 1,100 100 1,000 → 1,000 23,150 950 ← | 1,100 23,600 2,200 → 2,200 100 950 ← | 3,250 ↓ 3,250 ↑

200 ↓ 200 ↑ | 200 ← 200 24,900 ← | 25,550 →

600 ↓ 600 ↑ | 400 50 150 → 150 23,550 600 ← | 400 24,000 1,150 → 1,150 50 600 ← | 1,800 ↓ 1,800 ↑

200 ↓ 200 ↑ | 200 ← 200 24,100 ← | 24,750 →

Conser St | Marty St

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2040 Interim Year Build Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 5

NOT TO SCALE

FINAL

69

MATCHLINE "E"

US 69 Corridor Study

2040 Interim Year Build Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 6

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

X% = Heavy Vehicle Percentage

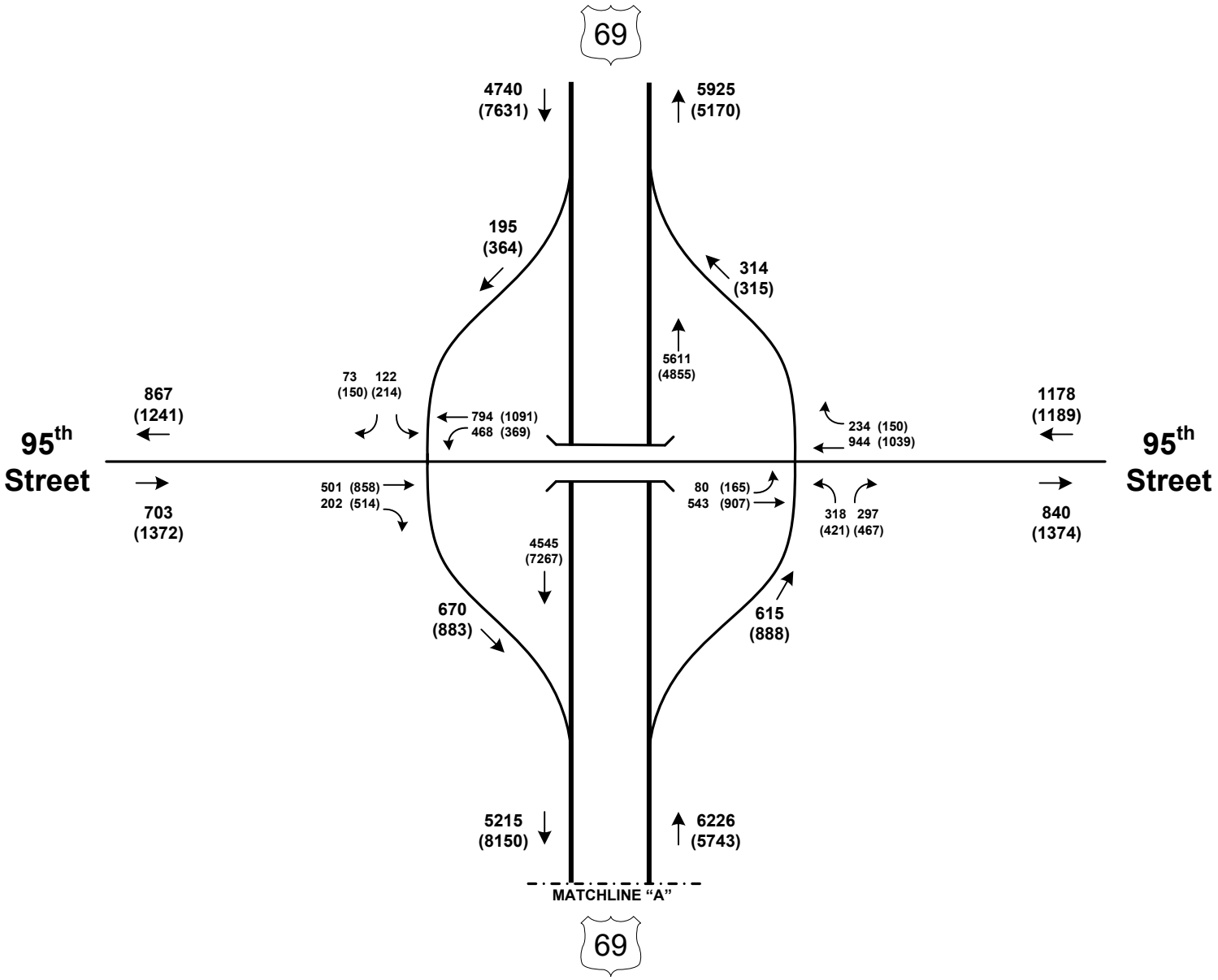
***Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street and 167th Street.

2040 Base Year Build Balanced Peak Hour Volumes

– All Vehicle Classes

FINAL

NOT TO SCALE



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

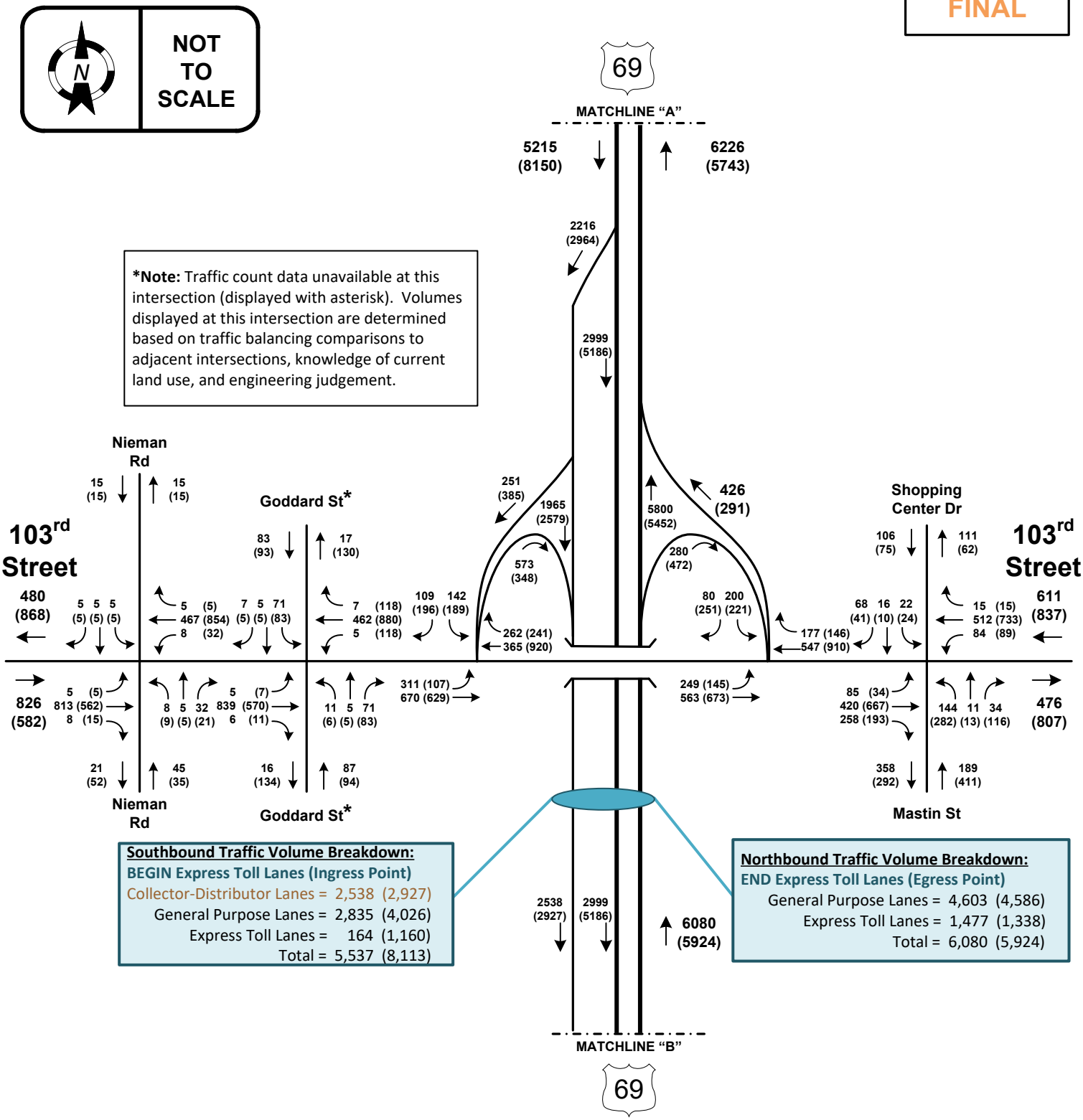
US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 1

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 2

NOT TO SCALE

FINAL

Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 2,538 (2,927)
General Purpose Lanes = 2,835 (4,026)
Express Toll Lanes = 164 (1,160)
Total = 5,537 (8,113)

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 4,603 (4,586)
Express Toll Lanes = 1,477 (1,338)
Total = 6,080 (5,924)

69

MATCHLINE "B"

2538 (2927)

2999 (5186)

6080 (5924)

2207 (2605)

331 (322)

Quivira Rd

1111 (1616)

1188 (1501)

403 (309)

1804 (2296)

1583 (1497)

4497 (4427)

234 (459) 877 (1157)

438 (466)
948 (898)

712 (1130)

1386 (1364)

1377 (1396)

853 (1190)

37 (167)

3226 (3464)

478 (671) 750 (1035)

1840 (2100)

890 (1357)

2473 (2854)

418 (452)

680 (1356)

Antioch Rd

1251 (983)

694 (1591)

257 994 (194) (789)

110 (239)
922 (480)

423 584 (1162) (1352)

2055 (2402)

1032 (719)

7180 (8047)

6468 (6917)

4628 (4817)

1446 (1759)

1340 (1229)

5968 (6046)

262 (904)

5706 (5142)

7761 (7544)

8793 (8263)

435

1184 (1512)

50

7561 (7314)

6635 (6543)

1113 (1828)

5522 (4715)

909 (356)

1043 (1047)

6565 (5762)

5995 (5381)

2682 (3026)

8677 (8407)

9578 (9159)

926 (771)

1272 (1462) 553 (593)

1952 (1403)

2022 (2184)

1619 (1797)

403 (387)

741 (1367)

403 (387)

3310 (3441)

570 (381)

3880 (3822)

1198 (796)

1475 441 (1127) (142)

901 (752)

152 (361)
1046 (435)

855 460 (2153) (610)

595 (627)

1267 (1508)

443 (145)

352 (289)

4094 (4040)

1446 (1759)

1506 (1145)

468 (537)

2952 (2904)

258 (362)
668 (409)

970 1399 (1344) (810)

109th St

Mastin Rd

2521 (1562)

1315 (2763)

1940 (1871)

2369 (2154)

36 (38)

35 (40)

2404 (4559)

1390 (1061)

866 (415)

524 (646)

2833 (2628)

104 (810)

110 (253)

Antioch Rd

Quivira Rd

1668 (2572)

5 5 26 (9) (5) (24)

8 (25)
1608 (2532)
17 (132)

1633 (2689)

2008 (2875)

163 (386)
563 (1337)
40 (431)

119 (276)

885 (2430)

66 16 22 (668) (9) (133)

15 (62)
675 (1714)
84 (40)

774 (1816)

College Blvd

1465 (1005)

22 (10)
1411 (930)
32 (65)

55 5 174 (31) (5) (174)

1611 (1015)

305 (151)
1213 (685)
93 (179)

546 162 (706) (200)

119 (276)
766 (2154)

2023 (1192)

84 (186)
1682 (960)
257 (46)

144 11 34 (48) (5) (23)

1738 (1116)

College Blvd

133 (610)

218 (108)

708 (906)

54 (202)

234 (97)

Switzer Rd

4334 (4409)

2615 (2520)

357 (95)

189 (76)

Mastin Rd

2141 (3485)

2404 (4559)

6949 (6929)

MATCHLINE "C"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

Single Point Urban Interchange (SPUI)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Volumes

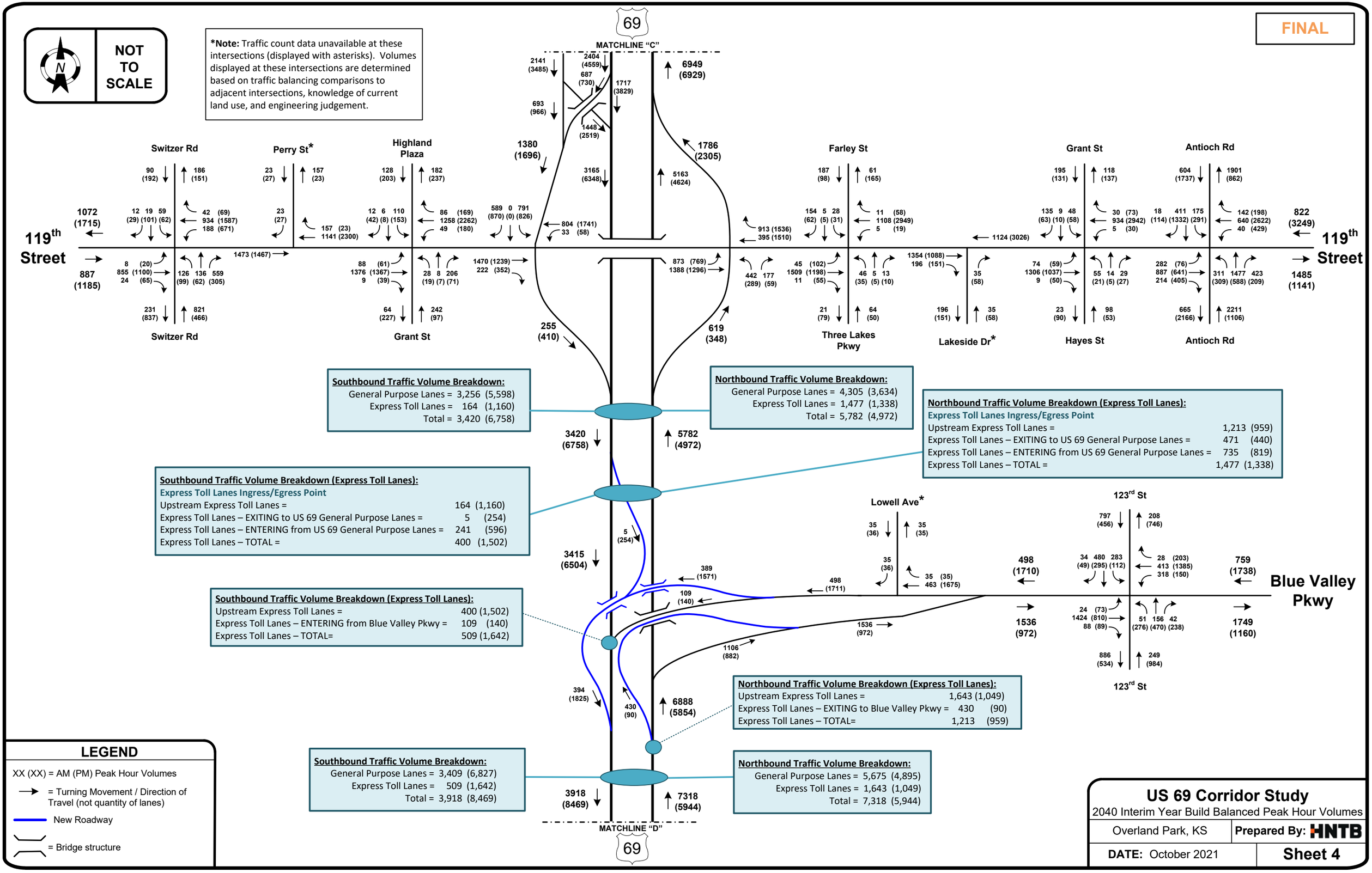
Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 3

FINAL

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.



Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,256 (5,598)
Express Toll Lanes = 164 (1,160)
Total = 3,420 (6,758)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 4,305 (3,634)
Express Toll Lanes = 1,477 (1,338)
Total = 5,782 (4,972)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point	
Upstream Express Toll Lanes =	1,213 (959)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	471 (440)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	735 (819)
Express Toll Lanes – TOTAL =	1,477 (1,338)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point	
Upstream Express Toll Lanes =	164 (1,160)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	5 (254)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	241 (596)
Express Toll Lanes – TOTAL =	400 (1,502)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	400 (1,502)
Express Toll Lanes – ENTERING from Blue Valley Pkwy =	109 (140)
Express Toll Lanes – TOTAL=	509 (1,642)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	1,643 (1,049)
Express Toll Lanes – EXITING to Blue Valley Pkwy =	430 (90)
Express Toll Lanes – TOTAL=	1,213 (959)

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,409 (6,827)
Express Toll Lanes = 509 (1,642)
Total = 3,918 (8,469)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 5,675 (4,895)
Express Toll Lanes = 1,643 (1,049)
Total = 7,318 (5,944)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 4

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,409 (6,827)
Express Toll Lanes = 509 (1,642)
Total = 3,918 (8,469)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 5,675 (4,895)
Express Toll Lanes = 1,643 (1,049)
Total = 7,318 (5,944)

3918 (8469) | 69 | 7318 (5944)

1983 (3033) | 1816 (1687) | 5502 (4257)

1935 (5436) | 4603 (2716) | 899 (1541)

422 (1176) | 905 (708)

2357 (6612) | 5508 (3424)

945 (2900) | 2491 (1724) | 3017 (1700)

279 (384) | 553 (600) | 1412 (3712)

1691 (4096) | 3570 (2300)

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 1,848 (4,970)
Express Toll Lanes = 509 (1,642)
Total = 2,357 (6,612)

Northbound Traffic Volume Breakdown
BEGIN Express Toll Lanes (Ingress Point)
General Purpose Lanes = 3,865 (2,375)
Express Toll Lanes = 1,643 (1,049)
Total = 5,508 (3,424)

MATCHLINE "E"

69

135th Street

Antioch Rd | Overland Pointe Marketplace* | Hemlock St | BP Gas Station* | Riley St | Mazuma Credit Union* | Metcalf Ave

1025 (2124) → 1386 (1423)

547 (1190) ↓ 972 (700) ↑
65 (264) 171 (511) 311 (415) ↓
147 (259) 934 (1743) 113 (154) ←
430 (121) 893 (1293) 63 (9) ↓
26 (117) 394 (320) 82 (47) ↑
347 (674) ↓ 502 (484) ↑

67 (58) ↑ 67 (58) ←
1194 (2156) ←
1251 (1697) 35 (58) →
35 (58) ↓

260 (764) ↓ 633 (547) ↑
44 (195) 14 (165) 202 (404) ↓
488 (384) 1212 (1989) 251 (420) ←
96 (108) 1145 (1574) 10 (15) ↓
5 (30) 49 (55) 336 (316) ↑
1683 (2294) →
275 (600) ↓ 390 (401) ↑

35 (104) ↓ 88 (58) ↑
35 (104) ←
88 (58) ←
1916 (2689)
1433 (1552) 250 (742) →

962 (1262) 1021 (1771) ↓
1042 (1485) 172 (434) ←
1555 (1782) 899 (1541) →

1816 (1687) ←
840 (1518) ←
374 (401) 531 (307) ↑

197 (446) ↓ 316 (315) ↑
152 (324) 13 (36) 32 (86) ↓
68 (69) 2387 (2664) 17 (63) ←
236 (233) 1763 (1527) 87 (329) ↓
117 (217) 12 (13) 19 (66) ↑
117 (428) ↓ 148 (296) ↑

58 (58) ↑
58 (58) 2472 (2796) ←
1814 (1679) →

302 (1713) ↓ 1209 (656) ↑
93 (530) 130 (778) 79 (405) ↓
100 (46) 1702 (1889) 66 (167) ←
452 (175) 1045 (1019) 317 (485) ↓
735 (435) 657 (435) 96 (147) ↑
513 (1430) ↓ 1488 (1017) ↑

1868 (2102) ←
1220 (1571) →

Antioch Rd | B&B Theatre* | Hemlock St | Riley St | Metcalf Ave

151st Street

Antioch Rd | SEE INSET A | Shopping Center | McDonald's* | Tay's Burger Shack* | Dunkin Donuts* | SEE INSET B | Metcalf Ave

695 (1835) → 1321 (839)

328 (485) ↓ 408 (524) ↑
66 (114) 117 (143) 145 (228) ↓
224 (193) 571 (1605) 77 (97) ←
78 (77) 1183 (675) 60 (87) ↓
58 (116) 106 (254) 202 (83) ↑
254 (327) ↓ 366 (453) ↑

136 (195) ↓ 72 (99) ↑
33 (22) 9 (26) 94 (147) ↓
24 (58) 784 (2042) 102 (278) ←
34 (26) 1556 (1052) 32 (37) ↓
42 (41) 14 (15) 240 (228) ↑
143 (341) ↓ 296 (284) ↑

12 (12) ↓ 12 (12) ↑
12 (12) ←
898 (2366)
1890 (1427) →
1761 (1243) 129 (184) →

344 (1349) 601 (1551) ↓
566 (1029) 150 (200) ←
1430 (766) 932 (2028) →

1061 (958) 484 (938) ←
232 (291) 321 (309) ↑

12 (12) ↓ 12 (12) ↑
12 (12) 1522 (1873) 12 (12) ←
212 (352) 172 (488) 87 (148) ↓
67 (82) 913 (1045) 202 (285) ←
232 (699) 349 (1681) 168 (114) ↓
322 (307) 346 (481) 181 (238) ↑
542 (887) ↓ 849 (1026) ↑

12 (12) ↓ 24 (24) ↑
12 (12) 1533 (1884) ←
12 (12) 1229 (2313) 12 (12) ←
23 (23) ↓ 23 (23) ↑
1240 (2324) 12 (12) →
23 (23) ↓ 12 (12) ↑
12 (12) ↓ 12 (12) ↑

1182 (1412) ←
967 (2067) →

Lowell Ave | Ace Hardware 1* | Ace Hardware 2* | Metcalf Ave

INSET A

Walgreens* | Trailwinds Center* | Hardy St

1507 (951) 23 (35) →
23 (35) ↓ 23 (35) ↑
23 (71) ↑
23 (35) 849 (1860) ←
64 (5) 23 (35) 35 (35) ↓
7 (35) 773 (1855) 35 (35) ←
23 (35) 1472 (941) 35 (46) ↓
35 (35) 23 (35) 35 (71) ↑
93 (116) ↓ 93 (141) ↑
6 (32) 10 (28) 99 (148) ↓
38 (198) 802 (1848) 19 (59) ←
19 (66) 1517 (923) 6 (58) ↓
7 (45) 5 (12) 6 (44) ↑
35 (145) ↓ 18 (101) ↑

151st Street → 151st Street

Jiffy Lube* | Target / Starbucks / Chipotle* | Hardy St

INSET B

Newton Dr | USPS Driveway* | Marty St | CVS Driveway*

104 (115) ↓ 143 (283) ↑
12 (18) ↓ 12 (18) ↑
33 (54) ↓ 225 (52) ↑
12 (18) ↓ 12 (18) ↑
8 (24) 8 (5) 88 (86) ↓
59 (97) 1255 (1570) 64 (113) ←
12 (18) 1366 (1762) ←
14 (32) 5 (5) 14 (17) ↓
75 (5) 1337 (1650) 35 (49) ←
12 (18) ↓ 12 (18) ↑
1266 (2218) →
71 (178) 1144 (2070) 37 (88) ↓
283 (303) 13 (8) 34 (62) ↑
145 (42) 1056 (2064) 65 (112) ↓
27 (98) 5 (5) 29 (63) ↑
1099 (2144) →
109 (206) ↓ 330 (373) ↑
105 (166) ↓ 61 (166) ↑

151st Street → 151st Street

Conser St | Marty St

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
→ = Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Volumes

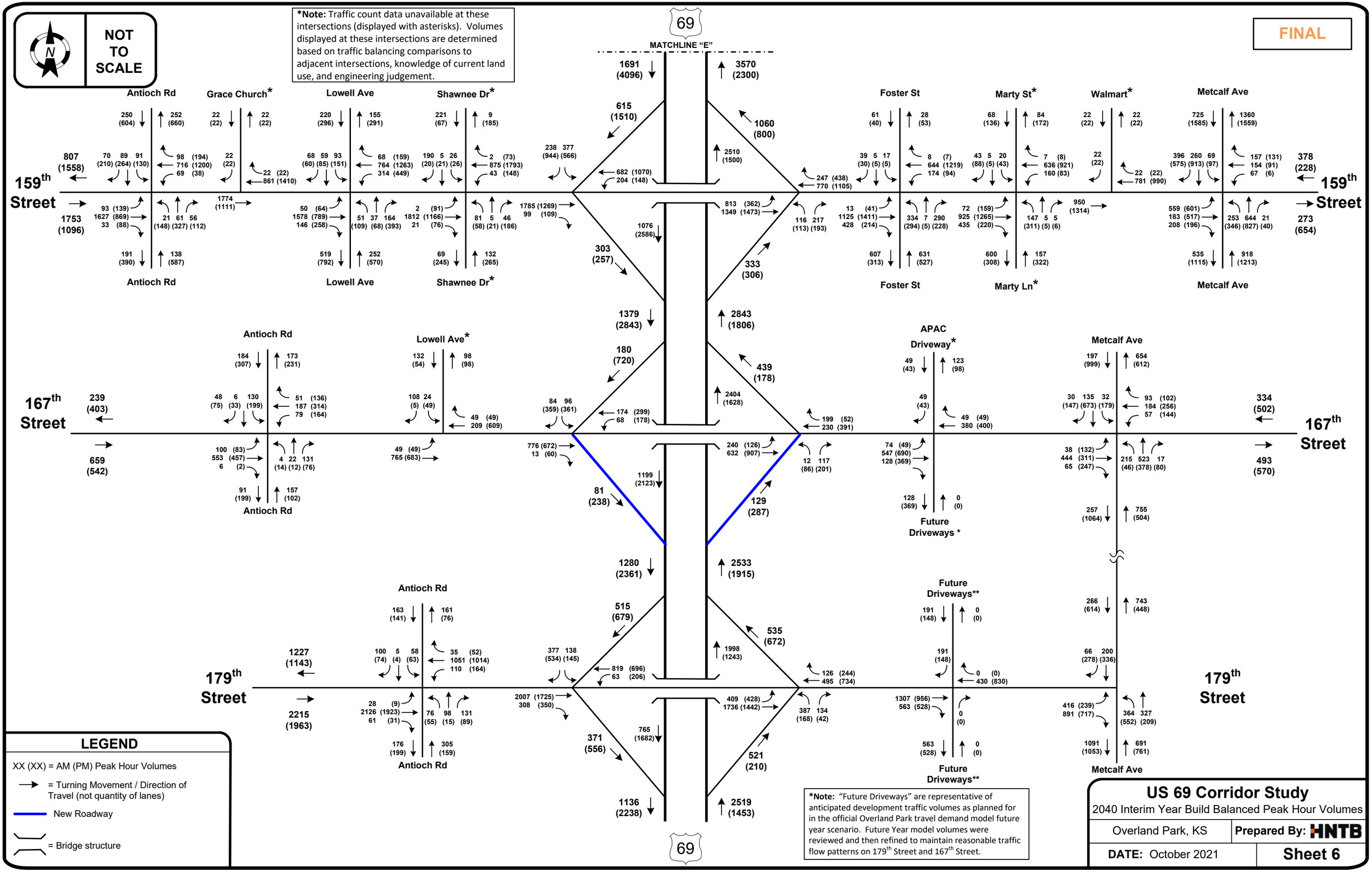
Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 5

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL



***Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street and 167th Street.

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Volumes

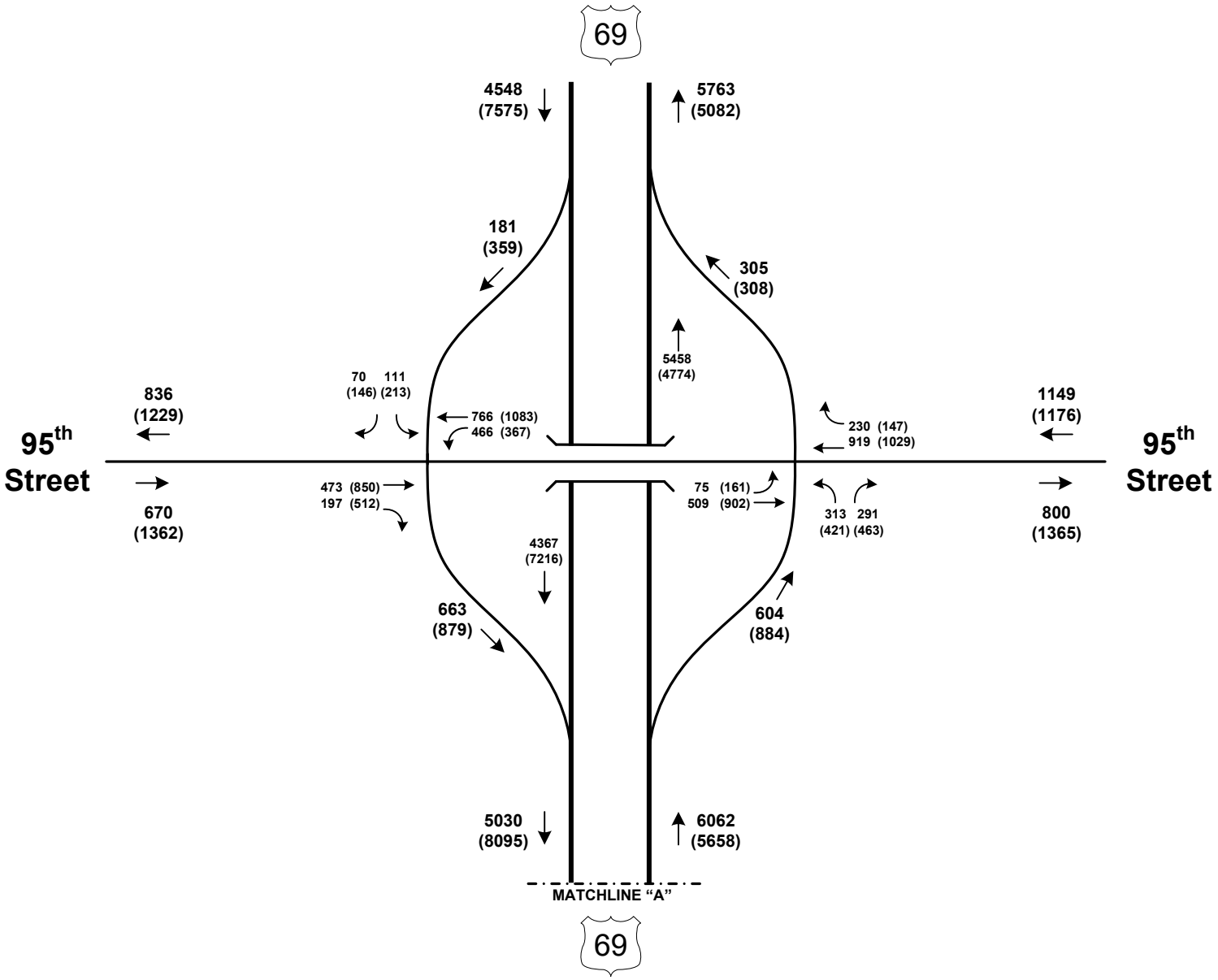
Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 6

2040 Base Year Build Balanced Peak Hour Volumes – Autos Only

FINAL

NOT TO SCALE



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

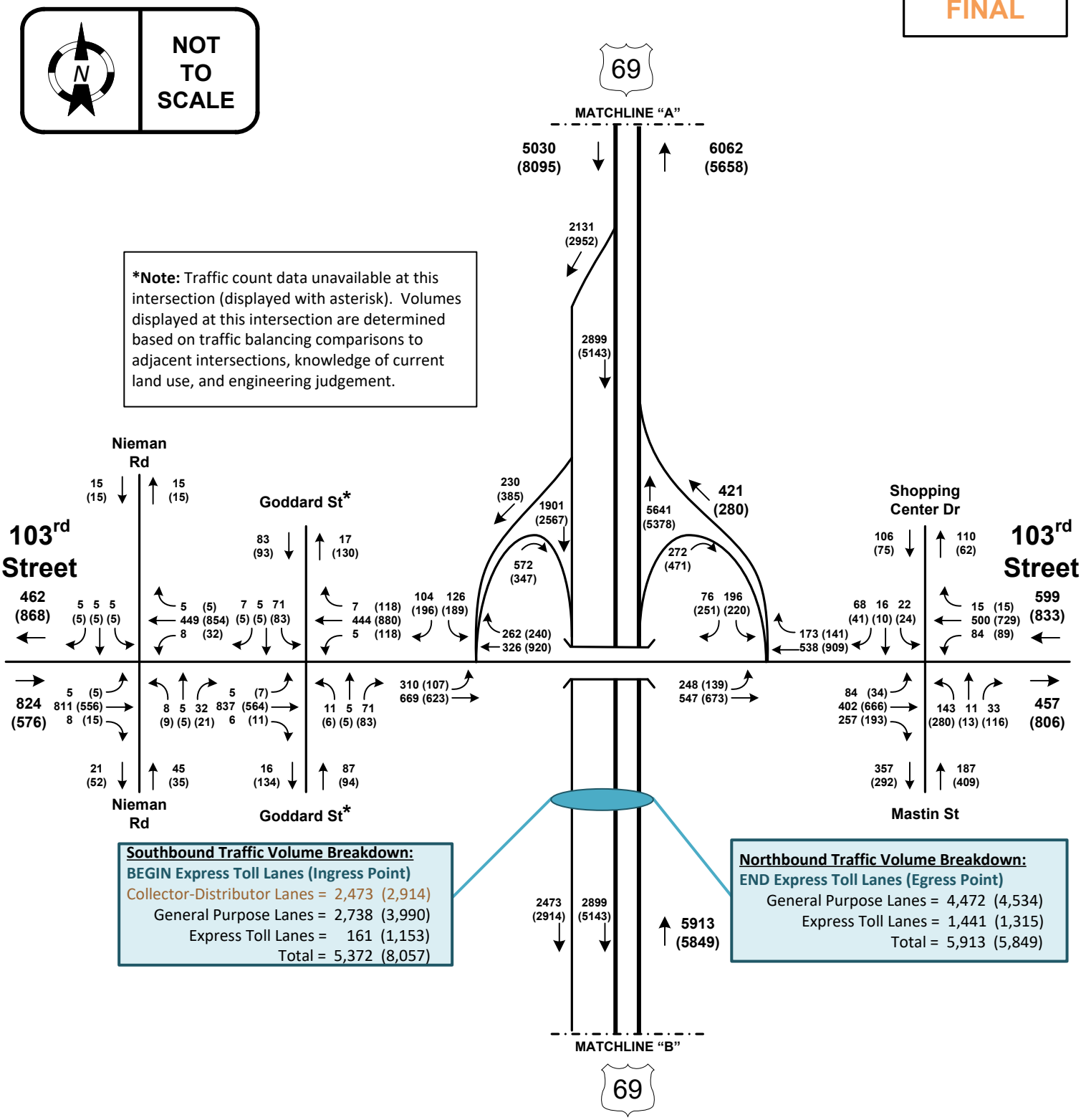
US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 1

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 2

FINAL

NOT TO SCALE

69

MATCHLINE "B"

Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 2,473 (2,914)
General Purpose Lanes = 2,738 (3,990)
Express Toll Lanes = 161 (1,153)
Total = 5,372 (8,057)

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 4,472 (4,534)
Express Toll Lanes = 1,441 (1,315)
Total = 5,913 (5,849)

2473 (2914)
2899 (5143)
5913 (5849)
2147 (2593)
326 (321)
401 (306)
1746 (2287)
1546 (1475)
4367 (4374)
824 (1181)
37 (165)
1363 (1388)
1396 (1696)
1326 (1223)
1150 (1502)
861 (1346)
2407 (2821)
409 (449)
259 (901)
5521 (5769)
5262 (4868)
1998 (2372)
1025 (719)
7260 (7240)
8285 (7959)
435
50

Quivira Rd
1097 (1602)
1161 (1492)
233 (454) 864 (1148)
437 (466)
935 (892)
688 (1109)
455 (655) 724 (1026)
1372 (1358)
1788 (2032)
3160 (3390)
6671 (7687)
5983 (6578)
4195 (4546)
6104 (6248)
6981 (7009)
5087 (4452)
1017 (1796)
899 (355)
1033 (1042)
6120 (5494)
877 (761)
1258 (1453) 541 (587)
1932 (1397)
1916 (2151)
1520 (1765)
396 (386)
717 (1358)
396 (386)
234 (354) 643 (407)
945 1391 (1327) (810)
1901 (1860)
2336 (2137)
Quivira Rd

109th St
36 (36)
34 (38)
5 5 26 (8) (5) (23)
8 (24)
1566 (2521)
17 (132)
21 (9)
1397 (921)
26 (65)
54 5 174 (31) (5) (60)
48 (202)
233 (96)
Switzer Rd

1591 (2677)
1597 (1004)
1625 (2560)
1444 (995)
College Blvd

1173 (1478)
1890 (2836)
295 (150)
1210 (675)
92 (179)
577 (624)
433 (144)
347 (287)
2322 (4519)
1357 (1055)
860 (411)
497 (644)
132 (610)
2022 (3446)
2322 (4519)
3971 (3988)
1396 (1696)
445 (535)
2758 (2553)
150 (385)
549 (1331)
40 (431)
545 161 (702) (199)
706 (901)
4232 (4354)
6774 (6799)
MATCHLINE "C"
69

1475 (1133)
2871 (2829)
113 (276)
216 (108)
2542 (2445)
3221 (3420)
544 (375)
5576 (5119)
3765 (3795)
113 (276)
739 (2147)
852 (2423)
2015 (1177)

Antioch Rd
1246 (981)
666 (1584)
257 989 (194) (787)
108 (239)
917 (480)
668 (1350)
411 (1156) 558 (1345)
2596 (3006)
1169 (789)
1466 440 (1126) (141)
129 (355)
1040 (434)
840 459 (2146) (609)
2506 (1560)
1299 (2755)
Antioch Rd

Mastin Rd
104 (808)
109 (251)
66 16 22 (666) (9) (133)
15 (62)
643 (1709)
84 (40)
83 (184)
1676 (948)
256 (45)
143 11 33 (48) (5) (23)
356 (94)
187 (76)
Mastin Rd

742 (1811)
1731 (1104)
College Blvd

8172 (8125)
899 (750)
9071 (8875)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

Single Point Urban Interchange (SPUI)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Auto Volumes

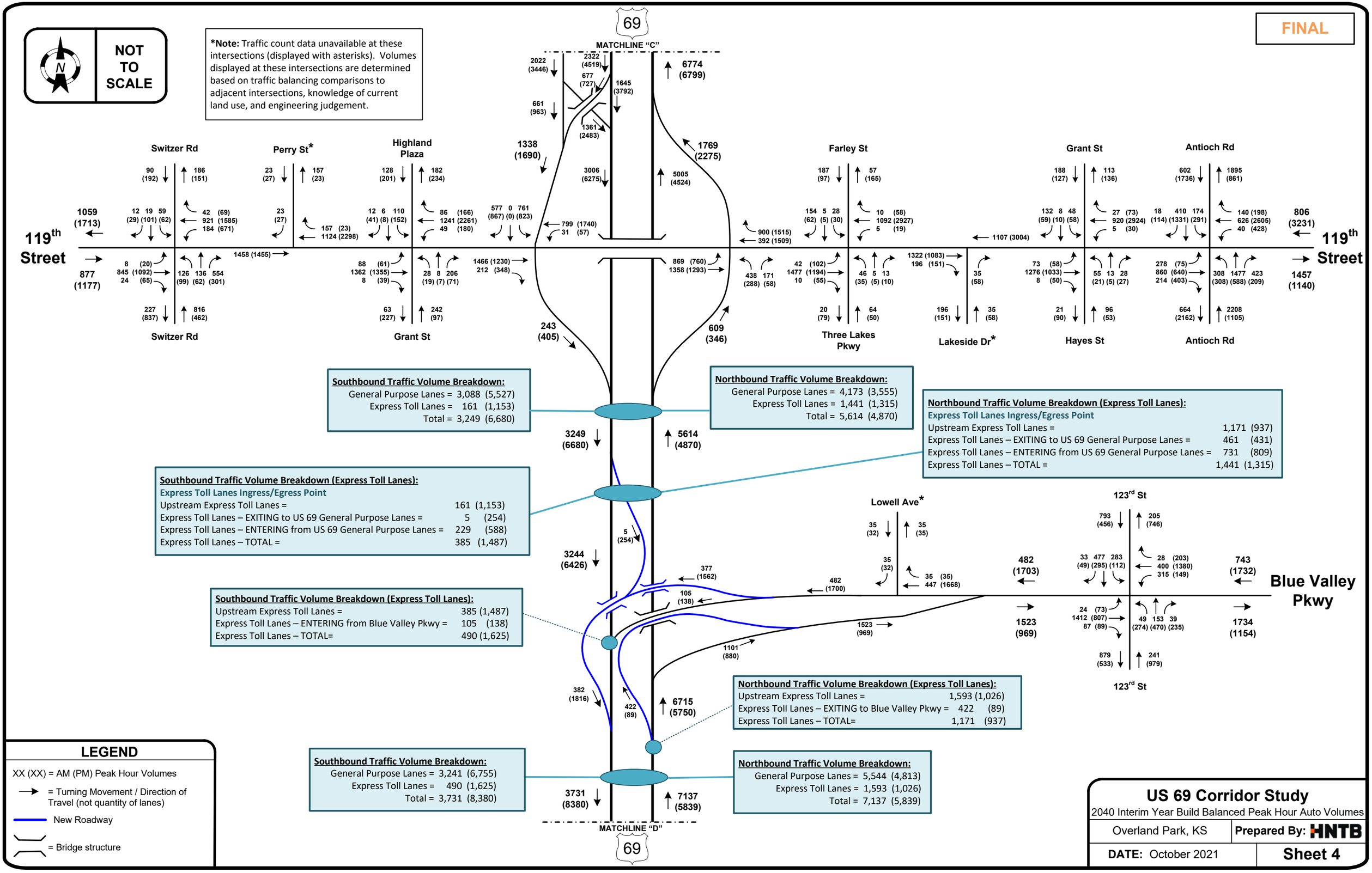
Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 3

FINAL

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.



Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,088 (5,527)
Express Toll Lanes = 161 (1,153)
Total = 3,249 (6,680)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 4,173 (3,555)
Express Toll Lanes = 1,441 (1,315)
Total = 5,614 (4,870)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point	
Upstream Express Toll Lanes =	1,171 (937)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	461 (431)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	731 (809)
Express Toll Lanes – TOTAL =	1,441 (1,315)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point	
Upstream Express Toll Lanes =	161 (1,153)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	5 (254)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	229 (588)
Express Toll Lanes – TOTAL =	385 (1,487)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	385 (1,487)
Express Toll Lanes – ENTERING from Blue Valley Pkwy =	105 (138)
Express Toll Lanes – TOTAL=	490 (1,625)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	1,593 (1,026)
Express Toll Lanes – EXITING to Blue Valley Pkwy =	422 (89)
Express Toll Lanes – TOTAL=	1,171 (937)

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,241 (6,755)
Express Toll Lanes = 490 (1,625)
Total = 3,731 (8,380)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 5,544 (4,813)
Express Toll Lanes = 1,593 (1,026)
Total = 7,137 (5,839)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 4

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,241 (6,755)
Express Toll Lanes = 490 (1,625)
Total = 3,731 (8,380)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 5,544 (4,813)
Express Toll Lanes = 1,593 (1,026)
Total = 7,137 (5,839)

3731 (8380) | 69 | 7137 (5839)

1919 (3021) | 1784 (1669) | 5353 (4170)

998 (1476) 134 (428) | 952 967 (1258) (1763) | 88 (58) 1862 (2676)

1784 (1669) 790 (1503)

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 1,693 (4,898)
Express Toll Lanes = 490 (1,625)
Total = 2,183 (6,523)

Northbound Traffic Volume Breakdown
BEGIN Express Toll Lanes (Ingress Point)
General Purpose Lanes = 3,735 (2,311)
Express Toll Lanes = 1,593 (1,026)
Total = 5,328 (3,337)

2183 (6523) | 5328 (3337)

910 (2891) | 2438 (1712) | 2890 (1625)

550 (1019) 142 (199) | 330 580 (1345) (1546) | 12 (12) 868 (2352)

1035 (949) 476 (928)

1273 (3632)

264 (375) | 528 (595)

1403 (763) 911 (2020) | 1734 (1237) 122 (176)

216 305 (290) (312)

1537 (4007) | 3418 (2220)

MATCHLINE "E"

69

135th Street

Antioch Rd | Overland Pointe Marketplace* | Hemlock St | BP Gas Station* | Riley St | Mazuma Credit Union* | Metcalf Ave

987 (2116) → 1365 (1409)

541 (1189) 960 (698) | 61 170 310 (264) (510) (415) | 140 (258) 900 (1735) 110 (154)

67 (58) 1150 (2147) | 44 14 198 (194) (165) (401) | 482 (383) 1168 (1981) 247 (416) | 35 (104)

429 (121) 873 (1279) 63 (9) | 26 391 81 (117) (319) (45) | 343 (673) 498 (481)

1229 (1681) 35 (58) | 35 (58)

96 (108) 1124 (1558) 9 (15) | 5 48 333 (30) (55) (316) | 1655 (2275) | 270 (596) 386 (401)

1418 (1539) 237 (736)

1504 (1770) 881 (1532) | 881 (1532) | 4472 (2638)

1812 (5359)

371 (1164) | 856 (699)

342 514 (401) (298)

194 (445) 313 (314) | 149 13 32 (323) (36) (86) | 68 (69) 2318 (2632) 14 (63) | 104 (424) 138 (296)

233 (232) 1708 (1511) 77 (325) | 107 12 19 (217) (13) (66)

1759 (1663)

58 (58) 2400 (2764)

302 (1713) 1209 (656) | 93 130 79 (530) (778) (405) | 100 (46) 1634 (1857) 65 (167) | 508 (1427) 1482 (1016)

452 (175) 994 (1006) 313 (482) | 731 657 94 (435) (435) (146)

1799 (2070) → 1167 (1557)

Antioch Rd | B&B Theatre* | Hemlock St | Riley St | Metcalf Ave

151st Street

Antioch Rd | SEE INSET A | Shopping Center | McDonald's* | Tay's Burger Shack* | Dunkin Donuts* | SEE INSET B | Metcalf Ave

664 (1822) → 1282 (830)

326 (484) 401 (521) | 66 116 144 (114) (142) (228) | 223 (193) 543 (1592) 74 (97) | 247 (326) 361 (448)

133 (195) 72 (99) | 30 9 94 (22) (26) (147) | 24 (58) 754 (2029) 102 (277) | 12 (12) 868 (2352) | 34 (26) 1523 (1038) 32 (37) | 42 14 239 (41) (15) (228) | 1856 (1413) | 143 (340) 295 (284)

12 (12) | 12 (12) | 74 (76) 1151 (667) 57 (87) | 55 104 202 (116) (252) (80)

1734 (1237) 122 (176)

12 (12) 1199 (2301) 12 (12) | 23 (23) | 1210 (2312) 12 (12) | 12 (12) | 12 (12) 1499 (1865) | 12 (12) 1488 (1854) 12 (12) | 23 (23)

12 (12) | 23 (23) | 24 (24) | 12 (12)

457 (976) 634 (901) | 208 164 85 (349) (479) (148) | 64 (82) 889 (1033) 197 (277) | 526 (868) 830 (1006)

232 (349) 676 (1671) 165 (112) | 315 338 177 (303) (470) (233)

1150 (1392) → 938 (2052)

Antioch Rd | Lowell Ave | Ace Hardware 1* | Ace Hardware 2* | Metcalf Ave

INSET A

Walgreens* | Trailwinds Center* | Hardy St

151st Street

1282 (830) → 1474 (940) 23 (35)

23 (35) 23 (35) | 23 (35) 817 (1847) | 23 (71)

122 (75) 53 (105) | 64 23 35 (5) (35) (35) | 7 (35) 741 (1842) 35 (35) | 23 (35) 1439 (930) 35 (46) | 35 23 35 (35) (35) (71) | 93 (116) 93 (141)

114 (204) 61 (276) | 6 10 98 (31) (28) (145) | 37 (198) 770 (1836) 19 (58) | 19 (66) 1485 (912) 5 (58) | 7 5 6 (45) (12) (44) | 34 (144) 18 (101)

1856 (1413)

Jiffy Lube* | Target / Starbucks / Chipotle* | Hardy St

151st Street

INSET B

Newton Dr | USPS Driveway* | Marty St | CVS Driveway*

151st Street

98 (115) 139 (283) | 5 8 85 (24) (5) (86) | 55 (97) 1224 (1551) 64 (113) | 71 (178) 1115 (2058) 36 (88) | 283 13 34 (303) (8) (62) | 108 (206) 330 (373)

12 (18) 12 (18) | 12 (18) 1331 (1743) | 1234 (2206)

33 (54) 225 (52) | 14 5 14 (32) (5) (17) | 75 (5) 1302 (1631) 35 (49) | 145 (42) 1031 (2052) 58 (112) | 27 5 28 (98) (5) (63) | 98 (166) 60 (166)

12 (18) 12 (18) | 12 (18) 1400 (1667)

1073 (2132)

Conser St | Marty St

151st Street

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 5

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

69

MATCHLINE "E"

Antioch Rd | Grace Church* | Lowell Ave | Shawnee Dr* | Foster St | Marty St* | Walmart* | Metcalf Ave

159th Street

Antioch Rd | Lowell Ave | Shawnee Dr* | Foster St | Marty Ln* | Metcalf Ave

Antioch Rd | Lowell Ave* | APAC Driveway* | Metcalf Ave

167th Street

Antioch Rd | Future Driveways * | Metcalf Ave

Antioch Rd | Future Driveways** | Metcalf Ave

179th Street

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

***Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street and 167th Street.

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Auto Volumes

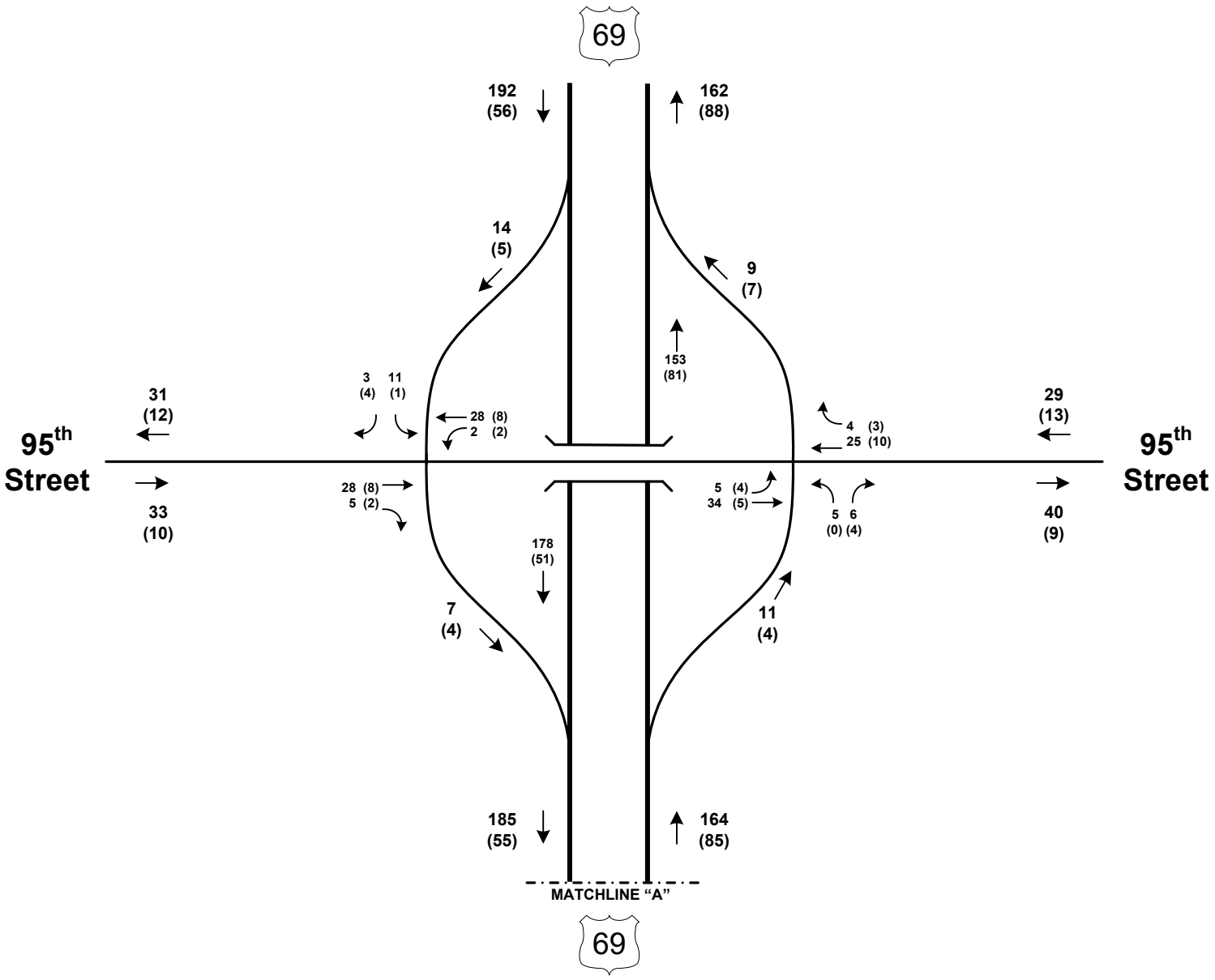
Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 6

2040 Base Year Build Balanced Peak Hour Volumes – Trucks Only

FINAL

NOT TO SCALE



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build

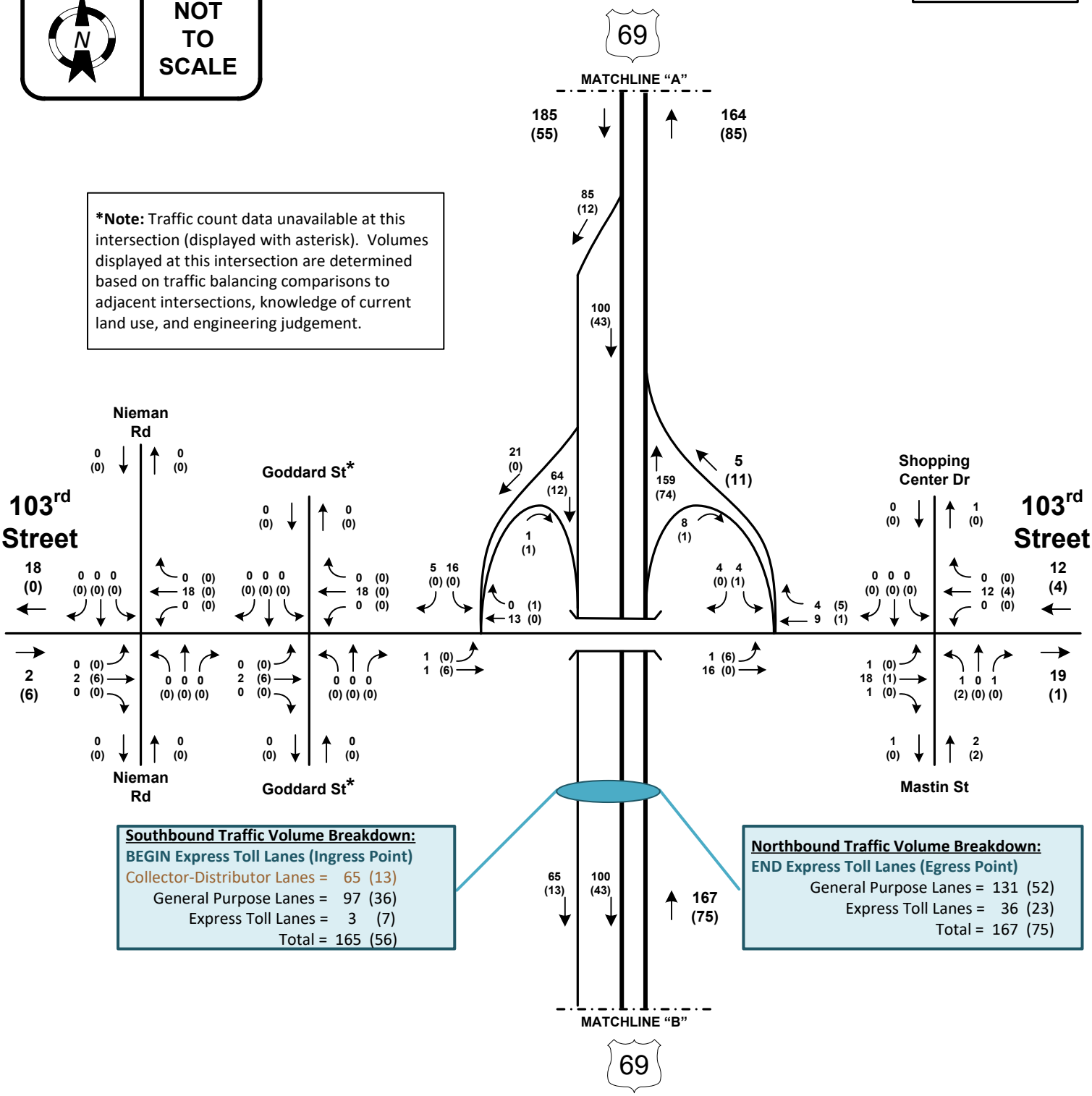
Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 1

FINAL

NOT TO SCALE



***Note:** Traffic count data unavailable at this intersection (displayed with asterisk). Volumes displayed at this intersection are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 65 (13)
General Purpose Lanes = 97 (36)
Express Toll Lanes = 3 (7)
Total = 165 (56)

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 131 (52)
Express Toll Lanes = 36 (23)
Total = 167 (75)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

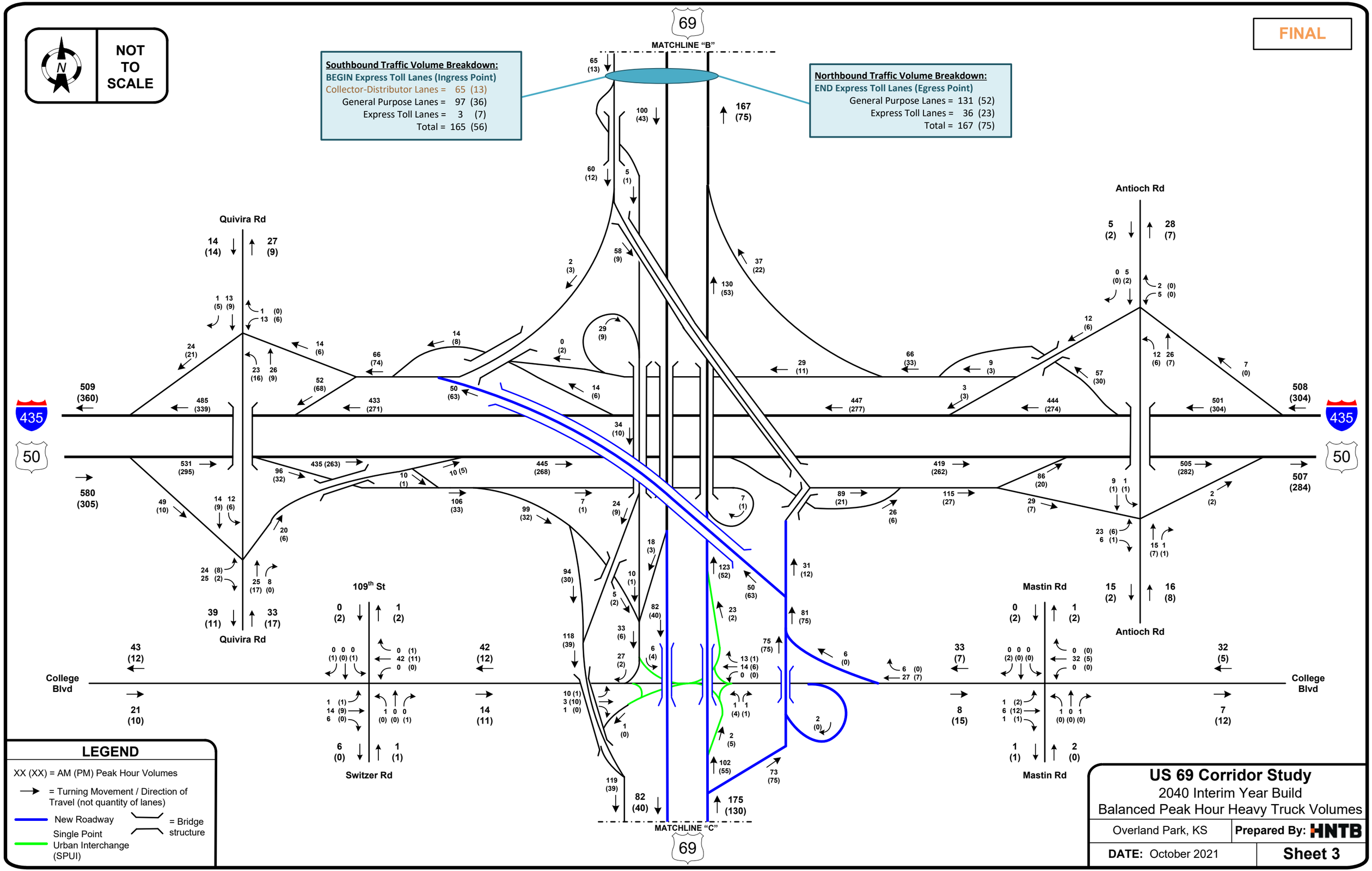
= Bridge structure

US 69 Corridor Study

2040 Interim Year Build
Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 2

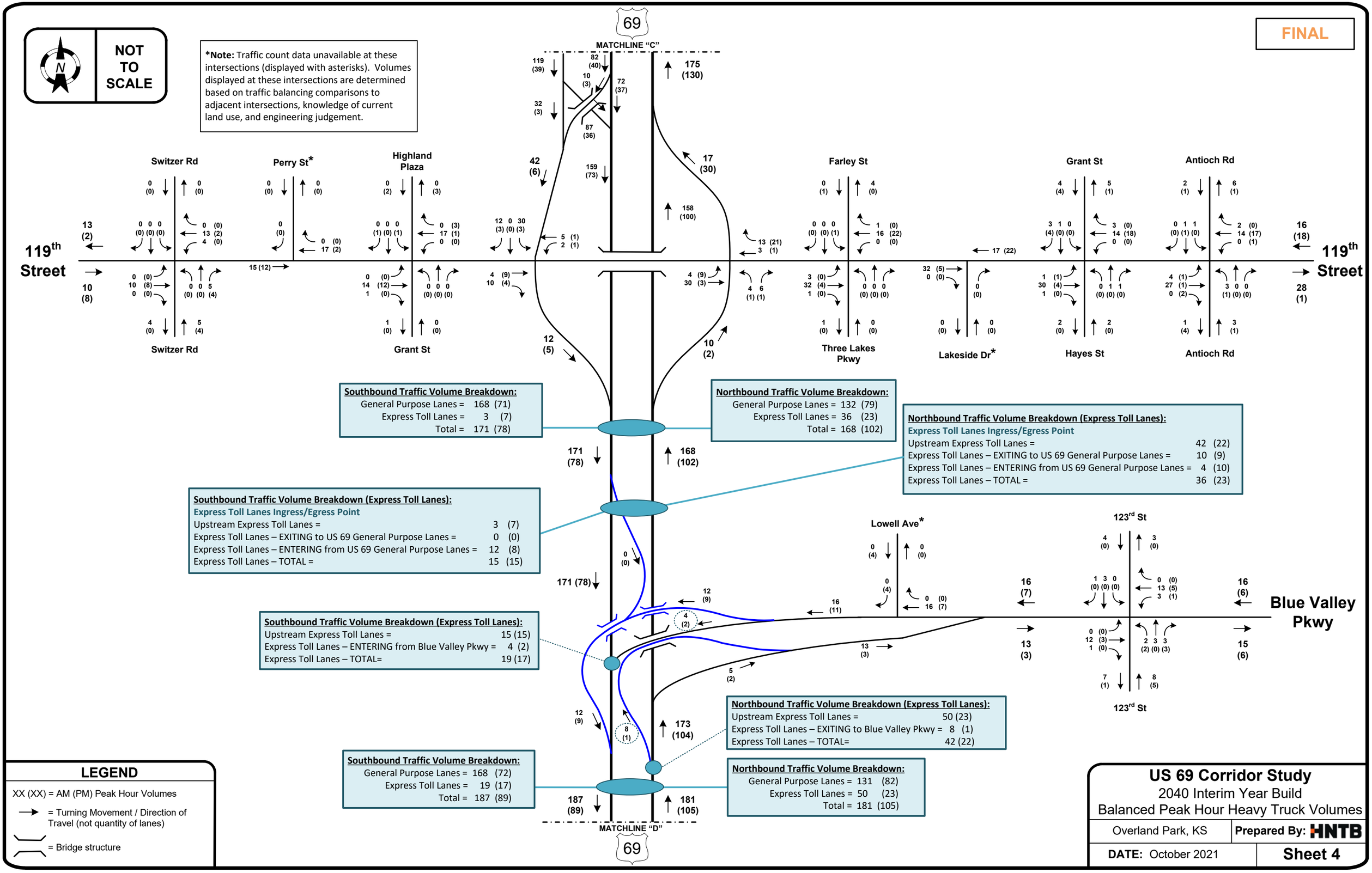


NOT TO SCALE
FINAL
69
MATCHLINE "B"
Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 65 (13)
General Purpose Lanes = 97 (36)
Express Toll Lanes = 3 (7)
Total = 165 (56)
Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 131 (52)
Express Toll Lanes = 36 (23)
Total = 167 (75)
Quivira Rd
Antioch Rd
109th St
Switzer Rd
Mastin Rd
College Blvd
435
50
MATCHLINE "C"
LEGEND
XX (XX) = AM (PM) Peak Hour Volumes
= Turning Movement / Direction of Travel (not quantity of lanes)
New Roadway
Single Point Urban Interchange (SPUI)
= Bridge structure
US 69 Corridor Study
2040 Interim Year Build
Balanced Peak Hour Heavy Truck Volumes
Overland Park, KS
Prepared By: HNTB
DATE: October 2021
Sheet 3

FINAL

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.



Southbound Traffic Volume Breakdown:

General Purpose Lanes =	168	(71)
Express Toll Lanes =	3	(7)
Total =	171	(78)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	132	(79)
Express Toll Lanes =	36	(23)
Total =	168	(102)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	42	(22)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	10	(9)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	4	(10)
Express Toll Lanes – TOTAL =	36	(23)

171 (78)

168 (102)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	3	(7)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	0	(0)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	12	(8)
Express Toll Lanes – TOTAL =	15	(15)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	15	(15)
Express Toll Lanes – ENTERING from Blue Valley Pkwy =	4	(2)
Express Toll Lanes – TOTAL=	19	(17)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	50	(23)
Express Toll Lanes – EXITING to Blue Valley Pkwy =	8	(1)
Express Toll Lanes – TOTAL=	42	(22)

12 (9)

8 (1)

173 (104)

Southbound Traffic Volume Breakdown:

General Purpose Lanes =	168	(72)
Express Toll Lanes =	19	(17)
Total =	187	(89)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	131	(82)
Express Toll Lanes =	50	(23)
Total =	181	(105)

187 (89)

181 (105)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build

Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: October 2021 | Sheet 4

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 168 (72)
Express Toll Lanes = 19 (17)
Total = 187 (89)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 131 (82)
Express Toll Lanes = 50 (23)
Total = 181 (105)

187 (89) | 69 | 181 (105)

64 (12) | 32 (18) | 149 (87)

Antioch Rd | Overland Pointe Marketplace* | Hemlock St | BP Gas Station* | Riley St | Mazuma Credit Union* | Metcalf Ave

135th Street

38 (8) | 21 (14) | 69 (32) | 53 (14)

Antioch Rd | B&B Theatre* | Hemlock St | Riley St | Metcalf Ave

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 155 (72)
Express Toll Lanes = 19 (17)
Total = 174 (89)

Northbound Traffic Volume Breakdown
BEGIN Express Toll Lanes (Ingress Point)
General Purpose Lanes = 130 (64)
Express Toll Lanes = 50 (23)
Total = 180 (87)

51 (12) | 123 (77) | 131 (78) | 18 (9) | 49 (9)

174 (89) | 180 (87)

35 (9) | 53 (12) | 127 (75)

Antioch Rd | SEE INSET A | Shopping Center | McDonald's* | Tay's Burger Shack* | Dunkin Donuts* | SEE INSET B | Metcalf Ave

151st Street

31 (13) | 39 (9) | 32 (20) | 29 (15)

Antioch Rd | Lowell Ave | Ace Hardware 1* | Ace Hardware 2* | Metcalf Ave

15 (9) | 139 (80) | 25 (5)

154 (89) | 152 (80)

MATCHLINE "E"

69

INSET A

Walgreens* | Trailwinds Center* | Hardy St

151st Street

Jiffy Lube* | Target / Starbucks / Chipotle* | Hardy St

INSET B

Newton Dr | USPS Driveway* | Marty St | CVS Driveway*

151st Street

Conser St | Marty St

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Heavy Truck Volumes

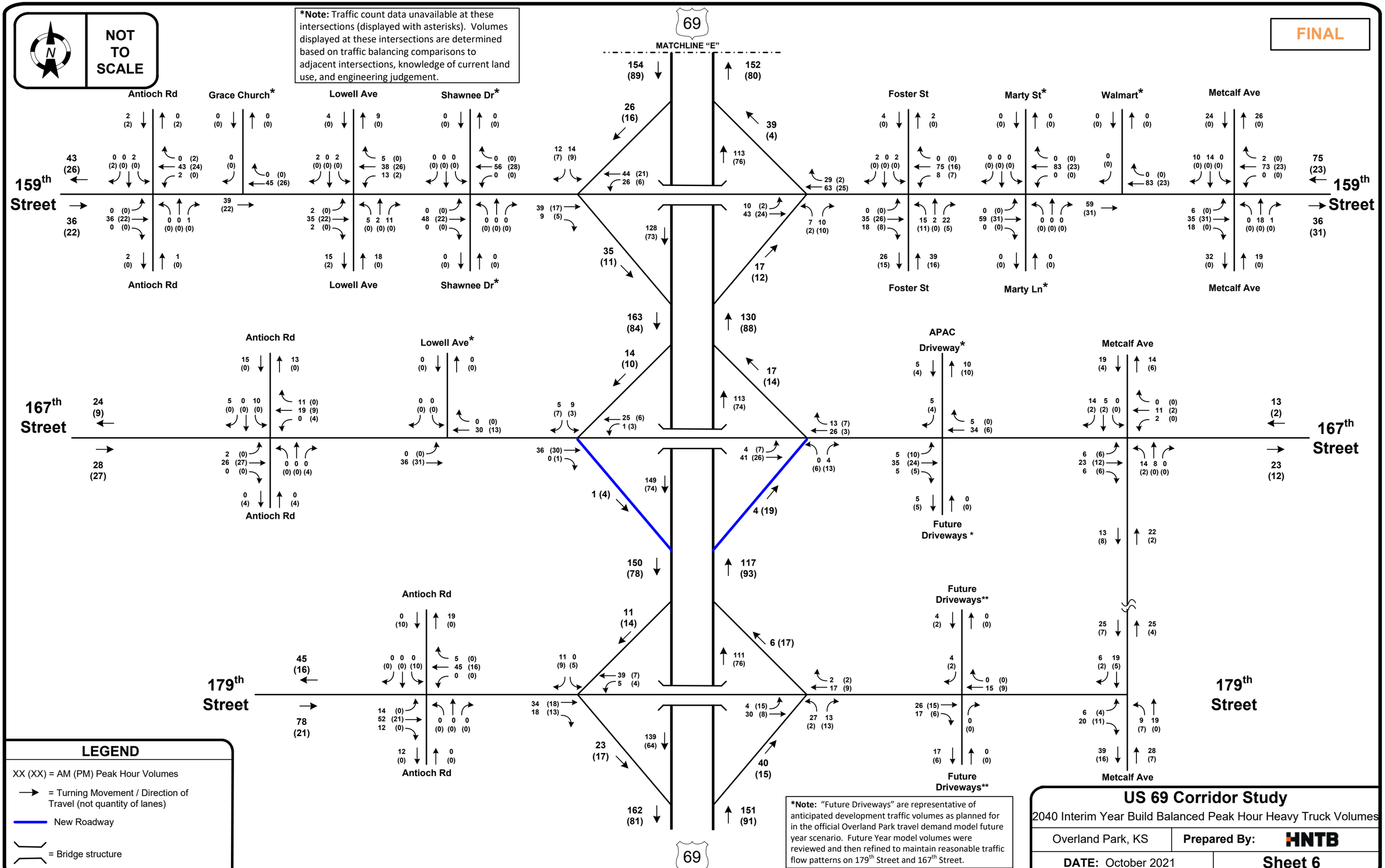
Overland Park, KS | **Prepared By:** HNTB

DATE: October 2021 | **Sheet 5**

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL



***Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street and 167th Street.

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

US 69 Corridor Study

2040 Interim Year Build Balanced Peak Hour Heavy Truck Volumes

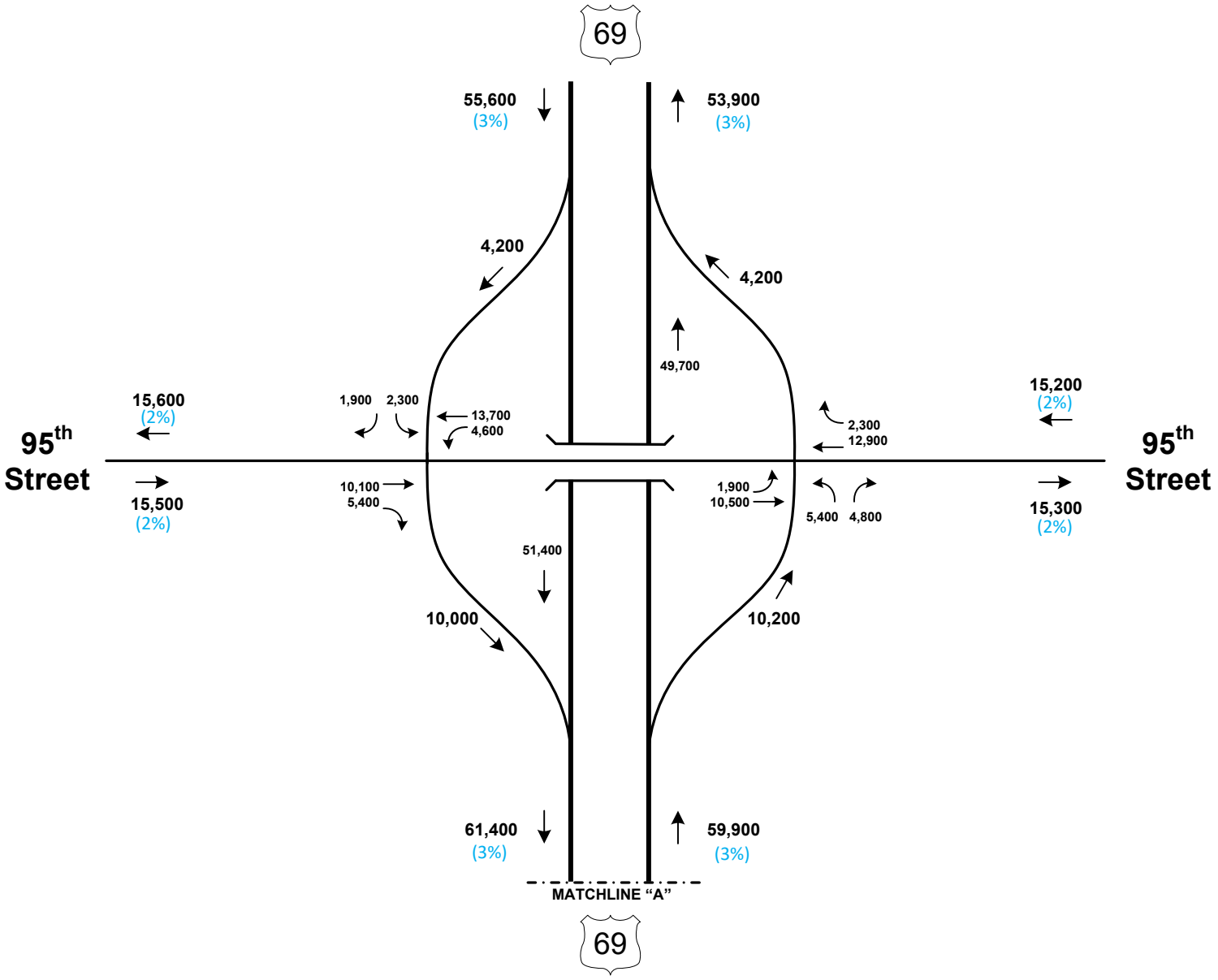
Overland Park, KS | **Prepared By:** HNTB

DATE: October 2021 | **Sheet 6**

2050 Ultimate Build Balanced Daily Volumes and Truck Percentages

NOT TO SCALE

FINAL



LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

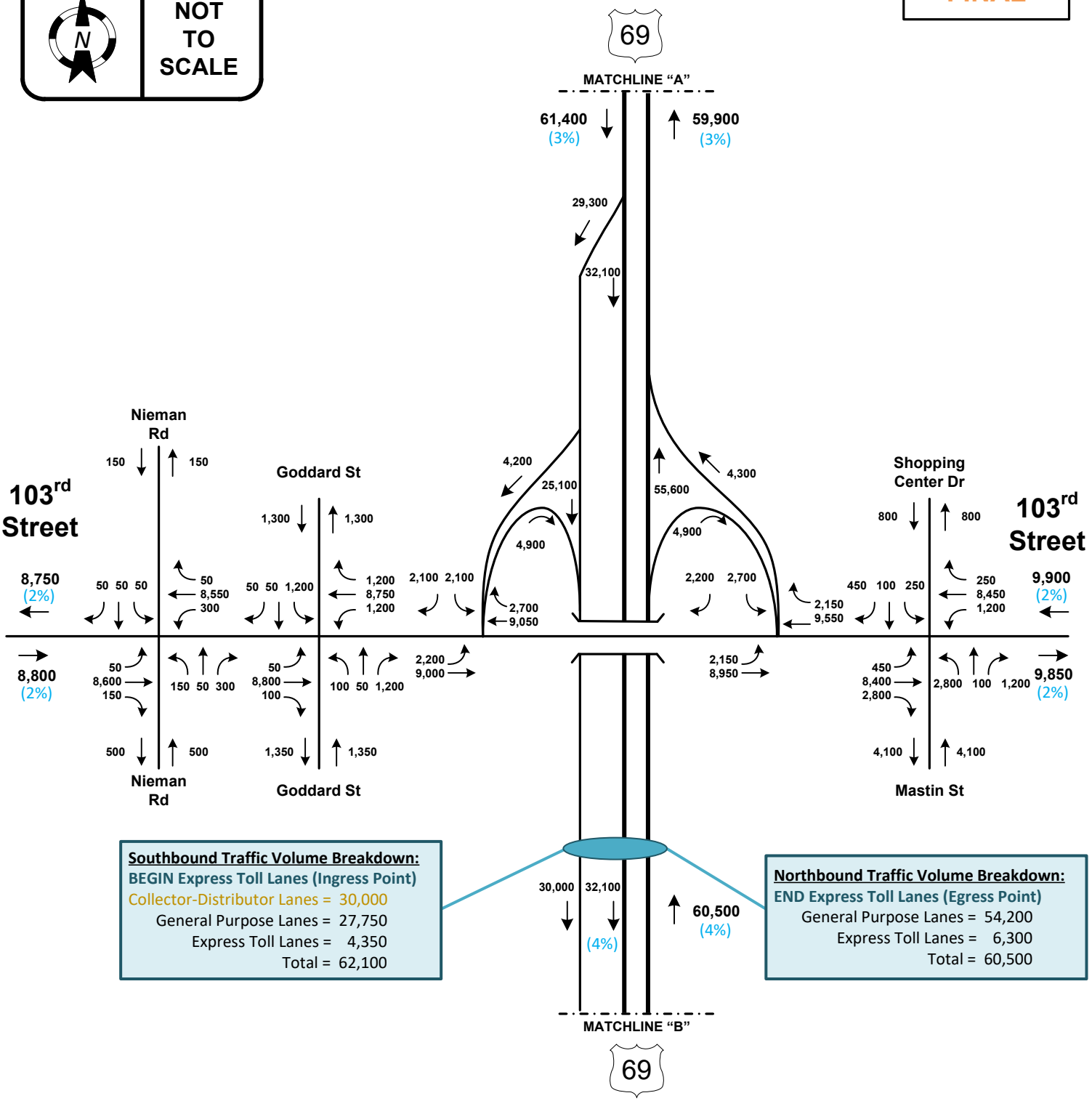
2050 FYB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 1

NOT TO SCALE

FINAL



Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 30,000
General Purpose Lanes = 27,750
Express Toll Lanes = 4,350
Total = 62,100

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 54,200
Express Toll Lanes = 6,300
Total = 60,500

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2050 FYB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | **Sheet 2**

NOT TO SCALE

FINAL

Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 30,000
General Purpose Lanes = 27,750
Express Toll Lanes = 4,350
Total = 62,100

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 54,200
Express Toll Lanes = 6,300
Total = 60,500

69

MATCHLINE "B"

30,000 ↓ | 32,100 ↓ (4%) | 60,500 ↑ (4%)

28,000 ↓ | 2,000 ↓

Quivira Rd

17,700 ↓ | 17,700 ↑

4,700 | 13,000 | 6,200 | 9,900

11,000 | 16,100 | 6,300 | 11,500

84,100 (6%) | 73,100 | 23,900 | 40,000 | 49,200 | 15,200 | 24,800 | 20,000

4,800 | 23,200 | 500 | 10,300 | 14,700 | 12,300

37,300 | 23,200 | 10,800 | 34,000 | 5,200 | 7,500 | 63,900 | 56,400

Antioch Rd

15,200 ↓ | 15,200 ↑

3,300 | 11,900 | 2,300 | 6,400

12,700 | 9,400 | 12,900 | 28,800 | 8,700 | 85,200 | 93,900 (6%)

435

50

81,600 (6%) | 70,600 | 11,000 | 16,700 | 6,200 | 16,100 | 4,700 | 6,300 | 13,100 | 9,900

49,100 | 21,500 | 3,400 | 12,700 | 24,900 | 61,800 | 4,600 | 20,300 | 10,500 | 4,600

54,300 | 34,000 | 7,500 | 41,500 | 28,800 | 12,700 | 16,000 | 2,300 | 3,300 | 9,400 | 19,000 | 6,400 | 8,700 | 83,100 | 91,800 (6%)

109th St

450 ↓ | 450 ↑

100 | 50 | 300 | 300 | 20,300 | 1,150

100 | 13,750 | 550 | 550 | 50 | 1,150

1,750 ↓ | 1,750 ↑

Switzer Rd

23,000 ↓ | 23,000 ↑

Quivira Rd

17,100 | 1,800 | 3,200 | 6,500 | 25,600 (5%) | 11,500 | 6,050 | 5,450 | 27,600 | 3,050 | 8,150 | 4,000 | 8,500 | 36,100 | 25,600 (5%)

32,700 (5%) | 20,000 | 6,300 | 3,250 | 12,250 | 4,500 | 4,050 | 4,350 | 8,400 | 34,800 | 25,900 | 60,700 (5%)

10,800 | 30,800 | 28,250 | 2,550 | 2,550 | 20,000 | 2,350

Mastin Rd

6,250 ↓ | 6,250 ↑

1,150 | 16,950 | 350 | 5,050 | 50 | 1,150 | 5,050 | 10,600 | 550 | 550 | 50 | 350

950 ↓ | 950 ↑

Mastin Rd

Antioch Rd

25,400 ↓ | 25,400 ↑

College Blvd

20,950 (2%) | 14,400 (2%) | 21,750 | 15,200 | 22,550 | 16,200 | 18,450 (2%) | 12,100 (2%)

MATCHLINE "C"

69

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

Single Point Urban Interchange (SPUI)

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2050 FYB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 3

NOT TO SCALE

FINAL

69

MATCHLINE "C"

119th Street

Switzer Rd

Perry St

Highland Plaza

Farley St

Grant St

Antioch Rd

Three Lakes Pkwy

Lakeside Dr

Hayes St

Antioch Rd

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 45,650
Express Toll Lanes = 4,350
Total = 50,000

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 42,100
Express Toll Lanes = 6,300
Total = 48,400

Northbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	6,050
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	3,150
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	3,400
Express Toll Lanes – TOTAL =	6,300

Southbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	4,350
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	500
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	2,500
Express Toll Lanes – TOTAL =	6,350

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	6,350
Express Toll Lanes – ENTERING from Blue Valley Pkwy =	3,000
Express Toll Lanes – TOTAL=	9,350

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	9,250
Express Toll Lanes – EXITING to Blue Valley Pkwy =	3,200
Express Toll Lanes – TOTAL=	6,050

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 61,850
Express Toll Lanes = 9,350
Total = 71,200

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 60,650
Express Toll Lanes = 9,250
Total = 69,900

Lowell Ave

123rd St

Blue Valley Pkwy

MATCHLINE "D"

69

LEGEND

XX = Daily Traffic Volume Estimates

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

X% = Heavy Vehicle Percentage

US 69 Corridor Study

2050 FYB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 4

NOT TO SCALE

FINAL

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 61,850
Express Toll Lanes = 9,350
Total = 71,200

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 60,650
Express Toll Lanes = 9,250
Total = 69,900

71,200 (4%) ↓ | 69 | 69,900 (4%) ↑

31,100 ↓ | 20,000 ↑ | 40,100 ↓ | 49,900 ↑

135th Street

Antioch Rd: 11,200 ↓ 11,400 ↑ | 22,500 (2%) → | 2,800 5,600 2,800 | 3,150 / 18,050 / 2,300 | 22,850 (2%) ← | 2,700 / 18,950 / 1,200 | 1,650 5,550 1,800 | 9,100 ↓ 9,000 ↑

Overland Pointe Marketplace: 600 ↑ | 600 / 23,500 ← | 22,950 → 600 | 600 ↓

Hemlock St: 7,850 ↓ 7,850 ↑ | 1,800 1,350 4,700 | 4,700 / 22,050 / 4,400 | 1,800 / 20,900 / 250 | 250 1,350 4,400 | 6,000 ↓ 6,000 ↑

BP Gas Station: 1000 ↓ 600 ↑ | 1,000 | 600 / 30,150 ← | 30,000 →

11,050 20,050 | 19,700 / 4,250 ← | 25,050 / 4,950 →

20,000 / 18,600 ←

Riley St: 4,550 ↓ 4,550 ↑ | 3,350 250 950 | 950 / 32,000 / 750 | 3,350 / 30,550 / 3,250 | 3,250 250 750 | 4,250 ↓ 4,250 ↑

Mazuma Credit Union: 600 ↑ | 600 / 33,700 ← | 32,250 →

Metcalf Ave: 13,900 ↓ 13,400 ↑ | 4,450 6,300 3,150 | 2,650 / 24,500 / 2,200 | 4,800 / 22,350 / 5,100 | 5,350 5,950 2,250 | 13,600 ↓ 13,550 ↑

29,350 (2%) → | 27,750 (2%) ←

33,100 / 12,000 ↓ | 12,000 ↓ | 5,350 4,050 ↑ | 37,900 ↑ | 9,200 ↓ | 9,400 ↑

Southbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	9,350
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	5,500
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	1,700
Express Toll Lanes – TOTAL =	5,550

Northbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	4,450
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	950
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	5,750
Express Toll Lanes – TOTAL =	9,250

151st Street

Antioch Rd: 7,350 ↓ 7,350 ↑ | 16,700 (2%) → | 1,550 3,100 2,700 | 2,700 / 14,200 / 1,500 | 17,000 (2%) ← | 1,700 / 14,350 / 950 | 950 2,900 1,550 | 5,550 ↓ 5,400 ↑

SEE INSET A

Shopping Center: 1,750 ↓ 1,750 ↑ | 300 200 1,250 | 1,250 / 19,400 / 3,050 | 300 / 20,000 / 450 | 450 200 3,050 | 3,700 ↓ 3,700 ↑

McDonald's: 100 ↓ 100 ↑ | 100 | 100 / 23,600 ← | 24,300 →

49,300 (6%) ↓ | 47,300 (6%) ↑ | 16,700 ↓ | 30,000 ↑ | 17,300 ↓ | 7,250 9,450 | 16,450 / 5,350 ← | 19,950 / 4,350 → | 9,700 ↓ | 32,600 ↓ | 10,100 ↑ | 7,200 / 22,200 → | 4,700 5,400 ↑ | 10,100 / 17,100 ←

Tay's Burger Shack: 150 ↓ 250 ↑ | 150 | 100 / 27,050 ← | 150 | 100 / 27,350 / 100 | 100 ↓ 300 ↑

Dunkin Donuts: 300 ↓ 100 ↑ | 300 | 100 / 26,850 / 150 | 27,550 / 100 → | 150 | 250 ↓ 150 ↑

SEE INSET B

Metcalf Ave: 10,350 ↓ 10,350 ↑ | 4,050 5,000 1,300 | 1,250 / 18,400 / 3,150 | 4,100 / 18,950 / 2,350 | 2,350 5,000 3,100 | 10,500 ↓ 10,450 ↑

22,800 (2%) → | 23,350 (2%) ←

Lowell Ave: 3,700 ↓ 3,700 ↑

Ace Hardware 1: 100 ↓ 300 ↑

Ace Hardware 2: 250 ↓ 150 ↑

Metcalf Ave: 10,500 ↓ 10,450 ↑

42,300 (6%) ↓ | 40,100 (6%) ↑

INSET A

Walgreens: 400 ↓ 400 ↑ | 400 | 400 / 18,000 ← | 18,200 → 400 | 800 | 400 ↓ 800 ↑

Trailwinds Center: 1,100 ↓ 1,100 ↑ | 250 450 400 | 400 / 17,650 / 650 | 250 / 18,250 / 500 | 500 450 650 | 1,600 ↓ 1,600 ↑

Hardy St: 2,900 ↓ 2,900 ↑ | 600 250 2,050 | 2,050 / 17,500 / 600 | 600 / 18,100 / 600 | 600 250 600 | 1,450 ↓ 1,450 ↑

Jiffy Lube | Target / Starbucks / Chipotle | Hardy St

INSET B

Newton Dr: 2,400 ↓ 2,400 ↑ | 1,200 100 1,100 | 1,100 / 23,550 / 1,050 | 1,200 / 24,150 / 2,350 | 2,350 100 1,050 | 3,500 ↓ 3,500 ↑

USPS Driveway: 200 ↓ 200 ↑ | 200 | 200 / 25,500 ← | 26,300 →

Marty St: 650 ↓ 650 ↑ | 450 50 150 | 150 / 24,000 / 650 | 450 / 24,600 / 1,250 | 1,250 50 650 | 1,950 ↓ 1,950 ↑

CVS Driveway: 200 ↓ 200 ↑ | 200 | 200 / 24,600 ← | 25,400 →

Conser St | Marty St

MATCHLINE "E"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 36,750
Express Toll Lanes = 5,550
Total = 42,300

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 35,650
Express Toll Lanes = 4,450
Total = 40,100

LEGEND

XX = Daily Traffic Volume Estimates
→ = Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure
X% = Heavy Vehicle Percentage

US 69 Corridor Study

2050 FYB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 5

NOT TO SCALE

FINAL

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 36,750
Express Toll Lanes = 5,550
Total = 42,300

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 35,650
Express Toll Lanes = 4,450
Total = 40,100

MATCHLINE "E"

69

Antioch Rd | Grace Church | Lowell Ave | Shawnee Dr | Foster St | Marty St | Walmart | Metcalf Ave

159th Street

42,300 (6%) | 40,100 (6%)

9,800 | 9,800 | 30,300 | 15,750 | 3,350 | 5,550 | 4,250 | 4,300 | 16,600

16,450 (3%) | 16,750 (3%) | 7,000 (3%) | 6,900 (3%)

2,200 | 4,100 | 2,000 | 2,200 | 13,550 | 650 | 2,300 | 13,200 | 1,250 | 700 | 3,600 | 1,100 | 6,000 | 5,400 | 16,300 | 300 | 300 | 16,100 | 3,300 | 3,300 | 700 | 900 | 1,700 | 1,700 | 13,550 | 4,950 | 700 | 13,450 | 2,150 | 2,150 | 900 | 4,950 | 8,000 | 8,000 | 1,500 | 1,500 | 650 | 250 | 600 | 600 | 18,750 | 1,950 | 650 | 18,650 | 800 | 800 | 250 | 1,950 | 3,000 | 3,000 | 18,750 | 2,450 | 5,500 | 17,500 | 2,500 | 3,400 | 550 | 550 | 400 | 100 | 50 | 50 | 16,100 | 2,300 | 400 | 16,100 | 4,400 | 4,400 | 100 | 2,300 | 6,800 | 6,800 | 1,800 | 1,800 | 1,450 | 50 | 300 | 300 | 15,000 | 300 | 1,450 | 15,000 | 2,000 | 2,000 | 50 | 300 | 15,600 | 2,350 | 2,350 | 300 | 300 | 300 | 15,300 | 17,400 | 17,250 | 6,450 | 9,650 | 1,300 | 1,350 | 5,300 | 350 | 6,600 | 5,250 | 3,750 | 3,850 | 9,300 | 350 | 13,750 | 13,500

Antioch Rd | Lowell Ave | Shawnee Dr | Foster St | Marty Ln | Metcalf Ave

167th Street

38,300 (6%) | 36,200 (6%)

3,000 | 2,900 | 33,300 | 11,950 | 400 | 1,700 | 1,300 | 900 | 12,000 | 2,000 | 13,000 | 350 | 650

12,700 (7%) | 12,900 (7%) | 13,250 (7%) | 12,350 (7%)

3,550 | 3,150 | 1,450 | 300 | 1,800 | 1,400 | 10,900 | 1,050 | 1,500 | 11,100 | 300 | 350 | 250 | 700 | 1,650 | 1,300 | 900 | 900 | 300 | 600 | 600 | 13,050 | 300 | 13,300 | 13,700 | 200 | 550 | 550 | 1,150 | 550 | 600 | 12,350 | 550 | 12,550 | 550 | 9,250 | 9,050 | 1,200 | 5,750 | 2,300 | 2,050 | 9,800 | 1,400 | 1,200 | 8,700 | 2,650 | 1,950 | 5,800 | 1,350 | 9,800 | 9,100

Antioch Rd | Lowell Ave | APAC Driveway | Future Driveways * | Metcalf Ave

35,300 | 600 | 1,000 | 35,900 (7%) | 34,300 (7%)

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)

Upstream General Purpose Lanes =	30,350
Upstream Express Toll Lanes =	5,550
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	3,450
General Purpose Lanes – EXITING to 179th Street Off-Ramp =	4,300
Express Toll Lanes – EXITING to 179th Street Off-Ramp =	2,100
Express Toll Lanes – TOTAL =	0
General Purpose Lanes – US 69 TOTAL =	29,500
General Purpose Lanes – 179th Street Off-Ramp TOTAL =	6,400

Northbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)

Upstream General Purpose Lanes =	27,800
Upstream Express Toll Lanes =	0
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	2,650
General Purpose Lanes – ENTERING from 179th Street On-Ramp =	4,700
Express Toll Lanes – ENTERING from 179th Street On-Ramp =	1,800
Express Toll Lanes – US 69 TOTAL =	4,450
General Purpose Lanes – US 69 TOTAL =	29,850
General Purpose Lanes – 179th Street On-Ramp TOTAL =	6,500

Antioch Rd | Future Driveways* | Future Driveways* | Metcalf Ave

179th Street

6,400 | 6,500 | 27,800 | 15,750 | 1,350 | 4,800 | 1,600 | 1,600 | 13,900 | 4,900 | 13,950 | 3,200 | 1,600 | 29,500 | 4,700 | 4,800 | 34,200 (9%) | 32,600 (9%)

18,850 (6%) | 18,800 (6%) | 15,500 (6%) | 15,550 (6%) | 12,000 (6%) | 12,050 (6%)

1,250 | 1,100 | 50 | 150 | 1,050 | 900 | 18,250 | 1,400 | 50 | 18,200 | 550 | 550 | 150 | 1,350 | 2,100 | 2,050 | 3,500 | 0 | 3,500 | 0 | 12,000 | 12,050 | 3,500 | 0 | 3,500 | 0 | 6,950 | 6,950 | 3,900 | 3,050 | 3,900 | 8,150 | 8,100 | 3,050 | 11,200 | 11,150

LEGEND

XX = Daily Traffic Volume Estimates

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

X% = Heavy Vehicle Percentage

***Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street and 167th Street.

US 69 Corridor Study

2050 FYB Balanced Daily Traffic Volumes

Overland Park, KS | Prepared By: HNTB

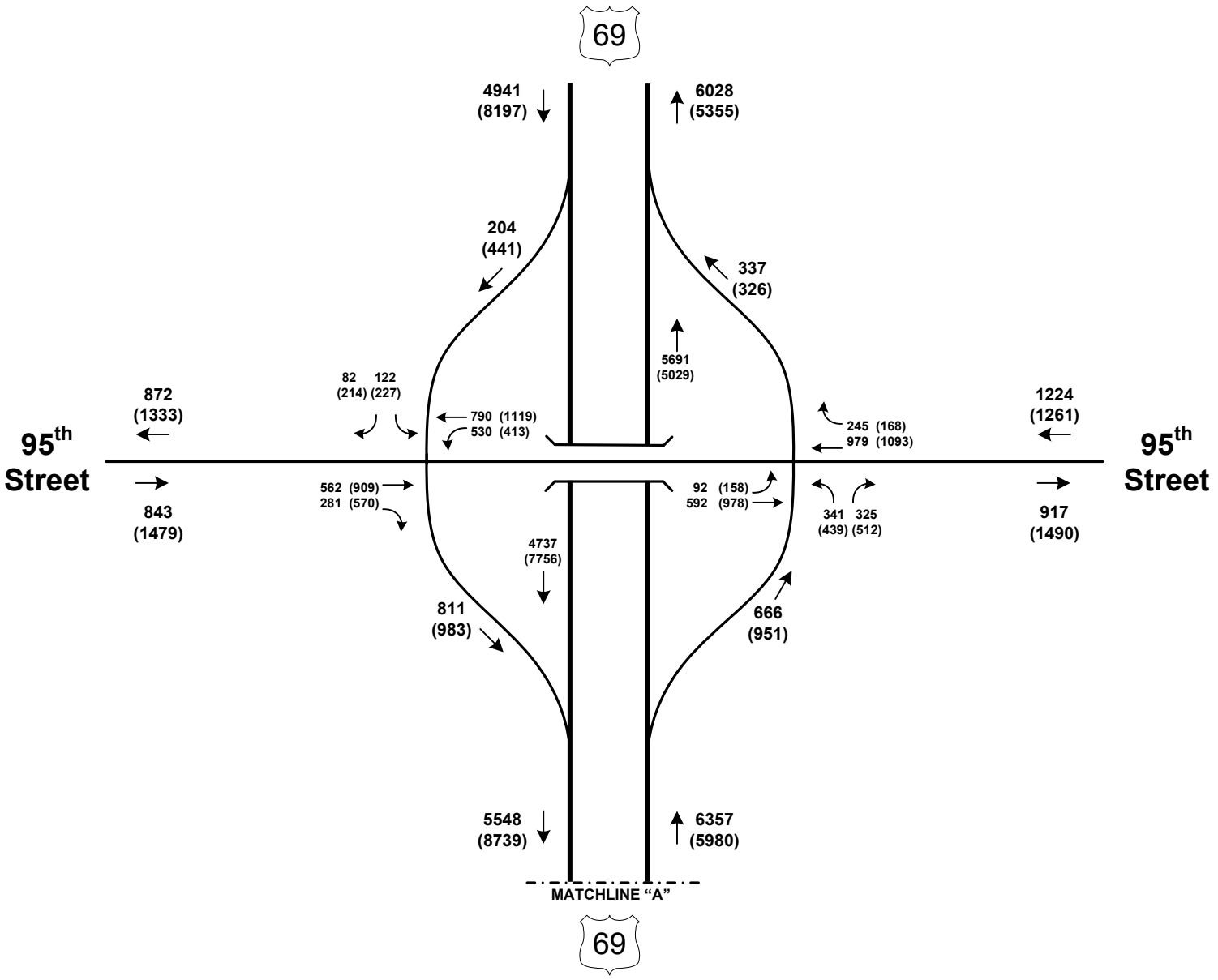
DATE: September 2021 | Sheet 6

2050 Ultimate Build Balanced Peak Hour Volumes

– All Vehicle Classes

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

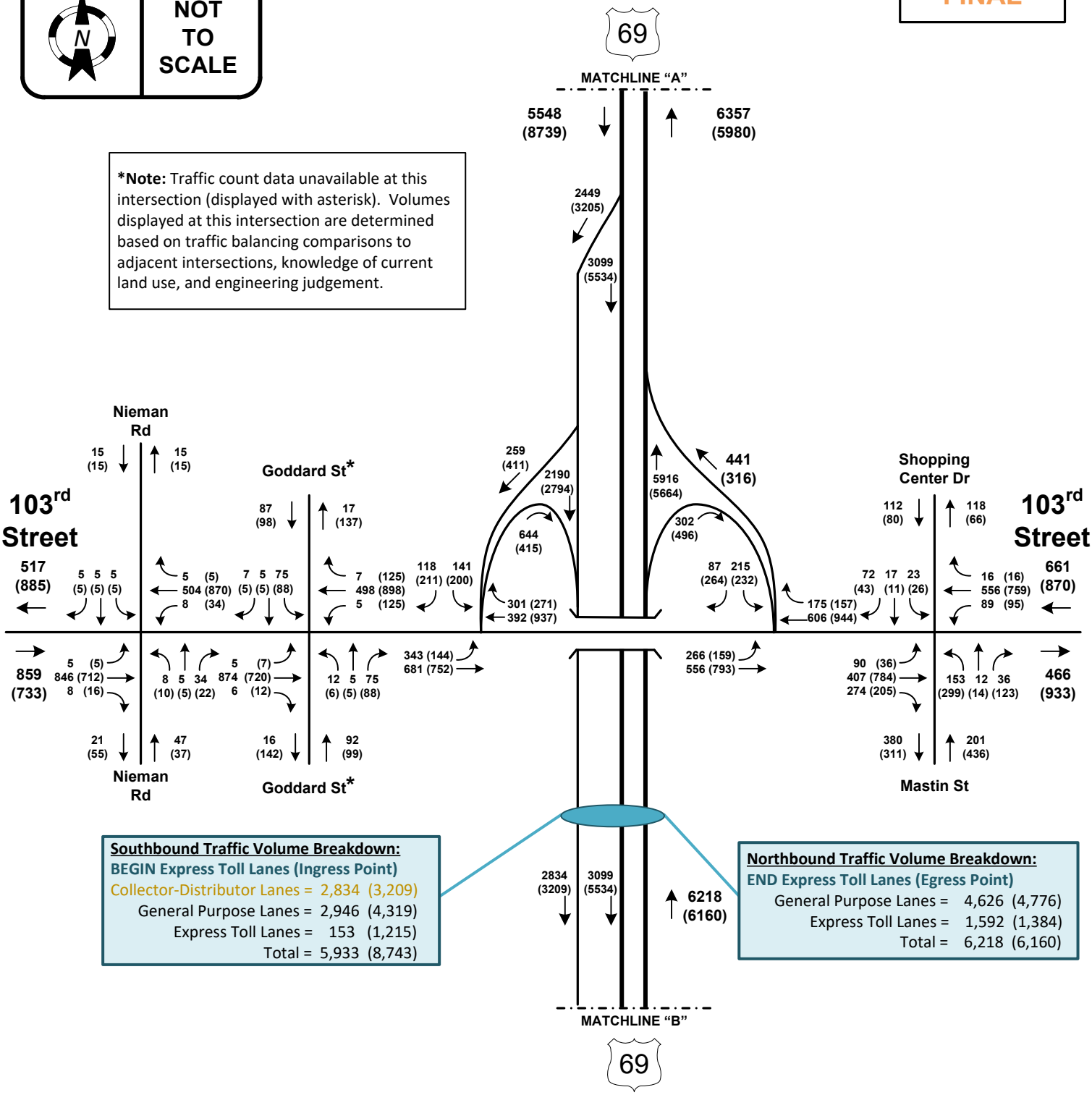
2050 FYB Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | **Sheet 1**

NOT TO SCALE

FINAL



***Note:** Traffic count data unavailable at this intersection (displayed with asterisk). Volumes displayed at this intersection are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)

Collector-Distributor Lanes =	2,834	(3,209)
General Purpose Lanes =	2,946	(4,319)
Express Toll Lanes =	153	(1,215)
Total =	5,933	(8,743)

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)

General Purpose Lanes =	4,626	(4,776)
Express Toll Lanes =	1,592	(1,384)
Total =	6,218	(6,160)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 2

NOT TO SCALE

FINAL

Southbound Traffic Volume Breakdown:

Collector-Distributor Lanes =	2,834	(3,209)
General Purpose Lanes =	2,946	(4,319)
Express Toll Lanes =	153	(1,215)
Total =	5,933	(8,743)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	4,626	(4,776)
Express Toll Lanes =	1,592	(1,384)
Total =	6,218	(6,160)

69

MATCHLINE "B"

2834 (3209)

3099 (5534)

6218 (6160)

2497 (2863)

337 (346)

Quivira Rd

1160 (1686)

1240 (1566)

244 916 (479) (1207)

457 (486) 990 (937)

743 (1180)

499 783 (701) (1080)

1447 (1423)

3498 (3458)

2051 (2035)

7678 (8319)

6935 (7139)

4884 (5104)

1482 (1408)

2106 (2050)

1526 (1735)

490 (315)

2007 (2548)

1617 (1670)

4601 (4490)

880 (1296)

140 (179)

1342 (1229)

1020 (1475)

2637 (3145)

448 (507)

274 (931)

6226 (6333)

5952 (5402)

Antioch Rd

1327 (1043)

737 (1688)

273 1054 (206) (837)

117 (254) 978 (509)

722 (1438)

449 620 (1232) (1434)

2189 (2638)

1095 (763)

8141 (8040)

9236 (8803)

435

50

6919 (6898)

1124 (2033)

5795 (4865)

980 (357)

1058 (1108)

6853 (5973)

6295 (5483)

2916 (3394)

9211 (8877)

7885 (7703)

966 (805)

1328 (1525) 578 (619)

2038 (1465)

2104 (2390)

1691 (1993)

413 (397)

768 (1484)

413 (397)

3628 (3748)

558 (490)

4186 (4238)

1270 (844)

1564 468 (1195) (151)

956 (798)

10167 (9675)

161 (383) 1109 (461)

908 488 (2283) (647)

269 (378) 697 (427)

1013 1460 (1403) (846)

627 (640)

1621 (1200)

1298 (1673)

449 (158)

4188 (4093)

1526 (1735)

393 (320)

527 (440)

2025 (1952)

2473 (2249)

Quivira Rd

109th St

38 (39)

36 (42)

2472 (4894)

3147 (2935)

Mastin Rd

2673 (1656)

1396 (2930)

Antioch Rd

1851 (2623)

1814 (2747)

2066 (3157)

1469 (1118)

876 (422)

3026 (2664)

5 5 28 (9) (5) (25)

8 (26) 1788 (2581) 18 (140)

593 (696)

183 (296) 570 (1331) 46 (503)

121 (271)

920 (2401)

110 (860)

117 (268)

802 (1749)

College Blvd

344 (144) 1245 (729) 101 (193)

651 244 (720) (237)

224 (134)

121 (271) 799 (2130)

70 17 23 (709) (10) (141)

16 (66) 697 (1641) 89 (42)

1534 (1056)

1690 (1066)

23 (11) 1477 (976) 34 (69)

58 5 185 (33) (5) (65)

147 (696)

895 (957)

2141 (1254)

89 (197) 1779 (1008) 273 (49)

153 12 36 (51) (5) (24)

1838 (1173)

57 (214)

248 (103)

Switzer Rd

4556 (4610)

2802 (2530)

379 (101)

201 (80)

Mastin Rd

2213 (3853)

2472 (4894)

7358 (7140)

MATCHLINE "C"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

Single Point Urban Interchange (SPUI)

= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 3

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

69

MATCHLINE "C"

2213 (3853) | 2472 (4894) | 701 (753) | 1771 (4141) | 687 (1132) | 1526 (2721) | 7358 (7140) | 3297 (6862) | 1894 (2336) | 5464 (4804)

1388 (1885)

894 (1826) | 36 (81)

578 0 810 (1021) (0) (864)

859 (1521) | 442 (1603)

1102 (3102)

835 (3291)

1599 (1141)

119th Street

1137 (1840)

1075 (1239)

Switzer Rd	Perry St*	Highland Plaza	Farley St	Grant St	Antioch Rd
124 (220) / 200 (161)	25 (29) / 169 (25)	138 (219) / 197 (256)	201 (105) / 65 (177)	175 (142) / 133 (147)	688 (1886) / 2078 (952)
30 24 70 (30) (119) (71) / 48 (86) 991 (1722) 186 (732)	25 (29) / 169 (25) 1200 (2511)	13 6 119 (45) (9) (165) / 93 (182) 1326 (2471) 53 (194)	166 5 30 (67) (5) (33) / 12 (62) 1085 (3019) 5 (21)	113 10 52 (68) (11) (63) / 38 (79) 930 (3011) 5 (32)	31 467 190 (179) (1402) (305) / 157 (232) 618 (2638) 60 (421)
18 (21) 1030 (1151) 27 (67) / 116 134 637 (88) (54) (331)	1737 (1553)	95 (66) 1632 (1445) 10 (42) / 30 9 222 (20) (8) (77)	1763 (1282) 210 (405) / 1035 (815) 1538 (1331)	488 129 (304) (63) / 48 (110) 1607 (1225) 12 (59) / 50 5 14 (38) (5) (11)	1440 (1106) 211 (163) / 38 (63)	80 (63) 1388 (1052) 10 (54) / 59 15 31 (23) (5) (29)	267 (87) 946 (647) 258 (410) / 324 1654 463 (305) (633) (189)
237 (918) / 887 (473)		69 (245) / 261 (105)	22 (85) / 69 (54)	211 (163) / 38 (63)	25 (97) / 105 (57)	785 (2233) / 2441 (1127)

Switzer Rd	Grant St	Three Lakes Pkwy	Lakeside Dr*	Hayes St	Antioch Rd

246 (486)

617 (367)

3543 (7348)

6081 (5171)

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,390 (6,133)
Express Toll Lanes = 153 (1,215)
Total = 3,543 (7,348)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 4,489 (3,787)
Express Toll Lanes = 1,592 (1,384)
Total = 6,081 (5,171)

Northbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	1,162	(1,022)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	445	(471)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	875	(833)
Express Toll Lanes – TOTAL =	1,592	(1,384)

Southbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	153	(1,215)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	5	(266)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	192	(553)
Express Toll Lanes – TOTAL =	340	(1,502)

5 (266)

3538 (7082)

379 (1742)

89 (153)

468 (1895)

1680 (1075)

1261 (978)

384 (2008)

419 (97)

7342 (6149)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	340 (1,502)
Express Toll Lanes – ENTERING from Blue Valley Pkwy =	89 (153)
Express Toll Lanes – TOTAL=	429 (1,655)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	1,581	(1,119)
Express Toll Lanes – EXITING to Blue Valley Pkwy =	419	(97)
Express Toll Lanes – TOTAL=	1,162	(1,022)

Lowell Ave*

123rd St

38 (38) / 38 (38) / 38 (38) / 38 (38) 430 (1857)

854 (495) / 228 (808) / 32 517 305 (56) (318) (121) / 30 (219) 387 (1536) 342 (162)

468 (1895) / 1680 (1075) / 30 (82) 1554 (893) 96 (100) / 49 168 45 (303) (507) (256) / 759 (1917) / 1904 (1270)

955 (580) / 262 (1066)

123rd St

Blue Valley Pkwy

4011 (9243)

7761 (6246)

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,582 (7,588)
Express Toll Lanes = 429 (1,655)
Total = 4,011 (9,243)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 6,180 (5,127)
Express Toll Lanes = 1,581 (1,119)
Total = 7,761 (6,246)

MATCHLINE "D"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 4

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,582 (7,588)
Express Toll Lanes = 429 (1,655)
Total = 4,011 (9,243)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 6,180 (5,127)
Express Toll Lanes = 1,581 (1,119)
Total = 7,761 (6,246)

4011 (9243) ↓ | 69 | ↑ 7761 (6246)

2002 (3387) | 2033 (1820) | 5728 (4426)

Antioch Rd | Overland Pointe Marketplace* | Hemlock St | BP Gas Station* | Riley St | Mazuma Credit Union* | Metcalf Ave

595 (1316) ↓ / ↑ 1074 (749)
72 (63) ↑
279 (823) ↓ / ↑ 649 (589)
38 (112) ↓ / ↑ 95 (63)
213 (481) ↓ / ↑ 340 (339)
63 (63) ↑
324 (1807) ↓ / ↑ 1275 (682)

1132 (2282) ←
91 212 292 (299) (689) (328) →
172 (189) / 946 (1938) / 108 (195) ←
72 (63) ← 1226 (2322)
47 15 217 (210) (178) (435) →
493 (414) / 1246 (2143) / 262 (452) ←
38 (112) ←
95 (63) ← 1963 (2897)
974 1028 (1425) (1962) →
1084 (1535) / 180 (574) ←
2033 (1820) / 828 (1765) ←
164 14 35 (349) (39) (93) →
73 (74) / 2571 (3002) / 18 (68) ←
63 (63) ← 2662 (3144)
91 154 79 (615) (767) (425) →
123 (48) / 1868 (2140) / 72 (173) ←
2063 (2361) ←

135th Street (left) — **135th Street** (right)

1623 (1428) →
329 (192) / 1231 (1283) / 63 (76) →
95 573 70 (168) (368) (89) →
1555 (1637) / 38 (63) →
103 (116) / 1441 (1505) / 11 (16) →
5 53 362 (32) (59) (340) →
2020 (2280) →
1782 (1610) / 238 (670) →
1874 (1969) / 936 (1603) →
436 535 (344) (340) ←
254 (251) / 2061 (1704) / 94 (354) →
126 13 20 (234) (14) (71) →
2116 (1868) →
498 (198) / 1277 (1174) / 341 (496) →
766 654 126 (452) (436) (152) →
1482 (1751) →

383 (960) ↓ / ↑ 738 (625)
38 (63) ↓
288 (646) ↓ / ↑ 420 (431)
126 (461) ↓ / ↑ 159 (319)
567 (1436) ↓ / ↑ 1546 (1040)

Antioch Rd | B&B Theatre* | Hemlock St | Riley St | Metcalf Ave

2009 (5856) ↓ | 936 (1603) | 4792 (2823) ↑ | 418 (1244) ↓ | 971 (684) ↑

Southbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	429	(1,655)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	360	(678)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	9	(280)
Express Toll Lanes – TOTAL =	78	(1,257)

Northbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	1,191	(386)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	266	(9)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	656	(742)
Express Toll Lanes – TOTAL =	1,581	(1,119)

Antioch Rd | SEE INSET A | Shopping Center | McDonald's* | Tay's Burger Shack* | Dunkin Donuts* | SEE INSET B | Metcalf Ave

364 (684) ↓ / ↑ 620 (636)
146 (210) ↓ / ↑ 78 (107)
13 (13) ↓ / ↑ 13 (13)
13 (13) ↓ / ↑ 13 (13)
25 (25) ↓ / ↑ 13 (13)
517 (1012) ↓ / ↑ 666 (956)

2427 (7100) ↓ | 5763 (3507) ↑ | 961 (2961) ↓ | 2284 (1714) ↑ | 3479 (1793) ↑

773 (1971) ←
72 131 161 (177) (246) (261) →
236 (206) / 641 (1691) / 81 (134) ←
35 10 101 (24) (28) (158) →
26 (63) / 865 (2191) / 110 (300) ←
13 (13) ← 988 (2541)
354 607 (1460) (1501) →
647 (1094) / 191 (286) ←
990 (950) / 571 (1053) ←
13 (13) ← 1548 (1990)
25 (25) ← 1536 (1978)
237 183 97 (399) (452) (161) →
69 (86) / 944 (1089) / 207 (308) ←
1220 (1483) ←

151st Street (left) — **151st Street** (right)

1336 (835) →
185 (99) / 1081 (657) / 70 (79) →
60 199 128 (103) (331) (128) →
37 (28) / 1397 (1115) / 35 (40) →
45 15 259 (44) (16) (246) →
1757 (1519) →
1617 (1305) / 140 (214) →
1294 (764) / 930 (2042) →
267 381 (327) (372) ←
1298 (2401) / 13 (13) →
1310 (2413) / 13 (13) →
13 (13) ← 1536 (1978)
267 (371) / 707 (1729) / 172 (106) →
275 330 170 (307) (499) (273) →
974 (2163) →

282 (459) ↓ / ↑ 387 (562)
155 (368) ↓ / ↑ 319 (306)
562 (866) ↓ / ↑ 775 (1079)

Antioch Rd | Lowell Ave | Ace Hardware 1* | Ace Hardware 2* | Metcalf Ave

331 (500) ↓ | 1466 (4139) ↑ | 648 (699) ↑

INSET A

Walgreens* | Trailwinds Center* | Hardy St

25 (38) ↓ / ↑ 25 (38)
132 (81) ↓ / ↑ 58 (114)
124 (223) ↓ / ↑ 67 (297)

25 (38) ← 933 (1993)
69 25 38 (5) (38) (38) →
8 (38) / 851 (1988) / 38 (38) ←
6 11 107 (34) (30) (159) →
41 (213) / 883 (1982) / 21 (64) ←

151st Street (left) — **151st Street** (right)

1345 (1008) →
25 (38) →
25 (76) ↑
25 (38) →
1307 (996) →
38 (50) →
38 25 38 (38) (38) (76) ↑
21 (71) →
1356 (977) →
6 (62) →
8 5 6 (48) (13) (47) ↑

25 (38) ↓ / ↑ 25 (76)
101 (126) ↓ / ↑ 101 (152)
38 (156) ↓ / ↑ 19 (108)

Jiffy Lube* | Target / Starbucks / Chipotle* | Hardy St

1797 (4639) ↓ | 4127 (2492) ↑

INSET B

Newton Dr | USPS Driveway* | Marty St | CVS Driveway*

112 (124) ↓ / ↑ 166 (319)
13 (19) ↓ / ↑ 13 (19)
35 (58) ↓ / ↑ 242 (55)
13 (19) ↓ / ↑ 13 (19)

8 9 95 (26) (5) (93) →
63 (105) / 1236 (1638) / 82 (135) ←
13 (19) ←
13 (19) / 1368 (1859) ←
15 5 15 (35) (5) (18) →
81 (5) / 1337 (1737) / 38 (53) ←
13 (19) ←
13 (19) / 1443 (1776) ←

151st Street (left) — **151st Street** (right)

89 (205) / 1194 (2126) / 40 (95) →
1326 (2286) →
305 14 37 (327) (9) (67) ←
156 (45) / 1100 (2120) / 70 (121) →
1146 (2206) →
29 5 31 (106) (5) (68) ←

131 (235) ↓ / ↑ 356 (403)
113 (179) ↓ / ↑ 65 (179)

Conser St | Marty St

MATCHLINE "E"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 1,719 (3,382)
Express Toll Lanes = 78 (1,257)
Total = 1,797 (4,639)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 2,936 (2,106)
Express Toll Lanes = 1,191 (386)
Total = 4,127 (2,492)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
→ = Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Volumes

Overland Park, KS | **Prepared By:** HNTB

DATE: September 2021 | **Sheet 5**

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

Southbound Traffic Volume Breakdown:

General Purpose Lanes =	1,719	(3,382)
Express Toll Lanes =	78	(1,257)
Total =	1,797	(4,639)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	2,936	(2,106)
Express Toll Lanes =	1,191	(386)
Total =	4,127	(2,492)

FINAL

69

MATCHLINE "E"

Antioch Rd | Grace Church* | Lowell Ave | Shawnee Dr* | Foster St | Marty St* | Walmart* | Metcalf Ave

159th Street

Antioch Rd | Lowell Ave | Shawnee Dr* | Foster St | Marty Ln* | Metcalf Ave

Antioch Rd | Lowell Ave* | APAC Driveway* | Metcalf Ave

167th Street

Antioch Rd | Future Driveways ** | Metcalf Ave

179th Street

Antioch Rd | Future Driveways** | Metcalf Ave

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)

Upstream General Purpose Lanes =	1,324	(1,479)
Upstream Express Toll Lanes =	78	(1,257)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	57	(798)
General Purpose Lanes – EXITING to 179th Street Off-Ramp =	553	(363)
Express Toll Lanes – EXITING to 179th Street Off-Ramp =	21	(459)
Express Toll Lanes – TOTAL =	0	(0)
General Purpose Lanes – US 69 TOTAL =	828	(1,914)
General Purpose Lanes – 179th Street Off-Ramp TOTAL =	574	(822)

Northbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)

Upstream General Purpose Lanes =	2,231	(1,301)
Upstream Express Toll Lanes =	0	(0)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	648	(256)
General Purpose Lanes – ENTERING from 179th Street On-Ramp =	319	(517)
Express Toll Lanes – ENTERING from 179th Street On-Ramp =	543	(130)
Express Toll Lanes – US 69 TOTAL =	1,191	(386)
General Purpose Lanes – US 69 TOTAL =	1,902	(1,562)
General Purpose Lanes – 179th Street On-Ramp TOTAL =	3,093	(1,948)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

****Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street and 167th Street.

US 69 Corridor Study

2050 FYB Balanced Peak Hour Volumes

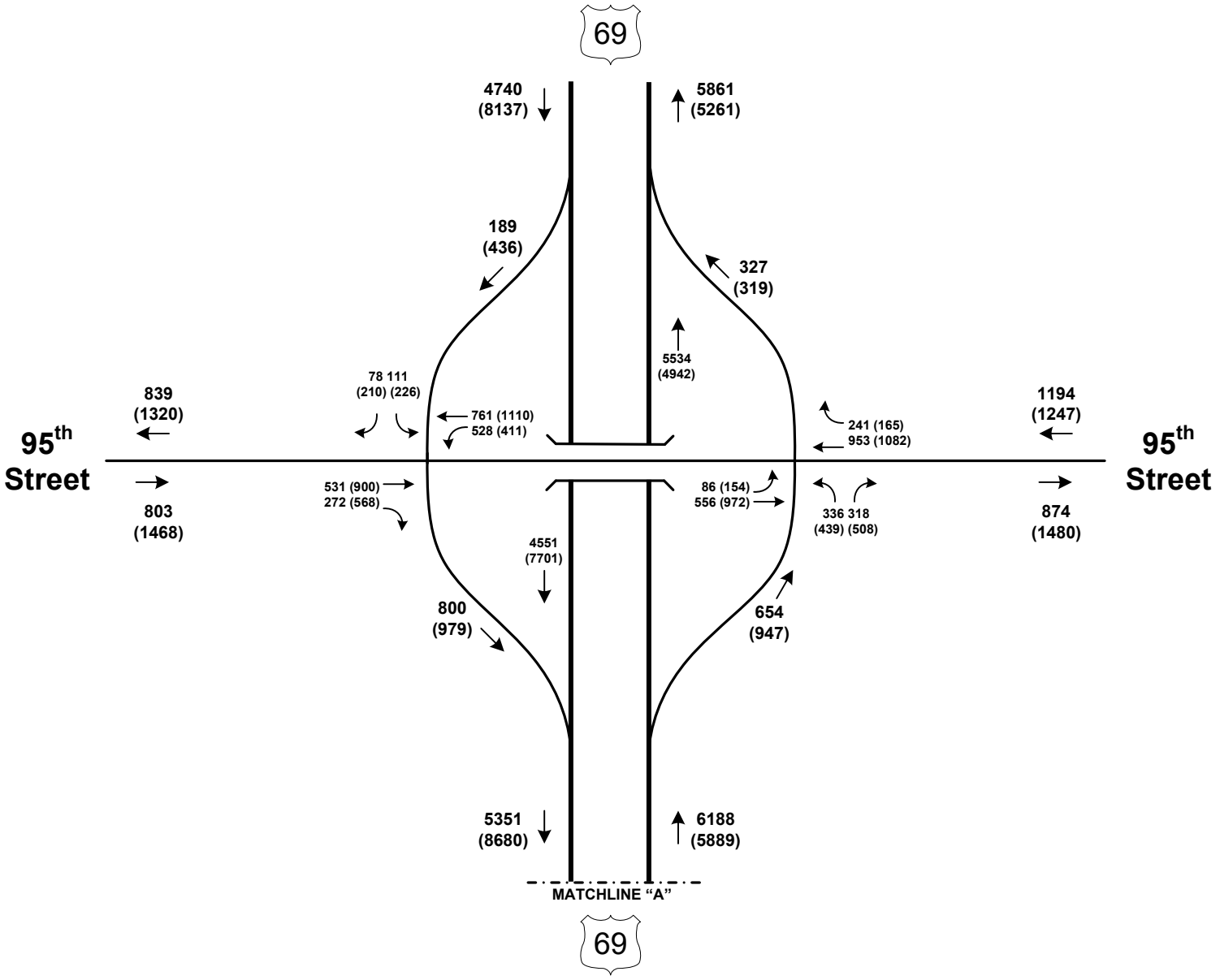
Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 6

2050 Ultimate Build Balanced Peak Hour Volumes – Autos Only

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

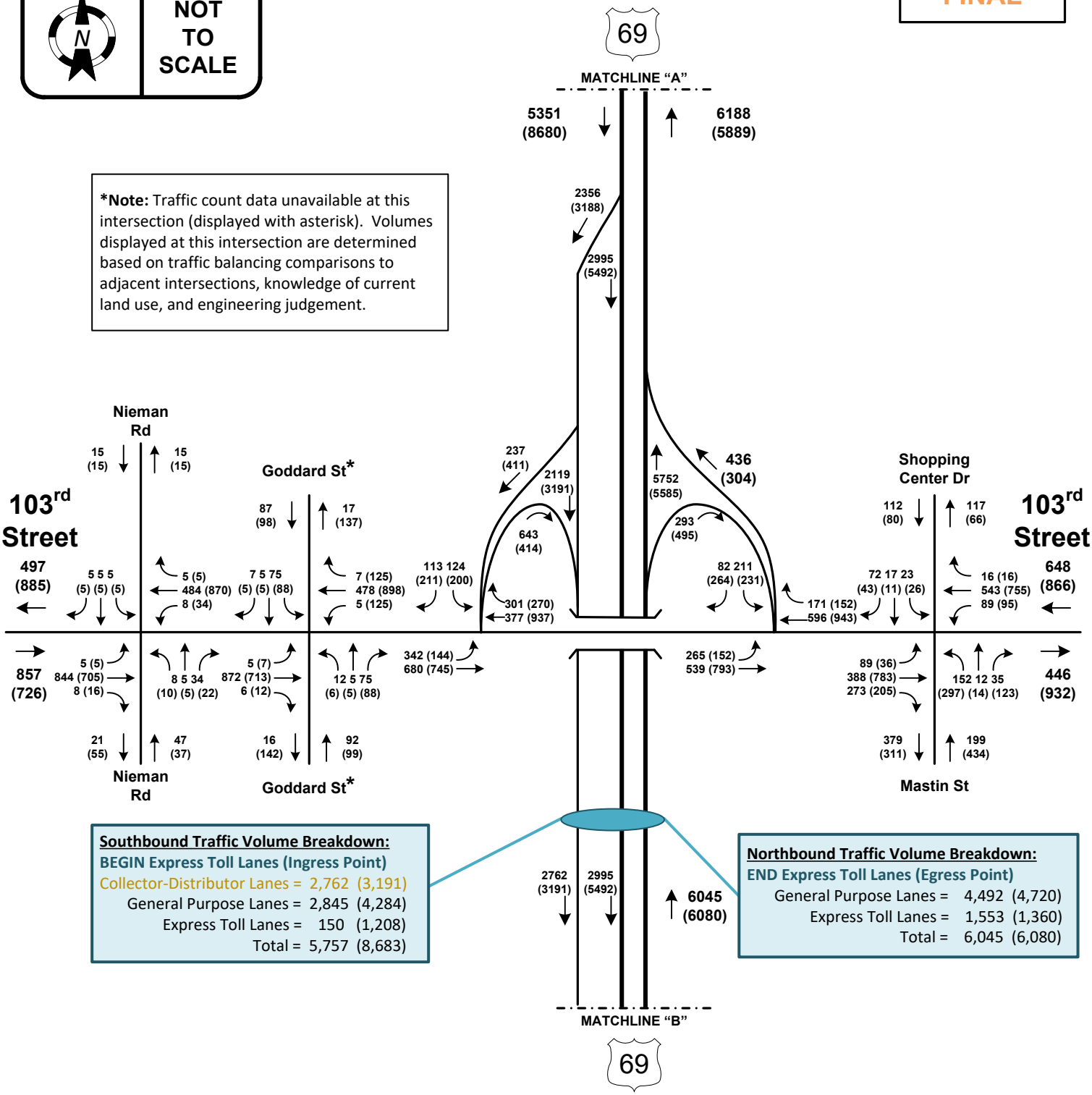
2050 FYB Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 1

NOT TO SCALE

FINAL



Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)

Collector-Distributor Lanes =	2,762	(3,191)
General Purpose Lanes =	2,845	(4,284)
Express Toll Lanes =	150	(1,208)
Total =	5,757	(8,683)

Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)

General Purpose Lanes =	4,492	(4,720)
Express Toll Lanes =	1,553	(1,360)
Total =	6,045	(6,080)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

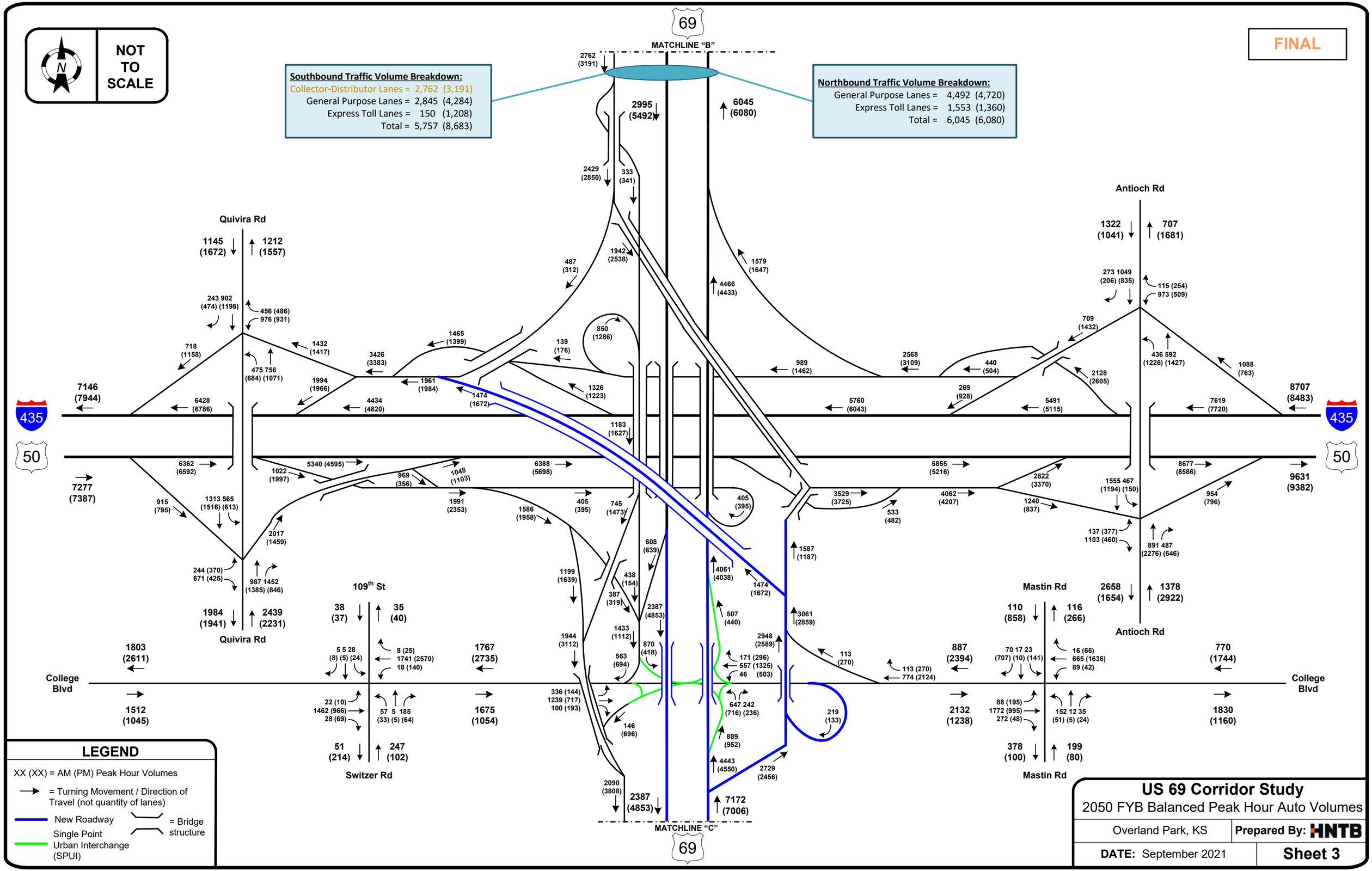
= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 2



NOT TO SCALE
FINAL
69
MATCHLINE "B"
Southbound Traffic Volume Breakdown:
Collector-Distributor Lanes = 2,762 (3,191)
General Purpose Lanes = 2,845 (4,284)
Express Toll Lanes = 150 (1,208)
Total = 5,757 (8,683)
Northbound Traffic Volume Breakdown:
General Purpose Lanes = 4,492 (4,720)
Express Toll Lanes = 1,553 (1,360)
Total = 6,045 (6,080)
Quivira Rd
Antioch Rd
Mastin Rd
109th St
Switzer Rd
College Blvd
435
50
MATCHLINE "C"
LEGEND
XX (XX) = AM (PM) Peak Hour Volumes
= Turning Movement / Direction of Travel (not quantity of lanes)
New Roadway
Single Point Urban Interchange (SPUI)
= Bridge structure
US 69 Corridor Study
2050 FYB Balanced Peak Hour Auto Volumes
Overland Park, KS
Prepared By: HNTB
DATE: September 2021
Sheet 3

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

69

MATCHLINE "C"

119th Street

Switzer Rd | Perry St* | Highland Plaza | Farley St | Grant St | Antioch Rd

Switzer Rd | Grant St | Three Lakes Pkwy | Lakeside Dr* | Hayes St | Antioch Rd

Southbound Traffic Volume Breakdown:

General Purpose Lanes =	3,216	(6,055)
Express Toll Lanes =	150	(1,208)
Total =	3,366	(7,263)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	4,350	(3,705)
Express Toll Lanes =	1,553	(1,360)
Total =	5,903	(5,065)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	1,122	(999)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	433	(460)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	864	(821)
Express Toll Lanes – TOTAL =	1,553	(1,360)

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	150	(1,208)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	5	(266)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	182	(545)
Express Toll Lanes – TOTAL =	327	(1,487)

Lowell Ave* | 123rd St

Blue Valley Pkwy

Southbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	327	(1,487)
Express Toll Lanes – ENTERING from Blue Valley Pkwy =	86	(151)
Express Toll Lanes – TOTAL=	413	(1,638)

Northbound Traffic Volume Breakdown (Express Toll Lanes):

Upstream Express Toll Lanes =	1,533	(1,094)
Express Toll Lanes – EXITING to Blue Valley Pkwy =	411	(95)
Express Toll Lanes – TOTAL=	1,122	(999)

Southbound Traffic Volume Breakdown:

General Purpose Lanes =	3,406	(7,507)
Express Toll Lanes =	413	(1,638)
Total =	3,819	(9,145)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	6,035	(5,041)
Express Toll Lanes =	1,533	(1,094)
Total =	7,568	(6,135)

MATCHLINE "D"

69

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Auto Volumes

Overland Park, KS | **Prepared By:** HNTB

DATE: September 2021 | **Sheet 4**

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL

MATCHLINE "D"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 3,406 (7,507)
Express Toll Lanes = 413 (1,638)
Total = 3,819 (9,145)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 6,035 (5,041)
Express Toll Lanes = 1,533 (1,094)
Total = 7,568 (6,135)

3819 (9145) | 69 | 7568 (6135)

1938 (3372) | 1996 (1800) | 5572 (4335)

1040 (1527) 141 (565) | 964 974 (1420) (1952) | 1996 (1800) 779 (1748)

135th Street

1093 (2398) | 87 211 291 (299) (688) (328) | 166 (188) 911 (1931) 105 (194) | 589 (1315) | 1062 (747)

1602 (1538) | 328 (192) 1211 (1270) 63 (76) | 95 568 69 (168) (367) (86) | 379 (958) | 732 (621)

1533 (1621) 38 (63) | 72 (63) 1182 (2313) | 72 (63) | 38 (63)

1992 (2261) | 47 15 213 (209) (178) (432) | 487 (413) 1202 (2135) 258 (448) | 38 (112) | 642 (588)

1766 (1595) 226 (666) | 103 (116) 1420 (1489) 10 (16) | 5 52 359 (32) (59) (340) | 283 (642) | 416 (431)

95 (63) 1909 (2884) | 275 (819) | 38 (112) | 95 (63)

1823 (1954) 917 (1593) | 1881 (5773) | 917 (1593) | 4655 (2742)

402 517 (344) (332) | 251 (250) 2006 (1686) 83 (350) | 115 13 20 (234) (14) (71) | 112 (457) | 148 (319)

2061 (1850) | 210 (480) | 337 (338)

498 (198) 1226 (1159) 337 (493) | 763 654 123 (452) (436) (151) | 562 (1433) | 1540 (1039)

1990 (2325) | 1428 (1735) | 161 14 35 (348) (39) (93) | 73 (74) 2499 (2966) 15 (68) | 63 (63) 2587 (3108) | 324 (1807) | 1275 (682) | 91 154 79 (615) (767) (425) | 123 (48) 1796 (2104) 71 (173)

Antioch Rd | Overland Pointe Marketplace* | Hemlock St | BP Gas Station* | Riley St | Mazuma Credit Union* | Metcalf Ave

Antioch Rd | B&B Theatre* | Hemlock St | Riley St | Metcalf Ave

Southbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	413	(1,638)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	347	(671)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	8	(273)
Express Toll Lanes – TOTAL =	74	(1,240)

Northbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point

Upstream Express Toll Lanes =	1,133	(371)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	253	(8)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	653	(731)
Express Toll Lanes – TOTAL =	1,533	(1,094)

367 (1231) | 2248 (7004) | 919 (676) | 5574 (3418)

927 (2955) | 2242 (1704) | 3332 (1714)

629 (1081) 181 (284) | 340 587 (1457) (1498) | 13 (13) 956 (2525) | 966 (943) 561 (1040)

312 (489) | 1321 (4049) | 619 (691)

1633 (4538) | 3951 (2405)

151st Street

740 (1956) | 72 130 160 (177) (245) (260) | 235 (206) 611 (1676) 78 (134) | 362 (682) | 610 (632)

1302 (826) | 179 (98) 1056 (649) 67 (79) | 57 196 128 (103) (328) (125) | 275 (458) | 381 (556)

1730 (1504) | 37 (28) 1371 (1100) 35 (40) | 45 15 258 (44) (16) (246) | 155 (367) | 318 (306)

1599 (1299) 131 (205) | 143 (210) | 78 (107) | 13 (13) | 13 (13)

1276 (761) 910 (2036) | 1267 (2389) 13 (13) | 1279 (2401) 13 (13) | 13 (13) | 13 (X) | 25 (25) | 13 (13)

249 370 (325) (366) | 13 (13) | 25 (25) | 13 (13) | 13 (13) | 25 (25) | 13 (13) | 13 (13) | 13 (13)

1186 (1462) | 945 (2148) | 233 174 95 (396) (443) (161) | 66 (86) 918 (1076) 202 (300) | 267 (370) 684 (1720) 169 (104) | 270 322 166 (303) (488) (267) | 502 (1000) | 655 (944) | 545 (847) | 758 (1058)

Antioch Rd | Lowell Ave | Shopping Center | McDonald's* | Tay's Burger Shack* | Dunkin Donuts* | Ace Hardware 1* | Ace Hardware 2* | Metcalf Ave

SEE INSET A

SEE INSET B

INSET A

151st Street

Walgreens* | Trailwinds Center* | Hardy St

25 (38) | 25 (38) | 25 (38) | 899 (1978) | 132 (81) | 58 (114) | 69 25 38 (5) (38) (38) | 8 (38) 817 (1973) 38 (38) | 123 (219) | 66 (297) | 6 11 106 (33) (30) (156) | 40 (213) 849 (1968) 21 (63)

1319 (996) 25 (38) | 25 (76) | 25 (38) 1281 (984) 38 (50) | 38 25 38 (38) (38) (76) | 21 (71) 1331 (965) 5 (62) | 8 5 6 (48) (13) (47)

25 (38) | 25 (76) | 101 (126) | 101 (152) | 37 (155) | 19 (108)

Jiffy Lube* | Target / Starbucks / Chipotle* | Hardy St

151st Street

INSET B

151st Street

Newton Dr | USPS Driveway* | Marty St | CVS Driveway*

106 (124) | 162 (319) | 13 (19) | 13 (19) | 35 (58) | 242 (55) | 13 (19) | 13 (19)

5 9 92 (26) (5) (93) | 59 (105) 1205 (1618) 82 (135) | 13 (19) | 13 (19) 1333 (1839) | 15 5 15 (35) (5) (18) | 81 (5) 1302 (1717) 38 (53) | 13 (19) | 13 (19) 1408 (1756)

89 (205) 1164 (2114) 39 (95) | 305 14 37 (327) (9) (67) | 1293 (2274) | 156 (45) 1075 (2108) 62 (121) | 29 5 30 (106) (5) (68) | 1120 (2194)

130 (235) | 356 (403) | 105 (179) | 64 (179)

Conser St | Marty St

151st Street

MATCHLINE "E"

Southbound Traffic Volume Breakdown:
General Purpose Lanes = 1,559 (3,298)
Express Toll Lanes = 74 (1,240)
Total = 1,633 (4,538)

Northbound Traffic Volume Breakdown:
General Purpose Lanes = 2,818 (2,034)
Express Toll Lanes = 1,133 (371)
Total = 3,951 (2,405)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
→ = Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Auto Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | **Sheet 5**

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

Southbound Traffic Volume Breakdown:

General Purpose Lanes =	1,559	(3,298)
Express Toll Lanes =	74	(1,240)
Total =	1,633	(4,538)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	2,818	(2,034)
Express Toll Lanes =	1,133	(371)
Total =	3,951	(2,405)

FINAL

69

MATCHLINE "E"

Antioch Rd | Grace Church* | Lowell Ave | Shawnee Dr* | Foster St | Marty St* | Walmart* | Metcalf Ave

159th Street

Antioch Rd | Lowell Ave | Shawnee Dr* | Foster St | Marty Ln* | Metcalf Ave

Antioch Rd | Lowell Ave* | APAC Driveway* | Metcalf Ave

167th Street

Antioch Rd | Future Driveways ** | Metcalf Ave

179th Street

Antioch Rd | Future Driveways** | Metcalf Ave

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)

Upstream General Purpose Lanes =	1,163	(1,405)
Upstream Express Toll Lanes =	74	(1,240)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	54	(786)
General Purpose Lanes – EXITING to 179th Street Off-Ramp =	540	(350)
Express Toll Lanes – EXITING to 179th Street Off-Ramp =	20	(454)
Express Toll Lanes – TOTAL =	0	(0)
General Purpose Lanes – US 69 TOTAL =	677	(1,841)
General Purpose Lanes – 179th Street Off-Ramp TOTAL =	560	(804)

Northbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)

Upstream General Purpose Lanes =	2,103	(1,221)
Upstream Express Toll Lanes =	0	(0)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	617	(246)
General Purpose Lanes – ENTERING from 179th Street On-Ramp =	327	(507)
Express Toll Lanes – ENTERING from 179th Street On-Ramp =	516	(125)
Express Toll Lanes – US 69 TOTAL =	1,133	(371)
General Purpose Lanes – US 69 TOTAL =	1,813	(1,482)
General Purpose Lanes – 179th Street On-Ramp TOTAL =	2,946	(1,853)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

****Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street and 167th Street.

US 69 Corridor Study

2050 FYB Balanced Peak Hour Auto Volumes

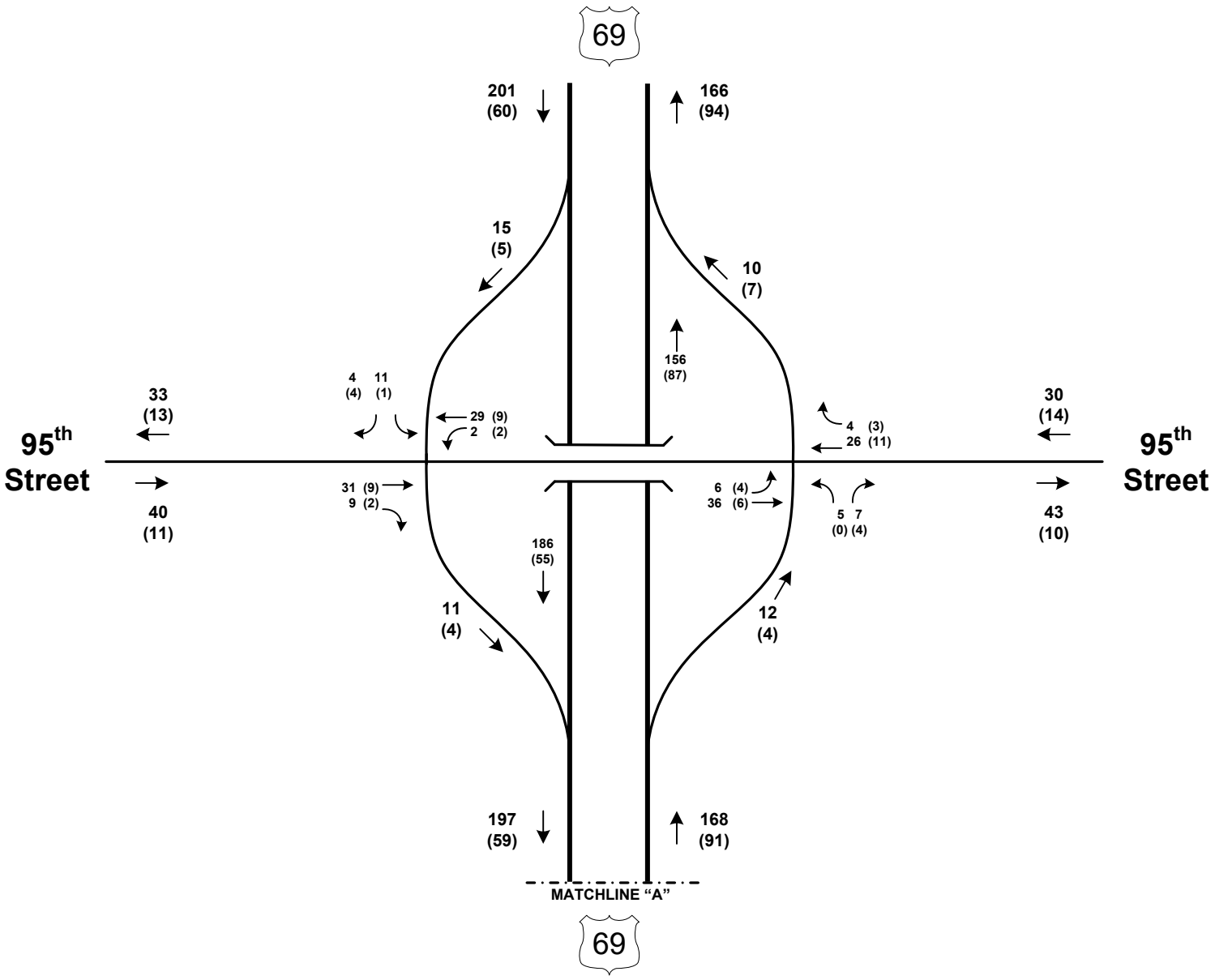
Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 6

2050 Ultimate Build Balanced Peak Hour Volumes – Trucks Only

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

= Bridge structure

US 69 Corridor Study

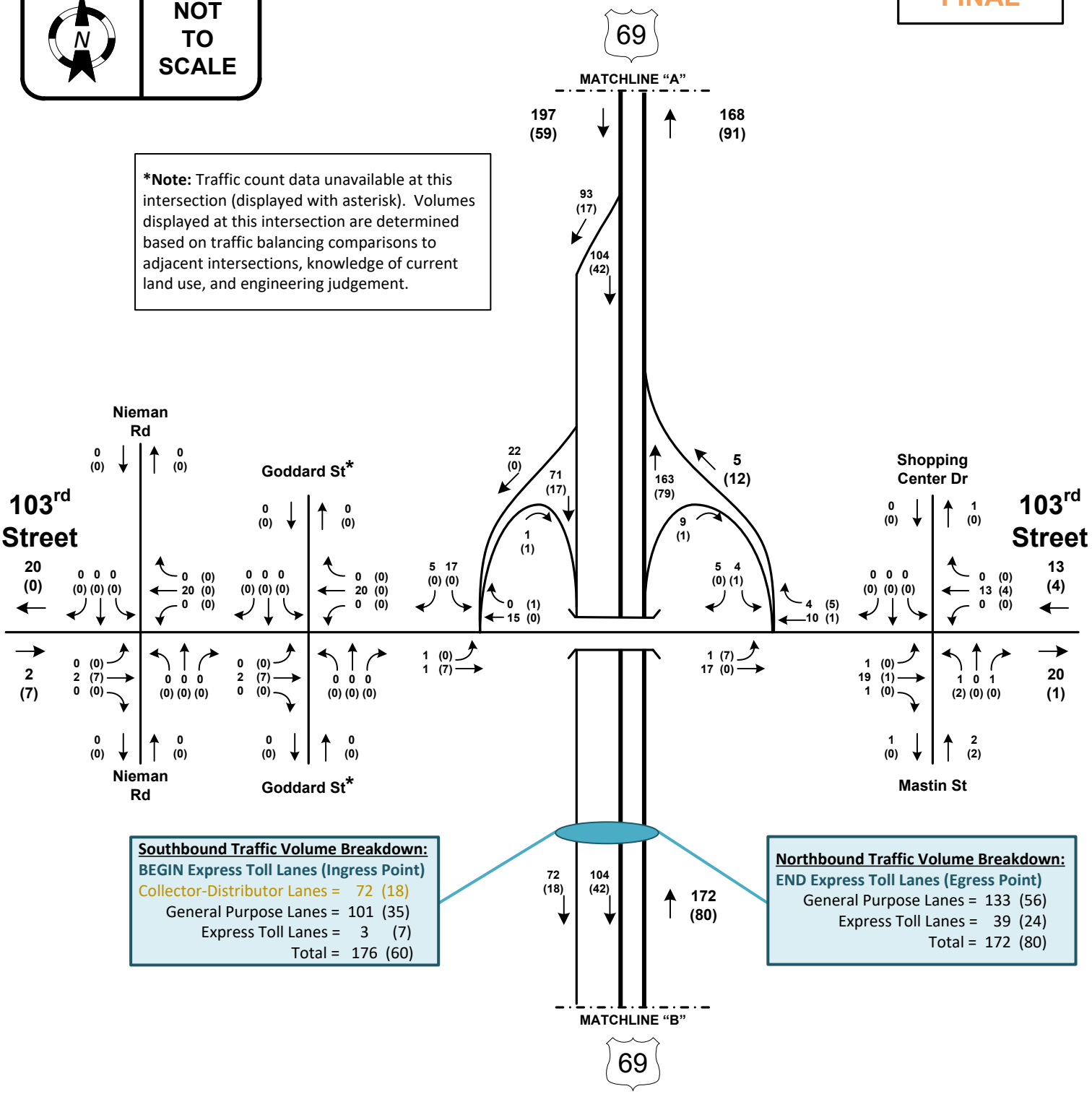
2050 FYB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | **Sheet 1**

NOT TO SCALE

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

= Turning Movement / Direction of Travel (not quantity of lanes)

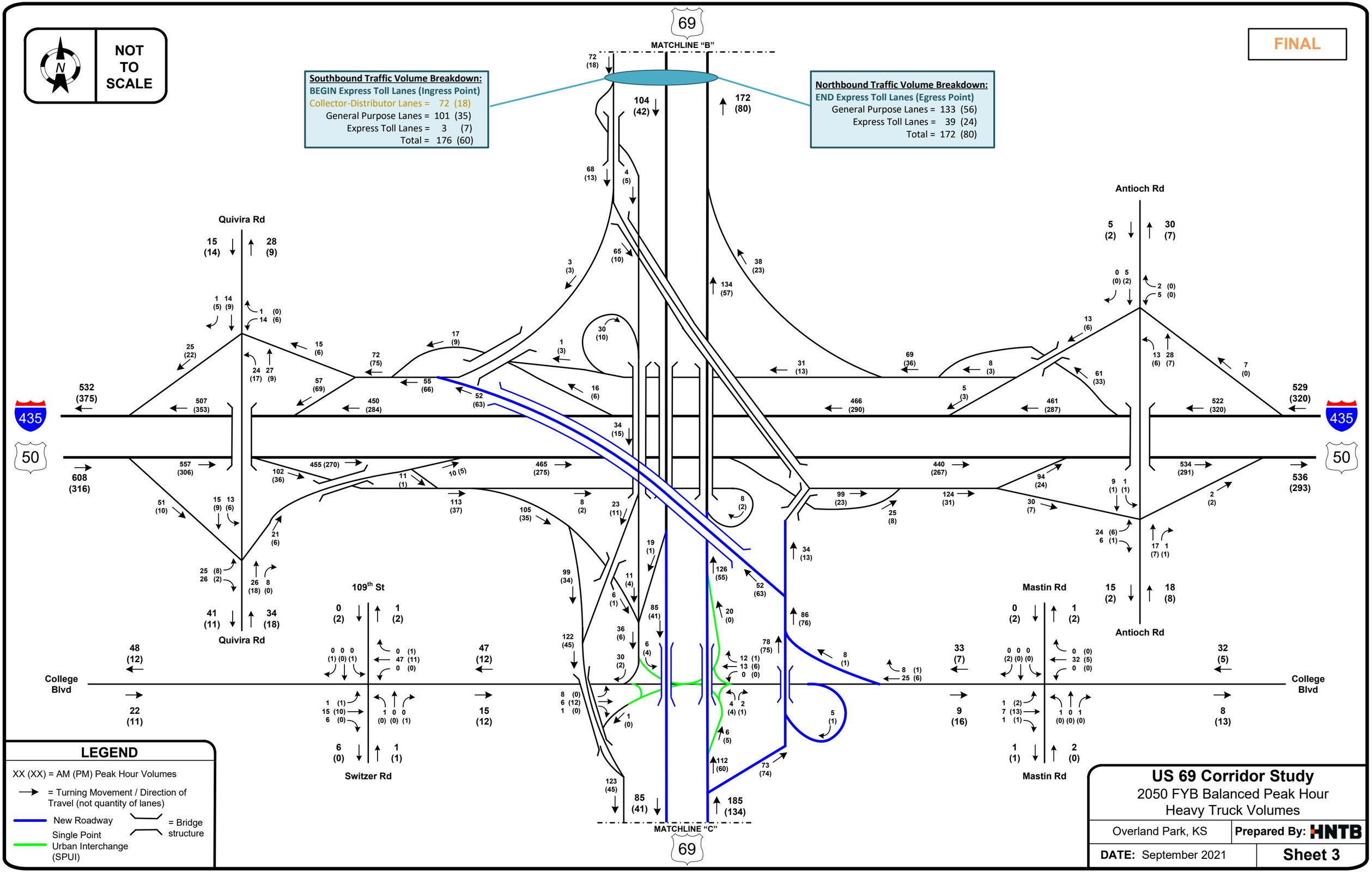
= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 2

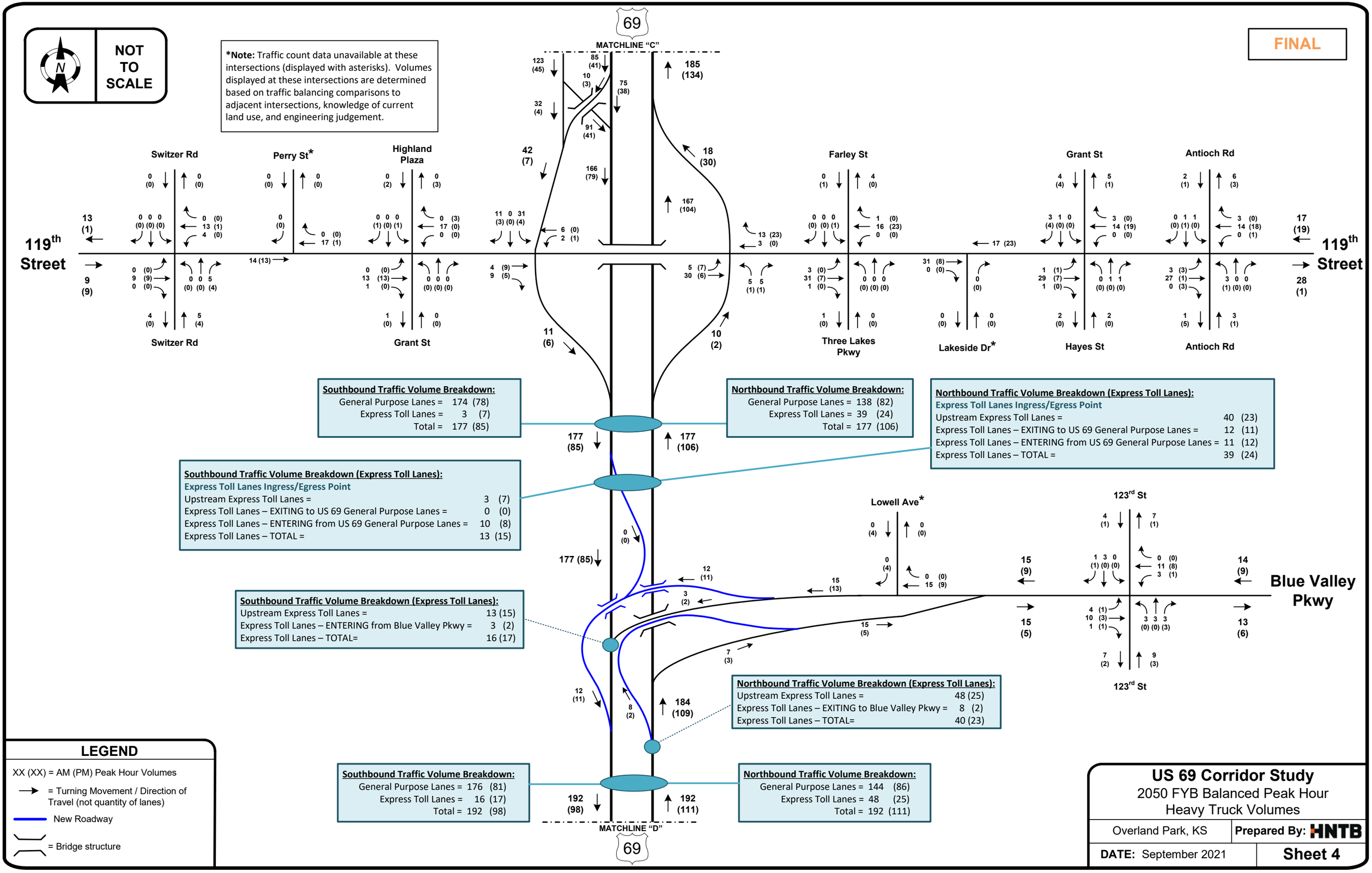


NOT TO SCALE
FINAL
69
MATCHLINE "B"
Southbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)
Collector-Distributor Lanes = 72 (18)
General Purpose Lanes = 101 (35)
Express Toll Lanes = 3 (7)
Total = 176 (60)
Northbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)
General Purpose Lanes = 133 (56)
Express Toll Lanes = 39 (24)
Total = 172 (80)
Quivira Rd
Antioch Rd
109th St
Switzer Rd
Mastin Rd
College Blvd
435
50
MATCHLINE "C"
LEGEND
XX (XX) = AM (PM) Peak Hour Volumes
= Turning Movement / Direction of Travel (not quantity of lanes)
New Roadway
Single Point Urban Interchange (SPUI)
= Bridge structure
US 69 Corridor Study
2050 FYB Balanced Peak Hour
Heavy Truck Volumes
Overland Park, KS
Prepared By: HNTB
DATE: September 2021
Sheet 3

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

FINAL



LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

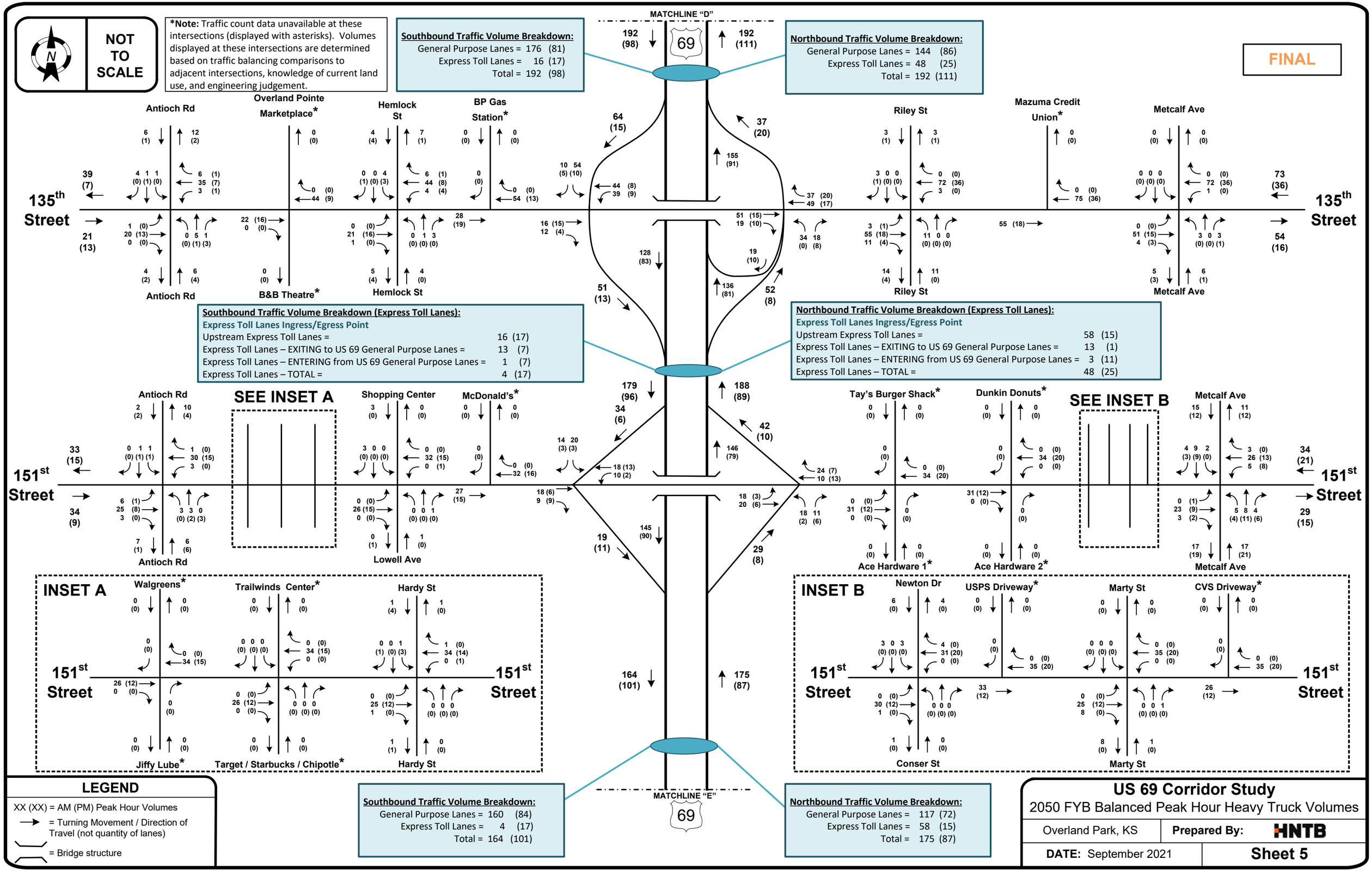
= Bridge structure

US 69 Corridor Study

2050 FYB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | Prepared By: HNTB

DATE: September 2021 | Sheet 4



NOT TO SCALE
*Note: Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.
Southbound Traffic Volume Breakdown:
General Purpose Lanes = 176 (81)
Express Toll Lanes = 16 (17)
Total = 192 (98)
Northbound Traffic Volume Breakdown:
General Purpose Lanes = 144 (86)
Express Toll Lanes = 48 (25)
Total = 192 (111)
FINAL
MATCHLINE "D"
69
Antioch Rd
Overland Pointe Marketplace*
Hemlock St
BP Gas Station*
Riley St
Mazuma Credit Union*
Metcalf Ave
135th Street
B&B Theatre*
Southbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point
Upstream Express Toll Lanes = 16 (17)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes = 13 (7)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes = 1 (7)
Express Toll Lanes – TOTAL = 4 (17)
Northbound Traffic Volume Breakdown (Express Toll Lanes):
Express Toll Lanes Ingress/Egress Point
Upstream Express Toll Lanes = 58 (15)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes = 13 (1)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes = 3 (11)
Express Toll Lanes – TOTAL = 48 (25)
SEE INSET A
SEE INSET B
Shopping Center
McDonald's*
Tay's Burger Shack*
Dunkin Donuts*
151st Street
Lowell Ave
Ace Hardware 1*
Ace Hardware 2*
INSET A
Walgreens*
Trailwinds Center*
Hardy St
Jiffy Lube*
Target / Starbucks / Chipotle*
INSET B
Newton Dr
USPS Driveway*
Marty St
CVS Driveway*
Conser St
MATCHLINE "E"
LEGEND
XX (XX) = AM (PM) Peak Hour Volumes
= Turning Movement / Direction of Travel (not quantity of lanes)
= Bridge structure
Southbound Traffic Volume Breakdown:
General Purpose Lanes = 160 (84)
Express Toll Lanes = 4 (17)
Total = 164 (101)
Northbound Traffic Volume Breakdown:
General Purpose Lanes = 117 (72)
Express Toll Lanes = 58 (15)
Total = 175 (87)
US 69 Corridor Study
2050 FYB Balanced Peak Hour Heavy Truck Volumes
Overland Park, KS
Prepared By: HNTB
DATE: September 2021
Sheet 5

NOT TO SCALE

***Note:** Traffic count data unavailable at these intersections (displayed with asterisks). Volumes displayed at these intersections are determined based on traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement.

Southbound Traffic Volume Breakdown:

General Purpose Lanes =	160	(84)
Express Toll Lanes =	4	(17)
Total =	164	(101)

Northbound Traffic Volume Breakdown:

General Purpose Lanes =	117	(72)
Express Toll Lanes =	58	(15)
Total =	175	(87)

FINAL

69 MATCHLINE "E"

Antioch Rd | Grace Church* | Lowell Ave | Shawnee Dr* | Foster St | Marty St* | Walmart* | Metcalf Ave

159th Street

Antioch Rd | Lowell Ave | Shawnee Dr* | Foster St | Marty Ln* | Metcalf Ave

Antioch Rd | Lowell Ave* | APAC Driveway* | Metcalf Ave

167th Street

Antioch Rd | Future Driveways ** | Metcalf Ave

Antioch Rd | Future Driveways** | Metcalf Ave

179th Street

Southbound Traffic Volume Breakdown:
END Express Toll Lanes (Egress Point)

Upstream General Purpose Lanes =	161	(74)
Upstream Express Toll Lanes =	4	(17)
Express Toll Lanes – EXITING to US 69 General Purpose Lanes =	3	(12)
General Purpose Lanes – EXITING to 179th Street Off-Ramp =	13	(13)
Express Toll Lanes – EXITING to 179th Street Off-Ramp =	1	(5)
Express Toll Lanes – TOTAL =	0	(0)
General Purpose Lanes – US 69 TOTAL =	151	(73)
General Purpose Lanes – 179th Street Off-Ramp TOTAL =	14	(18)

Northbound Traffic Volume Breakdown:
BEGIN Express Toll Lanes (Ingress Point)

Upstream General Purpose Lanes =	127	(80)
Upstream Express Toll Lanes =	0	(0)
Express Toll Lanes – ENTERING from US 69 General Purpose Lanes =	39	(10)
General Purpose Lanes – ENTERING from 179th Street On-Ramp =	0	(10)
Express Toll Lanes – ENTERING from 179th Street On-Ramp =	19	(5)
Express Toll Lanes – US 69 TOTAL =	58	(15)
General Purpose Lanes – US 69 TOTAL =	88	(80)
General Purpose Lanes – 179th Street On-Ramp TOTAL =	19	(15)

LEGEND

XX (XX) = AM (PM) Peak Hour Volumes

→ = Turning Movement / Direction of Travel (not quantity of lanes)

New Roadway

= Bridge structure

****Note:** "Future Driveways" are representative of anticipated development traffic volumes as planned for in the official Overland Park travel demand model future year scenario. Future Year model volumes were reviewed and then refined to maintain reasonable traffic flow patterns on 179th Street.

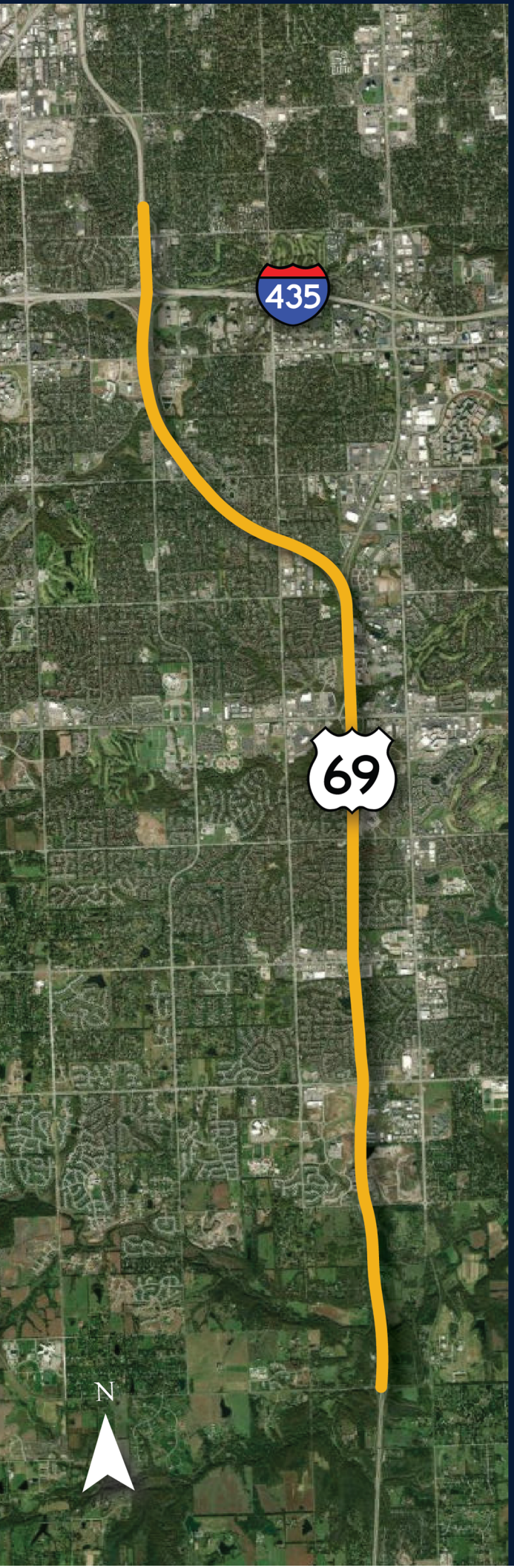
69

US 69 Corridor Study

2050 FYB Balanced Peak Hour Heavy Truck Volumes

Overland Park, KS | **Prepared By:** HNTB

DATE: September 2021 | **Sheet 6**



69 EXPRESS

US 69 EXPANSION PROJECT

Technical Memorandum

Anticipated Travel Changes with Express Toll Lanes

August 2021

Purpose

Traffic analysis was performed to determine the effect of building the U.S. 69 Express Toll Lanes (ETL) between 103rd Street and 179th Street on travel behavior in the 2050 design year. The two primary questions that this report answers are:

1. What happens to Overland Park arterial corridors when the Express Toll Lanes are added and
2. What happens to the I-435 service interchanges of Quivira, Antioch and Metcalf when the Express Toll Lanes are added?

Methodology

The Mid-America Regional Council (MARC) Travel Demand Model was used as the basis of the analysis. The Study Team used the model to develop a more detailed sub area model for the U.S. 69 study. The travel behavior was quantified using the change in volume between 2050 ETL Build alternative and 2050 No-Build alternative. The No-Build alternative represents no improvements to the U.S. 69 corridor, but does include planned improvements by the City of Overland Park to arterial roads as shown in **Figure 1**. The arterial improvements are also included in MARC's Fiscally constrained Long-Range Transportation Plan. Major improvements in the plan include:

- **Metcalf** widening to six lanes from 119th Street to 159th Street
- **Antioch** widening to six lanes from 119th Street to 167th Street.

Other arterial improvements are also included in the analysis as shown in **Figure 1**.

Travel changes were analyzed during three time periods consisting of the AM Peak period (6:00 – 9:00), PM Peak period (4:00-7:00), and Daily (24-hours).

The screen lines in **Figure 2** were used to analyze the travel behavior along Overland Park arterial corridors near the U.S. 69 corridor. Screen line 1 was divided into two segments, 1A and 1B. Screen lines 1 and 2 measure east/west travel while screen lines 3 through 6 measure north/south travel. Along each screen line, traffic volumes were obtained at the major arterial cross streets; changes in traffic along U.S. 69 and I-435 were not included in the analysis. The changes in volumes along all arterials crossing a screen line were summed together to produce a total change for the screen line in each direction of travel for each of the three time periods. Magnitudes of total change in volume along a screen line less than 50 were considered statistically insignificant and are not show in any tables or figures. In order to understand the magnitude of the volume changes, the percent change was calculated. Travel changes along the I-435 service interchanges of Quivira, Antioch, and Metcalf were also analyzed.

Figure 1 – Overland Park Proposed Regional Transportation Plan 2050

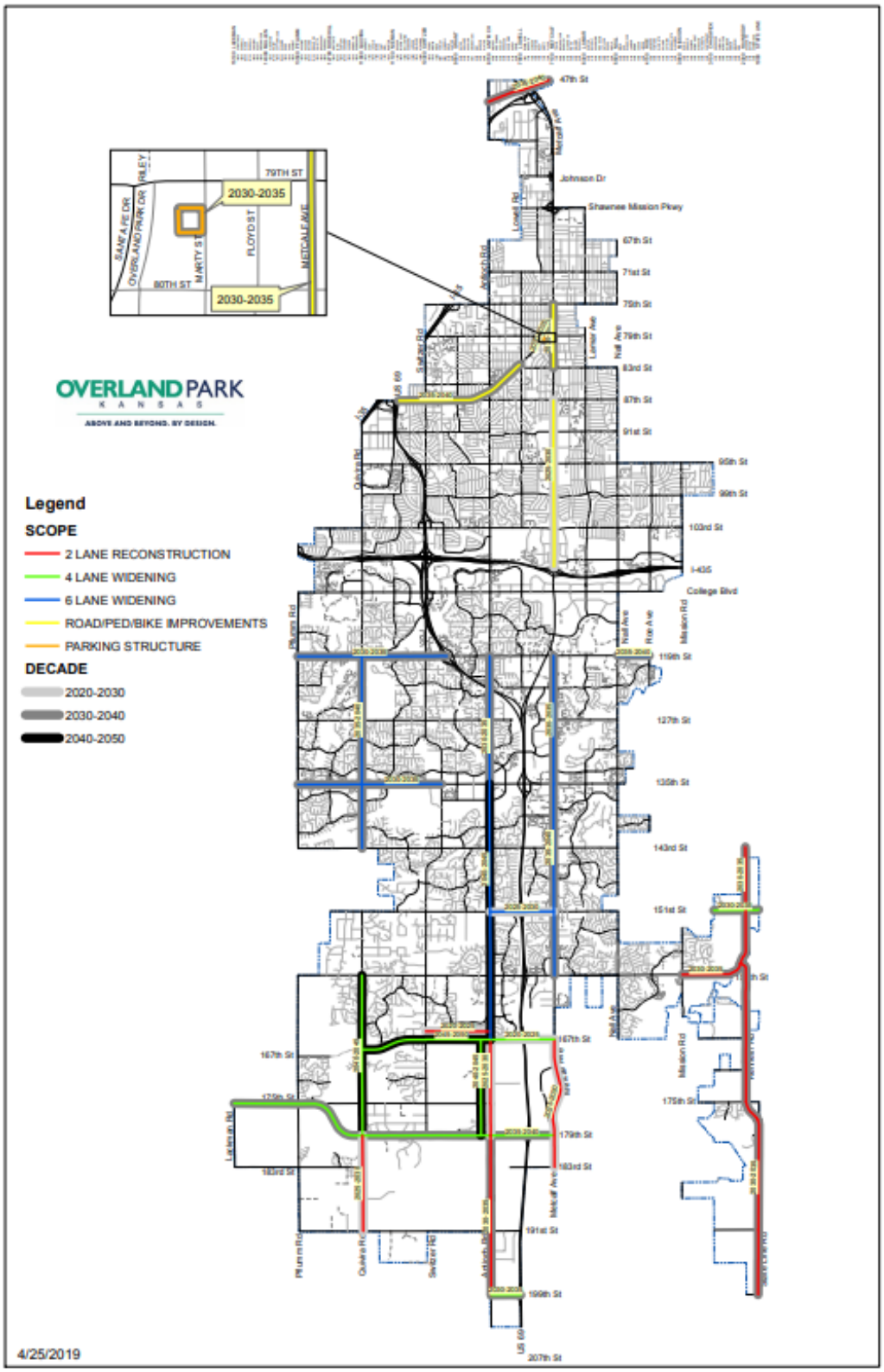
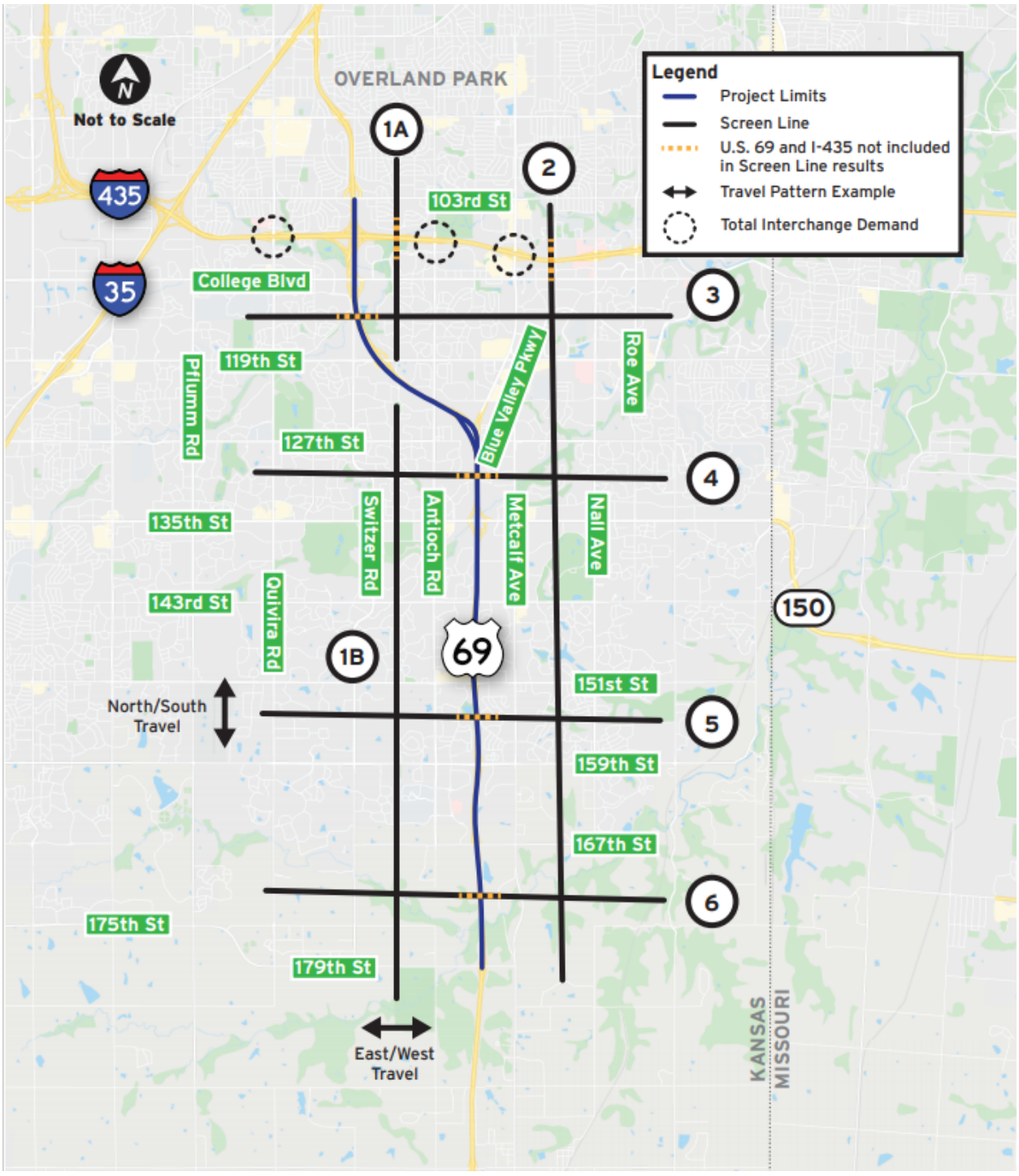


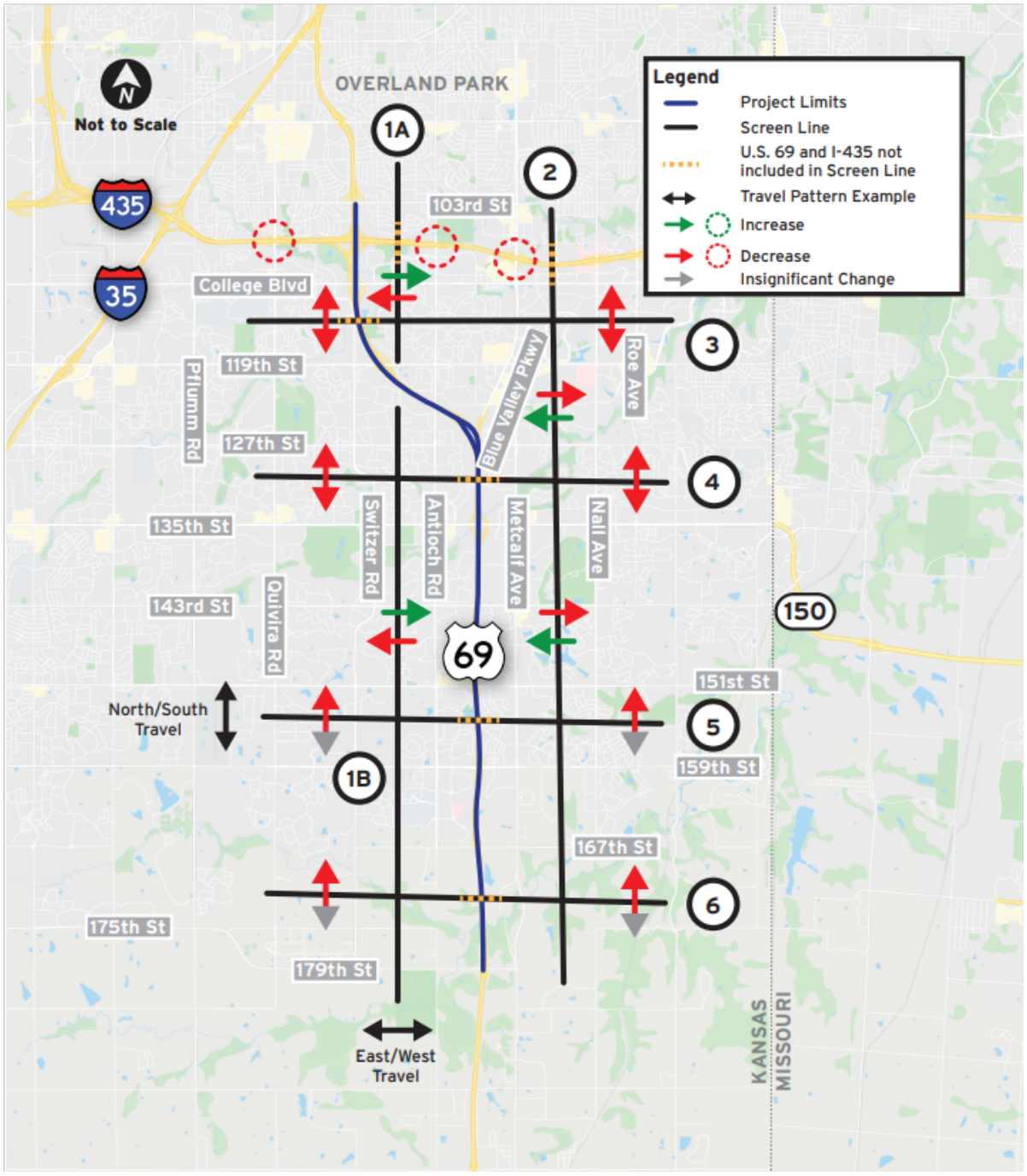
Figure 2: Screen Line Location



Results

A summary of the total volume change during the AM peak period along each screen line due to the ETL on U.S. 69 can be seen in **Figure 3.** The red arrows indicate a decrease in traffic along the screen line in the indicated direction, while the green arrows denote an increase in traffic. The travel demand model numbers used to create the figures can be found in the Appendix, **Tables 1 & 2**.

Figure 3: AM Peak Period Volume Changes



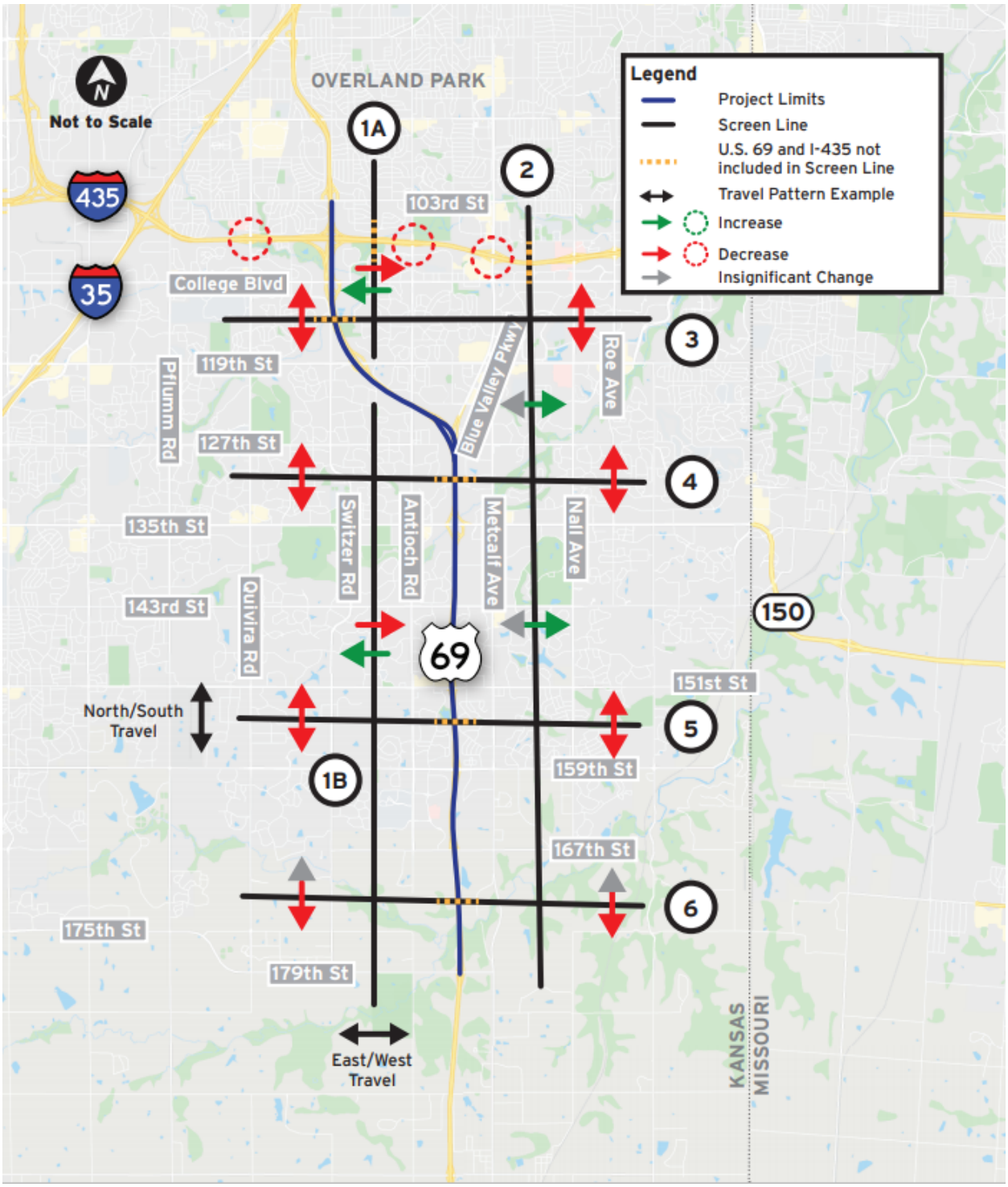
Screen lines 1B and 2 show an increase between 3.9% and 5.4% in the volume of traffic along east/west arterials going towards U.S. 69. This increase indicates that more people will use these east/west arterials to access U.S. 69. However, screen line 1A shows the opposite trend for east/west arterials as there is actually a 4.4% decrease in traffic going towards U.S. 69. The decrease in traffic is mostly due to the decrease in westbound traffic on W 119th St. and College Blvd.

Along all north/south arterials there is a decrease in traffic during the AM peak period. The decrease is most significant on screen lines 4 through 6 where it ranges from -11% to -13.3%. This decrease during the morning commute supports the idea that the increased speeds and capacity on U.S. 69, as a result of the ETL alternative, will draw traffic away from the parallel arterials.

The total volume change during the PM peak period along each screen line can be seen in **Figure 4.** Along the east/west arterials crossed by screen lines 1B and 2, there is an increase in traffic, ranging from 1% to 3.4%, going away from U.S. 69 during the PM peak. This can be explained by more people using US 69 to commute who then exit onto the east/west arterials to the home trip end. Screen line 1A shows the opposite trend for east/west arterials, as there is actually an increase in traffic going towards U.S. 69. This increase could be due motorists using U.S. 69 to access I-435 during the PM peak period. This correlates to the heavy U.S. 69 travel seen today.

Similar to the AM peak, the PM peak period shows a decrease in north/south arterial traffic which is largest on screen lines 4 and 5. However the magnitude of these decreases is smaller during the PM peak period at only -4.9% to -5.4%.

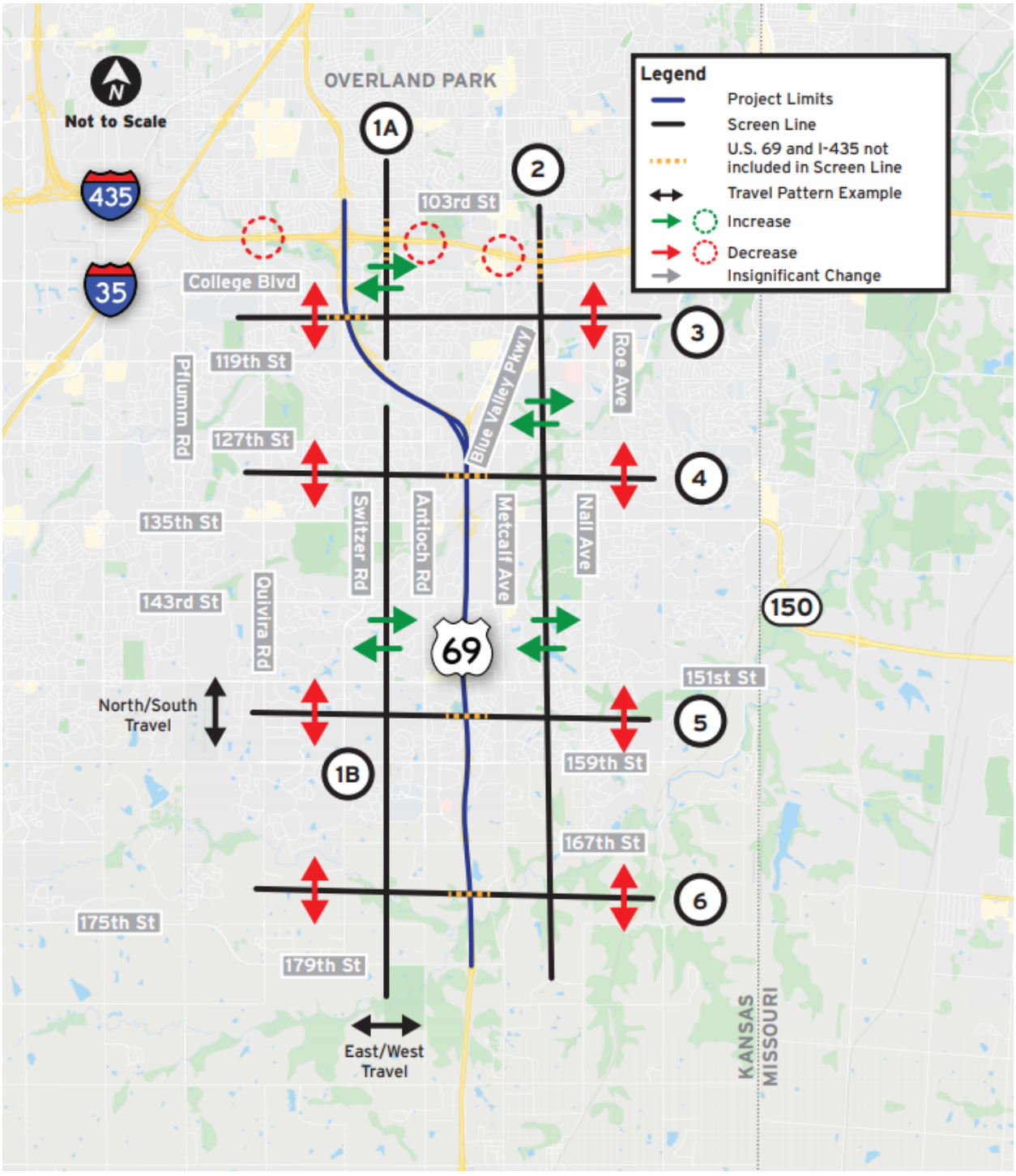
Figure 4: PM Peak Period Volume Changes



Finally **Figure 5** shows the Daily change in traffic volume along each screen line due to the ETL on US 69. These results show a more consistent increase in traffic along all east/west arterials ranging from 0.2% to 1.1%. The north/south arterials see a decrease in traffic ranging from -0.6% to -5.5%. Overall, these

results support the idea that the ETL on U.S. 69 will increase traffic on east/west arterials that have connections to U.S. 69 and decreased traffic on north/south arterials. The daily changes in magnitude in both directions are understandably smaller than those of both the AM and PM peak periods.

Figure 5: Daily Volume Changes



The results of the I-435 service interchange analysis along I-435 can be found in the Appendix, **Tables 3 and 4**. In summary, traffic will decrease at all three interchanges during all time periods, with the largest decreases on each ramp occurring during the AM peak period ranging from -0.9% to -3.6%. In particular, the Metcalf ramp will experience a decrease of -2.0% in the AM peak, -1.4% in the PM peak, and -0.9% Daily.

Conclusions

A comparison of 2050 ETL Build vs No-Build alternatives was performed using the U.S. 69 travel model for seven screen lines and three I-435 service interchanges. Below are the conclusions.

- East/west arterials crossing the U.S. 69 corridor are expected to see an increase in daily traffic while the north/south arterials are expected to see a decrease in daily traffic as the U.S. 69 corridor becomes an attractive corridor for motorists to use.

- AM and PM peak period results are similar to the daily results. The peak period traffic characteristic is most significant during the AM peak where the largest north/south traffic decreases range from -11% to -13.3%.

- Changes in traffic demand at the three I-435 service interchanges near U.S. 69 indicate that when the U.S. 69 ETL alternative is implemented, traffic volumes are expected to decrease during each time period analyzed, with the AM peak period experiencing the largest decrease at the Quivira Interchange (-0.9%), Antioch Interchange (-3.6%) and Metcalf Interchange (-2%).

Appendix

Table 1: Screen Line Total Volume Changes

2050 Build vs. No-Build Total Volume Changes				
Road	**Direction**	**AM**	**PM**	**Daily**
Screen Line 1A	EB	225	-175	89
	WB	-173	266	317
Screen Line 1B	EB	713	-145	743
	WB	-296	642	721
Screen Line 2	EB	-321	240	184
	WB	167		648
Screen Line 3	NB	-767	-915	-1726
	SB	-226	-504	-994
Screen Line 4	NB	-1789	-819	-3623
	SB	-234	-1156	-2607
Screen Line 5	NB	-1038	-330	-1193
	SB		-589	-914
Screen Line 6	NB	-606		-576
	SB		-125	-96

Table 2: Screen Line Percent Change in Volumes

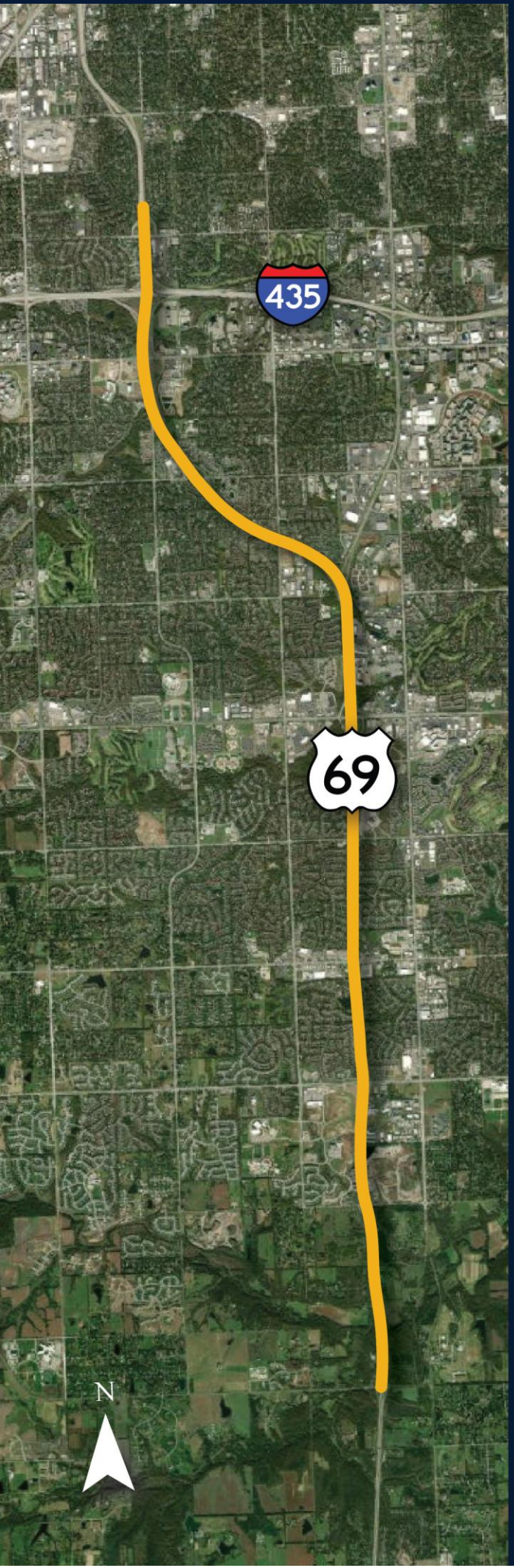
Percent Change				
Road	**Direction**	**AM**	**PM**	**Daily**
Screen Line 1A	EB	3.9%	-2.5%	0.3%
	WB	-4.4%	3.3%	1.1%
Screen Line 1B	EB	5.4%	-0.9%	1.1%
	WB	-2.9%	3.4%	1.1%
Screen Line 2	EB	-2.3%	1.0%	0.2%
	WB	0.5%		0.7%
Screen Line 3	NB	-4.7%	-4.3%	-2.2%
	SB	-1.6%	-2.6%	-1.3%
Screen Line 4	NB	-11.0%	-5.4%	-5.5%
	SB	-3.4%	-5.3%	-3.9%
Screen Line 5	NB	-12.4%	-4.1%	-3.7%
	SB		-4.9%	-2.7%
Screen Line 6	NB	-13.3%		-3.9%
	SB		-1.9%	-0.6%

Table 3: I-435 Ramps Total Volume Changes

Change in Volume			
	AM	PM	Daily
Quivira	-99	-113	-207
Antioch	-306	-148	-581
Metcalf	-246	-252	-613

Table 4: I-435 Ramps Percent Change in Volumes

Percent Change			
	AM	PM	Daily
Quivira	-0.9%	-0.9%	-0.4%
Antioch	-3.6%	-1.5%	-1.3%
Metcalf	-2.0%	-1.4%	-0.9%



69 EXPRESS

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US 69 EXPANSION PROJECT

Safety Analysis

September 2021

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1.0 CRASH ANALYSIS

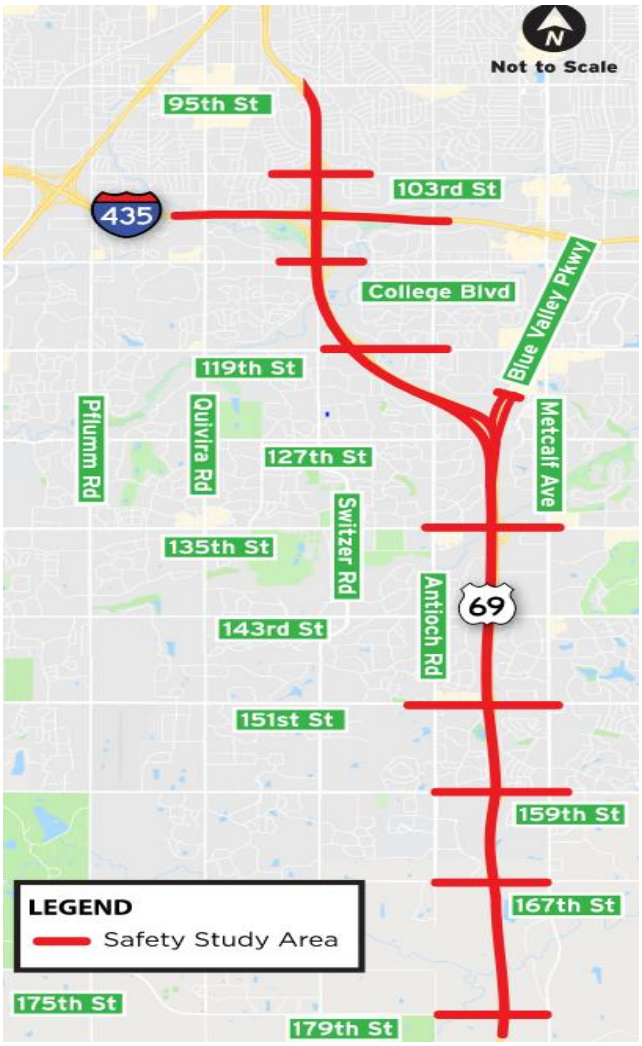
1.1 Introduction

As a part of the U.S. 69 Express Break-In-Access and U.S. 69 Environmental Assessment, an existing and future predictive crash analysis was conducted along portions of the U.S. 69 and I-435 freeway corridors as well as along major cross street arterials. Utilizing crash data for the years 2015-2019, the existing crash analysis is intended to aid in identifying existing safety related deficiencies along the study corridor. The future predictive crash analysis, utilizing the Interactive Highway Safety Design Model (IHSDM), developed by the Federal Highway Administration (FHWA), is used to evaluate the effectiveness of safety improvements and how proposed roadway improvements impact safety throughout the corridor. Results of the existing and future predictive crash analysis are summarized throughout this report.

1.2 Existing Safety Analysis

Existing safety conditions within the project study limits were evaluated using crash data obtained from the Kansas Department of Transportation (KDOT) and evaluated for the most current complete five-year period: 2015-2019. **Figure 1** shows the limits for the safety analysis. For this analysis, freeway and arterial segments were evaluated independently of each other, following the methodology presented in Section 1.2.

Figure 1: U.S. 69 Safety Study Area



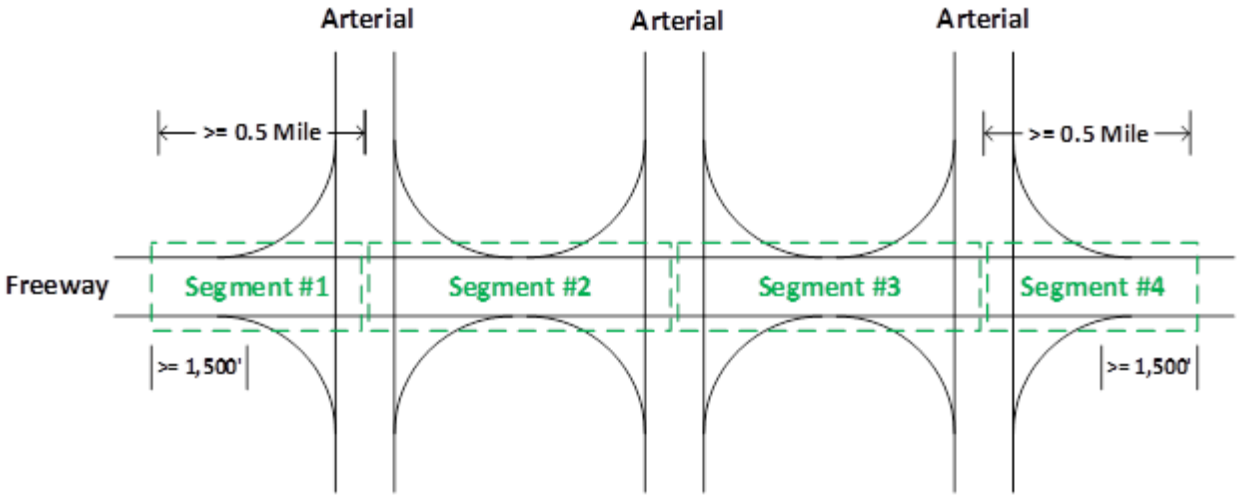
1.2.1 Existing Safety Methodology

Geographically located crash data was obtained from the KDOT Crash Database for the most current, complete 5-year period: 2015 to 2019. This data included crash characteristics such as crash type, severity, weather conditions, surface conditions, time of day, vehicle type, and driver condition. For this study, the existing analysis evaluated crashes occurring on the U.S. 69 and I-435 freeways and on arterials at interchanges intersecting the U.S. 69 and I-435 freeways. Due to minimal changes that occur to the ramp, crashes experienced on service interchange ramps and system to system ramps were excluded from the analysis.

All roadways evaluated in this analysis were segmented based upon the following criteria:

- Freeways – centerline of interchange to centerline of interchange as shown below in **Figure 2**
- Arterials – between major intersections (or a reasonable distance determined by local conditions if the nearest major intersection is over 1 mile away)

Figure 2: Freeway Mainline Segmentation



Analysis segments, for the freeway and the arterials, were then used to tabulate existing crash characteristics by location (crash type, severity) and calculate crash rates and frequency per mile. Crash rates measure the number of crashes that have occurred at a given location during a specified time period in terms of vehicle miles traveled, while crash frequencies count the number of crashes that have occurred at a given location during a specified time. Crash rates for this analysis were calculated using existing, 2019, average annual daily traffic (AADT) values and were compared to Kansas statewide crash rates for similar freeway facilities provided by KDOT.

1.2.2 Freeway Crash Analysis

Approximately 16 miles of roadway was evaluated on the U.S. 69 and I-435 freeway corridors between the years 2015 to 2019. Of the 16 miles of roadway evaluated, 14 individual roadway segments were identified: three segments on I-435 and 11 segments on U.S. 69. For the purposes of this study, these 14 roadway segments were evaluated collectively and will be referred to as the freeway.

1.2.2.1 Freeway Crash Severity and Type

During the five-year evaluation period, 2,810 crashes were reported on the freeway, resulting in six fatalities. Approximately 79% of all reported incidents resulted in property damage only, and nearly 21% of all incidents causing some form of injury to vehicle occupants (**Figure 3**). Rear-end vehicle collisions accounted for approximately

50% of all reported freeway crash types, while 29% were single vehicle crashes primarily resulting from drivers colliding with fixed objects (Figure 4).

Figure 4: Crash Type - Freeway

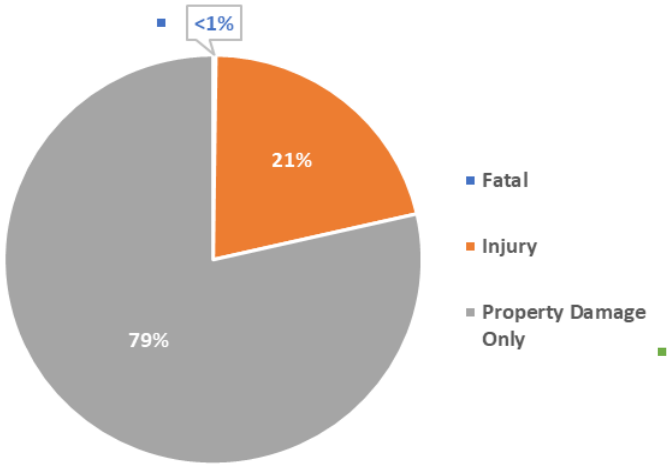
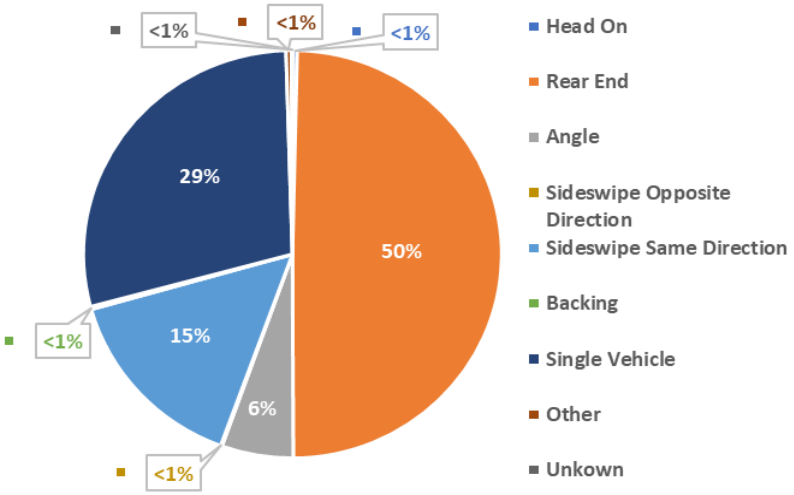


Figure 3: Crash Type - Freeway



When looking at crashes on the U.S. 69 corridor only during the five-year period, 1,712 crashes were reported, resulting in four fatalities. This equals almost one crash per day on average over the five-year period on U.S. 69. Crashes reported on the freeway primarily resulted in property damage only (80%), while approximately 20% of all reported crashes resulted in some form of injury to vehicle occupants (Figure 5). Rear-end collisions were the leading crash type, accounting for roughly 51% of all reported crash types on the corridor (Figure 6).

Figure 5: Crash Severity - U.S. 69

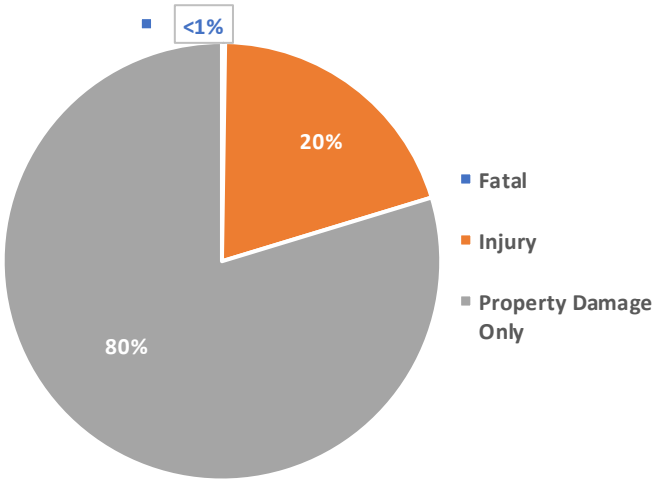
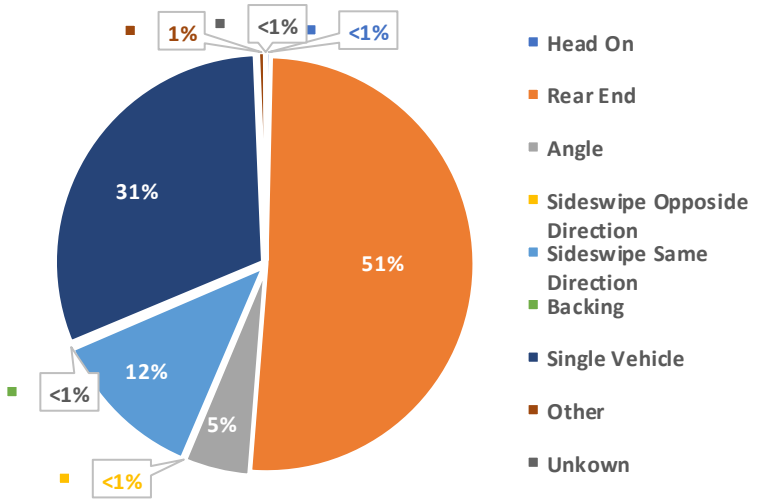


Figure 6: Crash Type - U.S. 69



1.2.2.2 Freeway Crash Rates

Statewide, 4-lane divided urban highways in Kansas, such as U.S. 69, saw average crash rates of 1.034 crashes per million vehicle miles traveled (MVMT) and 0.223 fatalities per hundred million vehicle miles traveled (HMVMT) between 2015 and 2019. Eight-lane divided urban highways in Kansas, such as I-435, saw average crash rates of 1.840 crashes per MVMT and 0.653 fatalities per HMVMT during the same period. When statewide averages are compared to the 13 identified roadway segments on the U.S. 69 and I-435 corridors, six segments on U.S. 69 and all three segments on I-435 surpassed at least one of Kansas's statewide total crash or fatal crash averages. However, one segment of I-435 from the northbound ramp to Antioch Rd. is noted to be the only segment to surpass both of Kansas's statewide crash averages. Of the six segments on U.S. 69 that surpassed Kansas statewide crash or fatal averages, crashes experienced on each segment primarily resulted in property damage only from rear-end or single vehicle collisions. All three segments on I-435 shared similarities in crash severity and crash type. Crashes occurring on these three segments primarily resulted in property damage only from rear-end collisions. **Figure 7** shows the location of the nine freeway segments that surpassed statewide crash averages.

Figure 7: Areas of Concern - Freeway

Tables 1 and 2 compare total crash and fatal crash rates for the 13 segments evaluated on the U.S. 69 and I-435 corridors to Kansas's statewide crash averages.

Table 1: U.S. 69 Crash Rates

U.S. 69 Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
W 95th St to W 103rd St	90300	39.4	0.2	0.534	0.271
W 103rd St to I-435	71250	20.6	0.0	1.200*	0.000
I-435 to College Blvd	65950	45.8	0.0	3.523*	0.000
College Blvd to W 119th St	61200	56.0	0.0	2.321*	0.000
W 119th St to W 127th St	60100	39.6	0.2	1.143*	0.577
W 127th St to W 135th St	91100	54.0	0	1.608*	0.000
W 135th St to W 151st St	62700	47.8	0.4	1.034*	0.865*
W 151st St to W 159th St	45600	12.2	0	0.726	0.000
W 159th St to W 167th St	36700	7.8	0	0.582	0.000
W 167th St to W 179th St	33700	19.2	0	0.924	0.000
		Kansas Statewide Average		1.034	0.653

[1]Kansas Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2015-2019) for a 4 lane/divided/full access/urban facility.
*Denotes segments with crash rates higher than statewide averages

Table 2: I-435 Crash Rates

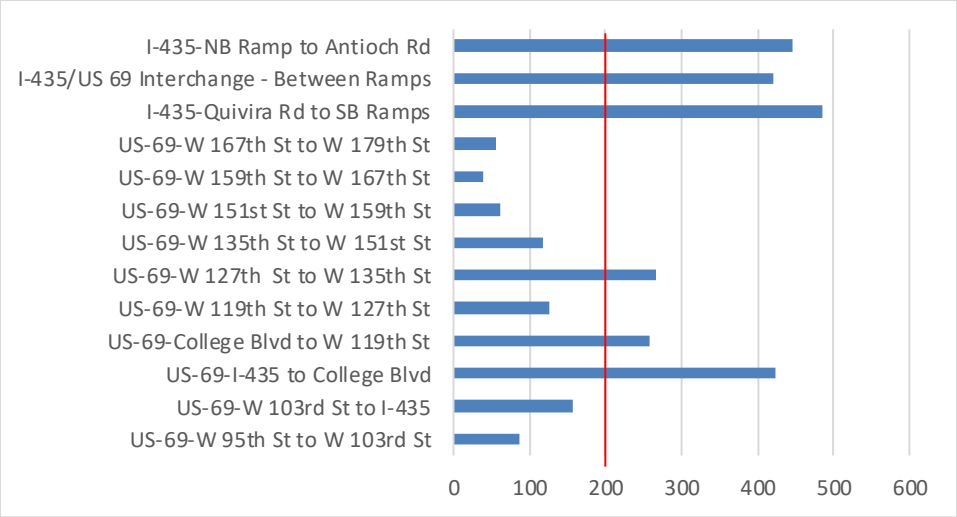
I-435 Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
Quivira Rd to SB Ramps	107,650	85.4	0	2.470*	0.000
I-435/U.S. 69 Interchange - Between Ramps	105,400	51.2	0	2.182*	0.000
NB Ramp to Antioch Rd	122,650	83	0.4	1.994*	0.961*
		Kansas Statewide Average		1.840	0.223

[1]Kansas Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2015-2019) for an 8 lane/divided/full access/urban facility.
*Denotes segments with crash rates higher than statewide averages

1.2.2.3 Freeway Crash Frequency

In addition to crash rates, crash frequencies were calculated for all freeway segments within this study. The total crashes per mile are shown in Figure 8.

Figure 8: Freeway Crashes Per Mile



Six segments of concern were identified when evaluating freeways in the study corridor. These six segments saw crash frequencies over 200 crashes per mile, they include:

1. I-435 - Quivira Rd. to SB Ramps: 485 crashes/mi
2. I-435 - NB Ramp to Antioch Rd.: 446 crashes/mi
3. I-435 – I-435/U.S. 69 Interchange – Between Ramps: 420 crashes/mi
4. U.S. 69 – I-435 to College Blvd.: 424 crashes/mi
5. U.S. 69 – W 127th St. to W 135th St.: 267 crashes/mi
6. U.S. 69 – College Blvd. to W 119th St.: 259 crashes/mi

Segment 1 - Between the years 2015 to 2019, 427 incidents were reported on I-435, from Quivira Rd. to I-435/U.S. 69 Interchange SB ramps. Approximately 81% of incidents reported on this segment resulted in property damage only, with nearly 19% of all incidents causing some form of injury to vehicle occupants; no fatalities were reported. Rear-end collisions were the leading crash type, accounting for approximately 50% of all crash types reported on this segment, followed by sideswipes (same direction) at 24%.

Segment 2 - 415 crashes were reported on I-435 from the I-435/U.S. 69 Interchange NB ramps to Antioch Rd. resulting in two fatalities. Roughly 74% of all crashes reported on this segment resulted in property damage only, and nearly 25% of all crashes causing some form of injury to vehicle occupants. The majority of crashes occurring on this segment came from rear-end collisions (50%), followed by single vehicle collisions, which accounted for approximately 26% of all reported crash types.

Segment 3 - On I-435, between the ramps of the I-435/U.S. 69 Interchange, 256 crashes were reported between 2015-2019. Much like the other segments on the I-435 corridor, crashes experienced between the interchange ramps primarily resulted in property damage only (75%), and roughly 25% of all crashes resulted in some form of injury to vehicle occupants. No fatalities were reported. Rear-end collisions were the leading crash type, accounting for approximately 39% of all crash types reported on this segment, followed by single vehicle collisions at 34%.

Segment 4 - Between the years 2015 and 2019, 229 incidents were reported on U.S. 69 from I-435 to College Blvd. Approximately 81% of incidents reported on this segment resulted in property damage only, and nearly 19% of all incidents causing some form of injury to vehicle occupants. No fatalities were reported. Rear-end collisions were the leading crash type, accounting for approximately 50% of all crash types reported on this segment, followed by single vehicle collisions at 34%.

Segment 5 - On U.S. 69 from W 127th St. to W 135th St., 270 crashes were reported during the evaluation period. Crashes experienced on this segment primarily resulted in property damage only (81%), and roughly 19% of all crashes resulted in some form of injury to vehicle occupants. No fatalities were reported. Crashes experienced on this segment mainly consisted of rear-end collisions, which accounted for approximately 72% of all reported crash types.

Segment 6 - There were 280 crashes reported on U.S. 69 from College Blvd. to 119th St. No fatalities were reported. Approximately 83% of incidents reported on this segment resulted in property damage only, and nearly 17% of all incidents caused some form of injury to vehicle occupants. The majority of crashes were caused by rear-end collisions (56%), followed by single vehicle collisions which accounted for approximately 25% of all reported crash types.

1.2.3 Arterial Crash Analysis

In addition to the mainline analysis, crashes occurring on a collective 8-miles of roadway and nine arterial streets, were evaluated for the 2015-2019 analysis period.

1.2.3.1 Arterial Crash Severity and Type

During the analysis period, 1,272 crashes were experienced, including five fatal, on all studied arterials. Of the 1,272 crashes reported, approximately 78% of crashes resulted in property damage only, 22% of all crashes caused some form of injury to vehicle occupants, and less than 1% (five crashes) resulted in a fatality. Crashes experienced on arterial streets, primarily consisted of rear end collisions (49%) followed by angle collisions (30%). **Figure 9** and **Figure 10** summarize crash severity and type for all arterial streets.

Figure 9: Crash Severity - Arterials

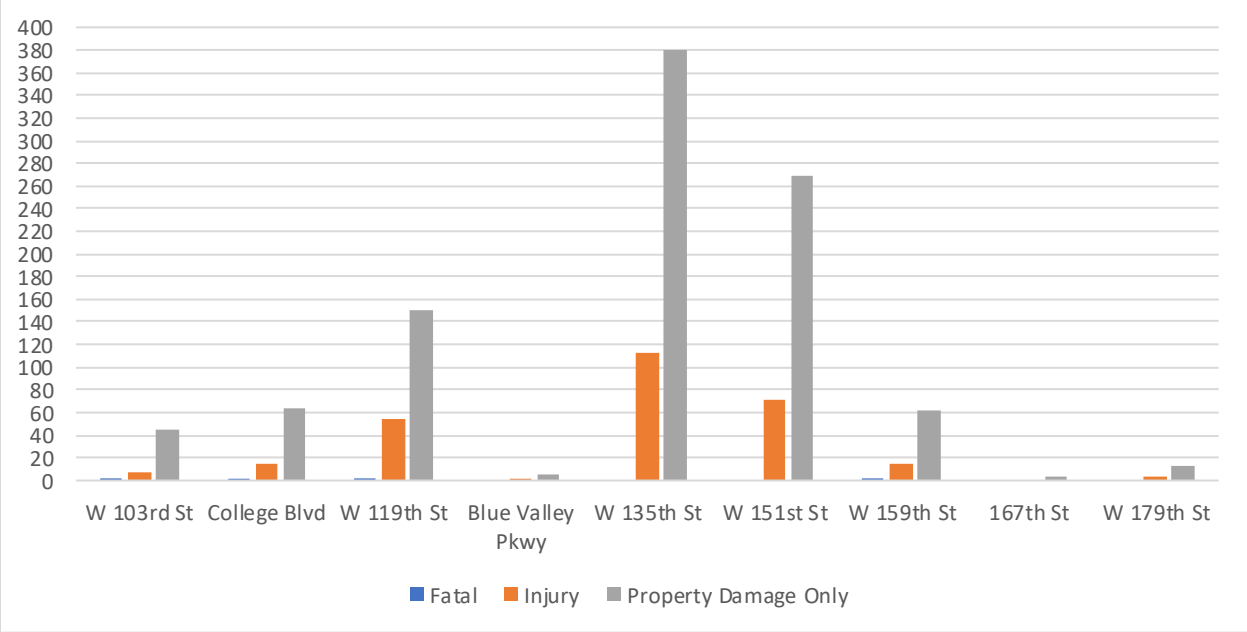
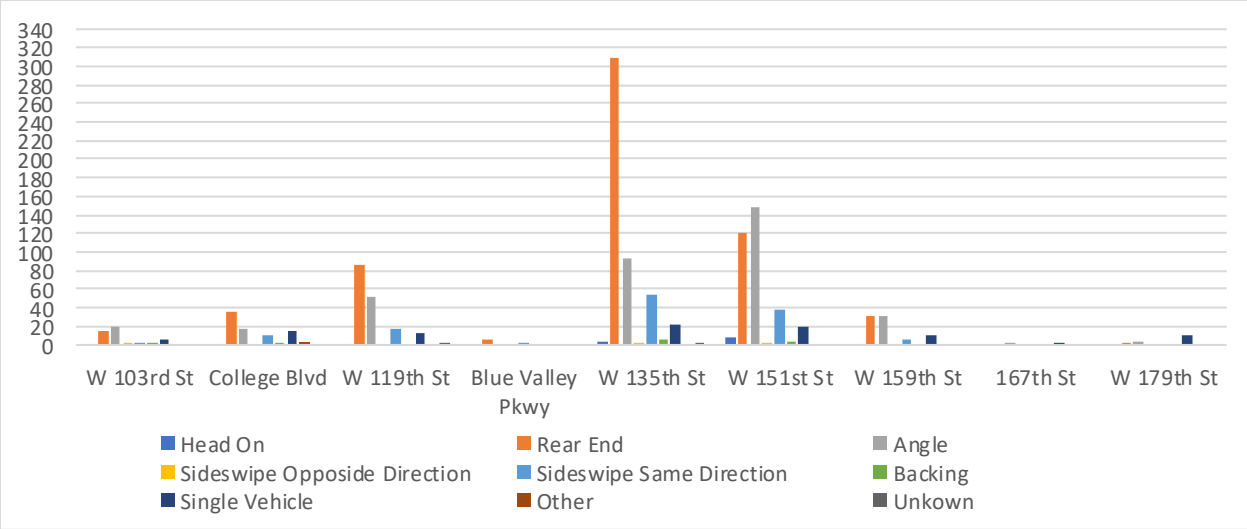


Figure 10: Crash Type - Arterials



1.2.3.2 Arterial Crash Rates

Crash rates for all arterial segments evaluated can be seen in **Table 3.** However, unlike highway facilities, KDOT does not report statewide crash averages for arterial streets. Crash rates were calculated for arterials to illustrate the magnitude of crashes and serve as a way to compare all arterials even though they could not be compared to statewide averages.

Table 3: Arterial Crash Rates

Arterial Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
W 103rd St - Barton St to Nieman Rd	14,600	0.0	0.0	0.00	0.00
W 103rd St - Nieman Rd to SB Ramp	16,900	3.0	0.0	1.68	0.00
W 103rd St -Between Ramps	19,200	3.8	0.0	2.85	0.00
W 103rd St - NB Ramp to Mastin St	19,500	1.0	0.0	1.56	0.00
W 103rd St - Mastin St to Farley St	16,500	2.6	0.2	3.32*	25.55*
College Blvd - W 109th St to SB Ramp	29,700	6.0	0.2	1.84	6.15*
College Blvd - Between Ramps	30,750	5.8	0.2	3.23*	11.14*
College Blvd - NB Ramp to Mastin St.	31,800	4.0	0.0	1.38	0.00
W 119th St - Grant St. to SB Ramp	40,900	9.4	0.0	4.84*	0.00
W 119th St - Between Ramps	42,550	11.6	0.0	4.15*	0.00
W 119th St - NB Ramp to Farley St	42,000	1.6	0.0	0.80	0.00
W 119th St - Farley St to Grant St	41,200	5.6	0.2	1.62	5.78*
W 119th St - Grant St to Antioch Rd	39,700	13.0	0.0	3.32*	0.00
Blue Valley Pkwy - Lowell Ave to W 127th St	31,000	1.4	0.0	0.33	0.00
W 135th St - Antioch Rd to N Hemlock St	36,600	27.4	0.0	5.86*	0.00
W 135th St - N Hemlock St to SB Ramp	47,650	15.2	0.0	4.37*	0.00
W 135th St - Between Ramps	53,000	15.8	0.0	4.30*	0.00
W 135th St - NB Ramp to Riley St	58,500	17.4	0.0	5.09*	0.00
W 135th St - Riley St to Metcalf Ave	51,200	22.6	0.0	2.47	0.00
W 151st St - Antioch Rd to Hardy St	29,870	13.6	0.0	2.90	0.00
W 119th St - NB Ramp to Farley St	42,000	1.6	0.0	0.80	0.00
W 119th St - Farley St to Grant St	41,200	5.6	0.20	1.62	5.78
W 119th St - Grant St to Antioch Rd	39,700	13.0	0.00	3.32*	0.00
W 135th St - Antioch Rd to N Hemlock St	36,600	27.4	0.00	5.86*	0.00
W 135th St - N Hemlock St to SB Ramp	47,650	15.2	0.00	4.37*	0.00
W 135th St - Between Ramps	53,000	15.8	0.00	4.30*	0.00
W 135th St - NB Ramp to Riley St	58,500	17.4	0.00	5.09*	0.00
W 135th St - Riley St to Metcalf Ave	51,200	22.6	0.00	2.47	0.00
W 151st St - Antioch Rd to Hardy St	29,870	13.6	0.00	2.90	0.00

Arterial Segments	Average Daily Two-Way Traffic	Average Annual Crashes (2015 - 2019)	Average Annual Fatal (2015 - 2019)	Crash Rate (MVMT)	Fatal Crash Rate (HMVMT)
W 151st St - Hardy St to Lowell Ave	32,600	8.6	0.0	7.23*	0.00
W 151st St - Lowell Ave to SB Ramp	381,00	3.2	0.0	2.30	0.00
W 151st St - Between Ramps	40,050	9.0	0.0	7.70*	0.00
W 151st St - NB Ramp to Newton Dr	42,000	6.6	0.0	3.08	0.00
W 151st St - Newton Dr to Marty St	39,800	15.2	0.0	4.98*	0.00
W 151st St - Marty St to Metcalf Ave	38,400	11.8	0.0	5.61*	0.00
W 159th St - Antioch Rd to Lowell Ave	15,400	1.4	0.0	1.31	0.00
W 159th St - Lowell Ave to SB Ramp	18,750	2.0	0.2	0.97	9.74*
W 159th St - Between Ramps	18,050	4.4	0.0	8.35*	0.00
W 159th St - NB Ramp to Foster St	17,400	0.8	0.0	0.90	0.00
W 159th St - Foster St to Metcalf Ave	13,300	6.8	0.0	3.42*	0.00
167th St - Antioch Rd to SB Ramp	5,100	0.2	0.0	0.24	0.00
167th St - Between Ramps	4,800	0.2	0.0	1.14	0.00
167th St - NB Ramp to Metcalf Ave	4,500	0.2	0.0	0.29	0.00
W 179th St - Antioch Rd to SB Ramp	9,400	1.6	0.0	0.86	0.00
W 179th St - Between Ramps	7,300	1.0	0.0	4.17*	0.00
W 179th St - NB Ramp to Metcalf Ave	5,200	0.6	0.0	0.88	0.00
			Average Crash Rates	3.05	1.39

*Denotes segments with crash rates higher than the average

When arterial crash rates for each segment evaluated are averaged, arterials streets within the project study area averaged a total crash rate of 3.05 per MVMT and a fatal crash rate of 1.39 crashes per HMVMT. Comparing arterial roadway segments against this total crash average, the following five roadway segments experienced the highest total crash rates:

1. W 159th St.: Between Interchange Ramps
2. W 151st St.: Between Interchange Ramps
3. W 151st St.: Lowell Ave. to U.S 69 SB Ramp Terminal
4. W 135th St.: Antioch Rd. to N Hemlock St.
5. W 135th St.: NB Ramp to Riley St.

When looking at crash rates, it's important to note that shorter study segments, such as roadways between ramp terminals, have the potential to skew crash rate results.

Segment 1 - W 159th St: Between Interchange Ramps, a 0.08 mi segment of the 159th St., experienced 22 crashes during the five-year evaluation period. Of the 22 crashes reported, approximately 77% of crashes resulted in property damage only and no fatalities were reported. Crashes occurring on this segment primarily consisted of angle collisions, which account for approximately 63% of all reported crash types.

Segment 2 - W 151st St.: Between Interchange Ramps, a 0.08 mi segment on the 151st St., experienced 45 crashes and no fatalities. Crashes on this segment primarily consisted of property damage only (82%). Angle collisions accounted for roughly 51% of all crash types reported on the segment.

Segment 3 - W 151st St.: Lowell Ave to U.S 69 SB Ramp Terminal, a 0.10 mi segment, experienced 16 crashes and no fatalities. Crashes on this segment primarily consisted of property damage only (82%). Rear-end collisions accounted for roughly 63% of all crash types reported on the segment.

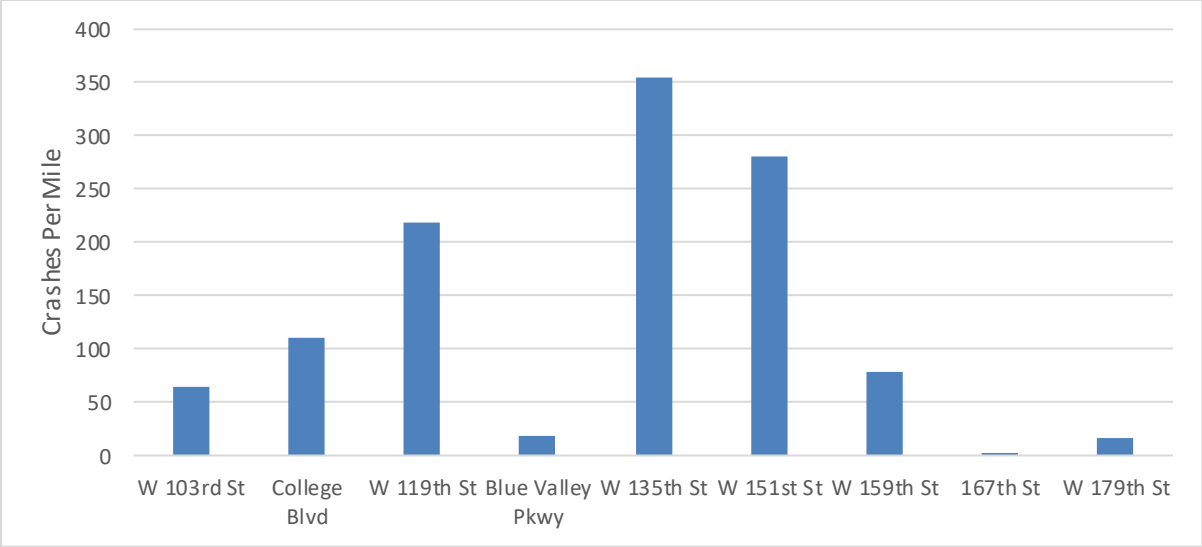
Segment 4 - W 135th St.: Antioch Rd to N Hemlock St, a 0.35 mi segment, experienced 137 crashes and no fatalities. Crashes on this segment primarily consisted of property damage only (75%). Rear-end collisions accounted for roughly 69% of all crash types reported on the segment.

Segment 5 - W 135th St.: NB Ramp to Riley St., a 0.16 mi segment on the 135th St. corridor, experienced 87 crashes and no fatalities. Crashes on this segment primarily consisted of property damage only (72%). Rear-end collisions accounted for roughly 60% of all crash types reported on the segment.

1.2.3.3 Arterial Crash Frequency

In addition to crash rates, crash frequencies were calculated for the arterial segments. The total crashes per mile are shown in **Figure 11**.

Figure 11: Arterial Crashes Per Mile



Of the nine arterials evaluated, it was determined that W 135th St. experienced the highest concentration of crashes with 492 reported incidents (354 crashes/mi), however, W 151st St. also posed potential safety concerns, with 340 reported crashes (281 crashes/mi).

West 135th St.

West 135th St. is a major arterial, providing approximately 50,000 daily drivers access to a number of different commercial, residential, and recreational facilities. When analyzing crashes experienced on W 135th St., from Antioch Rd. to Metcalf Ave., approximately 77% of the 492 crashes reported on the arterial resulted in property damage only, and roughly 23% of all reported crashes resulted in some form of injury to vehicle occupants. No fatalities were reported. Crashes on the arterial primarily consisted of rear-end collisions (63%) followed by angle collisions, which accounted for 19% of all reported crash types. Two locations that experienced the highest concentration of crashes on the corridor occurred from Antioch Rd. to Hemlock St. (137 crashes) and from Riley St. to Metcalf Ave. (113 crashes). Crashes occurring on these two segments of the W 135th St. resembled crash patterns seen throughout the corridor: property damage only caused by rear-end collision. Due to the number of daily drivers using the corridor and the nature of crashes experienced on the arterial, crashes occurring on the arterial can be attributed to congestion. Rear end crashes are usually indicative of highly congested areas and are typically attributed to lower speed crashes.

West 151st St.

West 151st St. is a major arterial, providing approximately 37,000 daily drivers access to a number of different commercial, residential, recreational, and institutional facilities. Of the 340 crashes reported on the arterial, approximately 79% of crashes resulted in property damage only, and roughly 21% caused some form of injury to vehicle occupants. Crashes occurring on the arterial primarily consisted of angle or rear-end collisions, which accounted for approximately 44% and 35% of all reported crash types, respectively. Two areas where the highest concentration of crashes were experienced on the corridor occurred from Antioch Rd. to Hardy St. (68 crashes) and from Newton Dr. to Marty St. (76 crashes). On both segments, over 70% of all reported crashes resulted in property damage only. The leading crash type for the segment from Antioch Rd. to Hardy St. was rear-end collisions with 38% of all reported crashes followed by angle collisions at 34%. For the segment from Newton Dr. to Marty St., approximately 57% of all reported crash types resulted from angle collisions. Due to the nature of crashes experienced on the 151st St. corridor, crashes can be attributed to a high presence of access drives and congestion.

1.2.4 Existing Crash Summary

When the 13 identified freeway segments on the U.S. 69 and I-435 corridors are compared to Kansas statewide crash averages, six segments on U.S. 69 and all three segments on I-435 had crash rates that surpassed at least one of Kansas's statewide total crash or fatal crash averages for similar freeway facilities (**Figure 12**). Crashes experienced on the freeway predominately consisted of rear-end collisions, however, a significant number of single-vehicle collisions did occur. Collectively, these two crash types represent roughly 79% of all crashes experienced on the freeway within the 5-year study period. Due to the nature of crashes experienced on the freeway, crashes can be attributed to elevated levels of congestion, as rear-end collisions are usually indicative of highly congested areas and are typically attributed to lower speed crashes. Single vehicle crashes are a result of substandard roadway geometry, a vehicle losing control, or being run off the road.

Figure 12: Areas of Concern

When crashes occurring on the nine evaluated arterial streets within the study are compared on a crash per-mile biases, two arterials (W 135th St. and W 151st St.) experienced the highest concentration of crashes (**Figure 12**). Both the W 135th and W 151st St. corridors are considered major urban arterials providing drivers access to a number of commercial, recreational, and residential facilities. Crashes occurring on these two major arterials reflect similar vehicle crash patterns seen on all arterials evaluated as a part of this analysis. Collectively, crashes occurring on the nine evaluated arterial streets primarily resulted in property damage only from either rear-end or angle collisions. Due to the nature of the crashes experienced, crashes can be attributed to an abundance of conflict points at intersections and driveways on the arterials and/or elevated levels of congestion.

1.3 Future Predictive Crash Analysis

A future predictive crash analysis was conducted using the Interactive Highway Safety Design Model (IHSDM) version 16.0.0 software, developed by the Federal Highway Administration (FHWA). The IHSDM implements methodology from the Highway Safety Manual (HSM) to predict crashes based on traffic volumes, roadway geometry, and other basic roadway characteristics such as barrier and shoulder widths. The predictive crash analysis evaluated Existing 2019, Future 2050 No-Build, and 2050 Build conditions. Limits of the IHSDM predictive analysis can be seen in **Table 4**.

Table 4: IHSDM Study Limits

Roadway	Limits
U.S. 69 Mainline and Ramps	95th Street south facing ramps to ~1100ft south of 179th Street
I-435 Mainline and Ramps	Quivira Road to Antioch Road
103rd Street	Goddard to Mastin Street
College Boulevard	109th Street to Mastin Street
119th Street	Grant Street to Farley Street
135th Street	Hemlock Street to Riley Street
151st Street	Lowell Avenue to Newton Drive
159th Street	Shawnee Drive to Foster Street
167th Street	475′ west of SB Terminal to 400′ east of NB Terminal
179th Street	950′ west of SB Terminal to 550′ east of NB Terminal

Existing (2019) and No-Build (2050) Comparison

The City of Overland Park's Proposed 2050 Regional Transportation Plan identified several arterial streets within the predictive analysis study limits slated for corridor improvements before 2050. These arterials and the proposed improvements are listed below:

- 119th Street – widen to 6 lanes west of the interchange
- 151st Street – widen to 6 lanes
- 167th Street – widen to 4 lanes
- 179th Street – widen to 4 lanes with signal control at the ramp terminals

With these corridor improvements accounted for in the 2050 Future No-Build IHSDM, **Table 5** provides a comparison of the Existing 2019 and 2050 Future No-Build predictive crash results.

Table 5: Crash Comparison – Existing and No-Build

Segment	Delta (Existing to FNB)			Percent Change		
	Total Crashes	F+I Crashes	PDO	Total Crashes	F+I Crashes	PDO
U.S. 69	83.78	22.22	62.15	65%	52%	73%
I-435	3.99	1.02	2.97	13%	10%	14%
103rd St. (Goddard to Mastin St.)	2.43	0.71	1.72	15%	10%	19%
College Blvd. (109th St. to Mastin St.)	8.96	3.47	5.48	33%	32%	33%
119th St. (Grant St. to Farley St.)	11.06	5.63	5.43	24%	27%	22%
135th St. (Hemlock St. to Riley St.)	39.97	19.21	20.75	35%	39%	32%
151st St. (Lowell Ave. to Newton Dr.)	11.75	6.09	5.65	43%	50%	37%
159th St. (Shawnee Dr. to Foster St.)	4.83	4.42	0.41	32%	83%	4%
167th St. (475′ west of SB Terminal to 400′ east of NB Terminal)	3.97	1.24	2.74	567%	539%	583%
179th St. (950′ west of SB Terminal to 550′ east of NB Terminal)	34.62	16.24	18.38	962%	1365%	766%
Total	205.36	80.25	125.68	45%	42%	47%

Crash results presented are based on the difference in crashes predicted by the IHSDM for the year 2019 and 2050
Source: FHWA's IHSDM

As depicted in Table 5, results from the predictive analysis shows that under 2050 Future No-Build conditions, crashes are predicted to increase along all analyzed mainline and arterial roadways. With roadway geometry and other basic roadway characteristics being consistent between the Existing 2019 and 2050 Future No-Build IHSDM, with the exception of the corridor improvements proposed in The City of Overland Park's 2050 Regional Transportation Plan, this predicted increase in crashes can be attributed to projected increases in traffic volumes, as this is the only non-consistent variable.

With Overland Park projected to continually grow into the southern quadrant of the city, arterials such as 167th Street and 179th Street were considered as arterials with the most growth potential, as traffic volumes are projected to increase by more than 350%. For this reason, when looking at Table 5, the percent change in crashes predicted between Existing 2019 and 2050 Future No-Build appear relatively high. As volumes increase along these arterials, it should be expected that the number of crashes experienced would increase as well.

1.2.5 No-Build (2050) and Build (2050) Comparison

Due to limitations of the Highway Safety Manual (HSM), a predicative crash assessment of the U.S. 69 mainline and along College Boulevard could not be conducted for the 2050 Build scenario, as the freeway will be constructed as a managed lane facility and the interchange at College Boulevard is being converted to a Single-Point Urban Interchange (SPUI). The FHWA has been made aware of these limitations and has acknowledged an evaluation of these two particular roadways is not possible.

However, a predictive crash analysis was performed to evaluate Build conditions along the remaining eight roadway segments identified within the study limits.

1.2.5.1 Breakdown of Highways, Arterials, and Ramps

A detailed breakdown of the predictive crash analysis for all roadway segments evaluated within the No-Build and Build Alternatives can be seen Table 7. Roadways with lower predicted crashes under the Build Alternative are highlighted in green.

Table 7: Predicted Crashes Per Year – All Segments - No-Build and Build Alternative

Highway/Ramp/Intersection	Total Crashes			Fatal and Injury Crashes			Property Damage Only		
	FNB	Build Alt	Difference	FNB	Build Alt	Difference	FNB	Build Alt	Difference
I-435 Mainline	35.79	35.49	-0.30	10.91	10.84	-0.07	24.88	24.65	-0.23
I435 EB - CD- US 69 Off Ramp	5.11	5.29	0.18	1.91	1.98	0.07	3.20	3.31	0.11
I435 EB College Blvd Off Ramp	0.39	0.37	-0.02	0.18	0.17	-0.01	0.22	0.2	-0.02
US 69 NB - I435 EB Off Ramp	1.22	1.23	0.01	0.50	0.5	0.00	0.72	0.73	0.01
I435 EB - US 69 NB On Ramp	2.13	2.05	-0.08	0.85	0.82	-0.03	1.28	1.23	-0.05
I435 EB CD Off Ramp	0.75	0.75	0.00	0.32	0.32	0.00	0.43	0.43	0.00
I435 WB CD Off Ramp (Mainline)	0.71	1.89	1.18	0.31	0.92	0.61	0.40	0.97	0.57
I435 WB - US 69 NB Off Ramp	3.78	3.70	-0.08	1.56	1.52	-0.04	2.22	2.18	-0.04
I435 WB CD Off Ramp	10.07	0.66	-9.41	4.59	0.28	-4.31	5.48	0.38	-5.10
US 69 NB - I435 WB Off Ramp	2.67	6.59	3.92	1.12	2.57	1.45	1.56	4.01	2.45
I435 WB - US 69 SB Off Ramp	1.68	1.71	0.03	0.70	0.71	0.01	0.98	1.00	0.02
US 69 SB - I435 WB Off Ramp	1.27	1.25	-0.02	0.60	0.59	-0.01	0.67	0.66	-0.01
US 69 SB - CD - I435 EB Off Ramp	7.85	7.81	-0.04	3.11	3.10	-0.01	4.74	4.71	-0.03
US 69 NB 179th St. Off Ramp	0.22	0.18	-0.04	0.10	0.08	-0.02	0.12	0.10	-0.02
US 69 SB 179th St. On Ramp	0.16	0.18	0.02	0.06	0.06	0.00	0.10	0.12	0.02
179th St. (950' west of SB Terminal to 550' east of NB Terminal)	38.22	14.68	-23.54	17.43	6.02	-11.41	20.78	8.66	-12.12
US 69 NB 179th St. On Ramp	0.18	0.35	0.17	0.07	0.14	0.07	0.11	0.21	0.10
US 69 SB 179th St. Off Ramp	0.20	0.43	0.23	0.08	0.17	0.09	0.12	0.25	0.13
US 69 SB 167th St. On Ramp	-	0.05	0.05	-	0.02	0.02	-	0.03	0.03
US 69 NB - 167th St Off Ramp	-	0.11	0.11	-	0.04	0.04	-	0.07	0.07
167th St. (475' west of SB Terminal to 400' east of NB Terminal)	4.67	11.2	6.53	1.47	6.02	4.55	3.21	5.18	1.97
US 69 NB 167th St On Ramp	0.18	0.19	0.01	0.07	0.08	0.01	0.10	0.11	0.01
US 69 SB 167th St Off Ramp	0.16	0.24	0.08	0.07	0.11	0.04	0.09	0.12	0.03
US 69 NB 159th St Off Ramp	0.41	0.41	0.00	0.16	0.16	0.00	0.26	0.26	0.00
US 69 SB 159th St On Ramp	0.61	0.61	0.00	0.22	0.22	0.00	0.39	0.39	0.00
159th St. (Shawnee Dr. to Foster St.)	20.07	20.07	0.00	9.75	9.75	0.00	10.32	10.32	0.00
US 69 NB 159th St On Ramp	0.57	0.57	0.00	0.23	0.23	0.00	0.34	0.34	0.00
US 69 SB 159th St Off Ramp	0.91	0.91	0.00	0.41	0.41	0.00	0.50	0.5	0.00
US 69 NB 151st St Off Ramp	0.51	0.49	-0.02	0.25	0.18	-0.07	0.26	0.32	0.06
US 69 SB 151st St On Ramp	0.41	0.37	-0.04	0.16	0.12	-0.04	0.25	0.25	0.00
151st St. (Lowell Ave. to Newton Dr.)	39.33	30.96	-8.37	18.30	14.68	-3.62	21.02	16.28	-4.74
US 69 NB 151st St On Ramp	0.99	1.13	0.14	0.37	0.38	0.01	0.62	0.75	0.13

Highway/Ramp/Intersection	Total Crashes			Fatal and Injury Crashes			Property Damage Only		
	FNB	Build Alt	Difference	FNB	Build Alt	Difference	FNB	Build Alt	Difference
US 69 SB 151st St Off Ramp	0.76	0.73	-0.03	0.39	0.35	-0.04	0.37	0.39	0.02
US 69 NB 135th St Off Ramp	1.13	0.88	-0.25	0.43	0.33	-0.10	0.71	0.55	-0.16
US 69 SB 135th St On Ramp	0.58	1.19	0.61	0.23	0.47	0.24	0.35	0.72	0.37
US 69 NB 135th St On Ramp (loop)	1.77	2.27	0.50	0.66	0.83	0.17	1.12	1.44	0.32
135th St. (Hemlock St. to Riley St.)	154.39	75.30	-79.09	68.20	34.25	-33.95	86.19	41.05	-45.14
US 69 NB 135th On Ramp	2.13	2.24	0.11	0.76	0.85	0.09	1.37	1.39	0.02
US 69 SB 135th St Off Ramp	2.13	1.67	-0.46	0.90	0.8	-0.10	1.24	0.87	-0.37
US 69 NB 119th St Off Ramp	0.22	0.48	0.26	0.09	0.20	0.11	0.13	0.28	0.15
US 69 SB 119th St On Ramp	0.32	0.63	0.31	0.12	0.22	0.10	0.20	0.41	0.21
119th St. (Grant St. to Farley St.)	56.21	26.65	-29.56	26.41	13.24	-13.17	29.80	13.41	-16.39
US 69 NB 119th St On Ramp	1.48	2.09	0.61	0.52	0.73	0.21	0.96	1.36	0.40
US 69 SB 119th St Off Ramp	0.75	0.99	0.24	0.33	0.48	0.15	0.42	0.51	0.09
103rd St. (Goddard to Mastin St.)	18.20	18.2	0.00	7.48	7.48	0.00	10.72	10.72	0.00
US 69 NB - 103rd St Off Ramp	0.87	0.87	0.00	0.36	0.36	0.00	0.51	0.51	0.00
US 69 SB - CD - 103rd St On Ramp	0.80	0.8	0.00	0.32	0.32	0.00	0.49	0.49	0.00
US 69 SB - CD - 103rd St Off Ramp	0.57	0.57	0.00	0.26	0.26	0.00	0.31	0.31	0.00
US 69 NB - 103rd St On Ramp	0.56	0.56	0.00	0.24	0.24	0.00	0.32	0.32	0.00

Due to HSM methodology and how IHSDM performs calculations Total Crashes, F+I and PDO crashes are separate calculations. Due to this and rounding F+I and PDO might not add up to the Total Crashes Per Year.
*Denotes road segments where no improvements were proposed in the Build Alternative
Source: IHSDM 2021

I-435 Mainline

With the exception of the proposed flyover ramp from U.S. 69 NB to I-435 WB, under the Build Alternative, the I-435 mainline and the surrounding roadway segments were left unimproved. As shown in Table 7, minor differences in predicted crashes between the No-Build and the Build Alternative, for segments outside of the area of influence of the proposed flyover ramp, can be attributed to minor changes in traffic volumes between the two future year scenarios.

In the No-Build, drivers are permitted access to I-435 WB from U.S. 69 NB via the loop ramp at the interchange, which connects to the I-435 WB C-D road at an approximate 400-foot weaving segment before merging with the I-435 WB exit ramp to Quivira Rd approximately 800 feet upstream. By nature, weaving segments require drivers to make necessary lane changes at a high speed, while operating within a confined space without the aid of traffic control devices. Weaving sections have the potential to lead to crashes at higher rates than would be expected during normal freeway driving conditions. When evaluating the impacts of the proposed flyover ramp from U.S. 69 NB to I-435 WB, results of the predictive analysis show a 32% decrease in crashes: a net reduction of 4 crashes per year. This predicted reduction in crashes can be attributed to the elimination of the waving segment on the I-435 WB C-D Road, and

the redistribution of volumes on the ramps and the C-D road. As an additional benefit, the proposed flyover ramp eliminates the weaving conflict on the U.S. 69 mainline, between the I-435 WB to U.S. 69 NB and the U.S. 69 NB to I-435 WB loop ramps, which provides for better traffic flow through the interchange.

Arterial Streets

Seven arterial streets were evaluated under Build conditions (College Boulevard was excluded from the analysis due to limitations of the HSM); however, no improvements were proposed along 103rd and 159th Streets. Of the five remaining arterials, where improvements were proposed, results of the predictive analysis shows that four arterials saw a predicted decrease in crashes, while one saw a predicted increase as a result of proposed improvements. Table 8 provides a comparison of the No-Build and Build predictive crash results for arterial streets.

Table 8: Crash Comparison - No-Build and Build

Segment	Delta (FNB to Build)			Percent change		
	Total Crashes	F+I Crashes	PDO	Total Crashes	F+I Crashes	PDO
103rd St. (Goddard to Mastin St.)	No Proposed Improvements – No Change In Crashes					
119th St. (Grant St. to Farley St.)	-29.56	-13.17	-16.39	-53%	-50%	-55%
135th St. (Hemlock St. to Riley St.)*	-79.09	-33.95	-45.14	-51%	-50%	-52%
151st St. (Lowell Ave. to Newton Dr.)	-8.37	-3.62	-4.74	-21%	-20%	-23%
159th St. (Shawnee Dr. to Foster St.)	No Proposed Improvements – No Change In Crashes					
167th St. (475' west of SB Terminal to 400' east of NB Terminal)	6.53	4.55	1.97	140%	310%	61%
179th St. (950' west of SB Terminal to 550' east of NB Terminal)	-23.54	-11.41	-12.12	-62%	-65%	-58%

Crash results presented are based on the difference in crashes predicted by the IHSDM for the year 2050
*Lane configuration modified to generate results due to limitations of the IHSDM
Source: FHWA's IHSDM

Under build conditions, as seen in Table 8, total crashes along 167th Street are predicted to increase by 140% as a result of proposed build improvements. In the No-Build, 167th Street is a two-lane arterial providing only partial access to the U.S. 69 mainline, with traffic control present for the ramp at the southbound terminal; the northbound ramp terminal is uncontrolled. With the improvements proposed under the Build Alternative, 167th Street will be widened to four-lanes (two-lanes each direction) with full access to the U.S. 69 mainline and signal control at the ramp terminals. By increasing the cross-section of the arterial and providing full access at the interchange, the number of conflicting points at the ramp terminals increased, ultimately increasing the potential for more crashes to be experienced at the ramp terminals.

1.2.5.2 Qualitative Assessment – U.S. 69 and College Boulevard

A quantitative assessment of the U.S. 69 and College Boulevard corridors could not be performed due to limitations of the HSM, however, a qualitative evaluation of the improvements proposed under the Build Alternative was conducted.

U.S. 69

In the No-Build, the U.S. 69 mainline is an eight-lane, barrier separated freeway from north of 95th Street to 103rd Street, and a four-lane divided freeway with a grass median from 103rd Street to south of 179th Street. Under the proposed Build Alternative, an additional travel lane in each direction will be added to the corridor from 103rd Street to 179th Street through the use of Express Toll Lanes (ETL). The ETL will utilize the current median of the corridor and will be buffer separated at locations where travelers can enter or exit the tolled facility. These locations will be indicated with a break in double stripe lanes and on overhead messaging signs.

With the presence of the ETL, the existing two travel lanes in each direction would remain free of charge, however, drivers would be given the option to bypass congestion for a fee via the tolled facility. As an added benefit, the presence of the ETL aids in reducing congestion in the toll-free general-purpose lanes (GPL). Results of the traffic analysis conducted to evaluate operations along the U.S. 69 corridor under No-Build and Build conditions showed sizable reductions in congestion as a result of the ETL. For this reason, it can be said with a decreases in congestion expected along the corridor in the Build Alternative, reductions in congested related crashes experienced along the corridor are anticipated.

College Boulevard

In the No-Build, College Boulevard is a six-lane divided arterial. The College Boulevard and U.S. 69 interchange is a combination of two interchange types. The ramps that serve southbound U.S. 69 traffic consist of a partial Single-Point Urban Interchange (SPUI) that intersect with the arterial at a signal. The ramp that serves northbound U.S. 69 traffic consist of a partial cloverleaf design with a loop ramp in the southeast quadrant of the interchange serving eastbound College Boulevard to northbound U.S. 69 traffic. Westbound College Boulevard traffic has a free-flow ramp to enter northbound U.S. 69, while all northbound U.S. 69 traffic exits at one ramp which intersects College Boulevard at a signal.

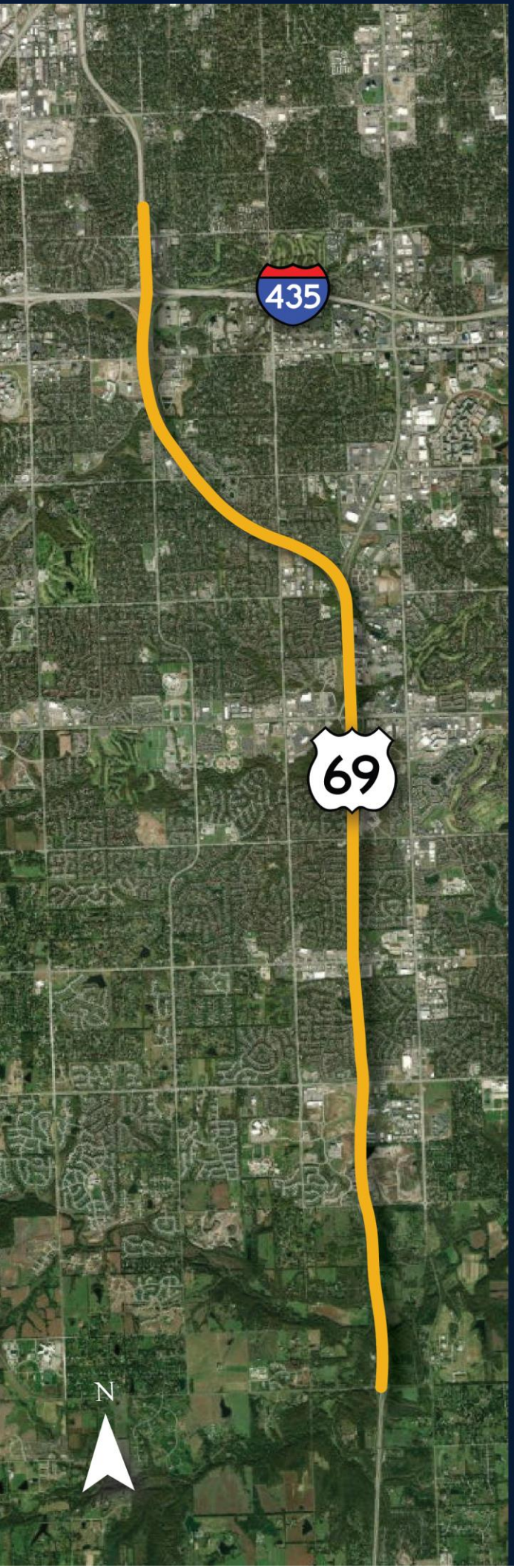
Under the Build Alternative, the interchange at U.S. 69 is converted to a full SPUI, with the existing loop ramp in the southeast quadrant and the free-flow ramp from westbound College Boulevard being used to facilitate access to I-435. With one traffic signal at the interchange, SPUIs by design improve safety (reduce the number of conflict points at the interchange) and improve operations of the interchange by allowing for more vehicles to clear the intersection in one traffic signal cycle; opposing

left turns can be made simultaneously. For this reason, the presence of the SPUI eliminated the need for the northbound ramp terminal, which decreases the number of conflicting points present along the arterial. As a result, a reduction in crashes experienced along the arterial under Build conditions is anticipated.

1.4 Conclusion

As a result of the existing crash analysis, three corridors within the project study area were identified as having potential safety concerns. These locations consisted of the U.S. 69 mainline from 103rd Street to 151st Street, 135th Street, and 151st Street. Under existing conditions, crashes experienced along the U.S. 69 mainline primarily consisted of property damage only as a result of rear-end collisions. As previously mentioned, due to the nature of crashes experienced on the freeway, crashes can be attributed to elevated levels of congestion, as rear-end collisions are usually indicative of highly congested areas and are typically attributed to lower speed crashes. In the Build Alternative, ETL are introduced to the corridor as a means of adding capacity to the U.S. 69 corridor from 103rd Street to 179th Street. With the addition of the ETL drivers would be given the option to bypass congestion for a fee via the tolled facility, but also aids in alleviating congestion in the toll-free general-purpose lanes. As the levels of congestion along the corridor decreases, reductions in congested related crashes experienced along the corridor are anticipated.

During the evaluation of arterial streets, under existing conditions, 135th Street and 151st Street experienced the most crashes. In the existing, 135th Street is a six-lane divided arterial, while 151st Street is a four-lane divided arterial. Crashes along these arterials primarily consisted of property damage only as a result of rear-end and angel collisions. Due to the nature of the crashes experienced, crashes can be attributed to an abundance of conflict points at intersections and driveways on the arterials and/or elevated levels of congestion. With the capacity improvements proposed under the build alternatives for both arterials, results of the predictive crash analysis shows a predicted decrease in congested related crashes along the corridors.



69 EXPRESS

US 69 EXPANSION PROJECT

Technical Memorandum

Break-in-Access Methodology and Assumptions

May 2021

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I. INTRODUCTION

United States Highway 69 (U.S. 69) is a vital corridor to the transportation network in the State of Kansas, the Kansas City metropolitan area and the City of Overland Park, Kansas. Often referred to as the backbone of Overland Park, U.S. 69 runs north-south through the city with the northern limit terminating at Interstate 35 (I-35) and the southern limit extending to the Overland Park city boundary and south through the State of Kansas. U.S. 69 links many of the primary east-west arterial corridors in the City providing connectivity to major employment centers and residential developments. More than 225,000 people and 10,000 businesses are located within five miles of U.S. 69. Furthermore, Overland Park is a growing community. Since 2015, new private development in the city has exceeded $500M per year, and between 2013 and 2017 Overland Park population grew at a rate of approximately 5.5% per year, adding nearly 10,000 new residents.

The Kansas Department of Transportation (KDOT) in cooperation with the Kansas Turnpike Authority (KTA), City of Overland Park (City) and the Federal Highway Administration (FHWA) is partnered with the HNTB Team (Consultant) for professional services for the U.S. 69 Modernization and Expansion Project (Project). The project is broken down into three phases, with the scope of work for the first phase including NEPA and Break-in-Access (BIA), the Traffic and Revenue Study component of the Toll Feasibility Study, and stakeholder engagement activities.

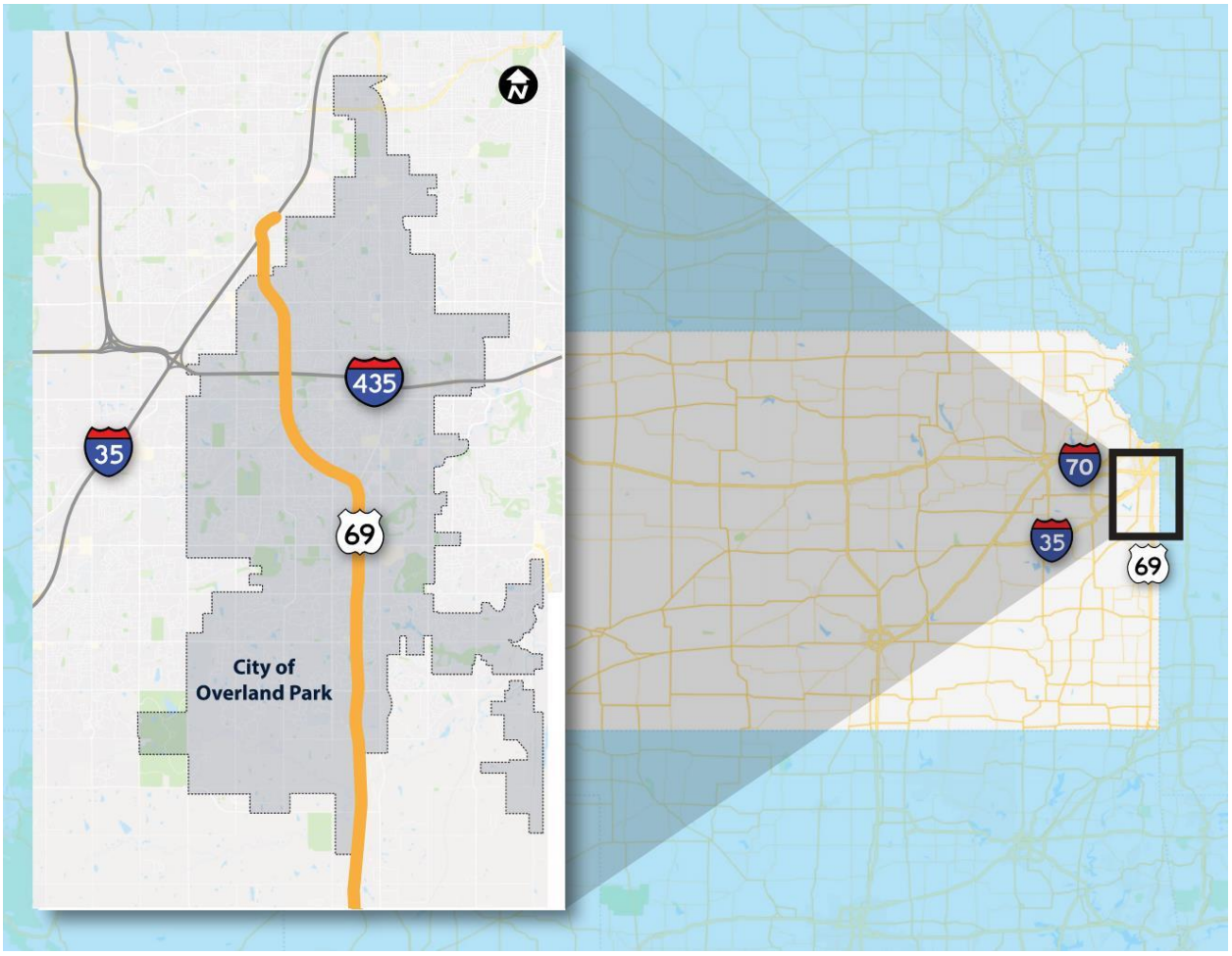
This report presents the traffic simulation methodology that will be used for the BIA and toll study components in phase one of the Project. It is intended to be a "living document" that will be updated as more details about the development of the traffic simulation models are determined. Once the models are complete, this report will be a record of the process and assumptions used during development.

II. PROJECT DESCRIPTION

The project limits of the U.S. 69 Modernization and Expansion project extend along U.S. 69 from just south of 179th Street to just north of 103rd Street, approximately 10 miles. It consists of evaluating the feasibility of expanding U.S. 69 to include one express toll lane in both the northbound and southbound directions along with interchange improvements and arterial turn-lane and ramp improvements throughout the study corridor. Federal guidelines dictate that the interchange adjacent to the proposed improvements must be included in the analysis.

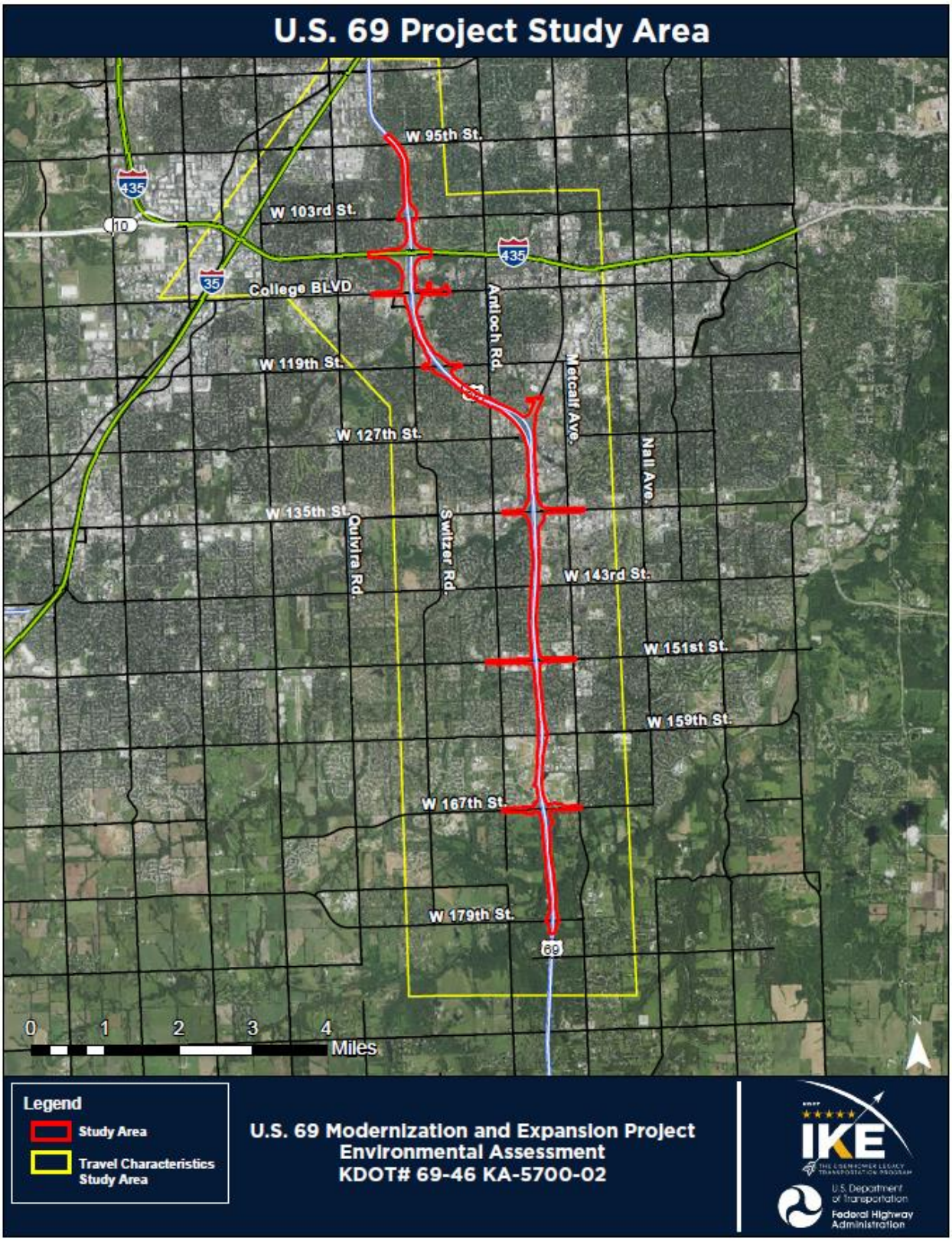
Therefore, the traffic simulation analysis along U.S. 69 also includes the 95th Street interchange at the north end of the Project. The study area does not include the next interchange beyond the Project to the south because the 199th Street Interchange is more than 2 miles south of the 179th Street Interchange. Figure 1 shows the location of the U.S. 69 study area within the State of Kansas. Figure 2 provides a more detailed illustration of the traffic analysis area. In Figure 2, the red boundary is the corridor microsimulation study area for the BIA.

Figure 1: U.S. 69 Project Location



Note: The U.S. 69 Modernization and Expansion project limits are 103rd Street on the north and 179th Street on the south.

Figure 2: U.S. 69 Project Study Area



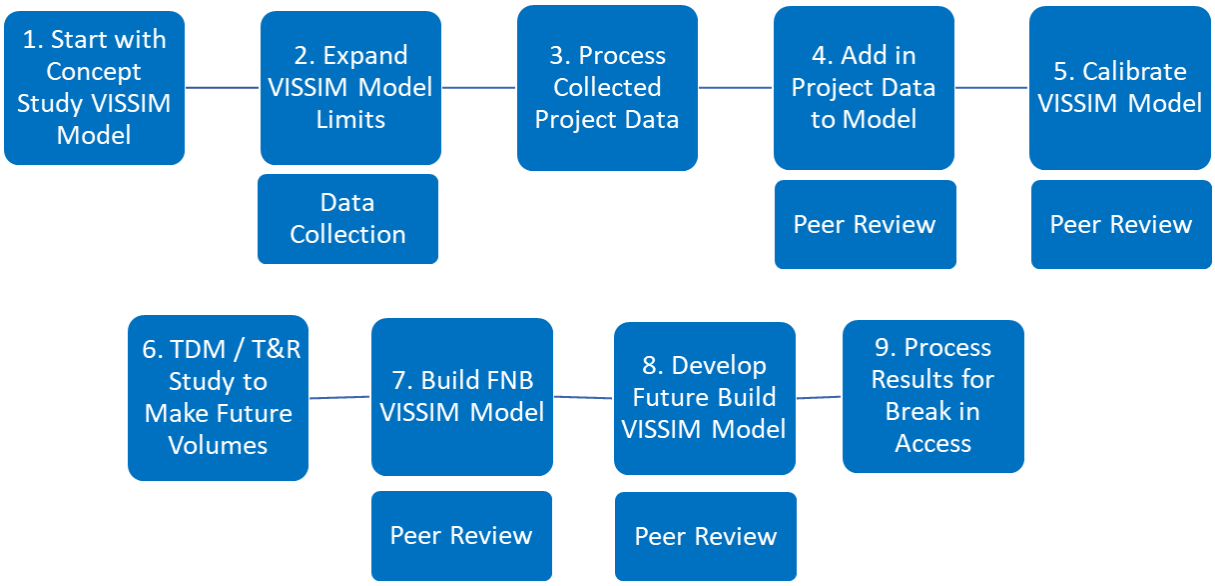
III. TRAFFIC METHODOLOGY

Microsimulation traffic models will be developed to assess the operations of traffic flow on the existing and future networks within the corridor area shown above in Figure 2 using PTV's VISSIM (version 2021) modeling software. Models will be developed for three and a half hour a.m. and p.m. peak periods. The models will include one and a half hours before and an hour after the a.m. and p.m. peak hours of 7:30 a.m. – 8:30 a.m. and 4:45 p.m. – 5:45 p.m. to ensure the network is properly loaded during the peak hours and any congestion is able to build and dissipate, as needed. FHWA's Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software, (TATIII) updated in 2019 will be used as guidance when developing the models. The VISSIM model results will have many uses, including input for the NEPA documentation, BIA, and Traffic and Revenue Study. The following sections describe the VISSIM model development process including the model inputs, the calibration assumptions used during development, the development of Future No-Build and Build models, and the results spreadsheet used to process the VISSIM outputs.

1.1 VISSIM Model Development

The VISSIM model development workflow is shown in Figure 3. Each step is described in more detail below.

Figure 3: VISSIM Model Development Process



Step 1: Start with Corridor Study VISSIM Model

The Consultant previously completed the U.S. 69 Corridor Study for Overland Park in 2018. As part of this study, a.m. and p.m. peak period VISSIM models were developed at a high-level to evaluate a long-term improvement concept for the U.S. 69 corridor. The existing VISSIM models developed in the previous study will be used as the starting point for developing the expanded VISSIM models that will be used for this project.

Step 2: Expand VISSIM Model Limits and Data Collection

In this step of the VISSIM model development process the VISSIM models will be expanded to include the entire model area and data collection will occur. Both of these activities can occur at the same time. Detailed information about each is provided in the following sections.

Expand VISSIM Model Limits

The VISSIM models from the 2018 Corridor Study do not encompass the entire VISSIM model area in Figure 2. Therefore, the models will be expanded to include all roadway segments and intersections within the red boundary. In the southern segment of the U.S. 69 corridor, the model will extend along the side-street arterials between Metcalf Avenue and Antioch Road, which are parallel to U.S. 69 and within a half mile of the corridor. Along these sections of the arterials, there are many closely spaced intersections, so the model will help to capture how operations in these areas will be impacted with any changes to the U.S. 69 corridor.

The study intersections that will be included in the models are listed below in Table 1 and identified in Figure 4.

Table 1: Study Intersections

1. 95th & U.S. 69	2. 103rd & U.S. 69
3. 103rd and Neiman	4. 103rd & Mastin
5. I-435 & Antioch	6. I-435 & U.S. 69
7. I-435 & Quivira	8. College & U.S. 69
9. College & Switzer	10. College & Mastin
11. 119th & Antioch	12. 119th & U.S. 69
13. 119th & Switzer	14. 119th & Grant (west)
15. 119th & Hayes	16. 119th & Farley
17. 123rd & Blue Valley	18. 135th & Metcalf
19. 135th & U.S. 69	20. 135th & Antioch
21. 135th & Hemlock	22. 135th & Riley
23. 151st & Metcalf	24. 151st & U.S. 69
25. 151st & Antioch	26. 151st & Conser/Newton
27. 151st & Hardy	28. 151st & Lowell
29. 151st & Marty	30. 159th & Metcalf
31. 159th and Foster	32. 159th & U.S. 69

Table 1: Study Intersections Continued

33. 159th & Lowell	34. 159th & Antioch
35. 167th & Antioch	36. 167th & Metcalf
37. 167th & U.S. 69	38. 179th & U.S. 69
39. 179th & Metcalf	40. 179th and Antioch

When expanding the VISSIM models, all existing model elements will reflect the existing geometrics and driving conditions throughout the model area. Below is a list of model elements and how they will be adjusted during the model development process.

- Link geometrics will be reviewed, updated, and coded throughout the models. The geometrics will be based off Google aerial images. Link evaluation segment lengths will be updated from the default value of 32.8 feet to 9999.0 feet to record link data for the entire length of the link. The link data will be used to develop the link results. For connectors, the lane change distance will be set to 1,600 feet on freeways and 1,000 feet on arterials; however, they may be edited to help calibrate the models. Advanced merging and cooperative lane changes will be activated for all link driving behaviors.

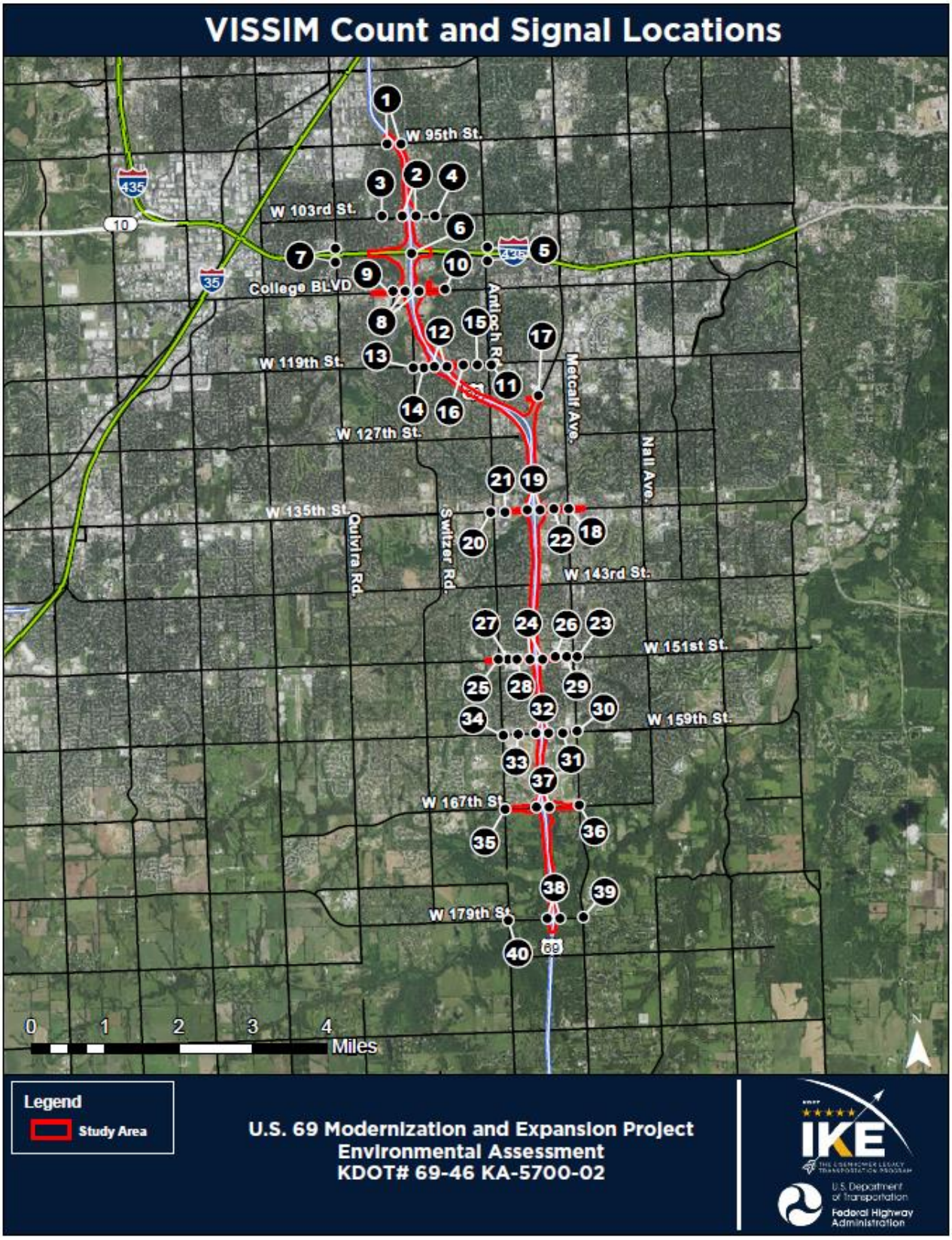
- Desired Speed Decisions will be reviewed and placed throughout the network where changes in speed occur. The speed distributions included in VISSIM are in kilometers per hour (kph), but are named and will be associated with posted speeds limits in miles per hour (mph) as shown in Table 2. These will be coded for car, heavy ground vehicle (HGV), and bus vehicle classes. Appropriate desired speed decisions are based on posted speed limits and observed free-flow speeds.

Table 2: Speed Distributions

Posted Speed Limit (mph)	Use Speed Distribution (kph)
75	120
70	100
65	90
60	90
55	85
50	80
45	70
40	60
35	50
30	50
25	40
20	30
15	20
10	15
8	12

Source: PTV VISSIM 2021-01

Figure 4: VISSIM Model Study Intersections



- Reduced Speed Areas will be reviewed and coded as appropriate for right- and left-turns at intersections, as well as on any curve that requires a reduced speed from the posted speed limit. The reduced speed areas for turns are as follows, but may be edited during calibration:

    - 90-degree right turns will use the following default speed distributions:
        - Car – 10 mph
        - HGV – 8 mph
        - Bus – 8 mph

    - 90-degree left turns will use the following default speed distributions:
        - Car – 15 mph
        - HGV – 10 mph
        - Bus – 10 mph

- Conflict Areas will be reviewed and coded where possible to model typical driver etiquette at intersections, so vehicles don't drive over one another. At locations where conflict areas are not appropriate, priority rules will be used. Default VISSIM settings for all Conflict Area parameters will be used, unless adjustments are needed for model calibration purposes.

- Priority Rules will be reviewed and coded when Conflict Areas are insufficient to prevent vehicle conflicts or when they provide driver behaviors that are not characteristic of the study area. A minimum gap time of at least 3 seconds will be used.

- Nodes will be reviewed and added, as needed, around the U.S. 69 and I-435 and U.S. 69 and Blue Valley Parkway interchanges and all the study intersections along the corridor. Nodes at the study intersections will generally be numbered to match the signal controller number.

- Stop Signs will be reviewed and added at all unsignalized intersections in the network. Default VISSIM settings will be used for all Stop Sign parameters.

- Vehicle Fleet characteristics will be reviewed and updated to VISSIM's North American Fleet Defaults which represent a typical mix of vehicles that can be found within the study area. The default VISSIM software values for the maximum and desired acceleration range (in feet per second squared [ft/sec^2]), maximum and desired deceleration range (in ft/sec^2), weight (in kilograms [kg]) and power (in kilowatts [KW]) will be used for different the vehicle types (Cars, HGV and Buses).

- Driving Behaviors will use the VISSIM default driving behaviors and behaviors developed during the concept study. All driving behaviors will use advanced lane changing activated as a default. These driving behaviors will be reviewed and updated as necessary during the calibration phase.

Data Collection

Data collection also occurs in this step of the model development process. This activity will occur simultaneously with expanding the VISSIM models. Many different types of data will be collected and used when developing and calibrating the models. Table 3 lists the various types of data and sources that will be collected within the study area. More details about how the data will be used when developing the models is included in the subsequent sections.

Table 3: Traffic Data and Sources

Data	Source
Signal Data	Corridor Study, OP
Vehicle Occupancy Statistics	Replica Model, MARC
Historical Traffic Counts	Corridor Study, KDOT, OP, Replica Model
Existing Mainline Traffic Counts	Corridor Study, KDOT, OP, Replica Model, Miovision
Existing Turning Movement Counts	Corridor Study, OP, Replica Model, Miovision
KDOT Permanent Counter Data	KDOT
Truck Percentage Data	Corridor Study, KDOT, OP, Replica Model
Origin-Destination Data	StreetLight Data and Replica Model
Transit Data	Corridor Study, KCATA
Travel Time Data	Replica Model and NPMRDS
Vehicle Queues	Corridor Study
Point Speed Data	KC SCOUT and NPMRDS
Saturation Flow Rates/Field Observations	Field Reconnaissance
Other Resources	As-Builts, geometric plans and planning documents

One of the sources of traffic data for this project is the Kansas City Metro Replica Urban Planning model (Replica Model). This model will provide verified 2018/2019 traffic data to help fill in some data gaps and calibrate new counts collected during COVID-19. Data in this model is aggregated on a quarterly basis. The Replica Model will also provide important travel characteristic data to better understand motorists' travel behavior along the U.S. 69 corridor.

Existing Data Inventory

As shown above in Table 3, traffic count data collected as part of the U.S. 69 Corridor Study (2018) will be used as part of this project. This data includes traffic counts collected in June 2016, and signal data.

The tables below provide an inventory of traffic count and signal data needed for this Project. Table 4 includes an intersection data inventory for the VISSIM models. The data year is provided if the data is available from the previous study. Cells highlighted in red indicate that new data is needed for the Project either because none could be located, or the existing data is older than 2016. Cells highlighted in black indicate that data is not necessary for the study team to conduct the required VISSIM analysis.

Table 4: Intersection Data Inventory for VISSIM Models

Count Number	Intersection/ Location	Signal Timing Year	Peak Hour Count Year
1	95th & U.S. 69		
2	103rd & U.S. 69	2016	2016
3	103rd and Neiman		
4	103rd & Mastin	2016	2016
5	I-435 & Antioch	2016	2016
6	I-435 & U.S. 69		
7	I-435 & Quivira	2016	2016
8	College & U.S. 69	2016	2016
9	College & Switzer	2016	2016
10	College & Mastin	2016	2016
11	119th & Antioch	2016	2016
12	119th & U.S. 69	2016	2016
13	119th & Switzer	2016	2016
14	119th & Grant (west)	2016	2016
15	119th & Hayes	2016	
16	119th & Farley	2016	
17	123rd & Blue Valley	2016	
18	135th & Metcalf		2016
19	135th & U.S. 69	2016	2016
20	135th & Antioch	2016	2016
21	135th & Hemlock	2016	2016
22	135th & Riley	2016	
23	151st & Metcalf	2016	2016
24	151st & U.S. 69	2016	2016
25	151st & Antioch	2016	2016
26	151st & Conser/Newton	2016	2016
27	151st & Hardy	2016	2016
28	151st & Lowell	2016	2016
29	151st & Marty	2016	
30	159th & Metcalf	2016	2016
31	159th and Foster		
32	159th & U.S. 69	2016	2016
33	159th & Lowell		
34	159th & Antioch	2016	2016
35	167th & Antioch		2016

36	167th & Metcalf		2016
37	167th & U.S. 69		2016
38	179th & U.S. 69		2016
39	179th & Metcalf		
40	179th and Antioch		

	Cells highlighted in red indicate that data is needed either because none could be located, or the existing data is older than 2016.
	Cells highlighted in black indicate that data is not necessary for the study team to conduct the required VISSIM analysis as the intersection is not currently signalized.

Note: 2016 count data provided by Thomas Brown, Inc.

2016 signal data provided by Overland Park

Table 5 includes two locations where seven-day vehicle classification counts are being collected along U.S. 69 and Blue Valley Parkway. This data will be used to aid in the development of the VISSIM models as well as the Traffic and Revenue study. New counts will be taken at these locations since the previous study did not collect any seven-day classification counts.

Table 5: 7-Day U.S. 69 Mainline Classification Count

Count Number	Location	Limits
SC-48	U.S. 69	Blue Valley and 119th
SC-27	Blue Valley Pkwy.	U.S. 69 and 119th

Note: SC = Screenline Count

Field Observations

Field observations were conducted to collect saturation flow rates and observe typical traffic flow during the morning and afternoon peak periods at various intersections within the U.S. 69 study area. The dates for data collection are as follows:

- Tuesday, October 27th, 2020 – 4 p.m. to 6 p.m.
- Wednesday, October 28th, 2020 - 7 a.m. to 9 a.m.
- Wednesday, November 4th, 2020 – 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m.

To collect a saturation flow rate, a minimum of seven vehicles (no heavy trucks) must be queued in a single through-lane at an intersection. When the light is green and the fourth vehicle in the queue passes over the stop bar on a particular link, the field observer starts a stop watch and will stop the timer when the seventh, eighth, ninth or tenth vehicle in queue passes over the same stop bar. That

time is then recorded. The same through lane in the peak direction should be used as often as traffic queuing allows during that peak period.

Due to lower traffic volumes on arterials due to the COVID pandemic, field observers moved to multiple locations in the corridor during the same peak period to collect the maximum amount of data. Unfortunately, finding intersection queues consistently long enough to be able to collect comprehensive saturation flow rate data proved challenging, and in the end the data collected was insufficient to incorporate into the VISSIM models. There were no intersections observed with significant queuing during the peak periods.

Commuter Observations

Because observation of "typical" field conditions was not possible during COVID, daily commuters of the corridor from the project team were consulted to identify typical pre-pandemic bottlenecks. They identified two main bottlenecks on northbound US-69 during the AM peak. The first one is between 135th Street and the Blue Valley Parkway due to heavy weaving and high traffic volumes. Many vehicles exit at Blue Valley Parkway and pre-position in the outside lane before the 135th Street interchange, which leads to uneven lane utilization. The second bottleneck is at the 119th Street merge, where the entering vehicles must merge into an already saturated traffic stream.

In the PM peak, there are two primary bottlenecks in the southbound direction and one northbound. The first southbound bottleneck is near 119th Street where the southbound CD road merges with the mainline, followed closely by the 119th Street onramp. In this location, five lanes of traffic must merge into two lanes. The second location is between Blue Valley Parkway and 135th Street. Similar to the opposite direction in the AM, a heavy weave and high traffic volumes contribute to this bottleneck. Finally, in the northbound direction at I-435 there is a high volume of traffic that wants to continue northbound through on US-69 (and some to westbound I-435). These vehicles must all squeeze into two lanes through the I-435 interchange. Drivers pre-position into these two lanes far upstream, leading to uneven lane utilization.

Step 3: Process Collected Project Data

Once the project data has been collected, the traffic counts, National Performance Management Research Data Set (NPMRDS) and SCOUT speed data will be processed before being used in the VISSIM models' development and calibration. The remaining data does not require extensive processing and can be used throughout the project in its raw form. The following sections describe the traffic volume development process and how this information will be incorporated into the origin-destination (O-D) matrices along with how the NPMRDS and SCOUT speed and travel time data will be processed for use in calibrating the models.

Traffic Volume Development and Origin-Destination (O-D) Matrices *(See Appendix A for Updated Methodology as of 12/17/2020)*

A set of balanced traffic volumes for 2019 (the base analysis year) within the model area will be developed using the traffic count data collected. The 2019 balanced volumes will be developed based

on:

- Mainline freeway traffic counts and turning movement counts collected in 2016 as part of the Corridor Study.
- 2018/2019 Replica model
- New 2020 traffic counts
- KDOT continuous counter on U.S. 69 south of 135th St.

If available, permanent count data will be used to verify the traffic count data was collected during what could be characterized as a representative day along the corridor. In the absence of permanent count data, the seven-day counts will be used to confirm the traffic data was collected under typical conditions.

Additional traffic counts were collected during the last week of October and the first week of November 2020 at locations within the model limits where data was not provided by the Corridor Study. Due to the COVID-19 pandemic, many people are working from home or have different travel patterns during the time period these counts were collected. To account for the change from "typical" travel conditions, these counts will be adjusted using traffic volume data from the Replica model for the following dates:

- Fall 2018 (September through November)
- Winter 2018/2019 (December through February)
- Spring 2019 (March through May)
- Summer 2019 (June through August)

All the adjusted mainline and turning movement counts will be balanced within the model area along the freeways and the eight side-street arterials. Initially, traffic volumes along the arterials will first be balanced in each direction between the interchange ramp terminal intersections based on the higher volume entering or exiting the interchange area. These volumes will then be balanced with the remaining intersection volumes along the same arterial by adding or subtracting volume for the through movements. The freeway traffic volumes will then be balanced at the U.S. 69 and I-435 interchange and the resulting volumes carried through along the freeways and balanced with the entrance and exit ramp volumes. The process described above will be carried out for both car and truck traffic separately. This will result in two separate sets of balanced traffic volumes, one for cars and the other for trucks.

O-D matrices for the model area will be developed from the balanced sets of traffic volumes using Visum and the program's TFlowFuzzy matrix estimator tool. Separate single-occupancy vehicle (SOV), high-occupancy vehicle (HOV), and truck matrices will be developed for the AM and PM peak hours for the freeway and each of the eight side-street arterials. This is a total of 78 matrices that will be included in the VISSIM model as shown below in Table 6. Having smaller matrices will allow the team to quickly develop a solution for them and implement into the VISSIM model. The team will use vehicle occupancy statistics from the Replica model and Mid-America Regional Council (MARC) to separate out the HOVs from the SOVs.

Table 6: Number of Existing VISSIM O-D Matrices

Location	SOV	HOV	Truck	Total
12 Side-Street Arterials	AM / PM = 24	AM / PM = 24	AM / PM = 24	72
Freeway	AM / PM = 2	AM / PM = 2	AM / PM = 2	6
Total	**26**	**26**	**26**	**78**

The balanced traffic volumes will be used as the checks in the development of the O-D matrices. StreetLight and Replica O-D data will also help to inform the U.S. 69 mainline O-D matrix checks. With the balanced check volumes, the O-D matrix will be solved using Visum's TFlowFuzzy tool. The TFlowFuzzy solver ensures that the check volumes will be zero at all locations indicating that the volumes in the O-D matrix match the balanced traffic volumes from the volume spreadsheets. Volumes from Visum can then be migrated into VISSIM. Because both programs are PTV products, integration of the inputs and routing decisions from Visum into VISSIM will be seamless.

NPMRDS Data Processing

NPMRDS is a historical speed and travel time data set that covers the national highway system (NHS). The NPMRDS uses the Traffic Message Channel (TMC) standard to identify road segments along the NHS. Each segment has a unique set of nine characters that makes up its "TMC Code".

NPMRDS speed and travel time data will be downloaded for passenger vehicles and trucks to aid in the calibration of the VISSIM models. This information will be used to verify that the modeled travel times and speeds along the freeway mainlines are correct. The preferred date range for collecting speed and travel time data is one that captures multiple months, accounts for the most recent year of available data, and avoids periods of expected reduced travel (i.e. holidays). The data will be downloaded for all segments along U.S. 69 from just south of 179th Street to just north of 95th Street using the following parameters:

- Date range: February 5, 2019 to April 25, 2019
- Days of week: Tuesday, Wednesday, Thursday
- Time periods: 6:00am - 10:00am and 3:15pm - 7:15pm in 15-minute intervals

Once downloaded, the travel time data will be organized to help identify a representative day with average demand and typical driving conditions along the U.S. 69 corridor. The travel times will represent the measured time to complete the routes listed in Table 7 every 15-minutes throughout the peak periods. The routes in Table 7 are broken down into shorter segments, between each interchange, in VISSIM for a more detailed calibration. Representative days will be identified for the AM and PM peak periods that minimize the difference between the time-variant travel times from the average travel time for the same time period. Once the representative days are identified, the travel time variation

envelopes will be calculated and plotted using the 1 Sigma (±1.0 standard deviations) and 2 Sigma (±1.96 standard deviations) bands. These travel time variation envelopes will be used when calibrating the AM and PM VISSIM models. Individual arterial roads will not be calibrated based on travel times due to the limited extent of each arterial. Travel time information on arterials will be pulled from VISSIM and compared to Google traffic on a typical weekday peak period. Arterial traffic volumes and vehicle queues will be compared to field data.

Table 7: VISSIM Model Calibration Travel Time Routes

Route	Direction	From	To
U.S. 69	SB	95th St	179th St
	NB	179th St	95th St

The speed data will be used to help identify bottleneck locations along the U.S. 69 corridor. Per FHWA's Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software, (TATIII) updated in 2019**,** bottleneck locations are defined as the set of network locations where transient demand exceeds facility capacity and resultant approach speeds drop below the bottleneck congestion speed threshold. A threshold of one third of the observed free-flow speed will be used to help determine bottleneck locations along the U.S. 69 corridor. Once bottleneck locations are identified, throughput volumes at 15-minute intervals will be determined from the available traffic counts located within 0.5 miles upstream or downstream of the bottleneck. These throughput volumes will be used to help calibrate the VISSIM models to ensure the bottlenecks are modeled at the appropriate locations along the corridor.

Step 4: Add in Project Data to Model and Peer Review

Once the VISSIM models have been expanded to include the entire model area, additional data that has been collected will be incorporated into the models. The following model elements will be reviewed and updated based on the data that has been collected.

- Existing grades will be used in the development of the traffic operations models. All grades greater than 2% will be coded into the models. This data will come from the as-built plans.

- Signal Controllers will be coded in VISSIM using the ring-barrier controller (RBC) type. Many of the existing controllers are already included in the model from the Corridor Study. However, additional signalized intersections have been added with the expanded model limits. The additional timing and phasing plans that are needed for these models will be obtained from Overland Park and used to code the RBC for the remaining intersections. Pedestrian signal timings have adequate clearance times as part of the timing plans, however pedestrian volumes along the corridor are very low and will not be included in the VISSIM model**.** Synchro (Version 11) models will be developed for all signalized study intersections to store and eventually optimize signal timings for future year scenarios.

- Signal Heads will be coded for each movement at all the signalized intersections in the network. At locations where drivers are permitted to make a right turn on red, stop signs will be used with the "right turn on red" function enabled.

- Detectors will be added at all signalized intersections throughout the network. The length of detectors will be no less than 16 feet and no more than 32 feet.

- Vehicle Inputs will be coded at all entry points to the network. Inputs will be numbered to match the corresponding origin number from the origin/destination (O/D) matrices. Volume inputs will fluctuate per 15-minute analysis period. These fluctuations will be calculated by taking the total traffic volume for the 15-minute period at a given origin, multiplying it by 4, then dividing that number by the total peak hour traffic volume at the same origin. For analysis intervals outside the two-hour count period data was collected, ratios will be developed based on permanent count data. If permanent count data is not available, data from the seven-day counts will be used. The resulting number will then be multiplied by the vehicle input volumes from the different O-D matrices to achieve the fluctuated volumes.

  The three and a half hours of simulation time for the AM and PM models consist of a half hour of seeding time to load the network with traffic to reach equilibrium between the number of vehicles entering and exiting the network, an hour prior to the peak hour to build congestion, the peak hour, and an hour after the peak hour to recover from congestion. The simulation durations developed in VISSIM are as follows:

    - Seeding Time: 0 to 1,800 simulation seconds (6:00-6:30am; 3:15-3:45pm)
    - Pre-Peak Hour: 1,800 – 5,400 simulation seconds (6:30-7:30am; 3:45-4:45pm)
    - Peak Hour: 5,400 – 9,000 simulation seconds (7:30-8:30am; 4:45-5:45pm)
    - Post-Peak Hour: 9,000 – 12,600 simulation seconds (8:30-9:30am; 5:45-6:45pm)

- Vehicle Routes will be coded into the models to **direct traffic from one entry link to the desired destination link**. **Static** routes will be added to the VISSIM models based on the individual smaller O-D matrices which will make the creating and manipulation of these routes easier than if one set of routes was created for the entire network. Static routes were chosen since there is generally only one possible route through the VISSIM network for vehicular traffic to reach a desired destination, and where there are potential multiple routes, there is generally only one logical route.

- Public Transportation Stops (including dwell times) and Public Transportation Lines will be coded as part of this study. Data from the Corridor Study and KCATA will be used to add this information into the network.

- Vehicle Travel Time routes will be coded along U.S. 69 for calibration purposes to match those listed above in Table 7. Additional travel time routes may be coded along I-435 and the arterial side-streets and used to confirm travel times on these roadways are realistic when compared to Google typical traffic data and Replica data.

Once the base existing AM and PM VISSIM models have been developed, the Consultant will go through an error checking process as part of the project quality control (QC). This will be a thorough review of all the model inputs and coding to ensure they reflect field conditions as best possible and all project data was input correctly.

After reviewing the models and addressing coding or input errors, the VISSIM models will be run to observe the simulation. Initially, they will be run for the entire peak period to identify any errors that would hinder the progress of the simulation. Then, the models will be rerun multiple times, and the animations reviewed closely to observe vehicular routes, traffic signal operations, conflict areas and priority rules. The models will be corrected if any of the observed elements are not operating accordingly. Updates will be made to both the AM and PM models for consistency. After the models are reviewed and all comments have been addressed and resolved, the models will be ready to be calibrated.

Step 5: Calibrate VISSIM Model and Peer Review

The VISSIM models will be calibrated according to the guidelines found in the TATIII. The FHWA toolbox indicates that the primary performance measures to validate model calibration is bottleneck throughput and travel time or speed. The TATIII guidance suggests that for each of the bottleneck locations identified, the maximum time-variant bottleneck throughput values from the VISSIM models should be as close as possible to the observed maximum throughput values. Global network parameters will be adjusted first to bring the throughput values close to the observed values. Then localized parameters specific to the bottleneck location will be adjusted to further refine the simulated throughput values.

The TATIII guidance also outlines how to use statistical and cluster analysis to validate the models with time-variant profiles. The NPMRDS and SCOUT travel time data along U.S. 69 will be used to develop a travel time variation envelope graph for each of the travel routes along U.S. 69 which will be used to test the four calibration criteria outlined in the TATIII:

- Control for Time-Variant Outliers: 95% of the simulated output results fall within the ~2 Sigma Band (±1.96 standard deviations)
- Control for Time-Variant “Inliers”: Two-thirds of the simulated results (and both critical time intervals) fall within the 1 Sigma Band
- Bounded Dynamic Absolute Error (BDAE): Average simulated absolute error from the representative day over all time intervals is less than or equal to differences from the representative day seen across all days in the travel condition, where:

$c_r(t)$ = observed value of representative day during time interval t

$c_i(t)$ = observed value of non-representative day within the cluster during time integral t

$\tilde{c}_r(t)$ = simulated performance measure during time interval t

N_T = number of time intervals

$N_{cluster}$ = number of days in the cluster representing this travel condition

$$\frac{\sum_t |c_r(t) - \tilde{c}_i(t)|}{N_T} \leq \frac{\sum_{i \neq r} \sum_t \frac{|c_r(t) - c_i(t)|}{N_T}}{N_{cluster} - 1}$$

- Bounded Dynamic Systematic Error: Average simulated error over all time intervals less than or equal to one-third of differences from the representative day seen across all days in the travel condition

$$\left| \frac{\sum_t c_r(t) - \tilde{c}_i(t)}{N_T} \right| \leq \frac{1}{3} \times \frac{\sum_{i \neq r} \sum_t \frac{|c_r(t) - c_i(t)|}{N_T}}{N_{cluster} - 1}$$

In addition to travel time and bottleneck throughput calibration parameters, the resulting link flows along U.S. 69 and intersection turning movements within the models will be compared to the balanced traffic volumes to check the calibration of the VISSIM model. Traditionally, GEH statistics have been used to validate volumes; however, as an industry, there is movement away from this statistic. Therefore, guidance from Wisconsin DOT's Traffic Engineer, Operations & Safety Manual Chapter 16, Section 20 will be used. The root mean squared percent error (RMSPE) will be calculated for all links along U.S. 69 and will be compared to a target of less than five percent. At the study intersections, the root normalized squared error (RNSE) will be calculated for all intersection turning movements and will be compared to a target of less than three percent for more than 75 percent of the turns.

Vehicle queue lengths will be checked on-screen to ensure that queues observed in the field and from the Corridor Study occur in the model and that there are not queues in the model that do not exist in the field or are not included in the Corridor Study. Table 8 summarizes the calibration criteria that will be used for the U.S. 69 VISSIM models.

Table 8: VISSIM Model Calibration Criteria

MOE	Criteria	Calibration Acceptance Targets
Travel Times	U.S. 69 segments	95% within 1.96 standard deviation

		67% within 1 standard deviation Absolute error < BDAE Error < BDAE / 3
Bottleneck Throughput	Selected bottlenecks along the corridor	As close as possible to observed values
Volume (hourly flows)	Scatterplot Link Segments along U.S. 69	Regression coefficient >= 0.88 RMSPE < 5.0%
	Turns at study intersections	RNSE < 3.0 % for > 75% of turns
Queues	Visually acceptable queuing based on queues in Corridor Study	To analyst's satisfaction

Note: BDAE (Bounded Dynamic Absolute Error), RMSPE (root mean square percent error), RNSE (Root normalized square error), Source: TATIII

If the above targets are not achieved, it may be necessary to adjust some of the model elements to better reach the targets. Default driving behavior characteristics for arterials and freeways may be adjusted in the VISSIM models to better replicate conditions in the study area network, especially where congestion formed and propagated from bottleneck points and at critical merge, diverge and weaving sections. At high volume/congested surface street intersections, driving behaviors may be modified also to reflect more aggressive driving and prevent unrealistic queue spillback conditions. Lane change distances may also be modified from default values to better represent field conditions where drivers select a lane further upstream to avoid late lane change maneuvers.

Step 6: T&R Study Using MARC Model to Develop Build Volumes

The MARC Travel Demand Model will be used in the T&R Study. The T&R Study will aid in the development of Future No-Build and Future Build volumes.

Step 7: Develop Future No-Build VISSIM Model and Peer Review

There are three parts to the development of the Future No-Build VISSIM models:

- Future year traffic volume development
- Future No-Build VISSIM model development
- Peer review

All are discussed in the following sections.

Future Year Traffic Volume Development

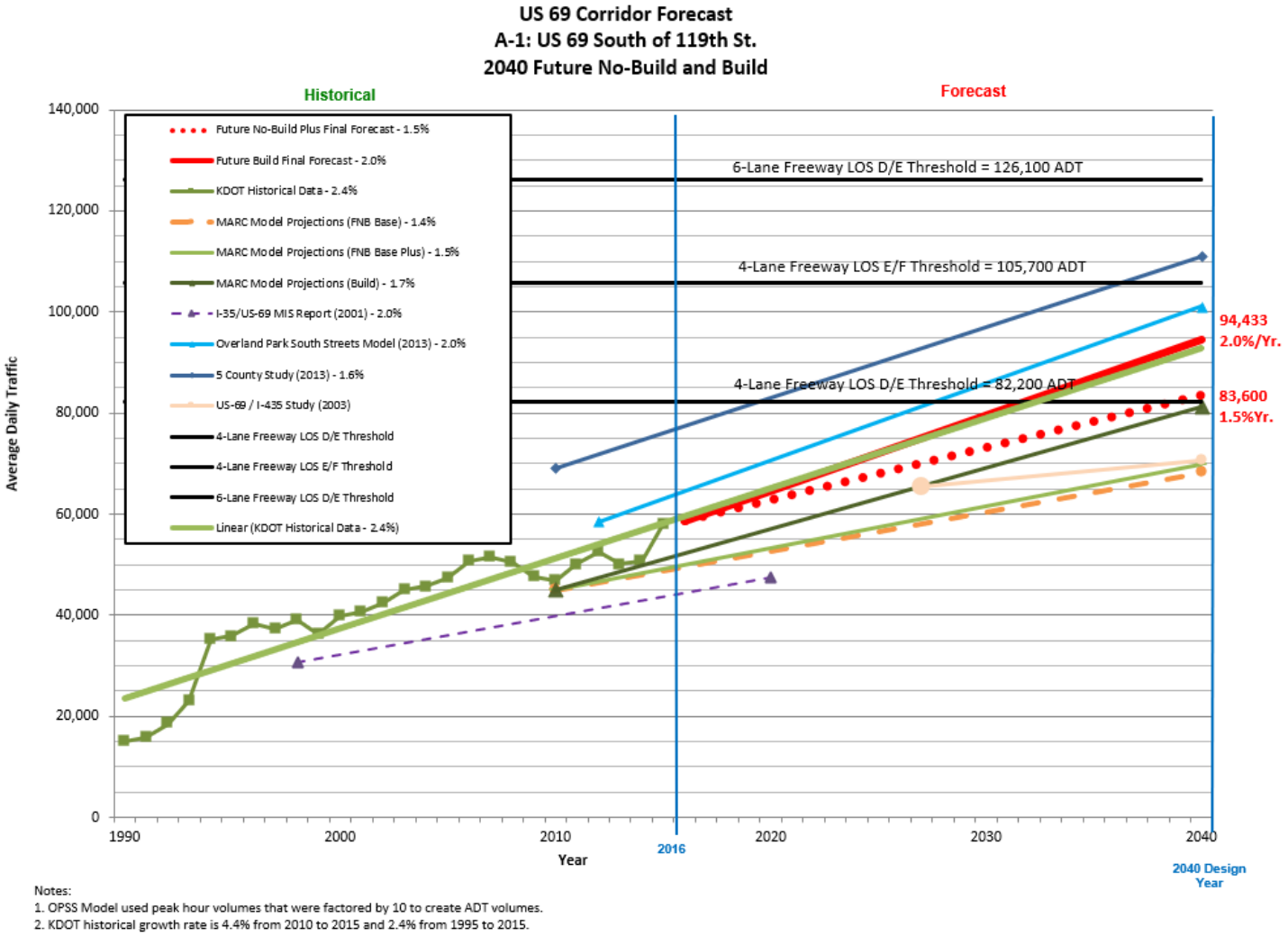
As part of the Future No-Build VISSIM model development process, traffic volume growth rates will be developed through traffic forecast graphs for the year 2050 for the U.S. 69 corridor at the following locations and each of the eight arterial cross streets:

- South of 95th Street

- South of College Boulevard
- South of 119th Street
- South of Blue Valley Parkway
- South of 167th Street

The forecast graphs will be created using available information along the corridor, including historical data, the MARC Travel Demand Model (TDM), and previous studies. The MARC model large trip generators in Johnson County will be reviewed by CDM Smith and EBP to ensure all factors have been accounted for when forecasting future traffic demand in the Kanas City and Overland Park region. The graphs will be developed in excel and contain both historical traffic and forecasted traffic profiles. A regression line based on the historical data will also be included. LOS D/E capacity will be added to the graphs to show the theoretical constraints of the roadway. Figure 5 is an example of what the forecast graphs will look like. All the information included in the forecast graphs, including the travel demand model, are tools in the forecasting toolbox and require engineering judgment to develop the final forecasts. The forecast graphs will be used to develop annual volume growth rates that will be applied to the existing traffic counts to develop the future traffic volumes for 2050. These future traffic volumes will serve as the new target volumes when balancing the O-D matrices for the future VISSIM models. This is the same methodology that was used in the Concept Study and Pre-Planning Study.

Figure 5: Example Daily Traffic Forecast Graph



Notes:
1. OPSS Model used peak hour volumes that were factored by 10 to create ADT volumes.
2. KDOT historical growth rate is 4.4% from 2010 to 2015 and 2.4% from 1995 to 2015.

Note: 2050 is the forecasted design year for U.S. 69.

After the future O-D matrices have been balanced using the new future volumes, multiple checks will be applied to these matrices. One check that will be performed on each of the matrices is to determine the difference between the future no-build traffic volumes and the existing traffic volumes. This check will confirm that none of the future traffic volumes are less than the existing traffic volumes. Another check includes calculating the growth rates between the future no-build and existing traffic volumes of each of the O-D pairs in the matrices to ensure they are all reasonable and there are no unexpected high or low values. The traffic volumes in the future O-D matrices will be used to develop the future U.S. 69 traffic volumes and the future turning movement volumes along the side-street arterials.

Future No-Build VISSIM Model Development

The calibrated existing VISSIM models will serve as the baseline for the Future No-Build VISSIM models. They will be updated to include all approved projects and geometric changes in the 2050 MARC travel demand model (TDM). Updated signal timings will also be developed for the Future No-Build models using Synchro models with the appropriate geometrics and adding the Future No-Build traffic volumes discussed above. Synchro will be used to optimize the vehicle splits and offsets while maintaining the existing intersection cycle lengths. These new timings will be added to the Future No-Build VISSIM models.

Similar to the existing models, vehicle inputs will be coded to fluctuate per 15-minute analysis period. The fluctuations developed for the existing models will be multiplied by the vehicle input volumes from the Future No-Build O-D matrices. This will provide the fluctuated volumes that will be used in the Future No-Build VISSIM models. Lastly, all existing transit routes will be maintained through the Future No-Build networks.

Peer Review

Like the existing model peer review, once the Future No-Build VISSIM models have been developed, the Consultant Team will go through an error checking process. This will be a thorough review of updated model coding to ensure it reflects the 2050 MARC TDM as best possible. After reviewing the models and addressing any coding errors, the VISSIM models will be run to observe the simulation. The animations will be reviewed during the model runs to primarily observe traffic signal operations and any model elements that were altered due to the updated network coding. The models will be corrected if any of the observed elements are not operating accordingly. Updates will be made to both the AM and PM models for consistency. After the models are reviewed and all comments have been addressed and resolved, the Future No-Build models will be considered final.

Step 8: Develop Future Build VISSIM Model and Peer Review

The Consultant Team will develop the Build VISSIM models for the following alternatives:

- 2050 Ultimate Build Alternative (up to five different scenarios may be analyzed). Below are potential scenarios that may be modeled. The model scenarios will be discussed with the team prior to analysis.

    1. Alternative supporting roadway network
    2. Managed lane access alternatives(s)
    3. Alternative managed lane usage (Trucks, HOVs, etc.)
    4. To be determined by project team
    5. To be determined by project team

- 2025 Interim Build Alternative – 103rd Street to 151st Street
- 2025 Interim Build Alternative - 103rd Street to 179th Street

The 2025 Interim Build Alternatives will use the preferred 2050 Ultimate Build Alternative scenario with different limits of the proposed improvements along U.S. 69. Similar to the future No-Build step, there are three parts to the development of the Future Build VISSIM models:

- Future Build year traffic volume development
- Future Build VISSIM model development
- Peer review

These three parts are discussed below in the following sections.

Future Build Year Traffic Volume Development

2019 base year model for U.S. 69 corridor study will be developed using the MARC TDM. The model will be calibrated to 2019 traffic conditions in the study corridor using traffic data collected and described in Table 3. The future year trip tables will be developed using updated socioeconomic forecasts. Future year 2050 No-Build and Build TDM will be developed using the 2019 calibrated TDM and updated future year trip tables. A subarea model will be developed using the updated 2050 TDM to reflect the different Build conditions. These models will be run and the outputs used to obtain the traffic forecasts under the various Build alternatives. Trip tables for the AM and PM peak periods representing a typical 24-hour weekday will be developed to model the traffic demand for the proposed improvements to the U.S. 69 corridor. These future trip tables will be used to develop the future U.S. 69 peak period traffic volumes and the future turning movement volumes along the side-street arterials.

The future build volumes will be developed by taking the change in traffic volume (delta) between the 2050 Future No-Build and 2050 Build TDM and applying the delta value to the previously developed balanced 2050 Future No-Build volumes used in the VISSIM model analysis.

Future Build VISSIM Model Development

The Future Build Alternatives VISSIM models will be developed from the Future No-Build models. These Build Alternatives will be analyzed to aid in the alternatives screening process.

Updated signal timings will be developed for all the Future Build Alternative VISSIM models. These timings will be developed by updating the Future No-Build Synchro models with the appropriate geometrics and adding the Future Build traffic volumes discussed above. Synchro will be used to optimize the vehicle splits and offsets while maintaining the existing intersection cycle length. These new timings will be added to the Future Build VISSIM models.

Similar to the Existing and Future No-Build models, vehicle inputs will be coded to fluctuate per 15-minute analysis period. The fluctuations developed for the existing models will be multiplied by the vehicle input volumes from the Future Build O-D matrices. This will provide the fluctuated volumes for the future Build VISSIM models. Lastly, all existing transit routes will be maintained through the Build networks.

Peer review

Like the Existing and Future No-Build models peer review, the Consultant Team will go through an error checking process. This will be a thorough review of updated model coding to ensure it reflects the Build Alternatives as best possible. After reviewing the models and addressing any coding errors, the VISSIM models will be run to observe the simulation. The animations will be reviewed during the model runs to primarily observe traffic signal operations and any model elements that were altered due to the updated network coding. The models will be corrected if any of the observed elements are not operating accordingly. Updates will be made to both the AM and PM models for consistency. After the models are reviewed and all comments have been addressed and resolved, the models will be considered final.

Step 9: Process Results for Break-in-Access

The quantitative results of the AM and PM Existing, Future No-Build, and Future Build VISSIM models include network performance, vehicle travel times, node results and link results. A total of ten simulations will be run at a minimum then, using the FHWA TATIII guidance, it will be determined if additional simulation runs are required. If they are required, the appropriate number of simulation runs will be added to comply with the guidance. All simulation runs will be averaged and have raw data extracted. This data will be exported to Excel spreadsheets and organized to report the measures of effectiveness (MOE) listed in Table 9. The MOEs will aid in the development of the EA documentation and the BIA report and were identified based on guidance within the 2019 update to the TATIII. These spreadsheets will also be used in the calibration phase to compare collected data to the modeled results.

Table 9: Anticipated Traffic Analysis Measures of Effectiveness

Performance Measures	Target	Notes	Analysis Approach	Assessment Type*		
				Existing	Future No-Build	Build
Freeway level of service	LOS D or better on all freeway segments[1]	Includes duration and percent at each LOS	VISSIM[2]	QN	QN	QN
Arterial intersection level of service	LOS D or better at all signalized study intersections[1]	Includes duration and percent at each LOS	VISSIM[2]	QN	QN	QN
Freeway speed	LOS D or better on all freeway segments[1]	Speed profiles	VISSIM[2]	QN	QN	QN
Ramp Terminal Queuing	Do queues extend back onto the freeway?	Average and 95th Percentile queue	VISSIM[2]	QN	QN	QN
Travel Times	Comparison to no-build scenario	Travel time in minutes	VISSIM[2]	QN	QN	QN
Overall vehicle throughput	Comparison to no-build scenario	Vehicles per hour through bottlenecks	VISSIM[2]	QN	QN	QN

*QN = Quantitative assessment

[1]Lesser mobility values may be considered acceptable if required measures to reach target are unreasonable, existing conditions do not meet targets, and alternate mobility routes are available.

[2] VISSIM output will be used to measure against Highway Capacity Manual V6 methodology.

IV. SAFETY METHODOLOGY

The safety analysis will be conducted in two parts: existing and predictive. The existing crash analysis is intended to assist in identifying existing safety related issues along the study corridor. The predictive safety analysis utilizing the Interactive Highway Safety Design Model (IHSDM) will seek to compare the Preferred Build Alternative against the baseline condition (2050 No-Build). Comparing the Preferred Build Alternative against the baseline allows for an evaluation of the effectiveness of safety improvements or impact to safety throughout the corridor. The existing condition (2019) will also be modeled utilizing IHSDM and will be compared against the existing crash analysis. A Safety Memo will summarize the results of the existing and predictive safety analyses. The report will also document assumptions utilized during the analysis effort. This memo will be incorporated into the BIA and EA.

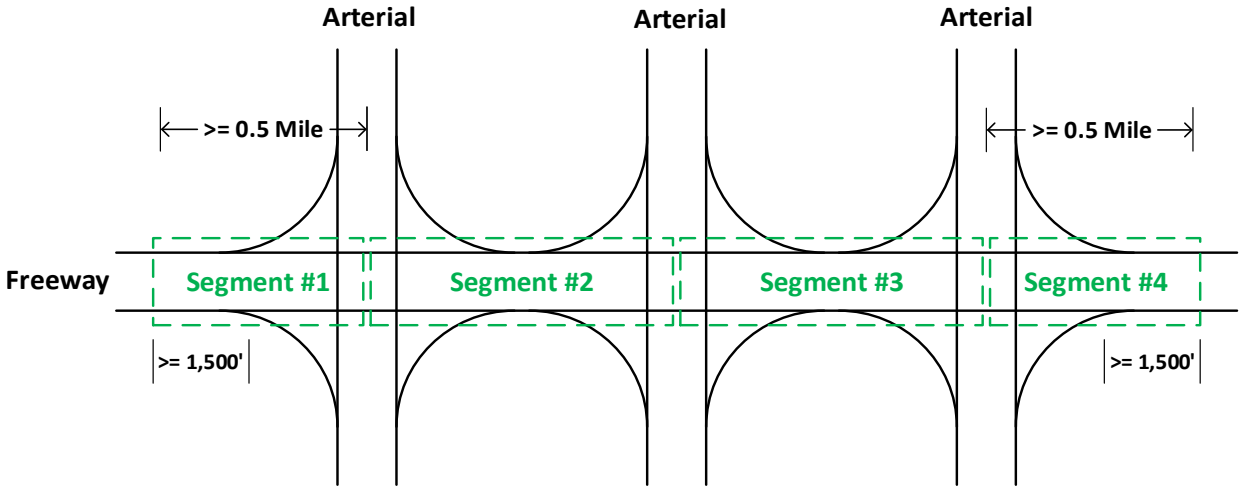
1.2 Existing Safety Analysis

Geo located crash data will be gathered from the KDOT Crash Database for the most current complete 5-year period, anticipated to be 2015 to 2019. The data will include crash characteristics such as crash type, severity, weather conditions, surface conditions, time of day, vehicle type, and driver condition. The analysis will include the freeways, arterials at interchanges, all service ramps and system to system ramps within the study area.

The corridor will be segmented in the following sections for the existing analysis within the study area.

- Freeway Mainline – centerline of interchange to centerline of interchange as shown below in Figure 6
- Arterials – between major intersections (or a reasonable distance determined by local conditions if the nearest major intersection is over 1 mile away)
- Service ramps and system to system ramps as data is available

Figure 6: Freeway Mainline Segmentation



The analysis segments will be used to tabulate existing crash characteristics by location (crash type, severity, weather conditions, and time of day) and calculate crash rates. Additional crash characteristics such as surface conditions, vehicle type and driver condition among others will be analyzed as necessary to fully understand the factors contributing to crashes in high crash areas. Crash rates will be calculated using existing average annual daily traffic (AADT) values and will be compared to Kansas statewide crash rates for similar facilities provided by KDOT.

1.3 Predictive Safety Analysis

A predictive safety analysis will be conducted to determine the impact to safety from the Build Alternative. Three models will be completed for this analysis; Existing, Future No-Build, and the Preferred Build Alternative. The models will be developed using MicroStation design files, specifically alignment files from InRoads. These files include the horizontal and vertical characteristics of the roadway and ramps for input into the IHSDM model. The results from the Existing model will be compared to the Existing Crash Analysis to serve as a check on the completeness of the IHSDM modeling process. The results of the Future No-Build model (total crashes overall and by segment) will serve as the baseline for comparison of the Preferred Build Alternative.

V. PROJECT TIMELINE

Once the model development process is complete, the results from the traffic and safety models will be used in the development of the NEPA documentation, BIA, and Traffic and Revenue Study. The current schedule for the completion of these tasks is shown below in Table 10. It will require constant communication and coordination between the Consultant team, KDOT, KTA, Overland Park and FHWA staff to ensure deadlines are met and proper approvals are granted in a timely manner.

Table 10: Current Traffic Modeling Schedule

Milestone	Date Complete
Data collection	December 2020
Existing traffic volumes	December 2020
Existing VISSIM Model	March 2021
Future No-Build Forecast	March 2021
Future No-Build Model	May 2021
Future Build Forecast	April 2021
Future Build Models	July 2021
Draft BIA Report	August 2021
Final BIA Report	October 2021

Note: schedule as of October 2020

APPENDIX A: EXISTING U.S. 69 TRAFFIC DEVELOPMENT DURING COVID-19

Addendum to Chapter III as of 12/17/2020

The study team is responsible for developing baseline traffic volumes for the year 2019 to be used in the development of the Break-in-Access (BIA). Existing 2019 baseline traffic will be used to calibrate the VISSIM models and to analyze existing operational conditions. Development of 2019 baseline traffic was accomplished during COVID-19 with the following steps. This methodology is added as an addendum to the U.S. 69 BIA Methodology and Assumption Memo.

Step 1 – Compile 2016 turning movement counts from the U.S. 69 Concept Study

Completed in 2018, the U.S. 69 Concept Study used traffic counts collected in 2016 within the U.S. 69 corridor and supporting local roadway network in the Study Area. The study team used these counts for developing 2019 base year volumes since the counts are less than five years old.

Step 2 - Use the KDOT Continuous Count Station on U.S. 69

KDOT has a continuous count station on U.S. 69 just south of the 135th Street Interchange. This mainline count station was used in the development of a COVID-Factor that is outlined in Step 4.

Step 3 - Collect 2020 traffic to fill data gaps

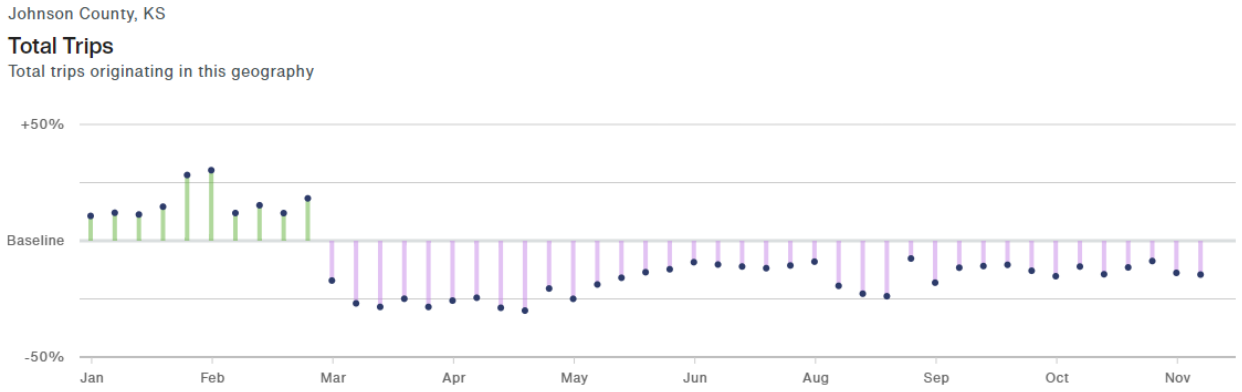
Although 2016 counts from the Concept Study were available for many locations in the study area, there were still locations where additional traffic counts had to be collected. **Tables 4 and 5** in the BIA Traffic and Safety Methodology and Assumptions Report identify the locations where intersection, ramp or highway mainline counts were necessary to be collected. Traffic counts were collected during the last week of October and first week of November 2020 (counts were not collected on November 3rd, election day). However, these counts are not considered an accurate representation of typical seasonal traffic experienced on the corridor prior to COVID-19. As a result, the counts collected to fill missing gaps must be adjusted to represent a typical non-COVID-19 day.

Step 4 - Modify 2020 counts based on U.S. 69 continuous counter data

2020 counts were post-processed to reflect typical traffic patterns in 2019. Impacts to traffic patterns from the COVID-19 pandemic were first evaluated using Replica Trends, a nationwide model that is updated weekly with the average number of trips taken within a state, county, or census tract. Shown in **Figure 1**, the Replica Trends data provides insight on the percent change in traffic volume in Johnson County for every week in 2020 compared to the same week in 2019. When looking at the two-week

period when traffic was collected, average daily trips in Johnson County **decreased by 14%** for the last week of October and **11%** during the first week in November.

Figure 1: Percent Difference in Total Trips Per Week in Johnson County, KS, Between 2019 and 2020



Source: Replica

To capture the fluctuation of traffic in the U.S. 69 study corridor and during the peak traffic periods, data from KDOT's U.S. 69 continuous traffic counter (see Step 2) was used.

Weekday data (T, W, TH) collected at the KDOT continuous counter location in October 2019 was compared to the volumes captured during that same time period in 2020. **Table A** shows the a.m. and p.m. peak period volumes. **Table B** displays the average difference in traffic volumes on U.S. 69 at the continuous counter location. The percent difference between 2019 and 2020 volumes represents the COVID adjustment factor.

It was determined that the average weighted COVID factor during the a.m. peak hour of 7:30 to 8:30 was 1.24, meaning that when traffic counts were collected, traffic volumes were approximately 24% higher in 2019 than they were in 2020. The average weighted COVID factor during the p.m. peak hour of 4:45 to 5:45 was 1.03 meaning that when traffic counts were collected, traffic volumes were approximately 3% higher in 2019 than they were in 2020. The daily volumes are 7% higher in 2019 compared to 2020. This 7% U.S. 69 difference can be compared to the overall Johnson County reduction of 11% to 14%. The a.m. and p.m. COVID Factors were multiplied by the 2020 peak hour volumes. Then the result was divided by the five-year seasonal adjustment average (1.052) in October to obtain the base year 2019 volumes. Seasonal adjustments for the last five years of October can be found in **Table C**.

Table A: 2019 and 2020 U.S. 69 Count Data

Month	Day	2020 Raw Counts					2019 Raw Counts				
		AM Peak		PM Peak			AM Peak		PM Peak		
		7-8	8-9	4-5	5-6	24-hr	7-8	8-9	4-5	5-6	24-hr
October	Tuesday	4,265	3,281	5,203	5,241	58,918	4,936	4,634	5,121	5,839	66,376
	Wednesday	4,291	3,365	5,358	5,491	61,130	4,822	4,522	4,953	5,616	64,736
	Thursday	4,292	3,504	5,650	5,617	63,347	4,706	4,541	5,186	5,769	65,836
	Average	4,283	3,383	5,404	5,450	61,131	4,821	4,566	5,087	5,741	65,649

Source: KDOT

Table B: COVID Factors

Month	Day	COVID Factor				
		AM Peak		PM Peak		
		7-8	8-9	4-5	5-6	24-hr
October	Tuesday	1.16	1.41	0.98	1.11	1.13
	Wednesday	1.12	1.34	0.92	1.02	1.06
	Thursday	1.10	1.30	0.92	1.03	1.04
	Average	**1.13**	**1.35**	**0.94**	**1.05**	1.07
		1.24	**AM COVID FACTOR**			
		1.03	**PM COVID FACTOR**			

Source: KDOT

Table C: KDOT's Five-Year Seasonal Adjustment Factors for October

	2015	2016	2017	2018	2019	Average
Adjustment Factor	1.067	1.031	1.034	1.047	1.083	**1.052**

Source: KDOT

Step 5 - Grow 2016 volumes to the 2019 Base Year

The 2016 counts from the Concept Study, taken pre-COVID, were grown to represent typical 2019 traffic. Separate approaches were used to determine growth rates for mainline and arterial segments. The mainline growth rates were based on the corresponding KDOT historic AADTs for the last five years and 5 locations along U.S. 69 were considered, as shown in **Table D**.

Table D: KDOT's Five-Year Compound Annual Growth Rate

Location	KDOT Historic AADT [1]						5-Year Growth Rate
	2017	2016	2015	2014	2013	2012	
US 69 south of 95th St.	99,600	93,600	90,500	81,000	79,900	84,500	3.3%

US 69 south of College Blvd.	88,300	75,400	72,900	71,500	70,500	72,200	4.1%
US 69 south of 119th St.	66,400	59,900	57,900	50,800	50,100	52,500	4.8%
US 69 south of Blue Valley Pkwy.	88,300	78,200	75,600	70,000	69,800	70,400	4.6%
US 69 south of 167th St.	27,700	26,200	25,400	24,600	24,300	25,900	1.4%

[1] Source: https://www.ksdot.org/bureaus/burtransplan/maps/HistoricalFlowMaps.asp

Table E displays the selected growth rates for each segment along US 69.

Table E: 2019 Selected Compound Annual Growth Rate

Location	Selected Growth Rate
US 69 south of 95th St.	3.3%
US 69 south of 103rd St.	3.3%
US 69 south of I-435	4.1%
US 69 south of College Blvd.	4.1%
US 69 south of 119th St.	4.8%
US 69 south of Blue Valley Pkwy.	4.6%
US 69 south of 135th St.	4.6%
US 69 south of 151st St.	4.6%
US 69 south of 159th St.	1.4%
US 69 south of 167th St.	1.4%
US 69 south of 179th St.	1.4%

The arterial growth rates were developed using the 2015 and 2050 MARC travel demand model outputs due to a lack of recent historic traffic counts on those facilities. Two growth rates for a.m. and p.m. peak hours were considered at the west and east of U.S. 69. In addition, applied growth rates were compared

with the 2018 Corridor Study future year NB growth rates (2010-2040) and the difference in the estimated 2019 peak hour volumes was found minimal **(Table F).**

Table F: 2019 Peak Hour Volume Comparison

Location	Selected FYNB CAGR (2010-2040) in 2018 Corridor Study	MARC Model CAGR (2015 - 2050)		Peak Hour Volume Using 2018 Corridor Study CAGR		Peak Hour Volume Using CAGR (2015-2050)		2019 Peak Hour Volume Difference			
				2019		2019		Value		%	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Antioch North of I-435 WB	-	0.60%	0.50%	-	-	1,793	2,395	-	-	-	-
Antioch South of I-435 EB	-	0.40%	0.30%	-	-	3,510	3,734	-	-	-	-
Quivira North of I-435 WB	-	0.50%	0.40%	-	-	2,043	2,931	-	-	-	-
Quivira South of I-435 EB	-	0.10%	0.30%	-	-	3,635	3,653	-	-	-	-
103rd West of US 69	0.40%	0.80%	0.80%	1,309	1,706	1,324	1,727	15	21	1%	1%
103rd East of US 69	0.40%	0.80%	0.90%	1,332	1,817	1,348	1,844	16	27	1%	1%
College West of US 69	0.40%	0.20%	0.40%	2,843	3,328	2,826	3,328	-17	0	-1%	0%
College East of US 69	0.40%	0.60%	0.60%	2,786	3,172	2,803	3,191	17	19	1%	1%
119th West of US 69	0.40%	0.80%	0.80%	2,705	3,383	2,738	3,424	33	41	1%	1%
119th East of US 69	0.40%	0.50%	1.00%	2,304	3,276	2,311	3,335	7	59	0%	2%
Blue Valley Parkway North of US 69	0.90%	1.30%	1.40%	1,668	2,366	1,688	2,401	20	35	1%	1%
135th West of US 69	0.88%	0.70%	0.90%	3,297	4,010	3,280	4,012	-17	2	-1%	0%
135th East of US 69	0.88%	1.10%	0.80%	3,935	4,921	3,961	4,910	26	-11	1%	0%
151st West of US 69	0.62%	1.10%	1.00%	2,101	2,482	2,131	2,510	30	28	1%	1%
151st East of US 69	0.62%	1.20%	1.30%	2,330	3,401	2,370	3,470	40	69	2%	2%
159th West of US 69	3.88%	1.00%	1.40%	1,264	1,708	1,162	1,589	-102	-119	-8%	-7%
159th East of US 69	3.88%	0.90%	1.30%	1,185	1,639	1,086	1,520	-99	-119	-8%	-7%
167th West of US 69	8.17%	8.20%	6.80%	247	490	247	471	0	-19	0%	-4%

167th East of US 69	8.17%	3.40%	3.20%	267	439	233	381	-34	-58	-13%	-13%
179th West of US 69	6.93%	5.40%	6.20%	913	878	875	860	-38	-18	-4%	-2%
179th East of US 69	6.93%	4.60%	4.90%	433	485	405	458	-28	-27	-6%	-6%

Once growth rates were generated for all mainline and arterial segments, they were applied to the corresponding 2016 counts and the result was divided by the five-year seasonal adjustment average (105.75) in June to obtain the base year 2019 unbalanced volumes. Seasonal adjustments for the last five years of June can be found in **Table G**.

Table G: KDOT's Five-Year Seasonal Adjustment Factors for June

	2015	2016	2017	2018	2019	Average
Adjustment Factor	105.1	107.69	104.89	107.4	103.69	**105.75**

Source: KDOT

Step 6 - Balance arterial and freeway volumes

After the 2016 and 2020 counts were standardized to a 2019 base year, the volumes were balanced, where applicable. To balance the 2019 peak hour mainline volumes, the weekday hourly volume (T, W, TH) collected at the KDOT continuous counter south of 135th Street in March 2019 was used. The volume averages calculated for a.m. and p.m. peak hours are shown in **Table H**.

Table H: KDOT's Weekday Peak Hour Volume in March

Northbound							
Month	**Day**	**2019 Raw Counts**					
		AM		**PM**		**AM Peak**	**PM Peak**
		7-8	**8-9**	**4-5**	**5-6**	**7:30 - 8:30**	**4:45 -5:45**
March	Tuesday	3,085	2,829	1,936	1,885	2,957	1,897
	Wednesday	2,909	2,805	2,049	2,005	2,857	2,016
	Thursday	3,062	2,891	2,034	1,971	2,977	1,987

	Average	3,019	2,842	2,006	1,953	2,930	1,967

Table H (Continued): KDOT's Weekday Peak Hour Volume in March

Southbound							
Month	**Day**	**2019 Raw Counts**					
		AM		**PM**		**AM Peak**	**PM Peak**
		7-8	**8-9**	**4-5**	**5-6**	**7:30 - 8:30**	**4:45 -5:45**
March	Tuesday	1,537	1,507	3,551	3,805	1,522	3,742
	Wednesday	1,588	1,496	3,581	3,811	1,542	3,753
	Thursday	1,622	1,558	3,462	3,755	1,590	3,682
	Average	1,582	1,520	3,531	3,790	1,551	3,726

Balancing the mainline volumes started from south of 135th Street and the unbalanced peak hour volumes were calibrated to the KDOT continuous counter peak hour volumes at this location. Then, they were balanced to the 2019 count data between Blue Valley Parkway and 119th Street from Planning Study. In the off-peak direction for both a.m. and p.m. peak hours, Replica volumes were consistently higher than the 2019 unbalanced volumes starting with around 20% south of 151st to 50% south of 179th Street. To make up some of the difference, the 2019 volumes were balanced to be only 10% lower than Replica volumes past the 151st Street.

During the balancing process, the estimated 2019 ramp peak hour volumes were refined based on Replica data, 2016 Balanced ramp peak hour volumes and engineering judgment to maintain the difference of less than 10% from 2019 unbalanced volumes or other source of data along the mainlines. Table I displays the 2019 unbalanced and balanced volume comparisons.

Table I: 2019 Unbalanced and Balanced Volume Comparison

Balanced from South of 135th outwards	**AM**		
	2019 Volumes	Difference	

Location	Mainline Volumes using 5-Year Historic AADT CAGR		Additional Data Source [1]		**Balanced** Volumes				% of Difference	
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
US-69 - South of 95th	4,592	4,518			4,123	4,671	-469	153	-10%	3%
US-69 - South of 103rd	2,067	4,771			2,217	4,519	150	-252	7%	-5%
US-69 - South of I-435	2,067	4,031			2,217	4,449	150	418	7%	10%
US-69 - South of College	1,182	4,297			1,136	4,291	-46	-6	-4%	0%
US-69 - South of 119th	2,477	3,088			2,429	2,842	-48	-246	-2%	-8%
US-69 - South of Blue Valley	2,870	4,834	2,640	3,928	2,820	4,107	180	179	7%	5%
US-69 - South of 135th	1,417	3,333	1,551	2,930	1,551	2,930	0	0	0%	0%
US-69 - South of 151st	825	2,290	1,067		1,036	2,066	-31	-224	-3%	-10%
US-69 - South of 159th	520	1,738	721		760	1,572	39	-166	5%	-10%
US-69 - South of 167th	432	1,535	642		689	1,377	47	-158	7%	-10%
US-69 - South of 179th	316	1,312	590		562	1,176	-28	-136	-5%	-10%

1. 2019 a.m. and p.m. peak hours volume from **KDOT Continuous Counter**, **Planning Study 2019 Count Data**, **Replica Data**

Table I (Continued): 2019 Unbalanced and Balanced Volume Comparison

Balanced from South of 135th outwards	**PM**									
	2019 Volumes						Difference		% of Difference	
Location	Mainline Volumes using 5-Year Historic AADT CAGR		Additional Data Source [1]		**Balanced** Volumes					
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB

US-69 - South of 95th [2]	5,093	3,307			6,176	3,651	1,083	344	21%	10%
US-69 - South of 103rd [2]	2,600	3,748			3,472	3,778	872	30	34%	1%
US-69 - South of I-435 [2]	2,600	3,516			3,472	3,868	872	352	34%	10%
US-69 - South of College [2]	1,705	3,940			2,337	3,641	632	-299	37%	-8%
US-69 - South of 119th [2]	3,244	3,130			4,079	2,825	835	-305	26%	-10%
US-69 - South of Blue Valley [2]	5,297	3,699		2,877	5,555	3,686	258	-13	5%	0%
US-69 - South of 135th	3,470	2,066	3,726	1,967	3,726	1,967	0	0	0%	0%
US-69 - South of 151st	2,360	1,318			2,468	1,442	108	124	5%	9%
US-69 - South of 159th	1,537	818		1,014	1,697	1,015	160	1	10%	0%
US-69 - South of 167th	1,190	682		952	1,303	906	113	-46	9%	-5%
US-69 - South of 179th	1,142	457		820	1,224	735	82	-85	7%	-10%

1. 2019 a.m. and p.m. peak hours volume from **KDOT Continuous Counter, Planning Study 2019 Count Data, Replica Data**
2. For calibrating the Vissim PM model, the mainline volume on SB increased by 750 through reducing on ramp volume from Blue Valley (by 400) and increasing the off-ramp volume to 135th (by 350).

Arterials were balanced from either the intersection with U.S. 69 SB ramp or U.S. 69 NB ramp by holding through volumes at the US 69 ramp intersection and adjusting through volumes along arterials. No turning movement volumes were adjusted to balance the volumes except for unsignalized intersections without any traffic count data available. Turning movement volumes at these intersections were estimated based traffic balancing comparisons to adjacent intersections, knowledge of current land use, and engineering judgement. The total volume on side streets were increased to at least one vehicle per hour (vph) to avoid incorrectly calculating those movements as being prohibited.

Daily volumes are developed by using p.m. peak K-factor and applying that to the balanced p.m. volumes for study area. The 2020 48-hour traffic counts show that the p.m. K-factor is around 9% for entire study area. The K factor also has been checked with 2019 count data south of Blue Valley Pkwy from the Planning Study and 2019 data from the KDOT continuous counter, south of 135th St. All available traffic count data show the 9% p.m. K-factor on U.S. 69.

Appendix B – Supporting Documents

- *159th BIA*
- *167th BIA*
- *U.S. 69 Corridor Study*
- *U.S. 69 Pre-Planning Analysis Summary*
- *U.S. 69 User Characteristics Memorandum*

159th Street and US 69 Break-In-Access Request

Engineering and Operational Concept

April 21, 2006

prepared for:
City of Overland Park, Kansas
Kansas Department of Transportation

HNTB

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Appendix A – Traffic Report
Appendix B – Ramp Metering
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159th Street and US 69 Interchange Break-In-Access Request

1.0 Introduction

The City of Overland Park requests approval from the Kansas Department of Transportation (KDOT) for a new point of access on US 69 at 159th Street. This break-in-access request provides the necessary documentation regarding access breaks as outlined in the Kansas Department of Transportation's Standard Operating Manual dated March 1, 1999. This break-in-access request includes the necessary analysis and documentation that the proposed access break at 159th Street and US 69 meets the eight requirements required by KDOT.

1.1 BACKGROUND

The City of Overland Park, Kansas, is a rapidly growing community of 162,728 (2004 census estimate) and ranks as the second largest city in the state of Kansas. The city is located in Johnson County along the south side of the greater Kansas City metropolitan area. Overland Park is located within the Kansas City urbanized boundary and is part of the Mid-America Regional Council's (MARC) metropolitan planning boundary. Major highways serving Overland Park are I-35, I-435, and US 69.

Figure 1
Regional Map

The U.S. Census indicates that Johnson County's population has increased 46% since 1990. Overland Park has experienced significant growth southward along the US 69 corridor, and to accommodate the continued growth in this region, the I-35/US 69 Major Investment Study (MIS) was undertaken. Completed in 2001, the MIS identified the need for improvements to the US 69 corridor, most notably a new interchange at 159th Street.

The South Metro Corridor Study, led by MARC, is currently underway to study a new or improved east/west roadway that would connect US 69 to US 71. The corridor study limits are 175th Street to the north and 199th Street to the south. The study limits for the South Metro Corridor Study are outside the limits of the Break-in-Access study.

1.2 LOCATION

The proposed interchange will be located along US 69 at 159th Street. The study area for the break-in-access request extends north/south along US 69 from the 151st Street interchange to the 167th Street interchange. The study area also includes Metcalf Avenue on the east and Antioch Road on the west as shown in Figure 2.

Figure 2
Study Area

1.3 PROJECT HISTORY

The need for an interchange at 159th Street and US 69 has been anticipated for almost 20 years. The I-35/US 69 Major Investment Study (2001), sponsored by the Kansas Department of Transportation (KDOT), identified new highway access at 159th Street as part of an overall plan to improve the US 69 corridor. In addition, the following studies have documented the need for the proposed interchange.

- Interchange Feasibility Study (US 69 and 159th Street), 1989
- 151st Street from Antioch Road to Metcalf Avenue Preliminary Design Study, 1994
- 159th Street from Antioch Road to Metcalf Avenue Preliminary Engineering Study, 1999

1.4 PURPOSE

A new interchange is needed to relieve congestion at the existing US 69/151st Street interchange and along the 151st Street corridor, increase traffic safety through the study area, provide access to existing and future community facilities in the study area, and to support economic development in the area.

At the initial stage of the study, a coordination meeting was held with KDOT to establish the break-in-access study criteria. During this initial stage of the study, 2035 was agreed upon by KDOT and the City of Overland Park as the design year for the break-in-access request. This met the criteria of setting a design year that was 20 years beyond when the proposed interchange improvements would be constructed.

Traffic Relief

The interchange will reduce traffic on the heavily used corridors in the study area. The traffic analysis (see Traffic Report, Appendix A) estimated a reduction in traffic demand along the heavily traveled 151st Street corridor and interchange with US 69, as well as a reduction in traffic on Metcalf Avenue and Antioch Road.

Safety

Because the proposed interchange will reduce traffic on heavily used corridors in the study area, a reduction in accident rates can be expected. Less congested travel corridors will improve safety for motorists who use those corridors. Currently, the 151st Street Corridor, and 151st and US 69 Interchange, has one of the City's highest accident rates. The 159th and US 69 Interchange is expected to reduce traffic congestion and improve safety in the study area.

Access to Community Facilities

The construction of the interchange will serve existing and future community facilities in the study area.

- Cedar Hills Elementary School, Pleasant Ridge Middle School, Blue Valley West High School, and Westminster School are all located along Antioch Road between 159th Street and 167th Street. Blue Valley High School and Stanley Elementary School are located on 159th Street east of Metcalf Avenue.
- There are numerous churches within the study area, and more are expected to be constructed. Four are located in the study area west of US 69, and one is currently located east of US 69.
- A fire station of the Overland Park Fire Department is located at the intersection of 159th Street and Metcalf Avenue.

Economic Development

The US 69 and 159th Street interchange will provide access to the planned commercial, office, residential, and industrial land use in this area, where there are tremendous development opportunities for mixed-use office/retail development. Land-use forecasts from the Overland Park travel model indicate that the area south of 151st Street is only 13% fully built out.

2.0 Break-In-Access

The following addresses the requirements for a break-in-access identified in the Kansas Department of Transportation's Standard Operating Manual dated March 1, 1999.

2.1 EXISTING FACILITIES

> *"The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended by the proposal."*

The study area is currently served by full local highway access at 151st Street and partial (to and from the north) local highway access at 167th Street. Currently the interchange at 151st Street and US 69, and the 151st Street corridor (between Antioch Road and Metcalf Avenue), experience traffic congestion and delays on individual movements during peak travel hours.

With the projected development in the study area, the existing interchanges will be unable to handle the future traffic demands in this area. Improvements to the 151st Street corridor were completed in 1997. The design for these improvements was based on the assumption that the 159th Street interchange would be constructed to help relieve traffic along the 151st Street corridor. A second southbound right turn lane is currently being designed for the 151st Street Interchange off-ramp. The purpose of the improvement is to improve safety at the intersection

of the southbound off-ramp and 151st Street by bringing the southbound to eastbound movements under signal control. This improvement is planned to be constructed in 2007.

Planned development in this area includes residential, office, business park and commercial development that will be better served with adjacent access to 159th Street. The proposed interchange also will help stimulate economic development in this region. Development in the area is currently in the early stages and at less than half of the 2035 design year and full build-out. Table 1 below indicates the percentage of projected 2035 development that has been built. As development continues within the area, traffic will increase, creating operational and safety problems at existing interchanges and on the major corridors within the study area.

Table 1
Percent of 2035 and Full Build-out Land Use Currently Built

Land Use	Study Area[1]		South of 151st Street[2]	
	Housing	Office, Commercial, Industrial	Housing	Office, Commercial, Industrial
Percent current land use of 2035 projections	53%	43%	14%	17%
Percent current land use of full build-out (2050) projections	52%	30%	13%	11%

Source: Overland Park Travel Model
1 Break-In-Access Study Area shown in Figure 2.
2 Overland Park Travel Model south of 151st Street. Model boundary is east to State Line, South to 215th Street and west to Renner Road.

2.1.1 Existing (2005) Conditions

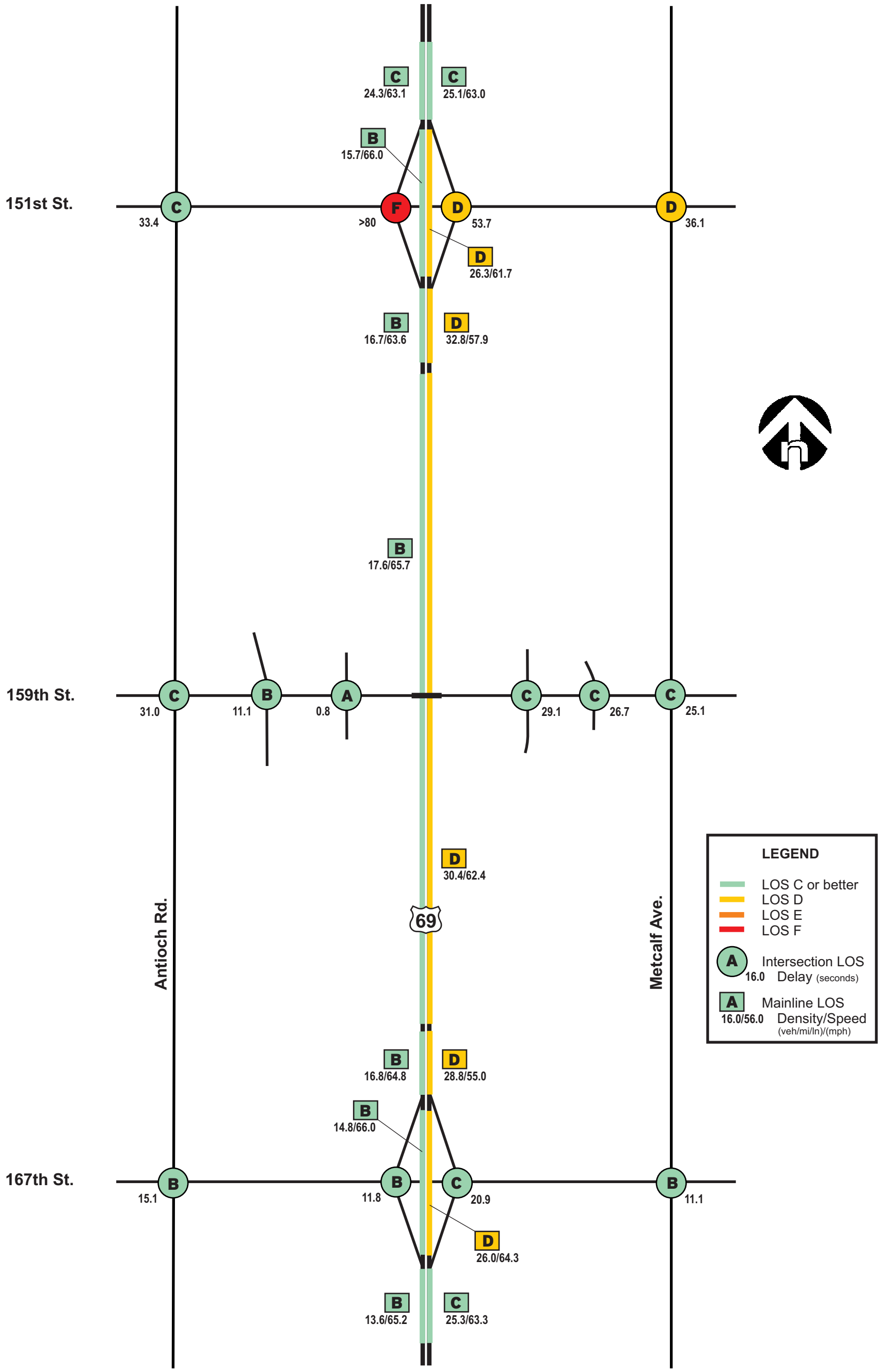
Existing traffic operations for the AM and PM peak hours were analyzed using the VISSIM simulation model. Desirable levels of service currently exist along US 69 and at the signalized study intersections. However, the traffic analysis indicates that individual movement failures are occurring, causing individual movement level of service (LOS) problems and long queues. As traffic volumes increase through the 151st Street and US 69 interchange and along the corridor, increases in vehicle queues and delay will push intersection levels of service to undesirable levels for the city and for KDOT.

2.1.2 Future (2035) No-Build Conditions

A future (2035) no-build traffic analysis was performed to provide an understanding of the traffic impacts associated without the addition of an interchange at 159th Street and US 69. "No-build" for this alternative means no interchange at 159th Street; however, other state and local roadway improvements would be completed. The future no-build alternative is defined as:

- No US 69 highway access at 159th Street
- Future widening of US 69 (six lanes south of 135th Street to 179th Street) including auxiliary lanes along US 69 both northbound and southbound, north of 151st Street
- Full access Interchange at US 69 and 167th Street
- Local street network improvements (i.e., widening of Antioch Road, Metcalf Avenue, 159th Street and 167th Street)

Figures 3 and 4 (also shown in the Traffic Report, Appendix A) show the future no-build AM and PM peak hour traffic operational analysis results. As shown in the exhibits, desirable levels of service are expected for the study area during the AM and PM peak hours with the exception of the southbound off-ramp to 151st Street.

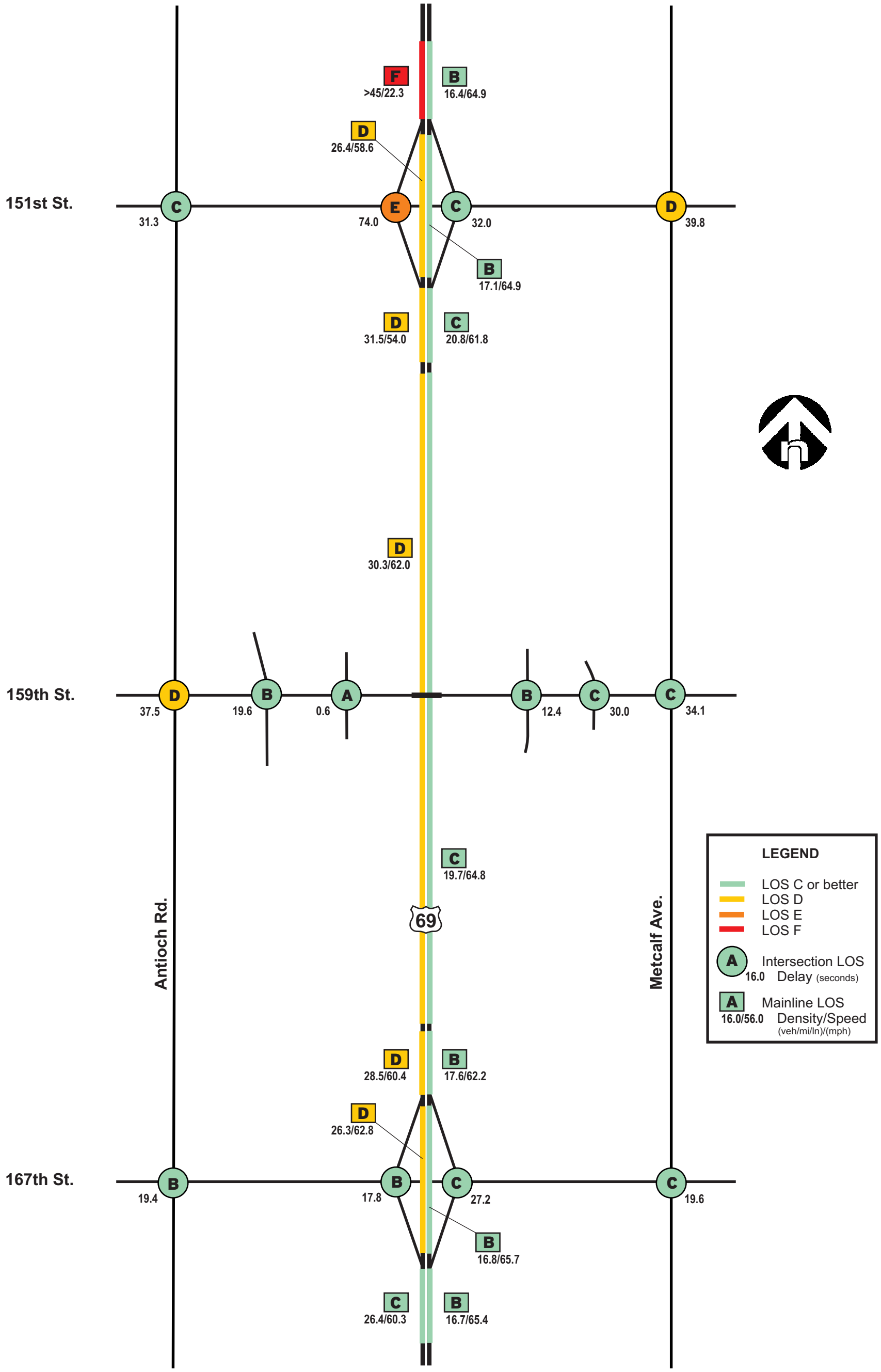


HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 AM Peak Level of Service
No-Build

FIGURE
3



HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 PM Peak Level of Service
No-Build

FIGURE
4

Significant delays and long vehicle queues are expected at the southbound off-ramp to 151st Street in the future in the no-build alternative due to two issues: (1) Continued development in south Overland Park would be primarily served by the 151st Street interchange. (2) This access point is not able to handle the increased traffic as a result of development south of the 151st Street corridor. As a result, the congestion at the southbound ramp terminal is expected to back up onto the highway mainline and create undesirable highway density and travel speeds, even after the planned 2007 project to add a second right turn lane to the southbound off-ramp at 151st Street is included in the analysis.

2.2 TRANSPORTATION SYSTEM MANAGEMENT

"All requests for new or revised access must be consistent with the metropolitan and/or statewide transportation system management plan."

The proposed interchange is consistent with *Mid-America Regional Council's (MARC) Transportation Outlook 2030.* Transportation Outlook 2030 is MARC's current long-range transportation plan (LRTP). The US 69 and 159th Street interchange is identified on a map of planned major corridor and interchange studies for the Kansas City metropolitan area. A map showing regionally significant capacity projects also identifies the interchange.

As documented in the I-35/US 69 MIS, US 69 highway will continue to serve as a transportation corridor for commuters into the Kansas City metropolitan area. Continued development southward is creating increased traffic demands on this corridor and the adjacent city street network. The study concluded that direct access to adjacent land will be important for the overall benefit of travelers in the area. The I-35/US 69 MIS limits extend south to 179th Street along US 69.

The I-35/US 69 MIS evaluated transportation system management (TSM) improvements to enhance the corridor operations. Some TSM improvements noted for the corridor include intelligent transportation system (ITS) and transit alternatives.

ITS within the study area is consistent with those being planned for the metropolitan area. In the urbanized Kansas City area, KDOT's policy is that any new interchanges should be designed to accommodate ramp metering. The I-35/US 69 MIS assumed that ramp metering would be included within the 159th Street and US 69 interchange. Ramp-metering analysis conducted in this study is provided in Appendix B.

2.3 OPERATIONAL ANALYSIS

"The proposed access point does not have a significant adverse impact on the safety and operation of the Interstate facility based on an analysis of current and future traffic."

Traffic analysis was performed to assess the impact of the proposed interchange on US 69 and the surrounding street network (see Appendix A – Traffic Report).

The analysis was performed to provide a comprehensive understanding of the impacts of adding an interchange at 159th Street. Alternatives analyzed include:

2035 No-Build Alternative

- No US 69 highway access at 159th Street

- Future widening of US 69 (six lanes south of 135th Street to 179th Street) including auxiliary lanes along US 69 both northbound and southbound, north of 151st Street
- Full access Interchange at US 69 and 167th Street
- Local street network improvements (i.e., widening of Antioch Road, Metcalf Avenue, 159th Street, and 167th Street)

2035 Build Alternative

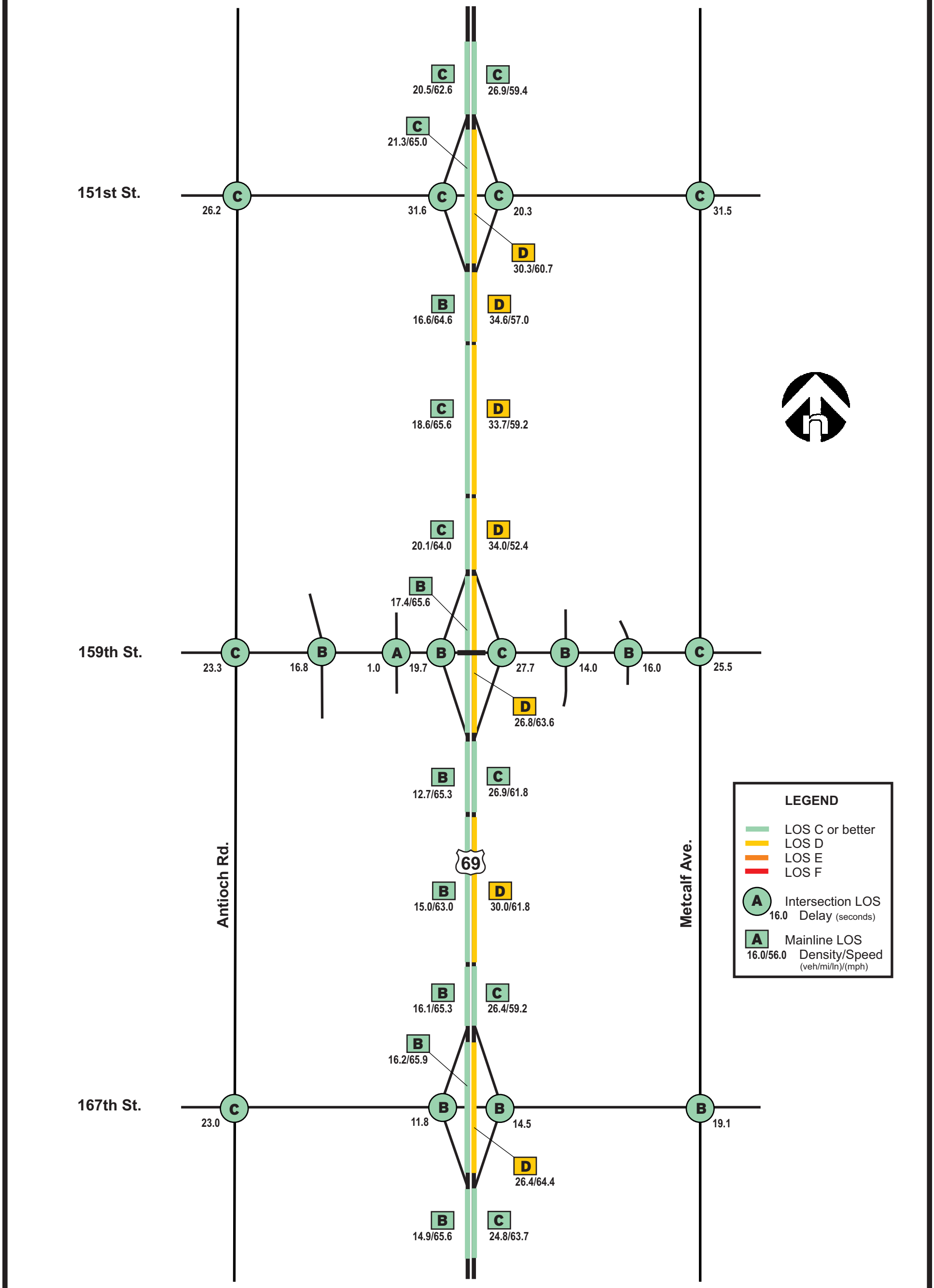
- Highway access at 159th Street (various interchange types were evaluated)
- Future widening of US 69 (six lanes south of 135th Street to 179th Street) including auxiliary lanes along US 69 both northbound and southbound, north of 151st Street plus southbound auxiliary lanes from 151st Street to 167th Street
- Full access Interchange at US 69 and 167th Street
- Local street network improvements (i.e. widening of Antioch Road, Metcalf Avenue, 159th Street, and 167th Street)

A VISSIM simulation model was developed to analyze the traffic impact on the freeway and local road network during future 2035 conditions. The traffic analysis used the Highway Capacity Manual (HCM*) 2000* methods to analyze VISSIM simulation output. Traffic studies, discussed in detail in Appendix A – Traffic Report, indicate that with the 2035 build alternative, desirable level of service results (LOS A through D) are achieved during the AM and PM peak hours in the build alternative as shown in Figures 5 and 6.

The build alternative initially included 6-lanes plus auxiliary lanes in both directions along US 69 north of 151st Street. From 151st Street to 159th, and 159th to 167th, the build alternative included only a 6–lane US 69. After initial analysis was completed, it was determined that an auxiliary lane in the southbound direction between 151st Street and 167th Street was necessary to achieve desirable level of service results. No auxiliary lane was necessary along the northbound lanes between 167th and 151st Street to meet capacity needs in the 2035 design year.

Delays and long vehicle queues shown in the no-build alternative are eliminated in the build alternative as a result of providing the additional 159th Street interchange access. As a result of the new access, traffic is spread over two off-ramps instead of just one at 151st Street and an improved level of service occurs along southbound US 69 highway and at the ramp terminals.

In summary, for the 2035 no-build condition, significant delays and congestion are expected to occur at the 151st Street interchange and along southbound US 69 in the vicinity of the 151st Street interchange. These problems are a result of future traffic growth exceeding available capacity at the 151st Street interchange. The analysis found that constructing the proposed 159th Street interchange and adding southbound auxiliary lanes between 151st Street and 167th Street on US 69 would allow all facilities, as defined in Exhibit A-14 – 2035 Intersection and Lane Geometry (Appendix A), to operate at acceptable levels of service during both peak hours through 2035. The new interchange would provide relief to adjacent interchanges and parallel corridors.

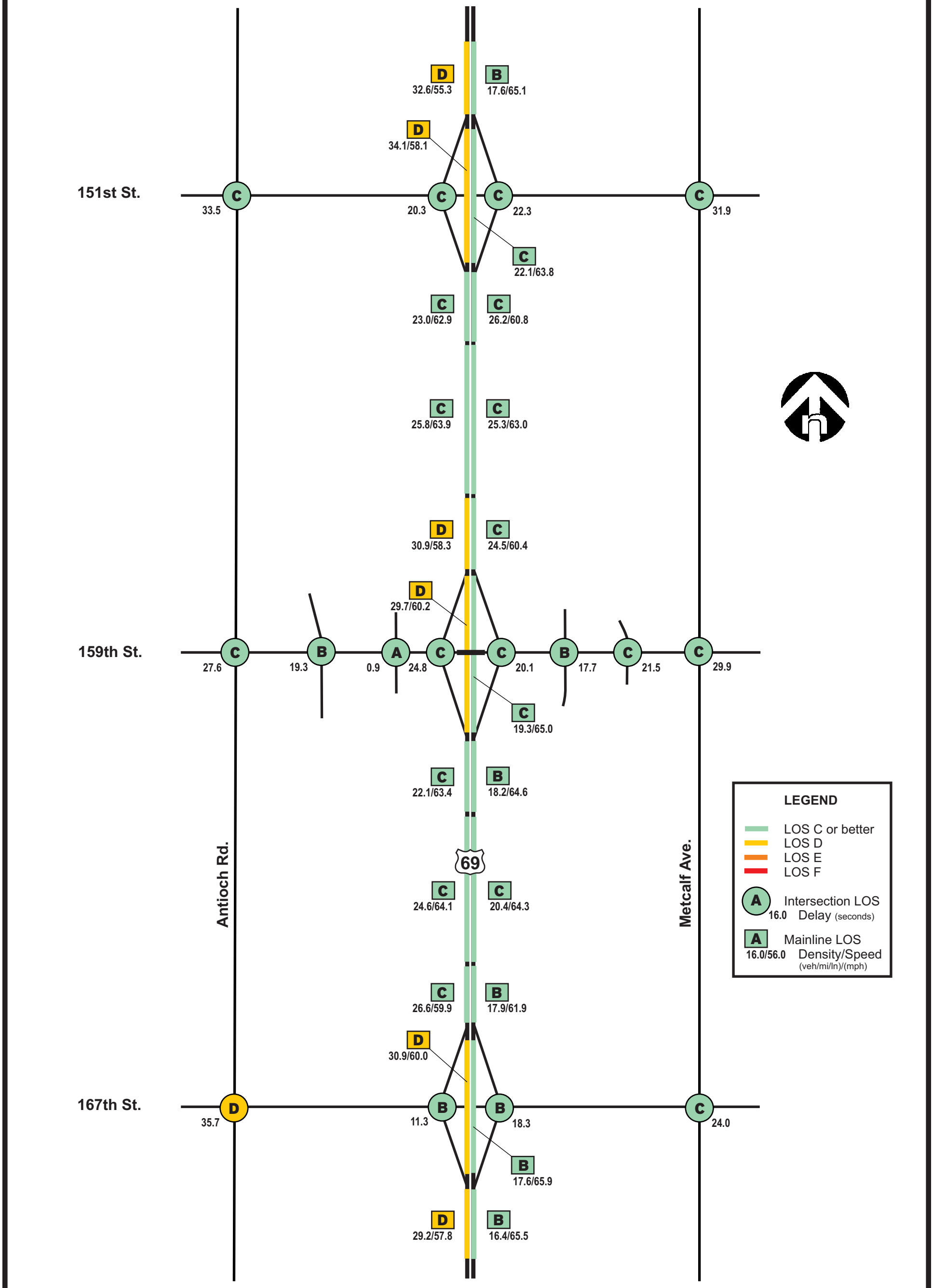


HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 AM Peak Level of Service
Build

FIGURE
5



HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 PM Peak Level of Service
Build

FIGURE
6

2.4 ACCESS CONNECTIONS AND DESIGN

"Less than full interchanges for special purposes may be considered on a case-by-case basis."

The proposed interchange will be designed with full access from both southbound and northbound lanes of US 69. The interchange will connect to existing 159th Street. Detailed plan plates of the 159th Street and US 69 interchange study area are shown in Appendix C.

2.4.1 Diamond Interchange

A diamond interchange is proposed at 159th Street and US 69, providing full access to 159th Street. This includes a 10-foot hike-and-bike path along the south side of 159th Street. The interchange impacts the WaterOne facility located in the northwest corner of the interchange. The WaterOne facility contains a maintenance building structure, an above-ground water storage facility, and associated pump facility. Figure 7 shows a general layout of the interchange, and a detailed plan of the interchange is located in Appendix C.

Alternative interchange types for this location were investigated. Previous studies identified a folded diamond for the southbound ramps and a standard diamond configuration for the northbound ramps. The folded diamond for the southbound ramps reduced the impact on the existing water storage/pump facility in the northwest quadrant of 159th Street and US 69. However, with the folded diamond interchange type, the southbound ramps are located farther away from US 69 and limit intersection locations between US 69 and Antioch Road.

The ramp terminal for a folded diamond interchange is typically located 800 ft. to 1000 ft. from the crossing facility (US 69). The ramp terminal for a diamond interchange is typically located 275 ft. to 400 ft. from the crossing facility. Using the folded diamond configuration will constrain the number of access points along 159th Street west of US 69 due to the required offset of the ramp terminal. This constraint will create problems with providing access to existing and proposed development in the area. The folded diamond configuration also requires much more right-of-way than a diamond interchange configuration.

Additional alternative interchange types were evaluated with the purpose of minimizing right-of-way needs, avoiding the water storage facility, and providing maximum distance between access points west of the interchange. A single-point urban interchange and tight urban diamond were investigated as alternative interchange options. Although there were benefits associated with right-of-way and access management for these two alternative interchange types, the physical impacts to the water storage facility could not be avoided. The cost of these two alternatives is significantly higher than the standard diamond interchange configuration.

Due to reasons stated above, the diamond interchange configuration was selected as the best overall option.

Figure 7
159th and US 69 Diamond Interchange

2.5 TRANSPORTATION LAND-USE PLANS

"The proposal considers and is consistent with local and regional land use and transportation goals."

The need for a new interchange along US 69 has been recognized in local and regional land use and transportation plans. Over the past 17 years the following studies have incorporated the proposed interchange in their planning efforts:

Overland Park

- Future Development Plan (last adopted in 2005)
- 159th Street Preliminary Engineering Study (1999)
- Interchange Feasibility Study (US 69 and 159th Street) (1989)

Regional

- Transportation Improvement Program -TIP (2006)
- MARC's 2030 Long-Range Transportation Plan (2005)
- I-35/US 69 MIS (2001)

2.5.1 City of Overland Park

Future Development Plan (2005)

The 159th Street interchange is included in Overland Park's future development plan, which is part of the city's comprehensive master plan. Last adopted in October 2005 (and updated on an annual basis), the future development plan identifies Overland Park's future vision for the study area. The plan is a graphic representation of land-use goals and policies of the city as identified in the text of the master plan.

While the study area is sparsely developed at the current time, rapid growth is occurring. The city's future development plan shows all types of land uses, including retail centers, office parks, residential neighborhoods, and public facilities. Figure 8 shows the 2005 adopted future development plan. To accommodate economic growth of the future land use, a transportation plan is also represented in the development plan. The transportation plan identifies the street functional classifications as well as the proposed 159th Street and US 69 interchange.

159th Street from Antioch Road to Metcalf Avenue Preliminary Engineering Study (1999)

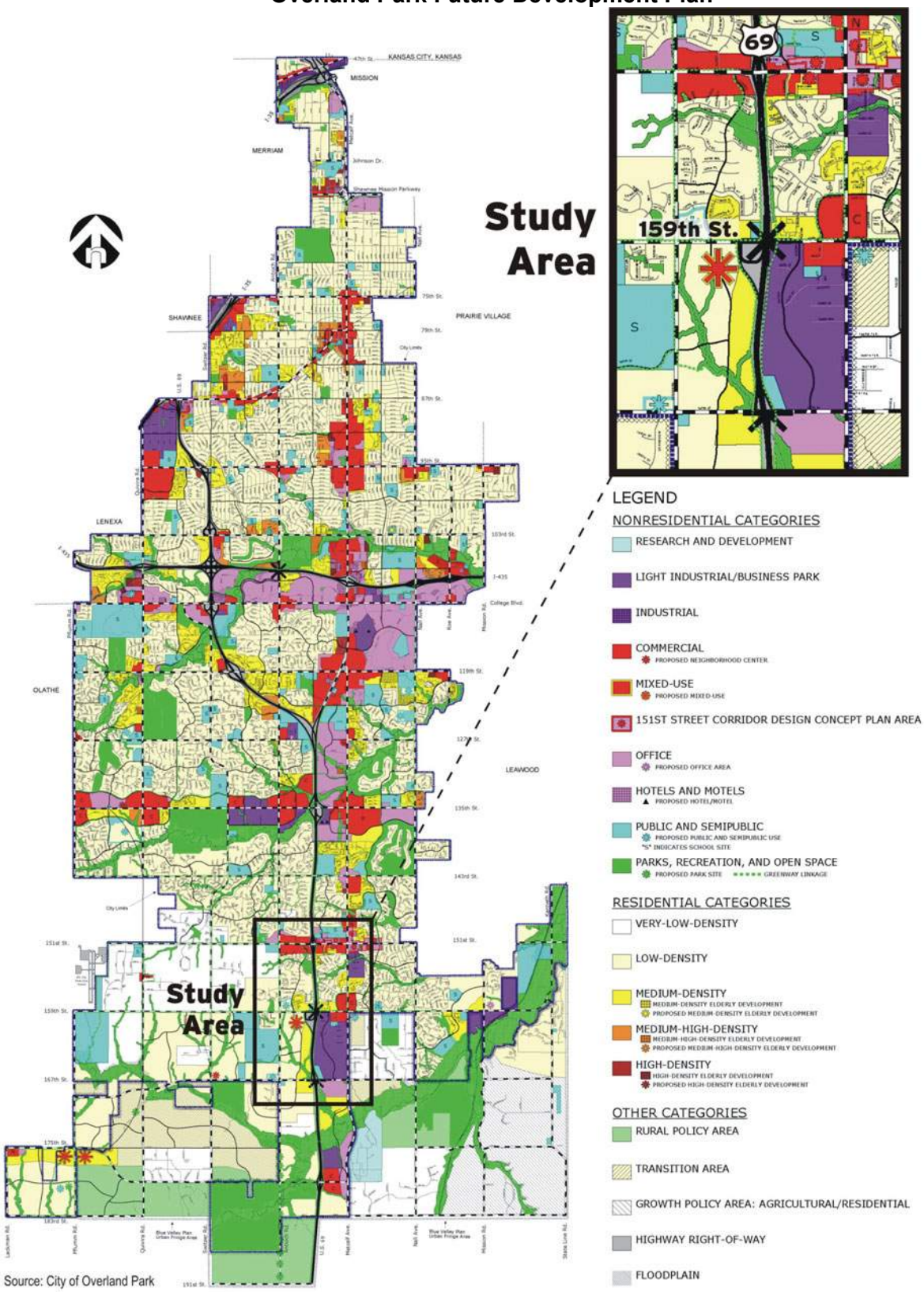
A study was performed to establish preliminary horizontal/vertical alignments for 159th Street (Antioch Road to Metcalf Avenue), Antioch Road (151st Street to 159th Street), and the proposed 159th Street and US 69 interchange. The purpose of the study was to develop a preliminary design to minimize impact to existing infrastructure and to serve as a planning tool for future development.

The recommended interchange configuration identified was a partial folded diamond interchange with the folded ramps in the southwest quadrant. This change from the 1989 study (see below) was made in response to comments from KDOT regarding the water storage facility being located within the loop ramp area.

Interchange Feasibility Study (US 69 and 159th Street) (1989)

An interchange feasibility study was performed for Overland Park and Johnson County in 1989 to identify the needed intersection improvements at 159th Street and Metcalf Avenue and to perform a study of the feasibility of an interchange at 159th Street and US 69. The study identified existing conditions, future growth patterns, facility needs, and interim improvements. It was concluded that an interchange between 151st Street and 167th Street was needed. A partial folded diamond interchange was identified, with the folded ramps in the northwest corner for the southbound direction and traditional diamond ramps for the northbound direction.

Figure 8
Overland Park Future Development Plan



Source: City of Overland Park

2.5.2 Region

Transportation Improvement Program -TIP (2006)

As the designated metropolitan planning organization (MPO) for the Greater Kansas City area, the Mid-America Regional Council (MARC) maintains a financially-constrained transportation improvement program (TIP) for the region. The TIP contains individual transportation improvements and projects to be implemented in the next five years. Only the first three years are included in the state transportation improvement program (STIP).

The 159th Street and US 69 interchange is identified in MARC's project listing as TIP # 350021 – Widen 159th Street from two lanes to four lanes and construct interchange at US 69. Before construction and right-of-way phases proceed, a determination of engineering and operational acceptability will need to be made by KDOT.

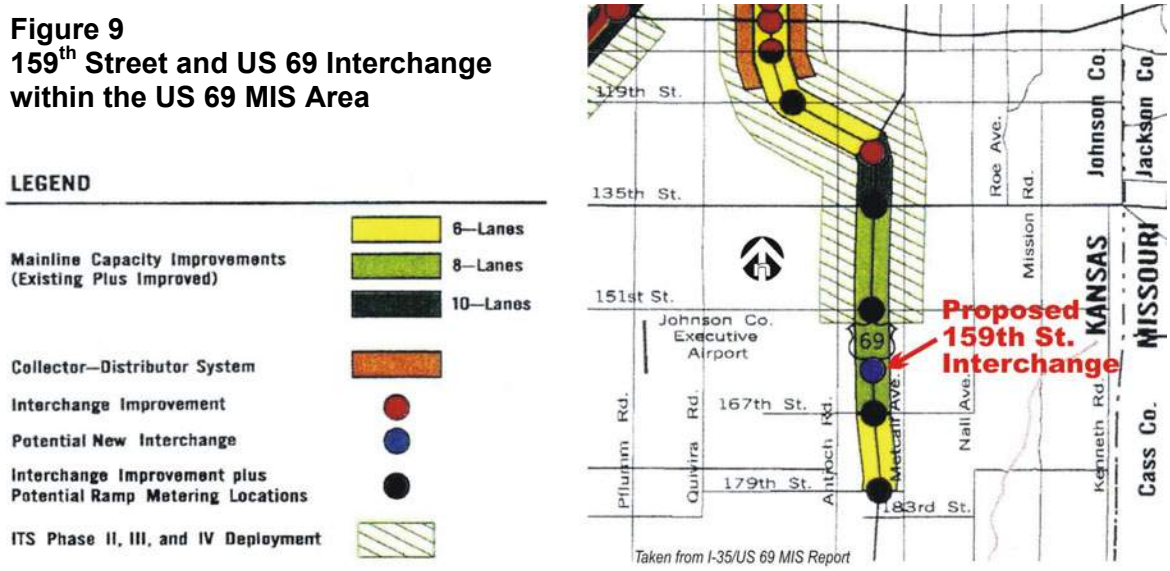
Mid-America Regional Council's Transportation Outlook 2030 (2005)

Transportation Outlook 2030 is MARC's current long-range transportation plan (LRTP). The US 69 and 159th Street interchange is listed on a map of major corridor and interchange studies for the Kansas City metropolitan area. A map showing regionally significant capacity projects also identifies the interchange.

I-35/US 69 Major Investment Study (MIS) (2001)

The I-35/US 69 MIS was sponsored by KDOT in coordination with MARC and several transportation agencies in Johnson County. The purpose of the study, with a design year of 2020, was to identify needed future improvements for the I-35 and US 69 highway corridors. The MIS southern study terminus along US 69 was 179th Street. Figure 9 illustrates the interchange study for the area of 159th Street and US 69 in relation to the US 69 MIS corridor.

Figure 9
159th Street and US 69 Interchange within the US 69 MIS Area



The primary study objectives were characterized as follows:

- Determine how to widen I-35 and US 69
- Determine impacts of widening
- Establish where new interchanges should be considered
- Plan for other modes of transportation within the study corridors
- Provide guidance to local agencies when making land-use decisions
- Provide guidance to the MPOs when making transportation planning and programming decisions

Based on the overall comparison of the benefits and impact of each combination strategy alternative using the evaluation methodology described in the report, and considering the trade-offs of each evaluation factor, the full build-out alternative (including modified C-D roadway, I-35 commuter rail upgrades, ITS improvements, and ramp metering) was recommended by the study management team as the most appropriate design concept and scope for the I-35/US 69 corridors. Specific recommendations regarding the implementation of alternative D within the 159th Street and US 69 interchange study area include the recommendation that US 69 be widened to a six-lane facility and that a new interchange be included at 159th Street. Improvements to adjacent US 69 interchanges at 151st Street and 167th Street were also identified in the study.

2.6 COMPREHENSIVE INTERSTATE NETWORK STUDY

"In areas where the potential exists for future multiple interchange additions or modifications, all requests for new or revised access are supported by a comprehensive interstate network study with recommendations that address all proposed desired access within the context of a long-term plan."

It is the position of the City of Overland Park that, other than the proposed access at 159th Street, no additional access will be pursued within the study area between 151st Street and 167th Street.

2.7 COORDINATION WITH TRANSPORTATION SYSTEM IMPROVEMENTS

"The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements."

The City of Overland Park has been coordinating development of the area that will be served by the proposed interchange since the mid 1980s. As a consequence, city planners have programmed necessary local roadway improvements to coordinate with the design and construction of the proposed interchange. This has been accomplished through the Overland Park Capital Improvement Plan (CIP) process and in coordination with MARC through its transportation improvement plan (TIP). Projects are either underway or are planned to improve the local roads in the study area including 151st Street, 159th Street, Antioch Road, and Metcalf Avenue.

2.8 PLANNING AND NEPA PROCESS

"The request for new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal."

The break-in-access request at 159th Street will undergo a National Environmental Protection Act (NEPA) review prior to the start of final design for the interchange. Because final approval for the break-in-access request cannot precede the completion of the NEPA process, this request is for a determination of engineering and operational acceptability. A screening-level environmental investigation has been performed in the vicinity of the proposed interchange. This review included archival research and review of published information regarding the corridor. On-site evaluations have not yet been performed; these will be accomplished during subsequent studies and evaluations. At the study screening level, terrestrial vegetative communities were documented with regard to threatened and endangered species of wildlife and plants within this area of Johnson County. Riparian corridors were also noted, including wetlands. In addition, cultural-resources documents were reviewed during the screening process. A summary of the noted general conditions follows by subject heading.

Topography

There is a rolling topography in the vicinity of the proposed interchange at US 69 and 159th Street. The difference in elevation varies from approximately 980 feet to 1070 feet, with a ridge located near the proposed interchange. The area drains both north and south of the proposed interchange.

Drainage Patterns

There are two major creeks in the vicinity of the intersection: Negro Creek to the northeast and an unnamed tributary of the Blue River to the southwest. Both of these streams flow eastward to their confluence with the Blue River. No stream crossings are located near the proposed US 69 and 159th Street interchange. Floodplains are defined for these streams and within areas north of the proposed interchange.

Wetlands

MARC recently released a report "On the Map: Conservation Planning for the Kansas City Region, February 2005". This included a number of environmental features drawn from a variety of sources, including the National Wetlands Inventory (NWI) maps. Any wetlands that might be identified within the general vicinity of the proposed interchange would be associated with streams, farm ponds, and detention areas.

Terrestrial Communities

Terrestrial communities, including grasslands, woodlands, and marsh, can be found in this area of the county. Both grassland and cultural grassland make up the majority of the communities in the vicinity of the proposed interchange. There are also small areas of marsh and wet herbaceous vegetation associated with farm ponds.

Urban forest is found in several locations in this vicinity, but this classification appears to show up in pockets of vegetation within developed areas. Deciduous woodland and immature forest include those areas previously altered through agriculture or forestry activities and can exhibit minimal subsequent management activities. These woodlands have self-regenerated and can exhibit a wide variety of species, composition, size, class, and appearance. These occur in a few areas near the proposed interchange.

Threatened and Endangered Species

For purposes of the screening-level study, research was done using the Kansas Department of Wildlife and Parks web site. Of the threatened and endangered species listed for the entire Johnson County area, five are noted as "endangered" by the state of Kansas and 10 are noted as "threatened." Within the entire Johnson County area, four species are listed as "endangered" by the US Fish and Wildlife Service and one is listed as "threatened." Further review of the site will be necessary to determine if any of these species are found within this specific vicinity.

Most of the grasslands, forests, and wetlands within this area of Johnson County have been degraded through past land-use practices and have minimal potential for providing habitat for resident or migratory species. These degraded habitats do have value, however, as they can form a buffer to high-quality habitats.

Cultural Resources

There are no known cultural sites in the vicinity of the proposed US 69 and 159th Street interchange. A review of the site files at the Kansas State Historical Society indicated a low probability for sites within the vicinity of the proposed interchange.

2.9 CONCLUSION

The City of Overland Park wishes to construct a new interchange along US 69 highway at 159th Street. Therefore a break in highway access is being requested to KDOT. The purpose of the new interchange is to relieve traffic congestion at the existing US 69/151st Street interchange and along the 151st Street corridor, increase traffic safety through the study area, provide access to existing and future community facilities in the study area, and to assist economic development in the area.

To ensure that the highway system is able to provide the best level of service in terms of safety and mobility, eight KDOT requirements were evaluated. The proposed highway plan and the attached report provide KDOT with the necessary information to demonstrate that acceptable levels of safety and mobility are achieved within the study area in the 2035 design year with the addition of the 159th Street and US 69 interchange.

Appendix C identifies the 2035 design year build project used in the break-in-access analysis. Once the access break review is completed, a next step will require KDOT and Overland Park to develop a plan defining the implementation of the build conditions including the specific improvements to be included with the interchange construction project.

APPENDIX A
Traffic Report

159th Street and US 69 Traffic Report

Appendix A

April 21, 2006

prepared for:
City of Overland Park, Kansas
Kansas Department of Transportation

HNTB

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Table A-1a Existing Freeway Level of Service Analysis
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APPENDIX A

159th Street and US 69 Interchange Traffic Report

1.0 Introduction

The City of Overland Park requests a break in highway access along US 69 at 159th Street. The purpose of this technical report is to document the detailed traffic operational analysis of the proposed changes to the surrounding transportation system.

The proposed interchange will be constructed along US 69 at 159th Street. The study area extends north/south along US 69 from the 151st Street interchange to the 167th Street interchange. The study extends from Metcalf Avenue on the east to Antioch Road on the west as shown in Exhibit A-1.

2.0 Methodology

2.1 DATA COLLECTION

The following data was gathered at the beginning of the study to assist in the evaluation of the traffic.

- 2005 Overland Park Travel Model
- Existing daily AM and PM peak hour traffic counts
- Existing lane geometrics and intersection control
- Existing travel-time studies conducted on all study area streets
- 2000 – 2005 accident data

2.2 FORECASTING

In 2005 a new Overland Park travel model was developed to forecast traffic for 2030 PM peak hour conditions. Existing 2005 and future 2030 land-use data was developed for the new model. The 2030 long-range regional model developed by the Mid-America Regional Council (MARC) was used as input for the regional travel characteristics. Compared to the previous Overland Park model, the roadway network was expanded south. The travel model was calibrated to 2005 existing conditions, and as a result, a 2030 PM peak hour traffic forecast was developed.

KDOT requested 2035 design year forecasts. To develop the forecasts, additional land use by location and intensity between 2030 and 2035 was identified by Overland Park's planning department. The travel model was then used to forecast 2035 PM peak hour traffic. Adjustments to future traffic volumes were made based on the base models ability to replicate existing traffic. The 2035 AM peak hour traffic was developed by transposing the PM trip table and applying an AM:PM ratio of trip generation by land-use type. The 2035 AM and PM peak hour forecasts were reviewed and approved by KDOT.

2.3 OPERATIONAL ANALYSIS

Operational results were characterized using analysis methods from the Highway Capacity Manual (HCM). The fundamental HCM parameter describing operational quality is level of service (LOS), an A (best) through F (worst) ranking scale. Overland Park and KDOT considered LOS D or better in the design year as the acceptable threshold for this study.

For freeway elements, LOS is based on density, defined as the number of vehicles per mile per lane. For intersections, LOS is based on the average control delay per entering vehicle. Control delay includes not only stops at intersections, but also slower speeds as vehicles advance in queue or decelerate upstream of an intersection. For the purposes of this study, the computer program VISSIM (version 4.10) was used to evaluate traffic operations. VISSIM is a micro-simulation model. The VISSIM model was calibrated to replicate existing conditions using field-measured travel speeds and existing traffic volumes. A Synchro model was developed to perform a preliminary assessment of needed intersection turning lanes and signal timings to be used in the VISSIM model. To determine anticipated operational conditions, the VISSIM models were run five times and the operational data was averaged.

The simulation model was used to evaluate freeway density and intersection delay in a way that would be analogous to HCM procedures. Table 1 shows the LOS ranges used to evaluate freeway lanes, signalized intersections, and unsignalized intersections.

Table 1
Level of Service Thresholds

LOS	**Freeways Mainline** Max Density (pc/mi/ln)	**Freeways Merge/Diverge** Max Density (pc/mi/ln)	**Signalized Intersections** Avg. Delay (sec/veh)	**Unsignalized Intersections** Avg. Delay (sec/veh)
A	≤ 11	≤ 10	≤ 10	≤ 10
B	> 11 – 18	> 10 – 20	> 10 - 20	> 10 - 15
C	> 18 – 26	> 20 – 28	> 20 - 35	> 15 - 25
D	> 26 – 35	> 28 – 35	> 35 - 55	> 25 - 35
E	> 35 – 45	> 35	> 55 - 80	> 35 - 50
F	> 45	Demand Exceeds Capacity	> 80	> 50

Source: Highway Capacity Manual 2000

3.0 Existing (2005) Conditions

3.1 TRAFFIC VOLUMES

Existing (2003-2004) AM and PM peak hour traffic counts for the signalized intersections in the study area were provided. Existing (2004) US 69 counts were obtained from a KDOT highway map. Exhibit A-2 shows the existing peak hour traffic volumes. A summary of US 69 and arterial traffic volumes are shown in Tables 2 and 3.

Table 2
Existing Counts
US 69 Traffic

Location	AM	PM
US 69 south of 151st Street	1,854 NB	1,660 SB
151st Street Interchange[1]	4,025	4,504

Source: Estimated based on 2004 ADT KDOT highway count map and I-35/US 69 existing directional distribution and percent in peak hour.
1 Interchange counts are represented by the total of all the interchange approach vehicles.

Table 3
Existing Counts
Arterial Traffic (Two-Way)

Location	AM	PM
Metcalf Avenue (South of 151st Street)	1,230	1,726
Antioch Road (South of 151st Street)	535	479

Source: City of Overland Park, 2003-2004

3.2 ROADWAY NETWORK

Exhibit A-3 shows the existing (2005) transportation network within the study area. The only four-lane divided roadway corridors that have been improved within the study area are 151st Street between Antioch Road and Metcalf Avenue and Metcalf Avenue between 151st Street and 159th Street. The remainder of the study area roadway network consists of rural two-lane roadways. There are currently signalized intersections along the 151st Street corridor. The only other signalized intersections within the study area are located along Metcalf Avenue at the intersections with 158th Street and with 159th Street.

US 69 currently has a full-access interchange at 151st Street and a partial access to and from the north at 167th Street within the study area.

3.3 OPERATIONAL ANALYSIS

Exhibits A-4 and A-5 show the existing AM and PM peak hour traffic operational analysis results. Existing signal timings were optimized for this analysis. As shown in the exhibits, desirable level of service currently exists along US 69 and at the signalized study intersections. However, traffic analysis indicates that individual movement failures are occurring. During the AM peak hour, a significant volume of westbound (i.e., right-turning) vehicles at 151st Street and the US 69 northbound on-ramp results in long vehicle queues and delay. During the PM peak hour, significant southbound volumes at the 151st Street and US 69 southbound off-ramp results in long vehicle queues and delay. As traffic volumes increase through the 151st Street and US 69 interchange and along the corridor, increases in vehicle queues and delay will push intersection level of service to undesirable levels for the city and for KDOT.

3.4 SAFETY

The traffic on the 151st Street corridor from Antioch Road to Metcalf Avenue will increase as development in south Overland Park continues. The City of Overland Park keeps extensive safety data for many of its roadways. Accidents that occurred between 2003 and 2005 are shown below.

Accidents on 151st Street (Antioch Road to Metcalf Avenue)

- 2005: 132 total accidents (31 mid-block accidents, 101 intersection-related accidents) – 18 were injury accidents
- 2004: 103 total accidents (18 mid-block accidents, 85 intersection-related accidents) – 23 were injury accidents
- 2003: 123 total accidents (31 mid-block accidents, 92 intersection-related accidents) – 18 were injury accidents

The interchange at 151st Street and US 69 is of particular concern regarding traffic accidents. Thirty-three accidents occurred in 2005 at the US 69 and 151st Street southbound off-ramp. This number ranks 12th on the list for high accident locations for 2005 in Overland Park. None of the other locations within the study area rank higher than 36th.

151st Street and US 69 Interchange Accidents

- 2005: 46 total accidents (33 on US 69 west side, 13 on US 69 east side) – six were injury accidents
- 2004: 32 total accidents (21 on US 69 west side, 11 on US 69 east side) – seven were injury accidents
- 2003: 42 total accidents (24 on US 69 west side, 18 on US 69 east side) – six were injury accidents

Exhibit A-17 in the addendum outlines the accidents that occurred along the 151st Street corridor from 2003 to 2005.

4.0 Future (2035) No-Build Conditions

4.1 TRAFFIC VOLUMES

Traffic forecasts for the future no-build and build conditions were developed from the Overland Park travel model. Exhibit A-6 shows the traffic growth from 2005 to 2035 during the PM peak hour in terms of trip origins and destinations from each traffic zone. The exhibit shows the magnitude of increased traffic, represented by the size of the pie graph, in each traffic zone. As indicated, a significant increase in traffic is anticipated south of 159th Street and west of US 69.

Exhibit A-7 shows the future 2035 no-build peak hour traffic volumes. A summary of US 69 and arterial traffic volumes are shown in Tables 4 and 5.

Table 4
Future 2035 No-Build
US 69 Traffic Forecasts

Location	AM	PM
US 69 south of 151st Street	5,568 NB	5,952 SB
151st Street Interchange[1]	6,151	6,713
167th Street Interchange[1]	2,412	2,789

1 Interchange forecasts are represented by the total of all the interchange approach vehicles.

Table 5
Future 2035 No-Build
Arterial Traffic Forecasts (Two-Way)

Location	AM	PM
Metcalf Avenue (South of 151st Street)	3,932	3,861
Antioch Road (South of 151st Street)	1,930	2,651
151st Street (East of US 69)	3,802	4,425
159th Street (West of US 69)	2,276	3,025
167th Street (West of US 69)	1,574	1,869

4.2 ROADWAY NETWORK

The future (2035) no-build provides a base condition to compare the future build network. The no-build network describes no interchange access at 159th Street and US 69. However, it does include other future network improvements programmed in the area. Exhibit A-8 provides a detailed description of the future no-build roadway network in the study area with more detailed lane geometrics shown along the 159th Street corridor. The future no-build alternative is defined as:

- No US 69 highway access at 159th Street
- Future widening of US 69 (six lanes south of 135th Street to 179th Street) including auxiliary lanes along US 69 both northbound and southbound, north of 151st Street
- Full access Interchange at US 69 and 167th Street
- Local street network improvements (i.e., widening of Antioch Road, Metcalf Avenue, 159th Street, and 167th Street)

4.3 OPERATIONAL ANALYSIS

The VISSIM simulation model was used to analyze future no-build conditions. Exhibits A-9 and A-10 show the future no-build AM and PM peak hour traffic operational analysis results. Table A-1a-d in the addendum shows the detailed results of the AM and PM peak hour operational analysis. As shown in the exhibits, desirable level of service is expected for the study area during the AM and PM peak hours with the exception of the southbound diverge to 151st Street and the southbound ramp terminal at 151st Street.

Significant delays and long vehicle queues are expected at the southbound off-ramp to 151st Street in the future with the no-build alternative, as continued development in south Overland Park would be served by the 151st Street interchange. High delay and poor level of service at the southbound ramp terminal is indicative of significant congestion within the entire interchange area. This access point is not able to handle the increased traffic as a result of development south of 151st Street corridor. As a result, the congestion at the southbound ramp terminal is expected to back up onto the highway mainline and create undesirable highway density and travel speeds.

5.0 Future (2035) Build Conditions

5.1 TRAFFIC VOLUMES

Traffic forecasts for the future build were developed from the Overland Park travel model. Exhibit A-11 shows the future 2035 build peak hour traffic volumes. A summary of US 69 and arterial traffic volumes are shown in Tables 6 and 7.

Table 6
Future 2035 Build
US 69 Traffic Forecasts

Location	AM	PM
US 69 south of 151st Street	6,025 NB (8% Increase)	6,508 SB (9% increase)
151st Street Interchange[1]	4,668 (24% decrease)	5,399 (20% decrease)
167th Street Interchange[1]	2,141 (11% decrease)	2,505 (10% decrease)

1 Interchange forecasts are represented by the total of all the interchange approach vehicles.

Table 7
Future 2035 Build
Arterial Traffic Forecasts (Two-Way)

Location	AM	PM
Metcalf Avenue (South of 151st Street)	3,510 (11% decrease)	3,681 (5% decrease)
Antioch Road (South of 151st Street)	1,856 (4% decrease)	2,481 (6% decrease)
151st Street (East of US 69)	2,965 (22% decrease)	3,743 (15% decrease)
159th Street (West of US 69)	3,027 (33% increase)	3,529 (17% increase)
167th Street (West of US 69)	1,555 (1% decrease)	1,852 (1% decrease)

As shown in these tables, shifts in peak hour traffic demand are expected as a result of the new 159th Street access. The US 69 interchanges at 151st Street and 167th Street would be expected to have a reduction in traffic as a result of the new access point at 159th Street, with the 151st Street interchange receiving the greatest reduction-in-traffic benefit. Exhibits A-12 and A-13 show the change in traffic between 2035 AM and PM peak hour traffic flow difference with and without an interchange at 159th Street and US 69.

5.2 ROADWAY NETWORK

The future (2035) build roadway network provides new freeway access at 159th Street compared to the no-build condition. The build condition provides a new full access diamond interchange at 159th Street and US 69 in addition to the no-build improvements identified in Section 4.2. Based on operational analysis, auxiliary lanes would be needed in the southbound direction between 151st Street Interchange and 167th Street Interchange.

Initially, the build alternative included a 6-lane US 69 plus auxiliary lanes in both directions along US 69 north of 151st Street. From 151st Street to 159th and 159th to 167th the build alternative included only a 6-lane US 69. After initial analysis was completed, it was determined that an auxiliary lane in the southbound direction was necessary to achieve desirable level of service thresholds. No auxiliary lane was necessary along the northbound lanes between 167th and 151st Street to achieve capacity needs in the 2035 design year.

Exhibit A-14 provides a detailed description of the future build roadway network in the study area with more detailed lane geometrics shown along the 159th Street corridor. Some of the important components of the network include:

- Highway access at 159th Street (various interchange types were evaluated)
- Future widening of US 69 (six lanes south of 135th Street to 179th Street) including auxiliary lanes along US 69 both northbound and southbound, north of 151st Street, plus southbound auxiliary lanes from 151st Street to 167th Street.
- Full access Interchange at US 69 and 167th Street
- Local street network improvements (i.e. widening of Antioch Road, Metcalf Avenue, and 167th Street)

5.3 OPERATIONAL ANALYSIS

The VISSIM simulation model was used to develop the operational analysis for the future build conditions. Exhibits A-15 and A-16 show the future build AM and PM peak hour traffic operational analysis results. Detailed results of the AM and PM peak hour operational analysis are shown in Table A-1a-d. The VISSIM model results indicated that a desirable level of service is expected within the study area during the AM and PM peak hours.

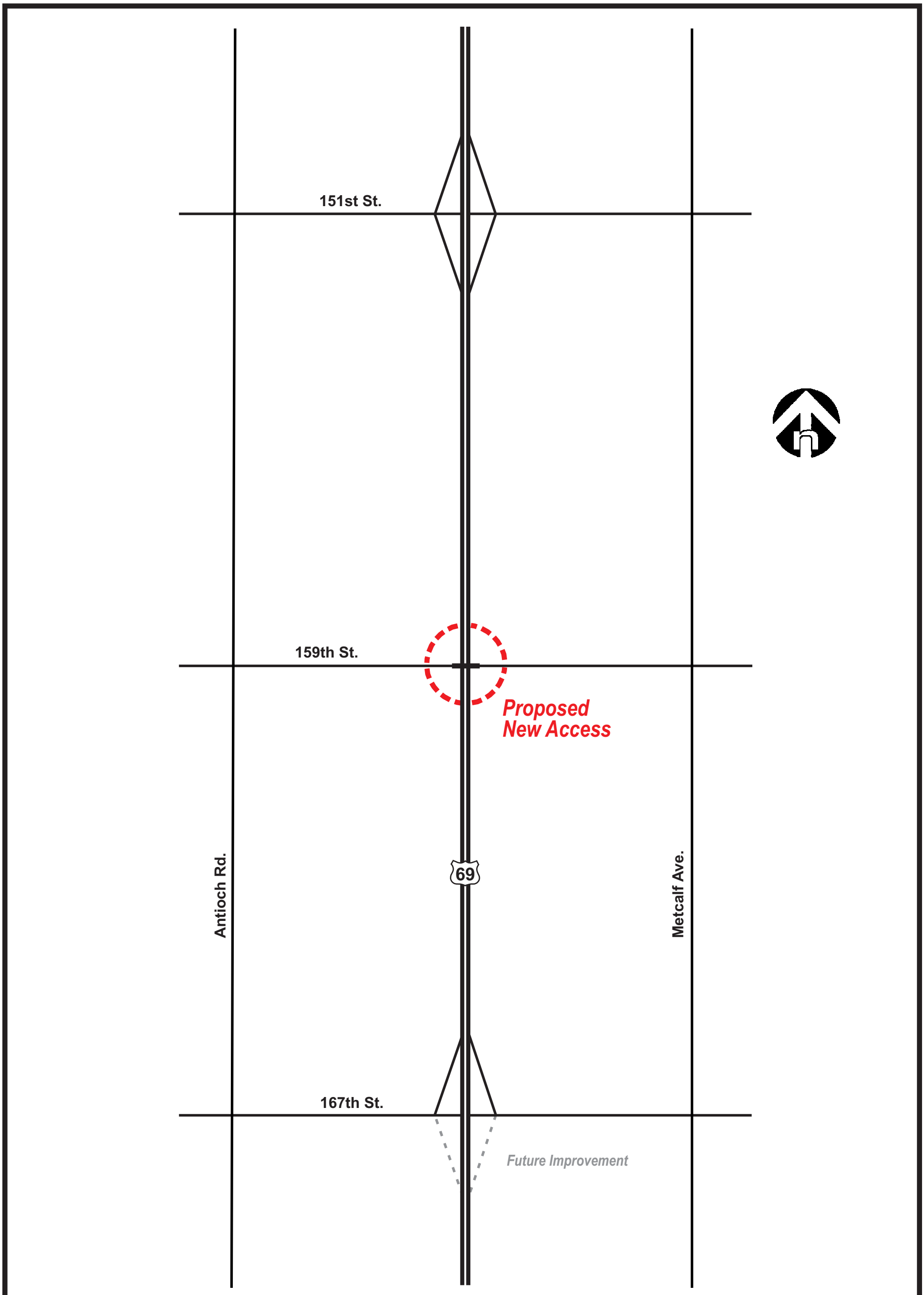
Delays and long vehicle queues that were observed in the future no-build alternative at the 151st Street interchange were eliminated in the build alternative as a result of the additional 159th Street interchange access. The addition of the new interchange also allows traffic to spread over two off-ramps instead of impacting just one interchange at 151st Street. Therefore, an improved level of service occurs along US 69 at the existing 151st Street ramp terminals as a result of the addition of the 159th Street interchange.

Auxiliary lanes in the northbound direction from the 167th Street on-ramp to the 151st Street off-ramp could be added to maximize safety due to the one-mile interchange spacing and close proximity of on-ramp and off-ramps, however, they are not needed for capacity reasons. In addition, auxiliary lanes in the northbound direction would help extend the capacity of US 69 mainline beyond the 2035 design year.

6.0 Conclusions

The analysis indicates that, under existing conditions, there are no locations that experience comprehensive undesirable level-of-service conditions. However, some individual movements have begun to fail in the 151st Street corridor. Increased traffic in the study area will worsen the traffic congestion around the 151st Street interchange to undesirable conditions. By the 2035 design year and under no-build conditions, significant delay and congestion are expected at the 151st Street interchange and along southbound US 69. These conditions are a result of problems associated with the 151st Street interchange as future traffic growth overtakes available capacity. Further, the analysis found that constructing the proposed interchange at 159th Street with US 69 mainline and auxiliary lane improvements would allow all facilities evaluated in the study area to operate at acceptable levels of service during both peak hours in 2035. The new interchange would provide relief to adjacent interchanges and parallel corridors thus enhancing safety in the area.

ATTACHMENTS



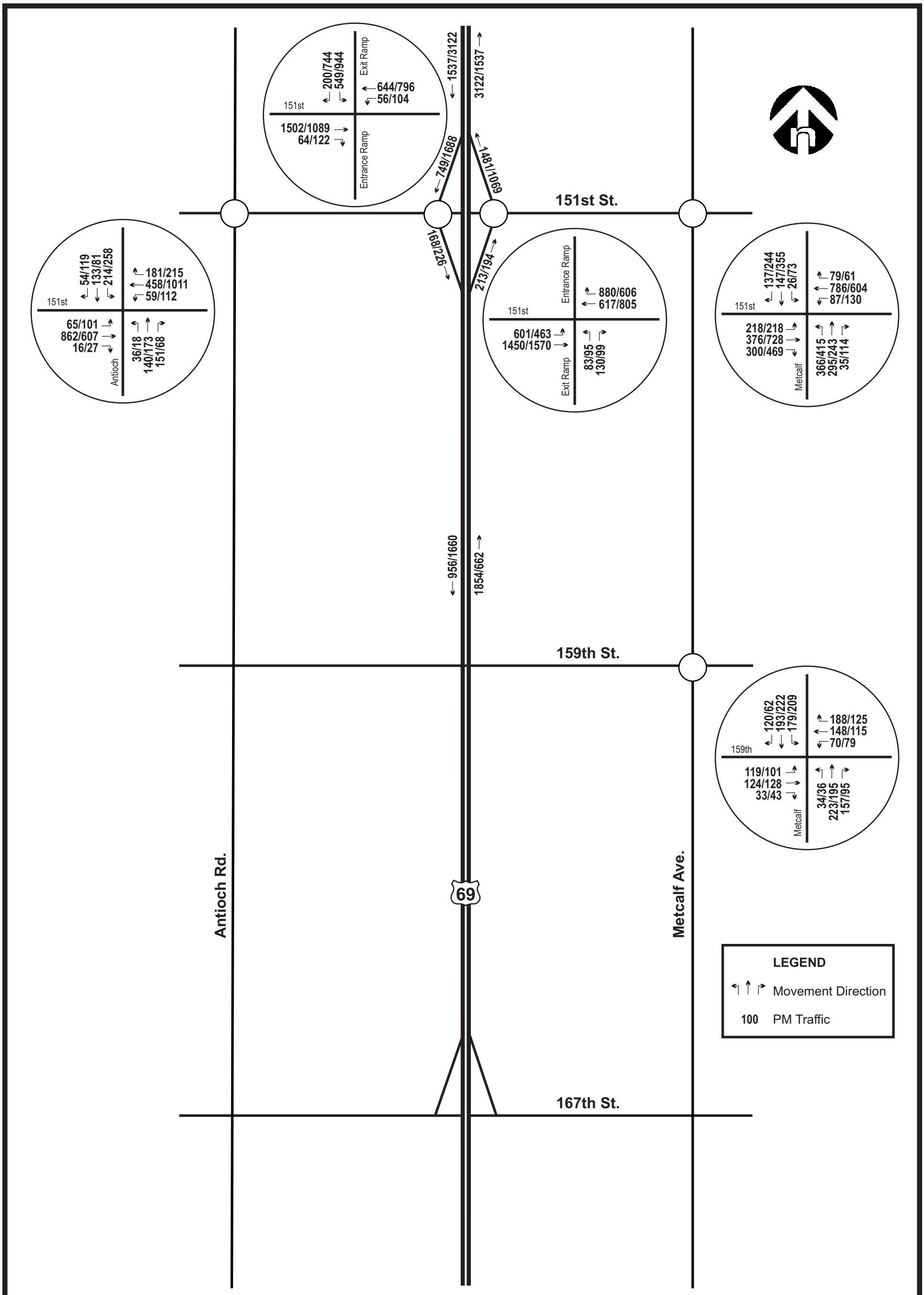
TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

HNTB

Study Area

EXHIBIT

A-1



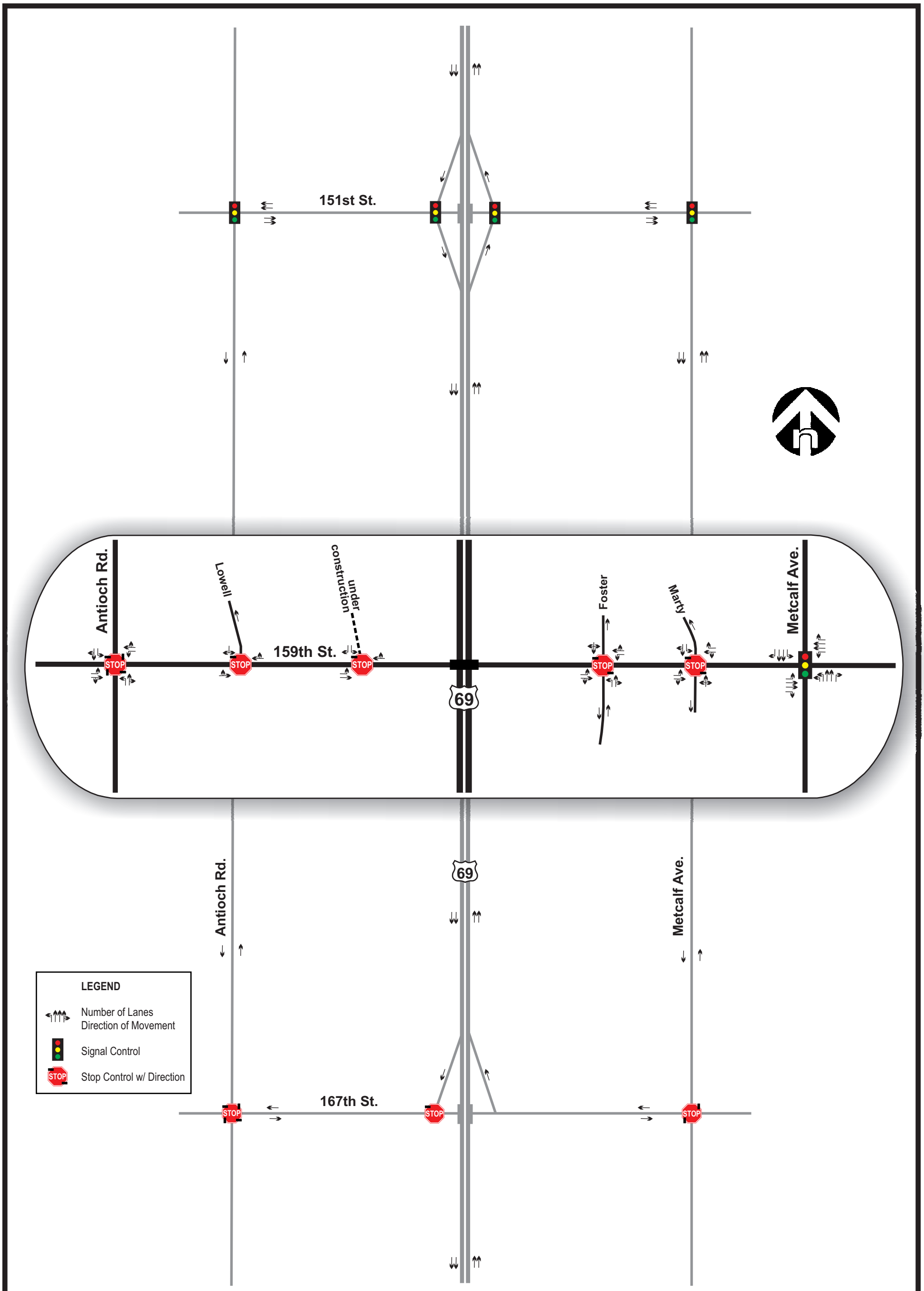
HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

Existing AM/PM Peak Hour Traffic

EXHIBIT

A-2



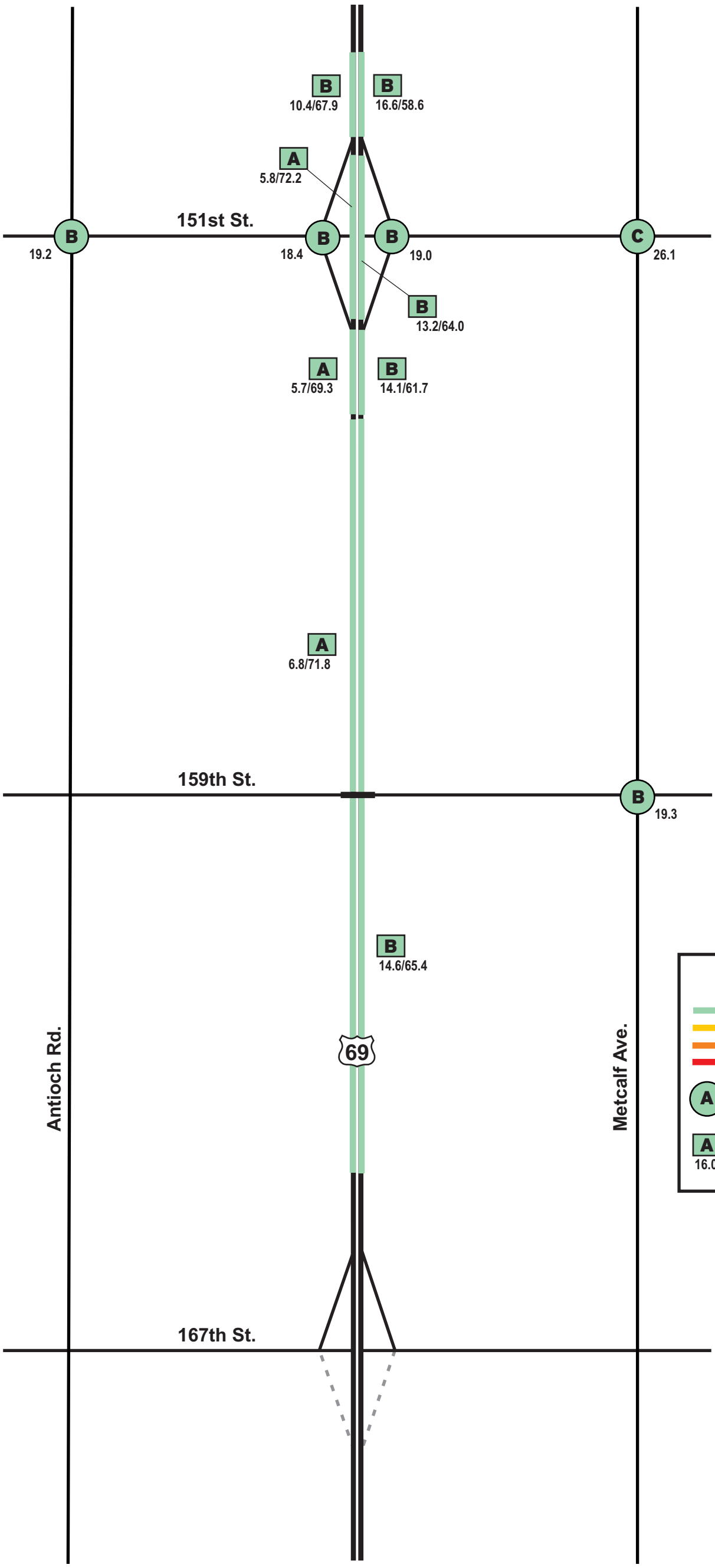
HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2005 Intersection and Lane Geometry

EXHIBIT

A-3



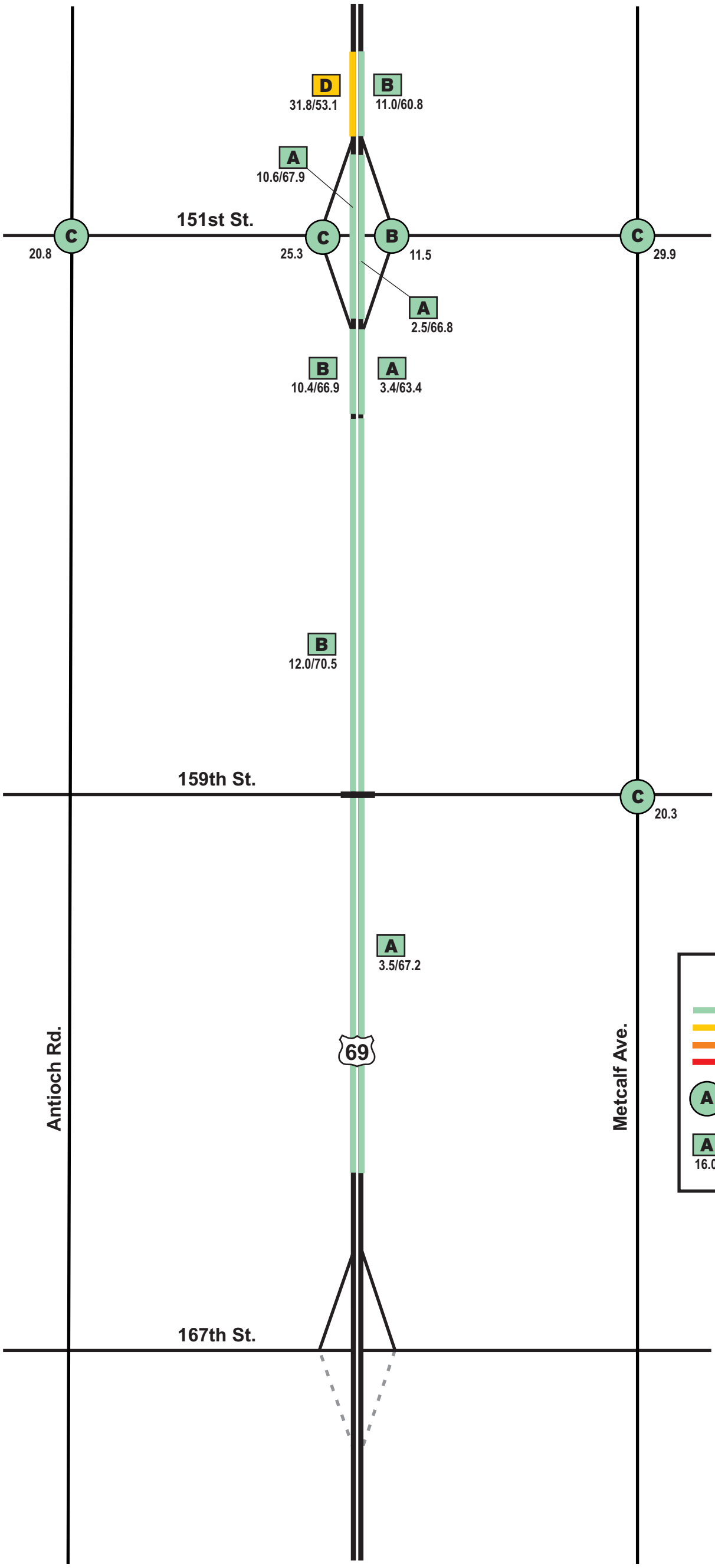
HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2005 AM Peak Level of Service

EXHIBIT

A-4



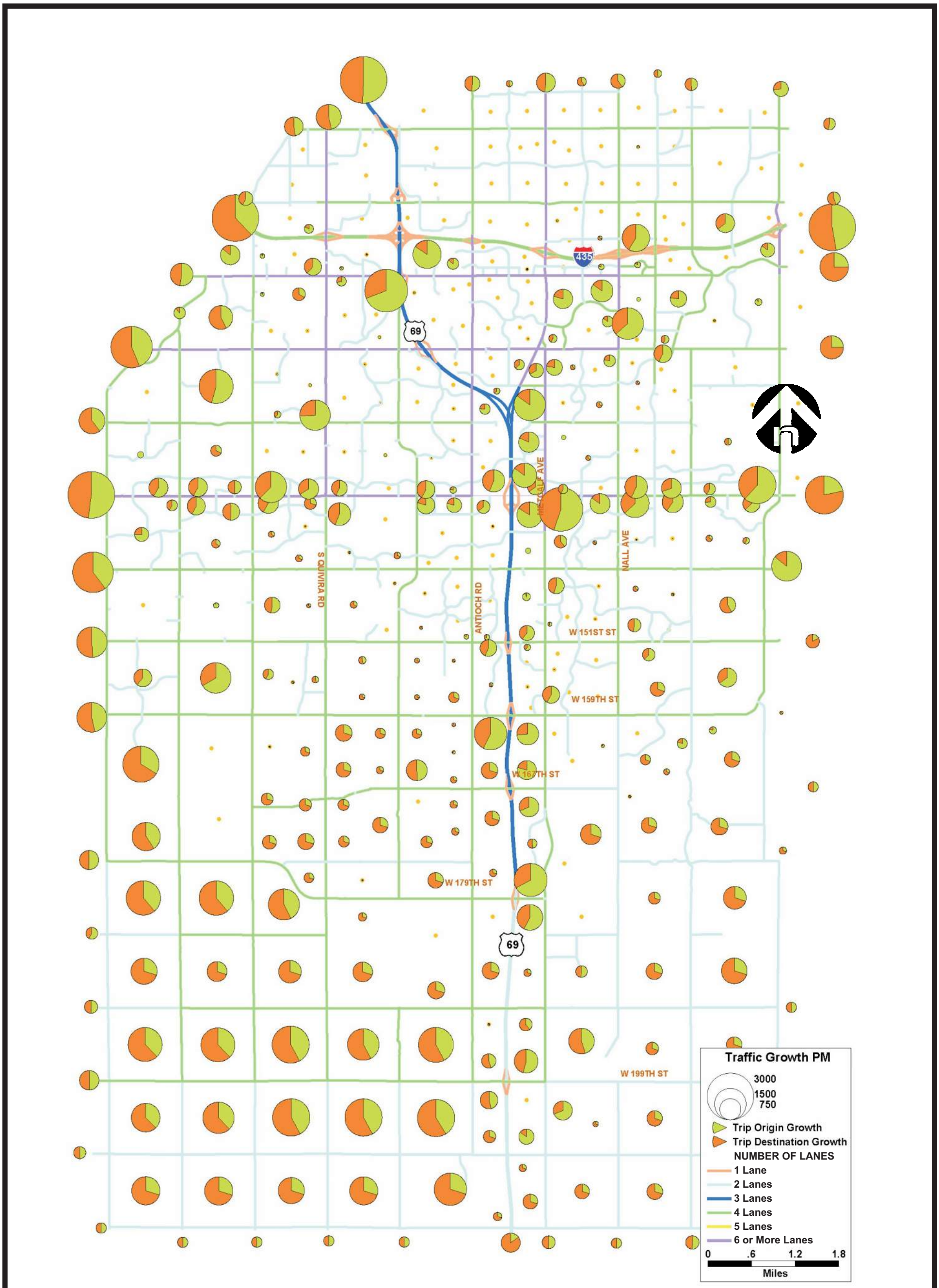
HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2005 PM Peak Level of Service

EXHIBIT

A-5



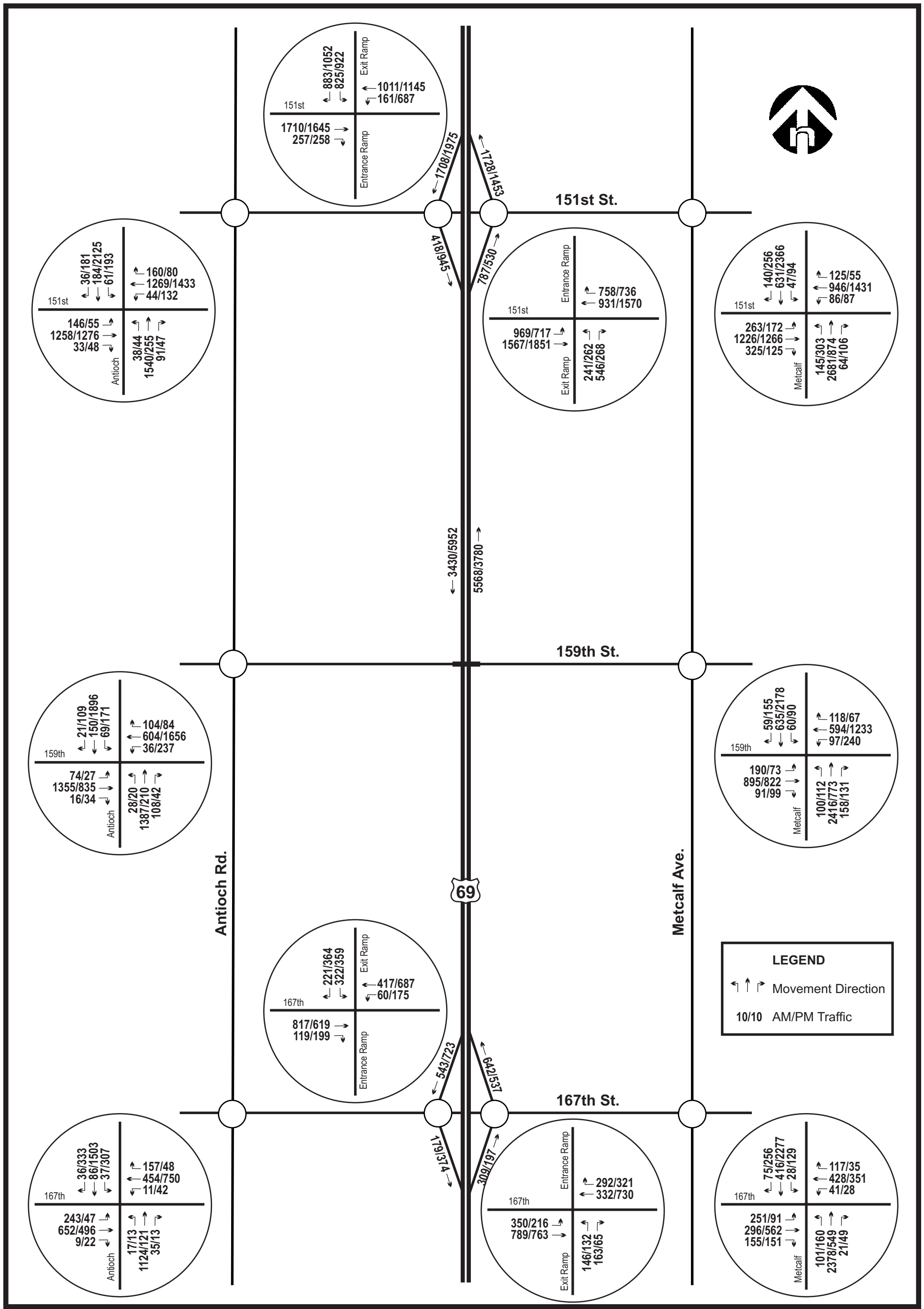
HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

PM Peak Hour Traffic Growth
from 2005 to 2035

EXHIBIT

A-6

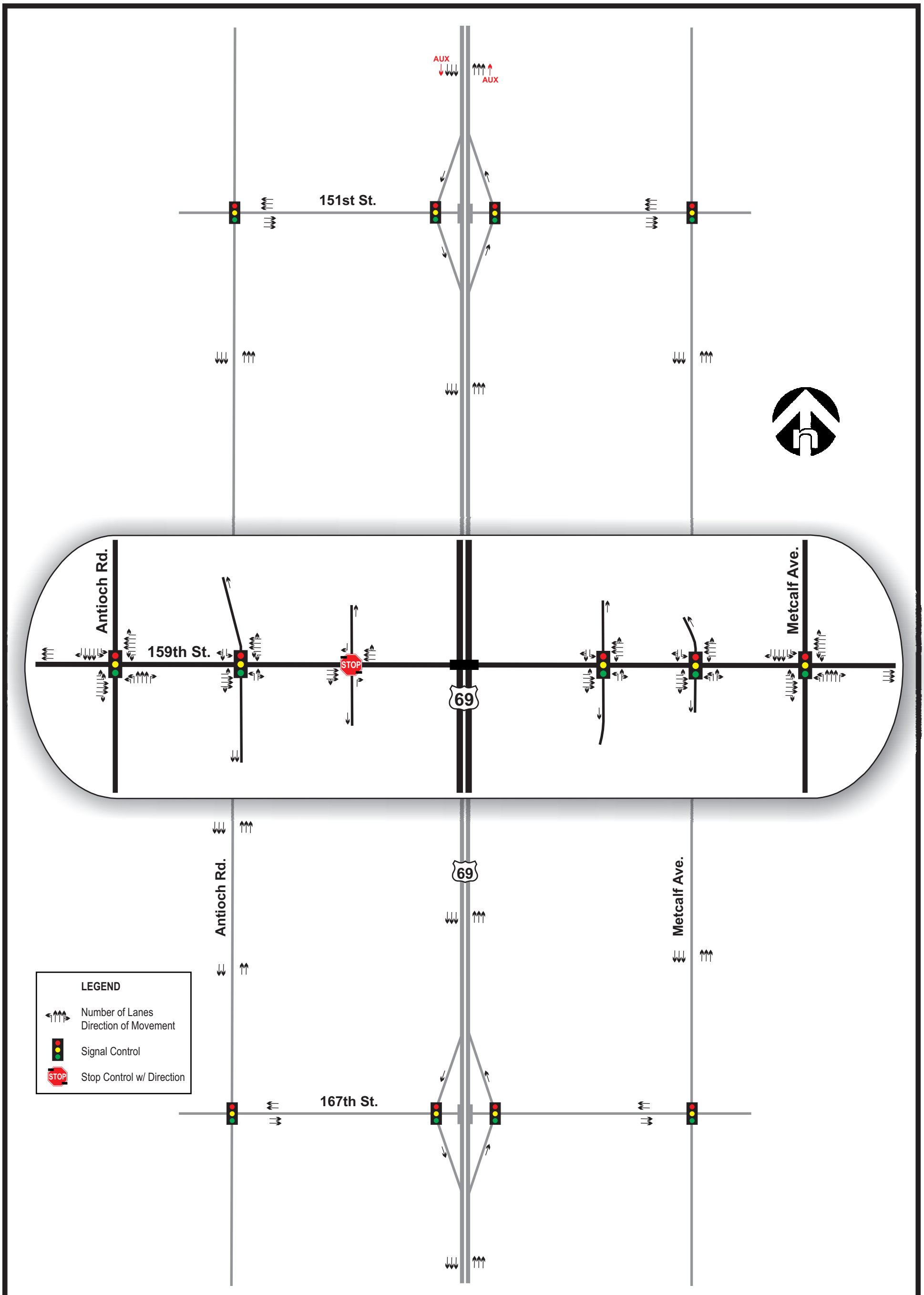


HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 AM/PM Peak Hour Traffic
No-Build

EXHIBIT
A-7

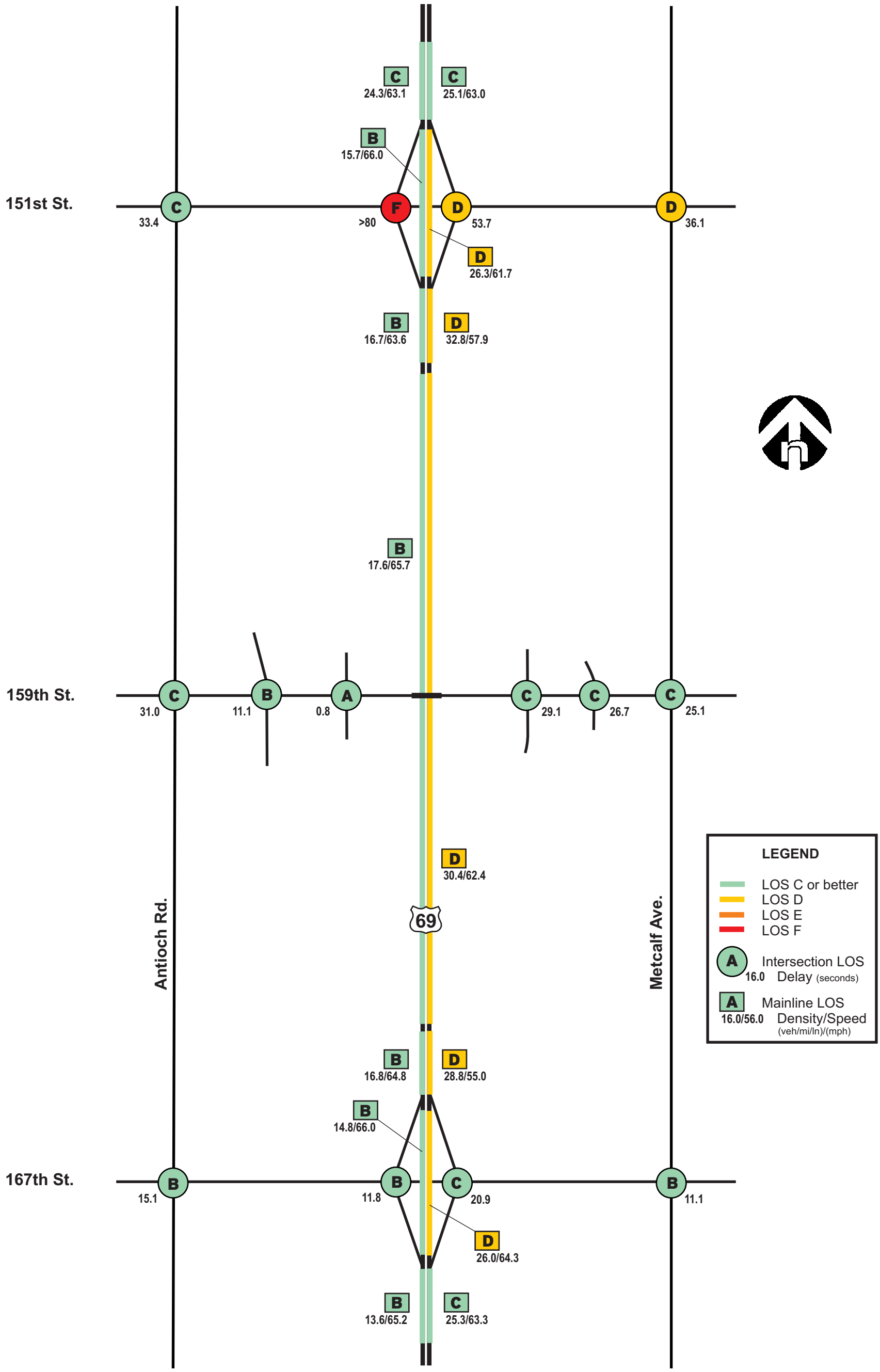


HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 Intersection and Lane Geometry
No-Build

EXHIBIT
A-8

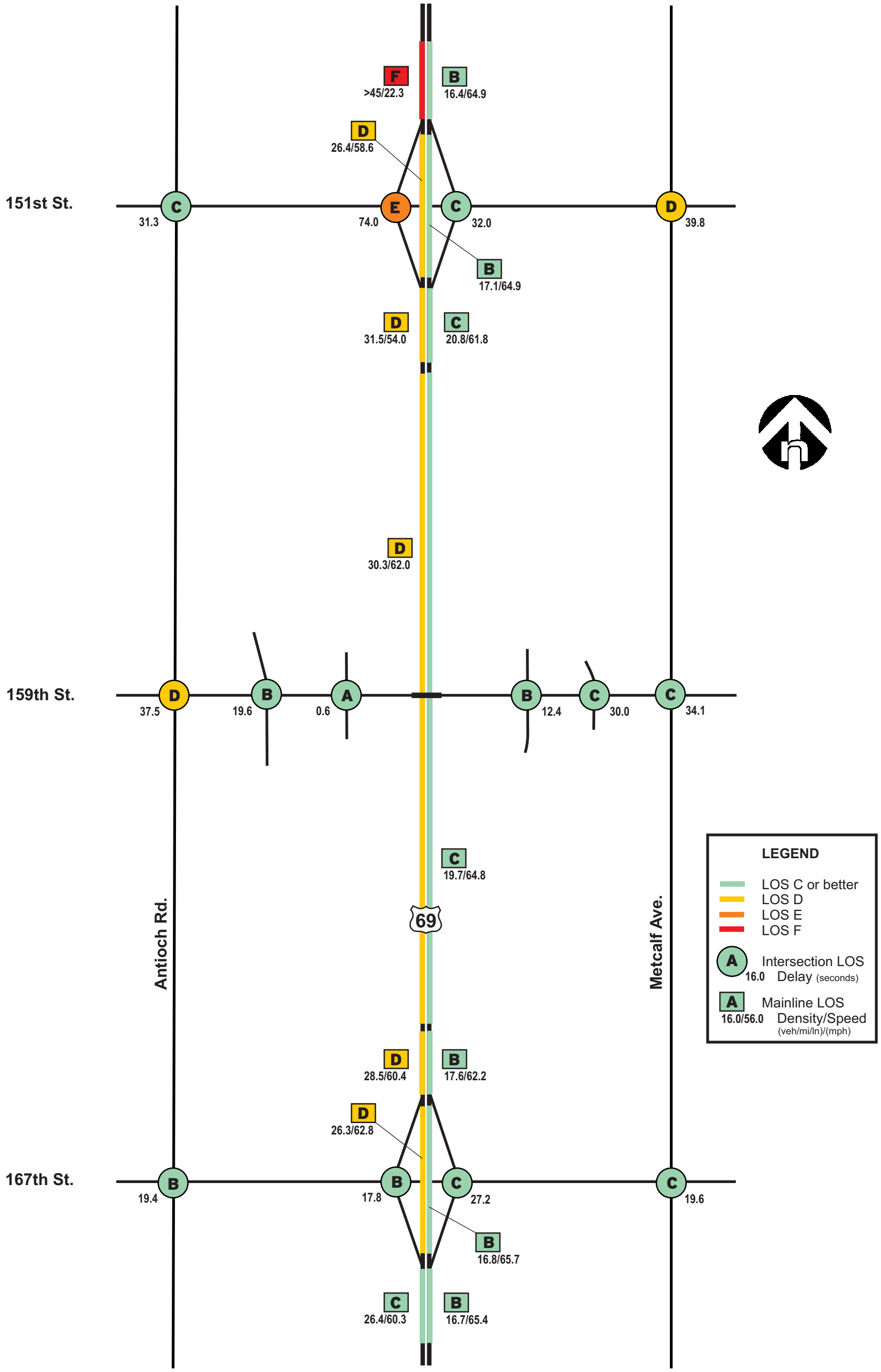


HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 AM Peak Level of Service
No-Build

EXHIBIT
A-9



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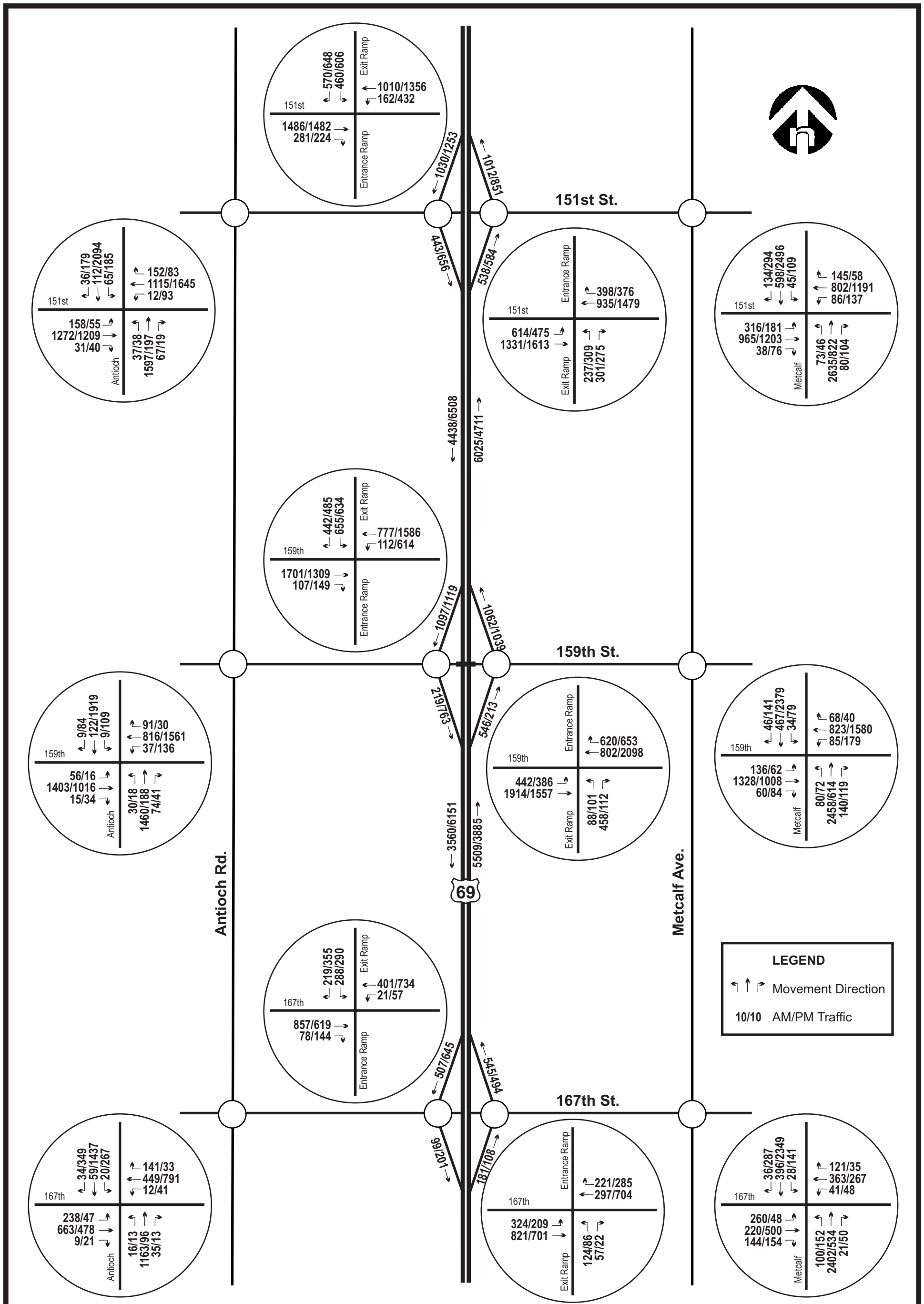
TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 PM Peak Level of Service
No-Build

EXHIBIT
A-10


151st St.
159th St.
167th St.
Antioch Rd.
Metcalf Ave.
69
1030/1253
1012/851
443/656
538/584
4438/6508
6025/4711
1097/1119
1062/1039
2191/763
546/213
3560/6151
5509/3885
507/645
545/494
991/201
181/108
151st
159th
167th
Antioch
Metcalf
Entrance Ramp
Exit Ramp
570/648
460/606
1010/1356
162/432
1486/1482
281/224
36/179
112/2094
65/185
152/83
1115/1645
12/93
158/55
1272/1209
31/40
37/38
1597/197
67/19
398/376
935/1479
614/475
1331/1613
237/309
301/275
134/294
598/2496
45/109
145/58
802/1191
86/137
316/181
965/1203
38/76
73/46
2635/822
80/104
442/485
655/634
777/1586
112/614
1701/1309
107/149
9/84
122/1919
9/109
91/30
816/1561
37/136
56/16
1403/1016
15/34
30/18
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74/41
620/653
802/2098
442/386
1914/1557
88/101
458/112
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467/2379
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68/40
823/1580
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136/62
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9/21
16/13
1163/96
35/13
221/285
297/704
324/209
821/701
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36/287
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41/48
260/48
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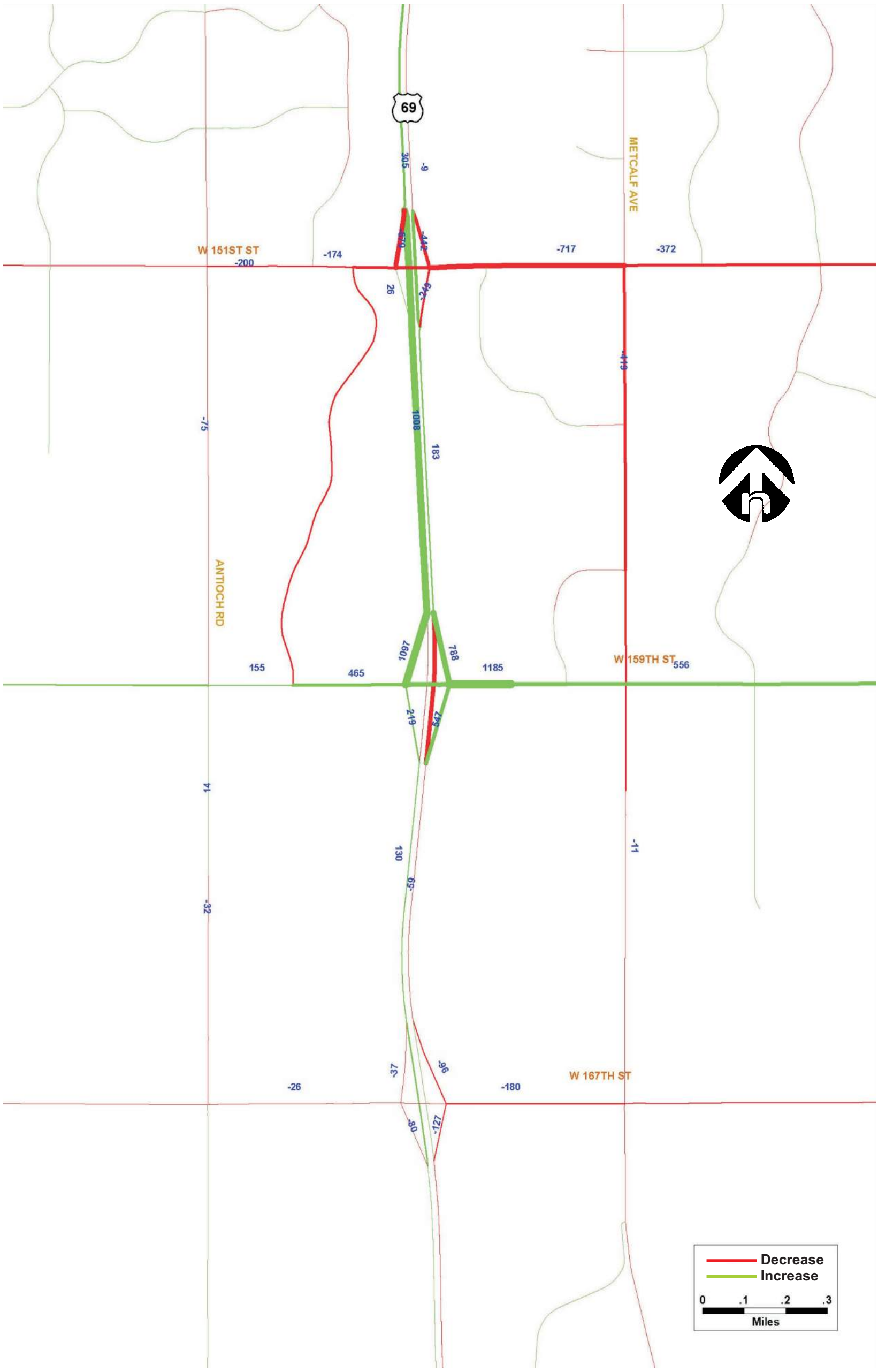
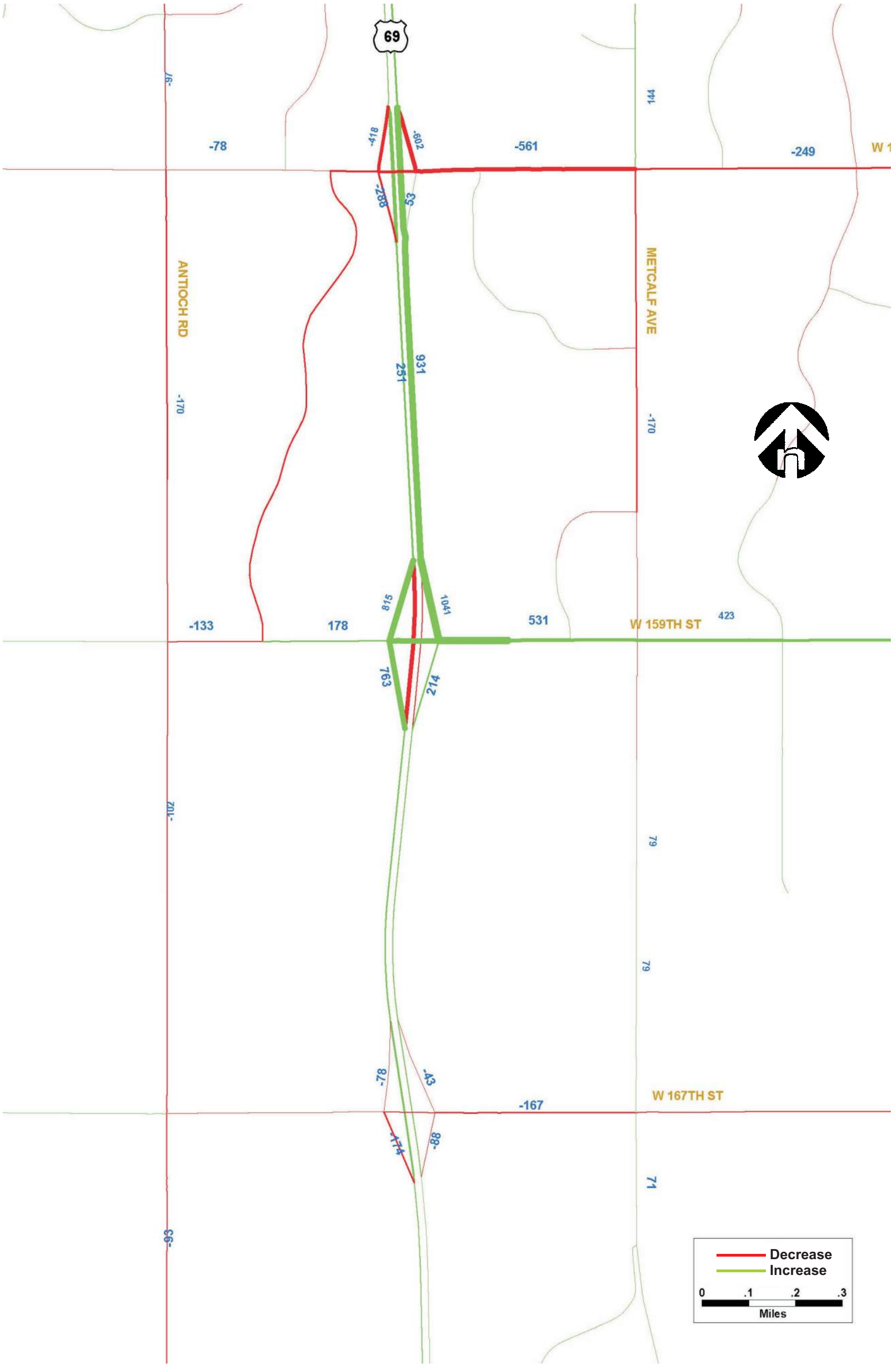
21/50
LEGEND
Movement Direction
10/10 AM/PM Traffic
TRAFFIC STUDY 159th St. Interchange – Overland Park, KS
HNTB
2035 AM/PM Peak Hour Traffic
Build
EXHIBIT
A-11



HNTB	**TRAFFIC STUDY** 159th St. Interchange – Overland Park, KS	EXHIBIT
	2035 AM Flow Difference **with and without 159th Interchange**	**A-12**

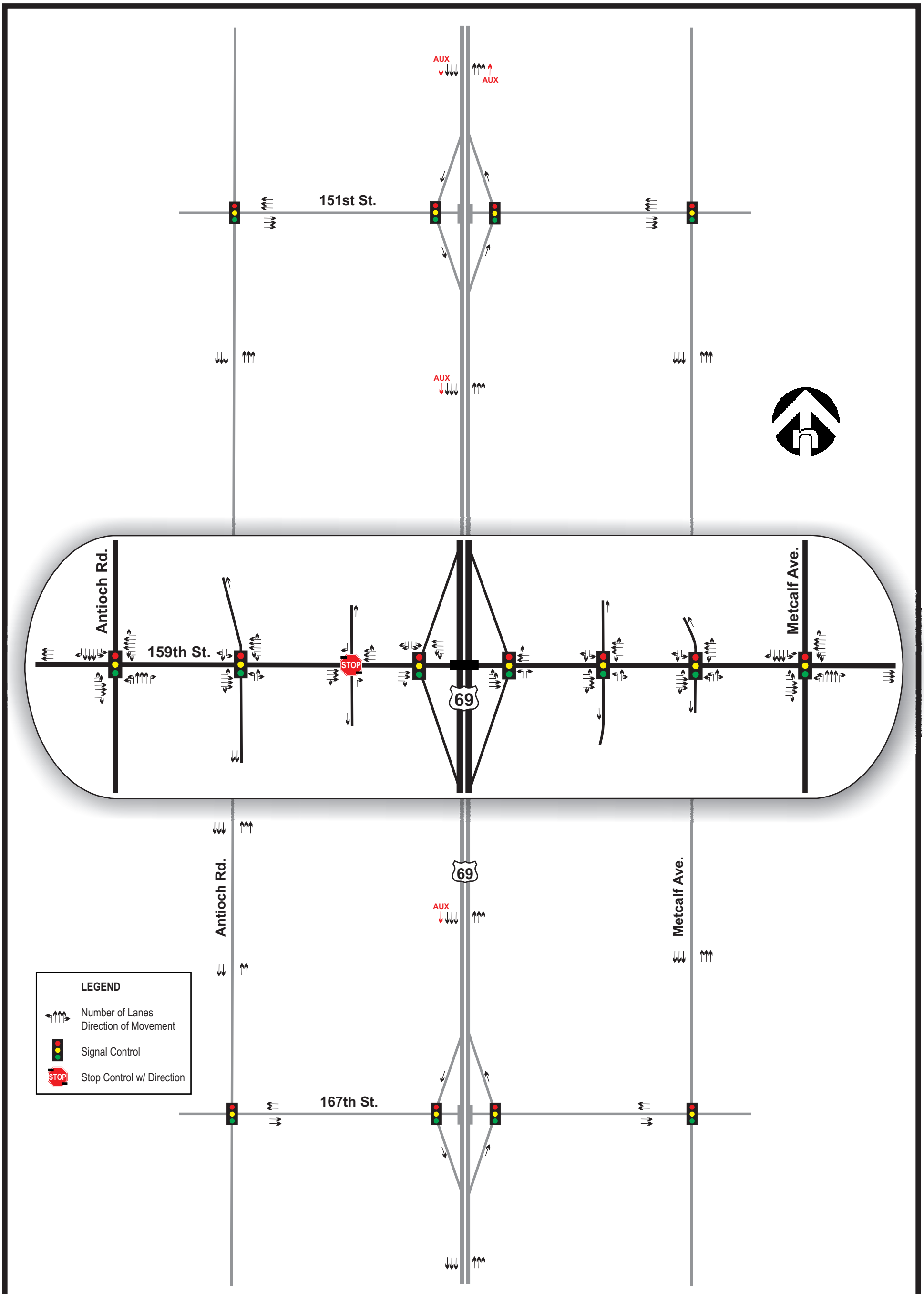


TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

HNTB

2035 PM Flow Difference
with and without 159th Interchange

EXHIBIT
A-13

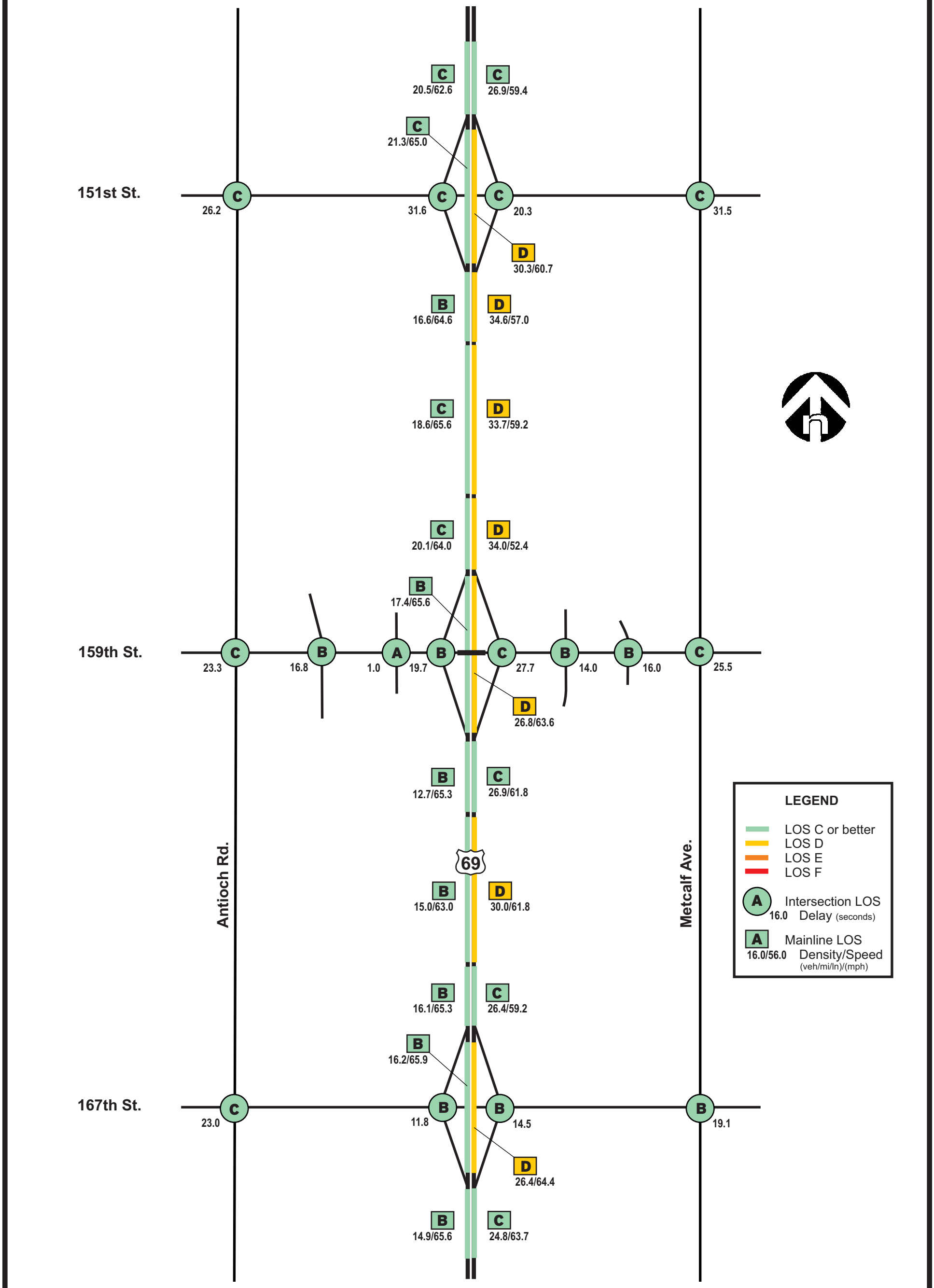


HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 Intersection and Lane Geometry
Build

EXHIBIT
A-14

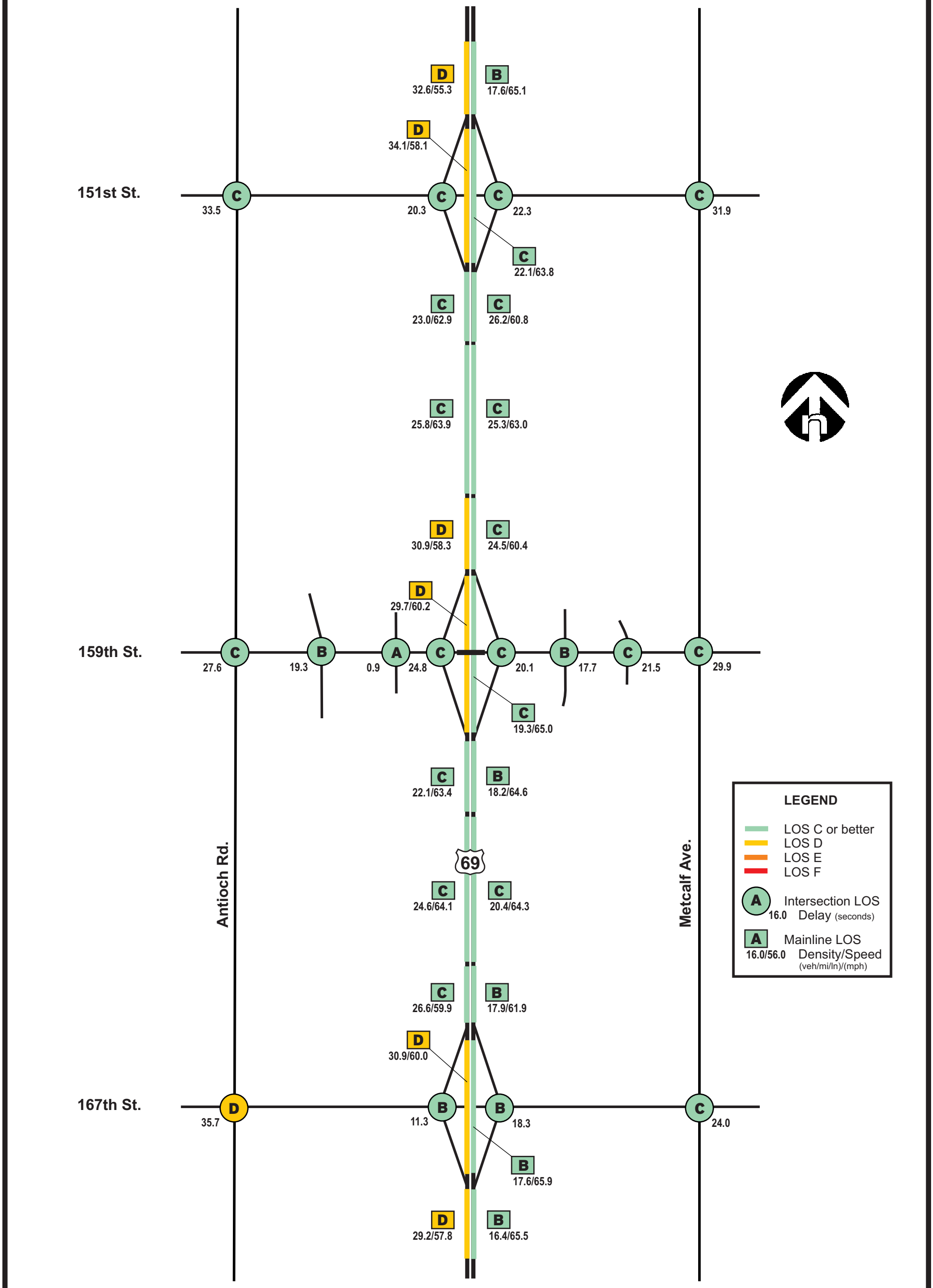


HNTB

TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

2035 AM Peak Level of Service
Build

EXHIBIT
A-15



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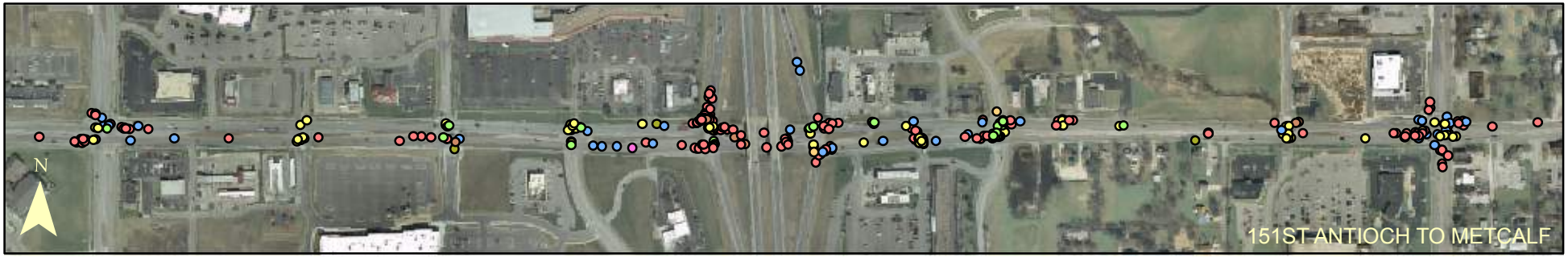
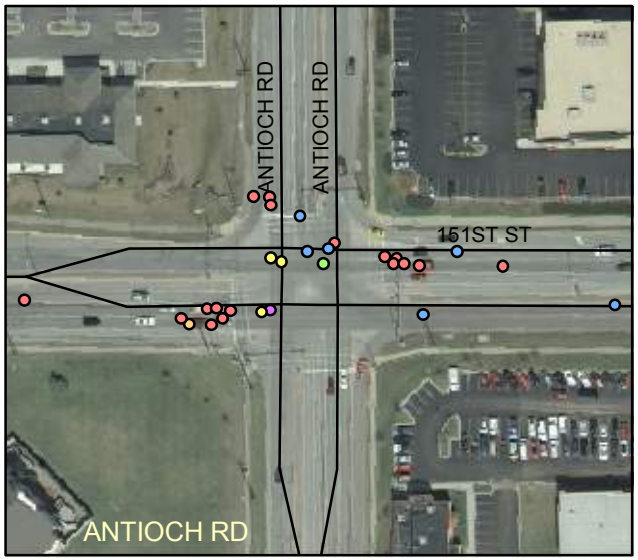
TRAFFIC STUDY 159th St. Interchange – Overland Park, KS

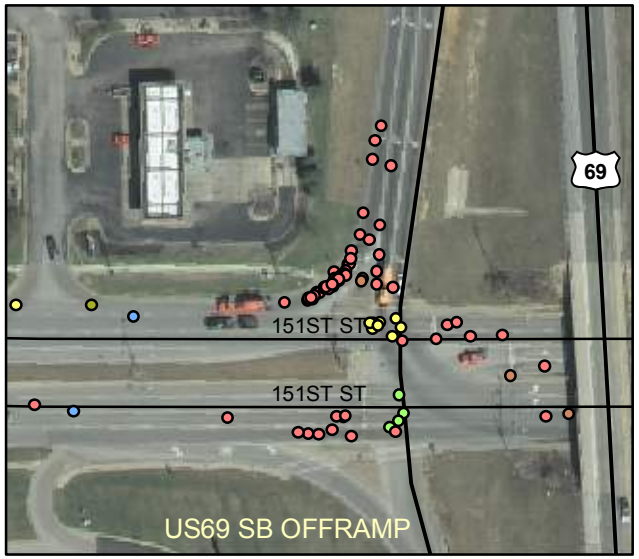
2035 PM Peak Level of Service
Build

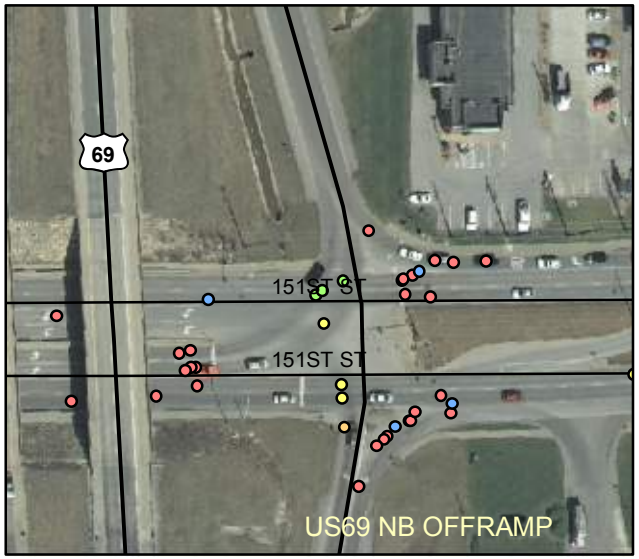
EXHIBIT
A-16

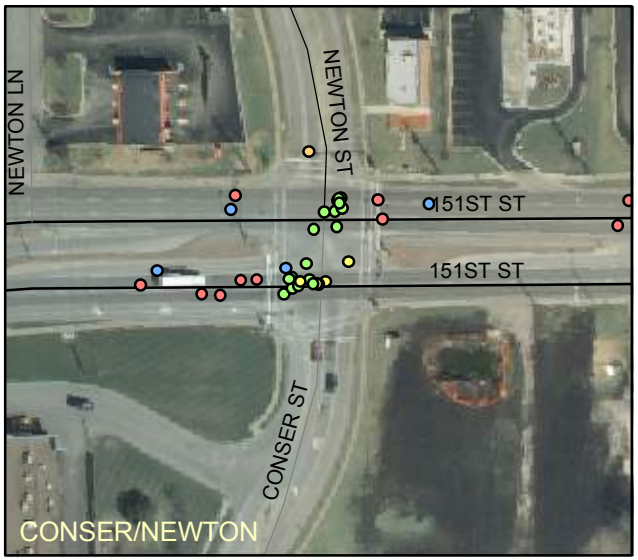
Exhibit A-17 151st Street: Antioch to Metcalf Accident Data (2003-2005)

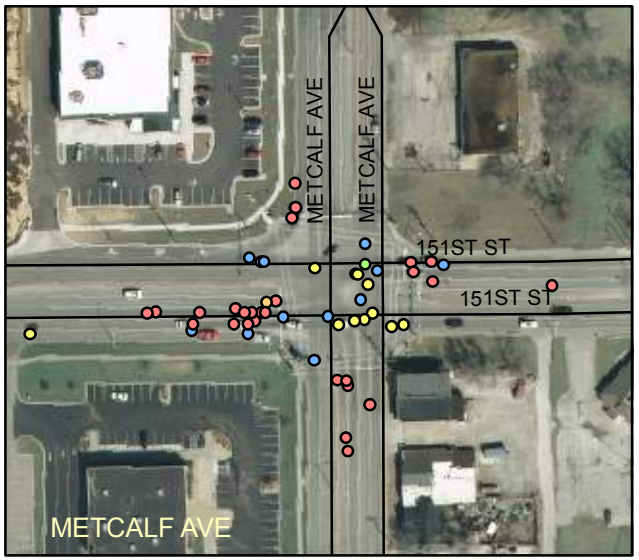












Legend

151st Street Corridor

Accident Type

- Rear End - 166
- Angle - 89
- Sideswipe - 40
- Backed into - 5
- Loss of Control - 3
- Fixed object - 7
- Left turn opp. - 46
- Bike - 1
- Other - 1

The City of Overland Park KANSAS

2/10/2006

Table A-1a
159th Street Break-In-Access Study
Existing Freeway Level of Service Analysis

Location	EXISTING					
	AM			PM		
	LOS	Density (pc/mi/ln)	Speed (mph)	LOS	Density (pc/mi/ln)	Speed (mph)
US 69 Southbound						
151st Off-Ramp Diverage	B	10.4	67.9	D	31.8	53.1
151st Off-Ramp to On-Ramp	A	5.8	72.2	A	10.6	67.9
151st Street On-Ramp Merge	A	5.7	69.3	B	10.4	66.9
US 69 Mainline	A	6.8	71.8	B	12.0	70.5
US 69 Northbound						
US 69 Mainline	B	14.6	65.4	A	3.5	67.2
151st Street Off-Ramp Diverge	B	14.1	61.7	A	3.4	63.4
151st Street Off-Ramp to On-Ramp	B	13.2	64.0	A	2.5	66.8
151st On-Ramp merage	B	16.6	58.6	B	11.0	60.8

Table A-1b
159th Street Break-In-Access Study
Existing Intersection Level of Service Analysis

Location	AM				PM			
	HCM LOS	HCM Delay	VISSIM LOS	VISSIM Delay	HCM LOS	HCM Delay	VISSIM LOS	VISSIM Delay
151st Street								
Antioch	B	19.4	B	19.2	C	21.7	C	20.8
SB US 69 Ramps	B	12.2	B	18.4	B	19.4	C	25.3
NB US 69 Ramps	B	14.9	B	19.0	B	13.9	B	11.5
Metcalf	C	26.8	C	26.1	C	26.1	C	29.9
159th Street								
Antioch Metcalf	C	20.4	B	19.3	B	19.0	C	20.3

Table A-1c
159th Street Break-In-Access Study
Future Freeway Level of Service Analysis

Location	2035 Future Build (with 159th Street Access)						2035 Future No-Build (without 159th Street Access)					
	AM			PM			AM			PM		
	LOS	Density (pc/mi/ln)	Speed (mph)	LOS	Density (pc/mi/ln)	Speed (mph)	LOS	Density (pc/mi/ln)	Speed (mph)	LOS	Density (pc/mi/ln)	Speed (mph)
US 69 Southbound												
151st Off-Ramp Diverge	C	20.5	62.6	D	32.6	55.3	C	24.3	63.1	F	>45	22.3
151st Off-Ramp to On-Ramp	C	21.3	65.0	D	34.1	58.1	B	15.7	66.0	D	26.4	58.6
151st Street On-Ramp Merge	B	16.6	64.6	C	23.0	62.9	B	16.7	63.6	D	31.0	54.0
151st to 159th Mainline	C	18.6	65.6	C	25.8	63.9						
159th Street Off-Ramp Diverge	C	20.1	64.0	D	30.9	58.3						
159th Street Off-Ramp to On-Ramp	B	17.4	65.6	D	29.7	60.2	B	17.6	65.7	D	30.3	62.0
159th Street On-Ramp Merge	B	12.7	65.3	C	22.1	63.4						
159th to 167th Street Mainline	B	15.0	63.0	C	24.6	64.1						
167th Street Off-Ramp Diverge	B	16.1	65.3	C	26.6	59.9	B	16.8	64.8	D	28.5	60.4
167th Off-Ramp to On-Ramp	B	16.2	65.9	D	30.9	60.0	B	14.8	66.0	D	26.3	62.8
167th On-Ramp Merage	B	14.9	65.6	D	29.2	57.8	B	13.6	65.2	C	26.4	60.3
US 69 Northbound												
167th Off-Ramp Diverage	C	24.8	63.7	B	16.4	65.5	C	25.3	63.3	B	16.7	65.4
167th Off-Ramp to On-Ramp	D	26.4	64.4	B	17.6	65.9	D	26.0	64.3	B	16.8	65.7
167th Street On-Ramp Merge	C	26.4	59.2	B	17.9	61.9	D	28.8	55.0	B	17.6	62.2
167th to 159th Mainline	D	30.0	61.8	C	20.4	64.3						
159th Street Off-Ramp Diverge	C	26.9	61.8	B	18.2	64.6						
159th Street Off-Ramp to On-Ramp	D	26.8	63.6	C	19.3	65.0	D	30.4	62.4	C	19.7	64.8
159th Street On-Ramp Merge	D	34.0	52.4	C	24.5	60.4						
159th to 151st Street Mainline	D	33.7	59.2	C	25.3	63.0						
151st Street Off-Ramp Diverge	D	34.6	57.0	C	26.2	60.8	D	32.8	57.9	C	20.8	61.8
151st Street Off-Ramp to On-Ramp	D	30.3	60.7	C	22.1	63.8	D	26.3	61.7	B	17.1	64.7
151st On-Ramp Merge	C	26.9	59.4	B	17.6	65.1	C	25.1	63.4	B	16.4	64.9

Table A-1d
159th Street Break-In-Access Study
Future Intersection Level of Service Analysis

Location	2035 Future Build (with 159th Street Access)								2035 Future No-Build (without 159th Street Access)							
	AM				PM				AM				PM			
	HCM LOS	HCM Delay	VISSIM LOS	VISSIM Delay	HCM LOS	HCM Delay	VISSIM LOS	VISSIM Delay	HCM LOS	HCM Delay	VISSIM LOS	VISSIM Delay	HCM LOS	HCM Delay	VISSIM LOS	VISSIM Delay
151st Street																
Antioch	C	33.4	C	26.2	D	44.9	C	33.5	C	29.5	C	33.4	D	46.1	C	31.3
SB US 69 Ramps	C	25.5	C	31.6	C	26.5	C	20.3	D	48.1	F	>80	E	59.3	E	74.0
NB US 69 Ramps	C	21.5	C	20.3	C	26.5	C	22.3	E	64.9	D	53.7	D	35.4	C	32.0
Metcalf	D	37.2	C	31.5	D	53.7	C	31.9	E	61.3	D	36.1	E	75.6	D	39.8
159th Street																
Antioch	C	32.2	C	23.3	C	23.6	C	27.6	C	23.5	C	31.0	C	35	D	37.5
Full Access	B	14.6	B	16.8	B	19.6	B	19.3	B	10.9	B	11.1	B	14.8	B	19.6
Right-In, Right-Out			A	1.0			A	0.9			A	0.8			A	0.6
SB US 69 Ramps	C	28.2	B	19.7	C	24.9	C	24.8			-	-			-	-
NB US 69 Ramps	C	32.8	C	27.7	C	31.6	C	20.1			-	-			-	-
Full Access	C	23.4	B	14.0	B	11.8	B	17.7	B	10.3	C	29.1	B	12.2	B	12.4
Full Access	B	23.0	B	16.0	C	26.9	C	21.5	B	17.8	C	26.7	B	14.7	C	30.0
Metcalf	D	43.0	C	25.5	D	49.3	C	29.9	C	22.4	C	25.1	D	40.6	C	34.1
167th Street																
Antioch	C	26.9	C	23.0	C	33.2	D	35.7	C	29.3	B	15.1	B	19.7	B	19.4
SB US 69 Ramps	B	11.9	B	11.8	B	12.8	B	11.3	B	17.4	B	11.8	B	19.9	B	17.8
NB US 69 Ramps	A	6.9	B	14.5	B	11.2	B	18.3	B	11.8	C	20.9	B	12	C	27.2
Metcalf	C	31.6	B	19.1	C	32.2	C	24.0	C	32.7	B	11.1	C	20.2	B	19.6

APPENDIX B
Ramp Metering

Appendix B
RAMP METERING
U.S. 69 & 159th Street Interchange

April 2006

This ramp metering review evaluates whether the proposed 159th Street interchange ramp designs will accommodate ramp metering in the design year of 2035. This assessment does not attempt to determine whether or not ramp metering is desirable at a system level for the U.S. 69 corridor. To assess the desirability and impacts of implementing ramp metering in the corridor, a comprehensive corridor analysis would be required.

Ramp metering is the use of traffic signals on the freeway on-ramps to regulate traffic entering the freeway. Ramp meters can operate at a fixed time of day rate or can be adjusted in real-time to manage mainline freeway demand. Ramp meters are generally active only during peak traffic volume periods of the day. Ramp meters are most often placed on service interchange ramps and not on system interchange ramps. An appropriate balance between freeway mainline traffic flow improvements (generally speed increase and crash reduction) and vehicle wait times in queues on entrance ramps needs to be determined.

Ramp metering can be implemented to reduce traffic turbulence resulting from the merging of platoons of traffic and can be used to regulate traffic entering a freeway upstream of a bottleneck. Typical diamond interchanges with traffic signal controlled crossroad intersections tend to create platoons of traffic as left and right turning streams of traffic are allowed to access the ramp. These platoons of on-ramp traffic can result in increased turbulence within the on-ramp merge area. This turbulence can cause safety and congestion problems. The ramp meter holds the platoon and releases the vehicles at a uniform rate so that a gap exists between vehicles. Implementing ramp metering has resulted in crash rate reductions ranging from 15% to 50%[1].

Regulating traffic depends on the mainline by limiting the flow rate of vehicles entering the freeway is a dynamic control measure. Vehicles are stored on the ramps and approach roadways to allow the mainline volume to remain below critical volume thresholds above which congestion will occur. The objective is to allow the mainline to operate in a free flow condition. Free flow operations on the mainline will result in overall travel time savings and emissions reductions[1].

As traffic grows along the U.S. 69 corridor, ramp metering should be considered. When mainline volumes reach a level at which available gaps in the outside lane traffic are significantly reduced, platoons of on-ramp traffic begin to generate undesirable turbulence. The level at which this occurs depends on the mainline volume and the ramp volume.

[1] *Ramp Management and Control Handbook*. TMC Pooled Funds Study. Draft May 2005.

The KDOT policy has been to limit ramp metering to service interchanges. The 159th Street interchange is a service interchange, so the on-ramps are candidates for implementation of ramp meters.

Number of Ramp Meter Lanes

The number of lanes at a ramp meter is determined by the ramp volume and whether or not certain classes of vehicles will have priority. The capacity of a ramp meter lane is dictated by the minimum time between vehicle releases. A minimum amount of time is required to release the vehicle and have the next vehicle in the queue reach the stop bar. The minimum amount of time is 4.0 seconds. With a release rate of 4.0 seconds per vehicle the hourly volume that can be processed is 900 vehicles.

If ramp volumes exceed 900 vehicles per hour, a platoon release scheme can be implemented or an additional ramp meter lane can be added. With a platoon release scheme two vehicles are allowed to enter per green indication. This approach can increase the ramp meter capacity to 1,200 vehicles per hour. This approach increases the required gap in mainline traffic for merging of the two vehicles, so more turbulence can result. With a second ramp meter lane, each lane is controlled by separate signals. Vehicles can be released in an alternating fashion at 4.0 second per vehicle, which results in a vehicle being released every 2.0 seconds. The capacity of a two-lane ramp meter is 1,700 vehicles per hour.

The northbound on-ramp at the 159th Street interchange has a forecast peak hour volume of 1,039 vehicles per hour in the year 2035. To allow a ramp meter to process this forecast volume, a platoon release scheme or two-lane ramp meter will be required. A one-lane ramp meter will be able to service the on-ramp volume until the peak hour volume exceeds 900 vehicles per hour. The two-lane ramp meter is recommended over the platoon release scheme to provide an optimal merge condition. The southbound 159th Street on-ramp peak hour volume in 2035 is forecast to be 763 vehicles per hour, so a one-lane ramp meter should be sufficient through the year 2035.

Interchange Ramp	Dir.	Year 2035 Volume			Ramp Meter Type	
		AM Peak	PM Peak	Maximum Peak Hour	Single Lane Meter (240- 900 vehicle/ hour)	Two- Lane Meter or Platoon Release (900-17,00 vehicle/ hour)
159th Street On-Ramp	NB	788	1,039	1,039		X
159th Street On-Ramp	SB	219	763	763	X	

Minimum Desirable Storage Requirements

The amount of storage required at each ramp meter is dependent on the ramp volume, the rate at which vehicles are released by the ramp meter and how vehicles arrive. The ramp volume will be somewhat less than forecast because the delay caused by the ramp meters will influence some drivers to use other routes. The rate at which vehicles are released (metering rate) can depend on the mainline volume upstream of the on-ramp or the overall traffic demands in the ramp metering corridor.

A corridor wide assessment of ramp metering strategies is beyond the scope of this ramp metering assessment, so the storage required reflects a minimum desirable storage capacity that will allow metering at or above demand. Storage to accommodate meter rates that will cause capacity to drop below demand, as can be required to manage mainline demand, is considered desirable to provide operational flexibility, but additional storage length is not included in determining the minimum desirable storage.

At the 159th Street interchange the ramp terminal/crossroad intersections will be controlled by traffic signals. Ramp traffic from the signalized intersections will generally arrive in platoons at the ramp meter.

The forecast year 2035 ramp volumes are used in the analysis to assess ramp metering feasibility and vehicle storage requirements. No diversion of traffic to alternative routes was assumed, which reflects the worse case scenario at each ramp. The exception would be a low volume ramp that might attract traffic diverted from higher volume ramps.

To estimate vehicle arrival from the traffic signals an assumed cycle length of 120 seconds is used to reflect the worst case scenario of stored vehicles. Given the 120-second cycle length, every 2 minutes 1/30th of the hourly traffic will queue at the ramp meter on average. This volume of 1/30th of the hourly volume must be able to queue upstream of the ramp meter without blocking the cross street. The assessment of minimum desirable vehicle storage is based on this estimated storage requirement. The minimum desirable storage lengths are calculated using an assumed average vehicle length of 25 feet (see table).

Interchange Ramp	Dir.	Upstream Traffic Control	Ramp Meter Type	Minimum Desirable Queue Storage (vehicles)	Minimum Storage Length (feet)
159th Street On-Ramp	NB	Traffic Signal	Two-Lane	35	875
159th Street On-Ramp	SB	Traffic Signal	One-Lane	26	650

Available Ramp Meter Storage

It is generally desirable to store all ramp meter queues on the ramp, although in some cases storage occurs on the cross streets as well. If ramp vehicle queues are stored on the cross street, the cross street/ramp terminal intersection must be designed to minimize the impact of the stored ramp traffic on through traffic and other turning traffic. For this analysis it is assumed that the ramp meters will be operated to maintain all ramp meter queue storage on the ramps.

The available storage space for vehicles on an on-ramp is dependent on the length of the ramp, the number of lanes, the grade of the ramp and mainline in the merging zone, and the geometrics of the merge area. Based on ramp design principles, the ramp meter stop bar is located so that a vehicle can accelerate from a stop and reach a desirable merging speed prior to the point where the parallel acceleration lane taper

begins. With the U.S. 69 design speed of 75 mph, the length required to accelerate from a stop to the acceptable merge speed of 55 mph is 1,790 feet[2]. This desired acceleration distance must also be adjusted for grades that are 3.0% or steeper. Upgrades lengthen the desired acceleration distance and downgrades reduce the acceleration distance. At the 159th Street interchange no grades are expected to exceed 3%, so no adjustment in the acceleration length was required.

Ideally, a ramp meter stop bar could be located upstream of the ramp merge sufficient distance to allow vehicles to accelerate to the acceptable merge speed on a standard length parallel merge auxiliary lane and taper. With the proposed on-ramp lengths for the 159th interchange, the ramp meter stop bars cannot be located at this ideal location and provide sufficient ramp meter vehicle storage on the ramps. The ramp meter stop bar must be located toward the ramp merge with the mainline to provide adequate minimum storage, which necessitates accepting much of the acceleration taking place on the auxiliary lane.

The *AASHTO Policy on Geometric Design of Highways and Streets* does not provide guidance on the desired on-ramp vehicle speed at the point where the mainline and ramp traveled ways meet (theoretical nose) for a parallel type ramp terminal. For this analysis it was assumed that a reasonable ramp vehicle speed at the theoretical nose was 31 mph, which equates to a design speed of 40 mph[3]. This speed exceeds the minimum design speed for loop ramps of 25 mph, so the assumed design speed is considered reasonable[4]. A ramp meter is considered similar to a loop ramp in that the need for storage makes accommodating ideal design speeds impractical. For the 159th Street interchange on-ramps, the stop bar is located 360 feet upstream of the theoretical ramp nose to maximize the storage provided on the ramp.

With the stop bar located 360 feet upstream of the theoretical ramp nose, the northbound parallel acceleration lane must be 1,430 feet in length to facilitate acceleration to 55 mph before reaching the taper. Given this long acceleration lane, constructing a continuous auxiliary lane northbound between the 159th Street on-ramp and the 151st Street off-ramp may be warranted when ramp metering is deployed. Southbound a continuous auxiliary lane is provided between the 159th Street interchange on-ramp and the 167th Street off-ramp, so no geometric modifications will be needed to allow acceleration to the acceptable merge speed.

Once the ramp meter stop bar is positioned, the available storage on the ramp is the distance from the stop bar to the cross street. If the ramp has more than one lane, the storage length is increased assuming that vehicles will queue in all available lanes. The following table summarizes the available vehicle storage and compares the available storage to the minimum storage length needed:

[2] Exhibit 10-70, Page 847, *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2004
[3] Exhibit 10-70, Page 847, *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2004
[4] Page 825, *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2004.

Interchange Ramp	Dir.	Available Storage Length (feet)			Minimum Storage Length Needed (feet)	Excess Storage Length (feet)
		Two-Lane	One-Lane	Total		
159th Street On-Ramp	NB	455	0	910	875	35
159th Street On-Ramp	SB	460	60	980	650	330

As shown in the table, both of the proposed ramps provide adequate minimum storage for ramp metering based on the forecast volumes used in the analysis.

Recommended Geometric Modifications

To provide minimum ramp meter vehicle storage on the northbound on-ramp even with the two-lane storage area, the stop bar must be located within 360 feet of the ramp merge with the mainline. To allow vehicles to accelerate to an acceptable merging speed, the acceleration auxiliary lane must be lengthened to 1,430 feet or a continuous auxiliary lane must be provided. With the proposed southbound on-ramp having two lanes for storage and the continuous auxiliary lane between the 159th Street and 167th Street ramps the minimum storage requirements for ramp metering are met, so no geometric modifications are suggested.

APPENDIX C
Plan Plates

159th Street & US 69 Interchange Study

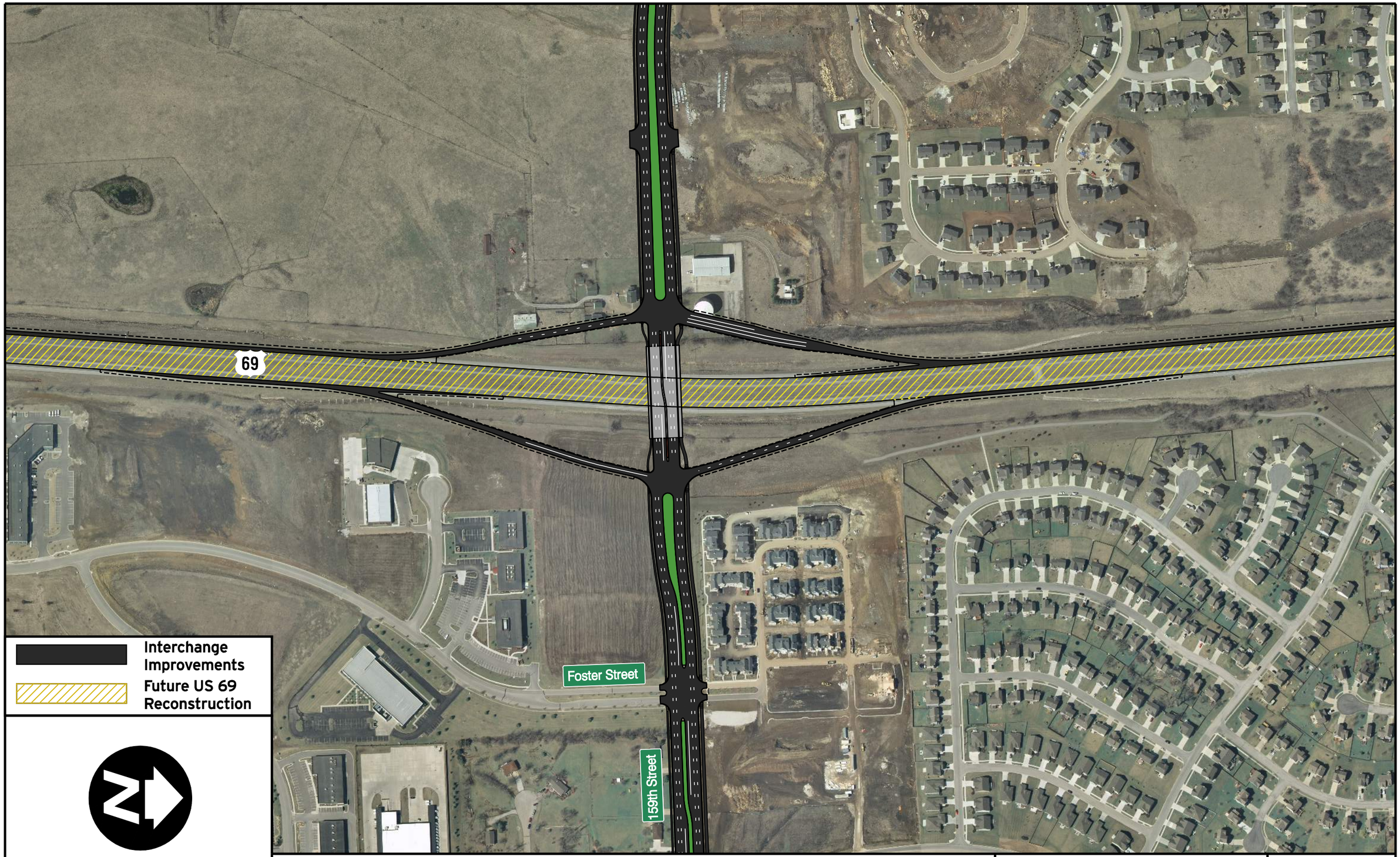
2035 Build

The City of Overland Park KANSAS

HNTB

Exhibit C–1

April 2006



159th Street & US 69 Interchange Study

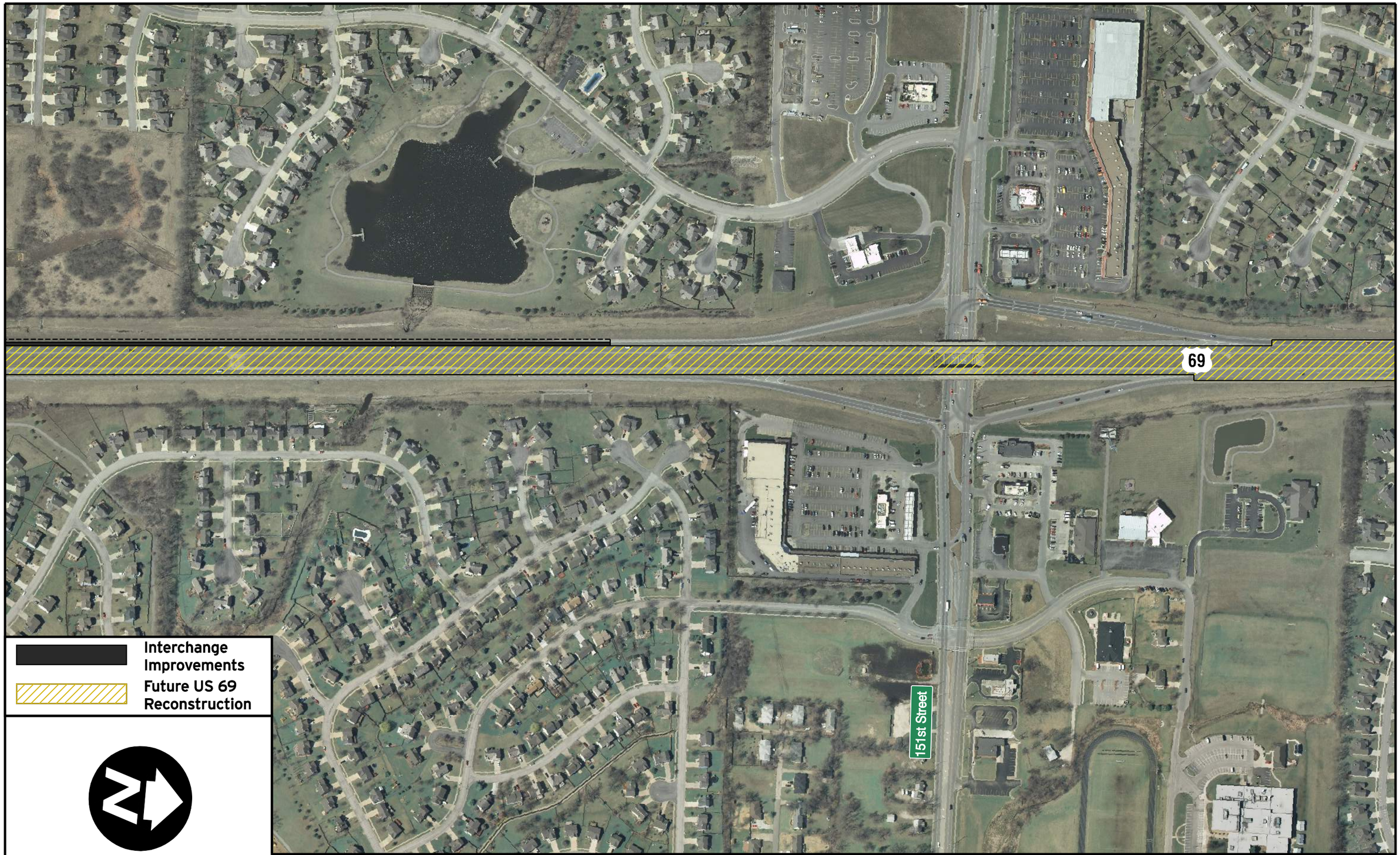
2035 Build

The City of Overland Park KANSAS

HNTB

Exhibit C–2

April 2006



159th Street & US 69 Interchange Study

2035 Build

The City of Overland Park KANSAS

HNTB

Exhibit C–3

April 2006

159th Street & US 69 Interchange Study

2035 Build

The City of Overland Park KANSAS

HNTB

Exhibit C–4

April 2006

159th Street

69

Interchange Improvements

Future US 69 Reconstruction

N

200′ 0 200′

159th Street & US 69 Interchange Study

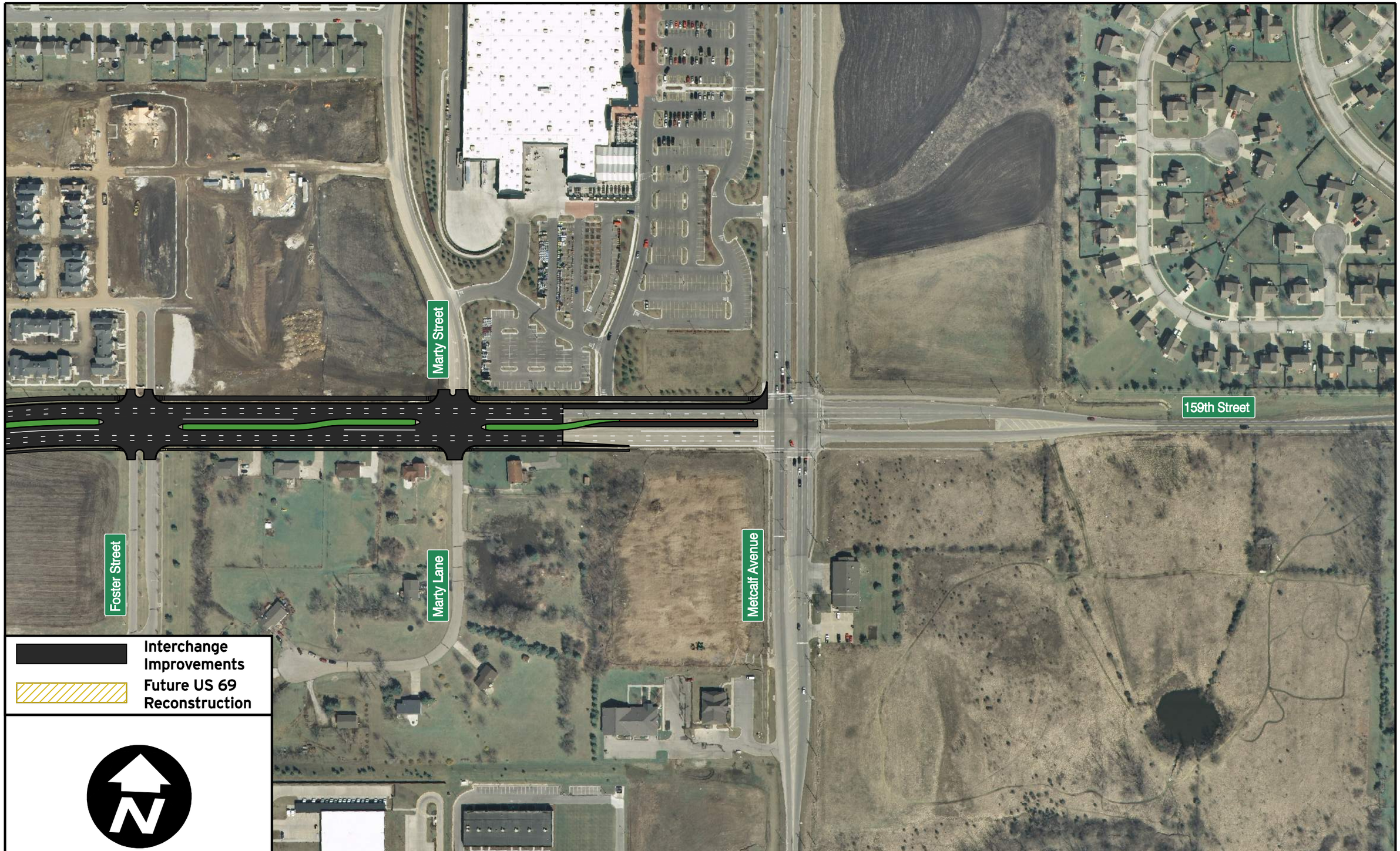
2035 Build

The City of Overland Park KANSAS

HNTB

Exhibit C–5

April 2006



159th Street & US 69 Interchange Study

2035 Build

The City of Overland Park KANSAS

HNTB

Exhibit C–6

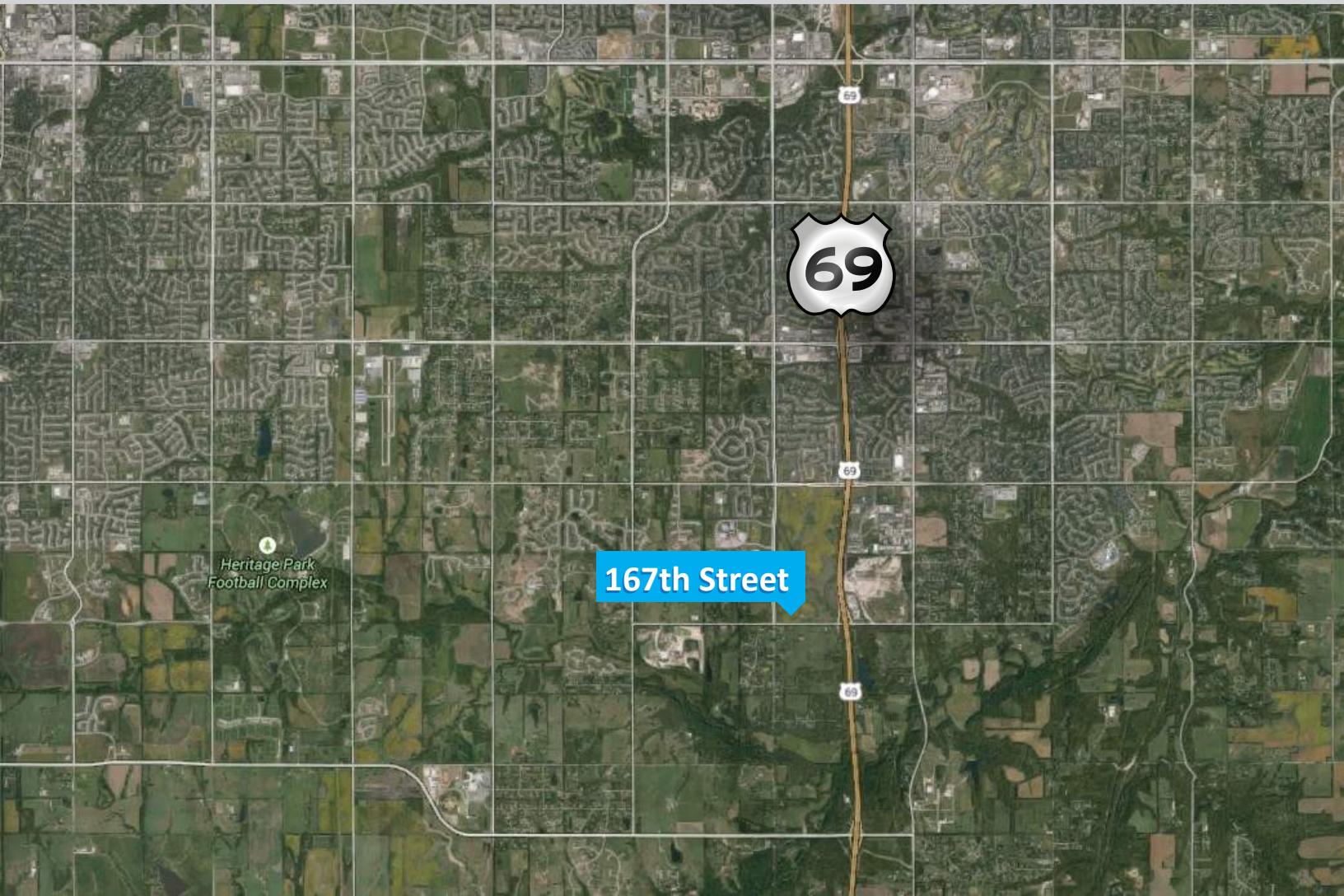
April 2006

167th Street and US-69 Break-In-Access Request

Kansas Department of Transportation

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

Prepared by HNTB



US-69 and 167th Street
Modification in Access Request

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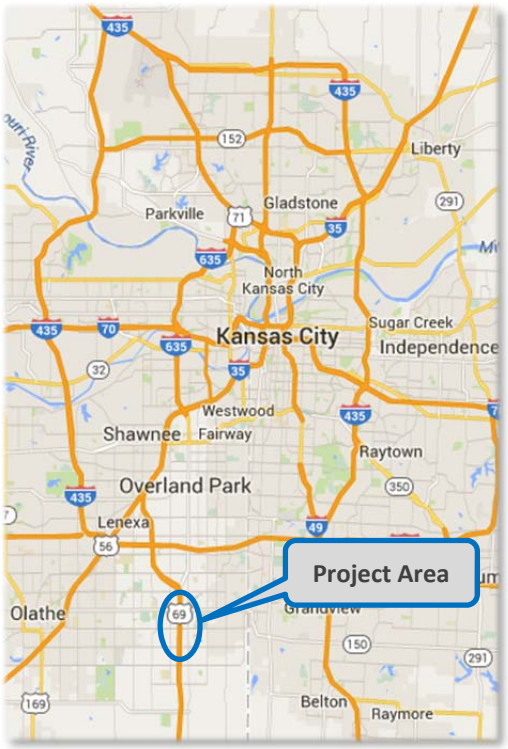
1.0 Project Summary

The 167th Street corridor and associated interchange with US-69 were identified for improvement by the City of Overland Park due to significant anticipated future growth south along US-69. 167th Street is currently an unimproved, two-lane, former county road with no sidewalks, bicycle or pedestrian accommodations, and in many locations no shoulders are present adjacent to the roadway. The current interchange does not provide access to 167th Street from northbound US-69 or access to southbound US-69 from 167th Street. Improvements to this corridor and interchange are necessary to serve existing and future traffic safely, support economic development and efficiently provide for all modes of travel well into the future. The following summarizes the need for improvements and the recommended improvements. Section 2.0 follows the Federal Highway Administration (FHWA) and Kansas Department of Transportation guidelines for an access modification.

Figure 1 – Project Location Map



1.1 Study Area

Figures 1 and 2 illustrate the project location and study area. Generally speaking the study area extends along 167th Street from Antioch Road to Metcalf Avenue and along US-69 from the 151st Street interchange to the 179th Street interchange. Existing (2014) and design year (2040) US-69 traffic operations were analyzed within this study area for the two screened alternatives, the modified diamond interchange and the diverging diamond interchange (DDI). A more detailed discussion on this can be found in Section 2.3.1.

1.2 Previous Studies

In 1998, HNTB conducted a Major Investment Study in coordination with the Mid-America Regional Council (MARC), KDOT and other transportation agencies within the Kansas City area for the I-35 and US-69 corridors in Johnson and Wyandotte Counties. The purpose of the study was to determine the best improvement to meet the area's needs and future travel demands. At the location of US-69 and 167th Street, the study recommended a full diamond interchange be built at this location in the future in order to accommodate anticipated land use and future traffic demand.

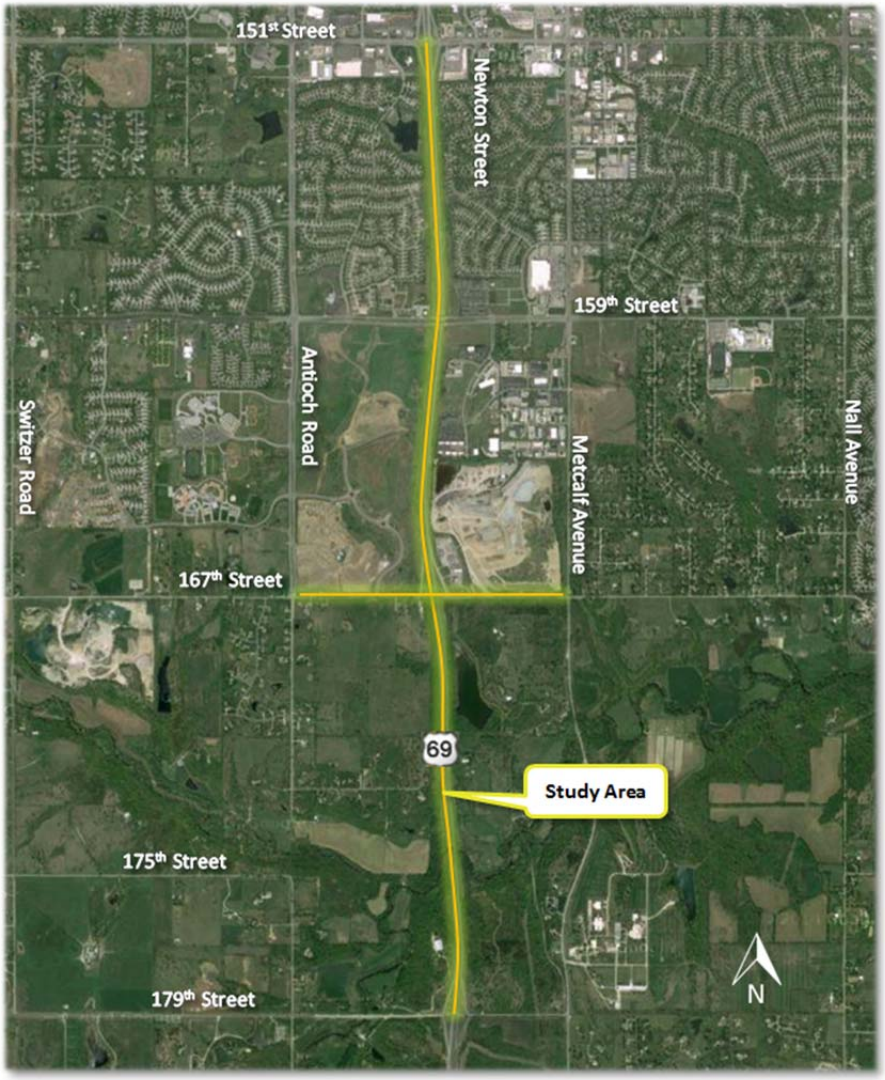
In 2005, as part of the break-in-access request for the US-69 and 159th Street interchange, HNTB evaluated impacts to the existing 167th Street interchange for the existing and future no-build condition of 159th Street. This request concluded that improvements to 167th Street, Antioch Road and Metcalf

Avenue as well as a full access interchange at US-69 and 167th Street would be required to provide adequate design year operations at the proposed US-69 and 159th Street interchange.

In 2006, The City conducted a preliminary engineering study for the 167th Street corridor. The study proposed that 167th Street between Metcalf Avenue and Antioch Road should be upgraded to a standard four-lane divided thoroughfare. In addition to roadway improvements, recommendations included reconstructing the US-69 bridges over 167th Street to accommodate the expansion, acquiring additional right-of-way, and making significant drainage improvements.

In 2015, The City completed the Overland Park South Streets Transportation Plan. This plan identified the need to improve transportation systems in South Overland Park from 159th Street south to the Johnson County line. Similar to previous studies, this study recognized the need to improve 167th Street to four lanes between Metcalf and Antioch with a full access US-69 interchange.

Figure 2 - US-69 and 167th Street Study Area



1.3 Public Involvement

The public involvement for this phase of the study included holding a stakeholder open house meeting to provide an overview of the study process and introduce the future interchange concept. The stakeholder meeting highlighted the following topics:

- Why the interchange is being modified/what are the existing and future problems that need to be addressed
- What improvements are recommended coming out of this study
- What impacts to surrounding properties result from the recommended improvements

The stakeholder meeting was held April 27, 2015 with property owners adjacent to the project area in the concept study. There was no significant opposition to the project and preferred alternative (Modified Diamond Interchange) presented. Additional public meetings will occur during design prior to initiating right-of-way acquisitions and prior to beginning construction.

1.4 Purpose and Need

The purpose of the improvements is to improve roadway geometric and safety conditions along 167th Street between Metcalf Avenue and Antioch Road, expand the capacity of the facility to accommodate the demands of future traffic, and upgrade the existing interchange to a full access interchange south of 167th Street. More specifically, the proposed project is expected to:

1. **Improve 167th Street and provide a full access interchange** based on existing conditions and to meet future travel demands.
2. **Improve traffic safety** by improving existing roadway, drainage, and bridge deficiencies.
3. **Improve pedestrian and bicycle accommodations** along 167th Street as well as connectivity to future trails along US-69.

1.4.1 Improve 167th Street and Provide a Full Access Interchange

Existing Conditions

Through the preliminary engineering study performed in 2006, it was determined that 167th Street between Metcalf Avenue and Antioch Road should be upgraded to a standard four-lane, divided arterial street. The traffic analysis performed with this study determined that this is the appropriate facility type for 167th Street through the Study Limits. The text below briefly describes the traffic evaluation performed for the existing conditions and future no-build conditions which leads to this conclusion.

Existing traffic operations were analyzed. The following provides background information related to existing 167th Street and the existing US-69 interchange.

- 167th Street is an unimproved, two-lane, former county road

- 167th Street existing posted speed is 35 mph
- 2,100 ADT along 167th Street west of interchange (2010, OP Count)
- 2,300 ADT along 167th Street east of interchange (2010, OP Count)
- 5,800 ADT west of interchange at Antioch Road (2013, OP Count)
- 7,800 ADT east of interchange at Metcalf Avenue (2012, OP Count)
- 167th Street is not designated as a truck route
- Existing land use is majority vacant or agricultural. Future land use is residential and industrial/business park.
- Existing crash rates along 167th Street are relatively low. Existing crash rates are high along US-69 and 151st Street.

Based on the existing local and regional land use, existing traffic demand was collected as shown in the Appendix A-1. The existing traffic demand along with the existing lane geometrics and existing signal timings at adjacent interchanges were used to evaluate the existing traffic operations as a baseline.

The existing intersection level of service and delay can be found in Section 2.1. The US-69 and 167th Street interchange and individual ramp intersection movements operate at an acceptable level of service during the morning and afternoon peak hours. Locations of high delay along 167th Street affects a relatively small number of vehicles either at the stop control at the ramp terminal or left turns onto Metcalf Avenue. The majority of the vehicles along 167th Street experience acceptable level of service. LOS D is the threshold goal for the City of Overland Park and KDOT for both intersections and freeways.

Future No-Build Conditions

Future No-Build conditions investigate growth in land use and traffic demand but with no improvements to the study interchange. However, improvements are expected to have occurred on Antioch Road and Metcalf Avenue adjacent to the study limits. Expected improvements include upgrading both streets to four lanes with turn lanes and signalization at 167th Street. The design year for the interchange is 2040. Based on historical growth trends and Overland Park's travel demand model, a 2040 traffic forecast was developed. Future traffic is shown in the Appendix A-5. The future traffic demand was used to analyze the existing facility and traffic operational results were developed using a VISSIM operational model. The existing level of service and delay can be found in Section 2.1.

Poor level of service E and F is a result of the design year traffic demand with the existing, unimproved configuration and capacity. The lack of US-69 ramps south of 167th Street as well as the capacity of 167th Street has a significant impact on the future operating conditions of 159th Street, Metcalf Avenue and Antioch Road. Appendix A-6 and A-7 show the intersection and freeway LOS problems which include southbound US-69 and all intersections along the 167th Street corridor. The Preferred Alternative addresses these problems.

US-69 and 167th St. Interchange Traffic

Existing (2014) = 7,850 ADT
Future No-Build (2040) = 33,620 ADT
Future Build (2040) = 40,030 ADT

1.4.2 Improve traffic safety by improving existing roadway, drainage and bridge deficiencies.

A safety analysis was performed on the existing US-69 mainline system (2008 through 2014) and arterial streets (2009 through 2013) to identify vehicle crash patterns, locations where there is a high density of crashes within the study area, and other safety statistics such as the most prevalent crash types and severity of crashes. This information was used to assess safety in the study area and help develop mitigation measures. Crash data for these periods was collected from KDOT for the study area. Supplemental crash data was also supplied by the City of Overland Park. A summary of the safety data is provided below.

- Between 2009 and 2013, there were 40 crashes on 167th Street and the approaches from Antioch Road and Metcalf Avenue.
- There has been one fatal, 11 injury, and 28 property damage only crashes along 167th Street.
- 40% of incidents were angle crashes and 20% were animal related along 167th Street.
- No intersections along 167th Street are listed on the Overland Park "Top 25 Accident Locations" lists for 2010 to 2013.
- Between 2008 and 2014, there were 289 crashes on US-69 mainline.
- There have been 3 fatal, 59 injury, and 227 property damage only crashes along US-69.
- 48% of incidents were rear end collisions, 14% animal related, and 14% fixed object crashes along US-69.
- The US-69 accident rate over this period is 0.830 MVMT compared to the statewide average accident rate of 1.134 MVMT of similar roadway type.
- The US-69 fatal accident rate over this period is 0.868 HMVMT compared to the statewide average fatal accident rate of 0.676 HMVMT of similar roadway type.

The US-69 mainline overall is a safer facility than the average four lane freeway in Kansas. However, fatal crashes are higher than the statewide average and many of the crashes are rear end collisions, which is likely due to congestion.

When considering improvements to 167th Street, it is recommended to not allow closely spaced intersections, particularly near the interchange with US-69, in order to maintain a safe corridor with good level of service. KDOT's Access Management Policy recommends for this type of thoroughfare (Class C) that public roads shall have signalized intersection spacing of no less than 3/8 mile and up to 3/4 mile from the interchange terminals. Unsignalized intersection spacing should be at least 365 feet from the interchange terminals. However, access points that do not meet this policy may be approved by KDOT if traffic analysis demonstrates adequate traffic operation. Access points should be kept to a minimum and new direct access should not be permitted when the property owner has other reasonable access.

167th Street is currently an unimproved, two-lane, former county road. The horizontal and vertical geometrics and roadside grading in many locations do not meet current design criteria. From a drainage perspective, the current FEMA hydraulic models show overtopping of 167th Street and the existing ramp from US-69 southbound to 167th Street in the 100-year storm. Significant drainage improvements will be required with the project to correct the overtopping of 167th Street and the interchange ramps.

The existing US-69 bridge over 167th Street provides substandard vertical clearances based on current design guidelines and does not provide adequate horizontal space for the standard four-lane divided thoroughfare and proposed bicycle and pedestrian paths. The existing US-69 bridges must be replaced to accommodate the future facility type and to meet current design criteria.

1.4.3 Improve pedestrian and bicycle accommodations along 167th Street as well as connectivity to future trails along US-69.

There are several ongoing studies in the Study Area with regard to provisions for accommodating bicycle and pedestrian traffic. The City of Overland Park Safe Bicycle Use Outreach Project developed a plan for a safe and accessible network of bicycle facilities throughout Overland Park. The project recommends buffered on-street bike lanes along 167th Street from Pflumm Road to Nall Avenue and a shared use path along US-69, outside KDOT right-of-way, north of 167th Street. The MARC Greater Kansas City Regional Bikeway Plan also recognizes the need for bicycle connectivity throughout this study area and includes this area in the MetroGreen plan utilizing the greenway space of the Blue River watershed.

The current City of Overland Park Comprehensive Plan recommends a future multi-purpose trail along the north side of 167th Street connecting the study area to 159th Street to the north, 179th Street and the Arboretum to the south, and Heritage Park and local schools to the west. For the purposes of this study, bicycle and pedestrian facilities have been shown consistent with the current City of Overland Park Comprehensive Plan. The on-street bike lanes recommended by the Safe Bicycle Use Outreach Project are not shown in this study as the City is still in the process of developing an implementation plan for this program. However, major elements, such as the US-69 bridges over 167th Street and the anticipated right-of-way footprint, have been developed to accommodate future on-street bike lanes should they be desired as this moves forward into design and construction. The traffic analysis performed with this study does not include on-street bike lanes, but the impact of these facilities is negligible to the overall performance of the facility.

1.5 Preferred Alternative

A preferred alternative was developed to address the purpose and need of the project. It was essential that the impacts of existing and future traffic growth at this location be considered so that the appropriate interchange, bridge configuration and associated geometric improvements could be incorporated to provide the most feasible, cost-effective solution.

The **Modified Diamond Interchange** was selected as the preferred alternative. This alternative was selected based on improved LOS, safety, maintenance of traffic, and project phasing flexibility. This alternative also provided the City with the greatest flexibility in implementing its Safe Bicycle Use Outreach program. Section 2.0 describes in detail the process by which this alternative was selected and addresses the eight requirements for a modification in access.

Figure 3 - Modified Diamond Preferred Alternative

Source: HNTB

2.0 Access Modification

The following section addresses the requirements for a break-in-access identified in the Federal Register dated August 27, 2009 and in the Kansas Department of Transportation's Standard Operating Manual effective December 1, 2005 regarding access breaks. Eight requirements are addressed in the following section. These requirements are:

2.1 Improving Existing Facilities
2.2 Transportation System Management and Alternatives Analysis
2.3 Operational Analysis
2.4 Access Connections and Design
2.5 Consistency with Transportation Plans
2.6 Consistency with Future Access Plans
2.7 Coordination with Future Development
2.8 Status of NEPA

At the beginning of each of the eight sections, the Federal guideline's intent is described in italics. It is directly quoted from federal guidelines for break-in-access requirements.

2.1 Improving Existing Facilities

FHWA Policy Point One: ***Current design does not meet existing and future purpose and need.***

> *The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).*

The existing interchange system (US-69 interchange and 167th Street from Antioch Road to Metcalf Avenue) does provide the capacity needed to meet existing traffic demand but does not provide access to 167th Street from northbound US-69 and to southbound US-69 from 167th Street. In the future, the existing interchange cannot provide the capacity needed to meet future traffic demand based on Overland Park's Future Land Use Plan which includes new office and retail development along US-69 and Metcalf Ave., and new residential development outside of the US-69 corridor. The methodology used to evaluate traffic operations and arrive at these conclusions is summarized below.

Methodology

VISSIM (version 6.0) was used to analyze the intersection traffic delay and queues on the arterial street network. The *Highway Capacity Manual* (HCM) 2010 methodology was used for this analysis. Level of service analyses were performed at the study area intersections for the weekday AM and PM peak hours. Intersection level of service (LOS) is a quantitative and qualitative measure describing operational conditions (how well the intersection operates), in terms of average delay per motorist. LOS is described with letter designations A (best) through F (worst). The *Highway Capacity Manual* provides a description of the qualitative and quantitative meaning of each letter. For this study, LOS D was assumed to be the minimum desirable LOS for this type of area. Table 1 shows the intersection delay thresholds for signalized and unsignalized intersections.

Table 1 - Intersection Level of Service (LOS) Thresholds

	Level of Service (LOS)	**Signalized Intersection** Avg. Delay (sec/veh)	**Unsignalized Intersection** Avg. Delay (sec/veh)
Desirable	A	≤ 10 Seconds	≤ 10 Seconds
	B	< 20 Seconds	< 15 Seconds
	C	< 35 Seconds	< 25 Seconds
	D	< 55 Seconds	< 35 Seconds
Undesirable	E	< 80 Seconds	< 50 Seconds
	F	> 80 Seconds	> 50 Seconds

Source: Highway Capacity Manual, 2010

Freeway operations are also measured on the LOS scale. A, B, C and D levels of service are generally considered acceptable in urban areas. When the LOS for a section of roadway decreases from level D to levels E or F, traffic flow can be impeded (see Table 2). Level of service A describes nearly free flow operation of vehicles, virtually unaffected by the presence of other traffic. In contrast, LOS E describes operation at capacity. Traffic flow at this level is very unstable. Any flow interruption or disruption produces extensive queuing. There is little freedom to maneuver within the traffic stream. KDOT considers LOS D or better the desirable levels of service for the design year peak hour traffic conditions.

Table 2 - Freeway Level of Service (LOS) Thresholds

	Level of Service (LOS)	**Freeways - Mainline** Max Density (pc/mi/ln)	**Freeways - Merge/Diverge** Max Density (pc/mi/ln)
Desirable	A	≤ 11	≤ 10
	B	> 11 – 18	> 10 – 20
	C	> 18 – 26	> 20 – 28
	D	> 26 – 35	> 28 – 35
Undesirable	E	> 35 – 45	> 35
	F	> 45	Demand Exceeds Capacity

Source: Highway Capacity Manual, 2010

The table below shows the existing AM and PM peak hour level of service and average motorist delay based on the methodology described above. The intersections at 151st, 167th and 179th Streets show the overall intersection average level of service and delay along with the individual movement level of service and delay. The intersections along 159th, 167th and 179th Streets shows the intersection delay and level of service for the worst movement along with the individual movement level of service and delay. The Highway Capacity Manual standard is to use average intersection delay for signalized intersections and the worst movement intersection delay for stop controlled intersections. Level of service E and F are highlighted.

Table 3 - Existing (2014) Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)
US-69 SB Ramp/151st St.	Signal	**B (16.3)**	**C (20.1)**
WB Left		C (27.3)	D (37.7)
WB Thru		B (11.8)	B (11.6)
SB Left		C (20.8)	C (26.2)
SB Right		A (7.2)	B (14.3)
EB Right		A (7.9)	A (9.7)
EB Thru		B (18.7)	C (24.9)
US-69 NB Ramp/151st St.	Signal	**B (16)**	**B (14.6)**
WB Right		D (39.3)	B (18)
WB Thru		C (23.4)	B (17.7)
NB Left		D (45.3)	D (39.8)
NB Right		A (1.8)	A (1.2)
EB Left		C (33.9)	C (34.3)
EB Thru		A (5.7)	A (5)
167th St./Metcalf Ave.	2-Way Stop	**D (37.2)**	**D (44.5)**
WB Right		C (15.3)	A (8.8)
WB Thru		C (22.6)	C (21.4)
WB Left		D (26.1)	C (21.1)
EB Left		E (35.2)	E (44.5)
EB Thru		E (37.2)	E (43.8)
EB Right		C (24.6)	D (30.8)
NB Thru		A (1.6)	A (2.1)
NB Right		A (1.1)	A (1.7)
NB Left		A (3.9)	A (7.5)
SB Left		A (8.2)	A (2.4)
SB Right		A (1.4)	A (0.9)
SB Thru		A (1.9)	A (1.4)
167th St./Antioch Rd.	4-Way Stop	**B (16.2)**	**B (13.7)**
NB Right		A (6.5)	A (7.2)
NB Thru		B (13.7)	B (11.3)
NB Left		A (8.4)	B (10.2)
EB Thru		B (12)	A (9)
EB Right		B (13.9)	A (7)
EB Left		A (10)	A (8.4)
SB Left		B (11.4)	A (7.1)
SB Thru		B (12.7)	B (11.5)
SB Right		A (6)	A (5.7)
WB Left		A (8.9)	A (8)
WB Thru		C (16.2)	B (13.7)
WB Right		B (10.1)	A (8)

Table 3 - Continued
Existing (2014) Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)
167th St./Lowell Ave.	1-Way Stop	**A (3.1)**	**A (0.7)**
EB Thru		A (0.7)	A (0.2)
EB Left		A (3.1)	A (0)
WB Thru		A (0.3)	A (0.4)
WB Right		A (0.7)	A (0.7)
SB Left		A (0)	A (0)
SB Right		A (0)	A (0)
167th St./KDOT Facility Dr.	1-Way Stop	**A (9.1)**	**A (6.9)**
WB Thru		A (0.5)	A (0.4)
WB Right		A (0.9)	A (0.9)
EB Thru		A (0.5)	A (0.2)
EB Left		A (3.3)	A (2.2)
SB Right		A (5.5)	A (5)
SB Left		A (9.1)	A (6.9)
US-69 SB Ramp/167th St.	1-Way Stop	**A (9.5)**	**B (10.2)**
SB Left		B (11)	B (10.2)
SB Right		A (9.5)	A (9.5)
WB Thru		A (0.4)	A (0.5)
EB Thru		A (0.4)	A (0.4)
US-69 NB Ramp/167th St.	1-Way Stop	**A (3.5)**	**A (2.1)**
WB Right		A (0.7)	A (0.6)
WB Thru		A (0.6)	A (0.4)
EB Thru		A (0.5)	A (0.4)
EB Left		A (3.5)	A (2.1)
US-69 SB Ramp/179th St.	1-Way Stop	**B (14)**	**C (18.6)**
EB Right		A (0.6)	A (0.7)
EB Thru		A (1.3)	A (1)
WB Left		A (5)	A (5)
WB Thru		A (0.8)	A (1.1)
SB Right		B (12.8)	C (18.6)
SB Left		B (14)	C (17.8)
US-69 NB Ramp/179th St.	1-Way Stop	**B (12.1)**	**B (10.1)**
NB Right		A (8)	A (8.1)
NB Left		B (12.1)	B (10.1)
WB Right		A (1.1)	A (0.9)
WB Thru		A (2.1)	A (1.2)
EB Left		A (7.3)	A (2.2)
EB Thru		A (5.1)	A (1.1)

Source: VISSIM Model using HCM 2010 methodology. LOS E and F conditions are highlighted.

The City of Overland Park and KDOT prefer an intersection level of service A-D. The 167th Street and US-69 interchange and other intersections within the study limits currently operate at an acceptable level of service during the morning peak hour. Some individual PM peak hour turning movements are operating at LOS E at the 167th Street and Metcalf Avenue intersection.

The existing crash analysis for 167th street included the intersections of Metcalf & 167th and Antioch & 167th. Crash data was collected from January 2009 to December 2013 for the side streets. In total over the five years, there were 40 crashes on 167th street and the approaches from Antioch and Metcalf. One was a fatal crash, 11 were injury crashes, and 28 were PDO crashes. 16 were angle crashes, making up about 40% of the crashes. Another eight crashes were related to animals.

With existing conditions, the interchange is not considered to have severe crash problems. Crash rates in the US-69 / 167th Street study area (0.830 MVMT) are lower than the statewide averages (1.134 MVMT) compared to other 4-lane urban highways in Kansas. However, the fatal crash rate (0.868 HMVMT) is higher than the statewide average (0.676 HMVMT). Over six years from July 2008 to May 2014, the northbound mainline had 180 crashes while southbound had 109 for a total of 289 crashes or a crash every 7 and a half days on average. There were three fatalities over the six year period in the years 2010, 2011, and 2012. There were 59 injury crashes, and the remaining 227 crashes were property damage only. The majority of the freeway crashes were rear end collisions.

The Future No-Build analysis evaluated anticipated traffic operations using design year (2040) traffic demand through an unimproved facility. Improvements at 159th Street of a full interchange were assumed to be in place since it is currently under construction and planned to open in 2015. For the design year, adjacent land use changes from vacant/agricultural to residential/business park increasing the traffic demand for the study area. Poor levels of service are expected for most of the study area movements. Future No-Build conditions warrant improvements to the existing intersections at Antioch Road, Metcalf Avenue and the interchange at US-69 to provide an acceptable level of service and improve safety.

The poor level of service shown at the study intersections in Table 3 is a result of queue backups from the study interchange. The table below shows the Future No-Build AM and PM peak hour level of service and average motorist delay. The freeway mainline Future No-Build LOS is shown in Appendix A-6 and A-7.

Table 4 - Future (2040) No-Build Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)

US-69 SB Ramp/151st St.	Signal	**C (27.1)**	**C (25)**
WB Left		F (>120)	E (66.2)
WB Thru		B (11.9)	B (10.2)
SB Left		F (>120)	F (81.1)
SB Right		F (>120)	E (56.8)
EB Right		D (50.5)	D (36.5)
EB Thru		C (25.3)	C (25.4)
US-69 NB Ramp/151st St.	Signal	**D (44.7)**	**C (21.5)**
WB Right		F (113.9)	C (24.3)
WB Thru		C (32.4)	C (28.8)
NB Left		D (40.8)	D (37.3)
NB Right		B (11.4)	A (6.5)
EB Left		D (44.4)	D (47.3)
EB Thru		A (8.4)	A (8.1)
US-69 SB Ramp/159th St.	Signal	**F (110.6)**	**F (>120)**
SB Left		F (>120)	F (>120)
SB Right		F (>120)	F (>120)
WB Left		F (>120)	F (>120)
WB Thru		B (11.5)	B (10.1)
EB Thru		F (>120)	F (>120)
EB Right		F (>120)	F (>120)
US-69 NB Ramp/159th St.	Signal	**C (26.7)**	**F (>120)**
NB Left		D (51.4)	D (41.9)
NB Right		D (38.7)	C (24)
EB Left		D (52.1)	D (51.7)
EB Thru		A (8.7)	B (12.7)
WB Thru		D (40.2)	F (>120)
WB Right		C (27.5)	F (>120)
167th St./Metcalf Ave.	Signal	**F (>120)**	**F (>120)**
WB Right		F (>120)	F (>120)
WB Thru		F (>120)	F (>120)
WB Left		F (>120)	F (>120)
EB Left		F (>120)	F (>120)
EB Thru		F (>120)	F (>120)
EB Right		F (>120)	F (>120)
NB Thru		F (115.3)	D (50.6)
NB Right		F (111.4)	D (41.2)
NB Left		F (>120)	F (111.2)
SB Left		F (101.5)	F (116.1)
SB Right		F (>120)	F (113.2)
SB Thru		F (92.2)	F (115.3)

Table 4 - Continued
Future (2040) No-Build Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)
167th St./Antioch Rd.	Signal	**F (>120)**	**F (>120)**
NB Right		F (>120)	F (88.6)
NB Thru		F (>120)	D (40.2)
NB Left		F (112.4)	E (58.5)
EB Thru		F (>120)	F (>120)
EB Right		F (>120)	F (>120)
EB Left		F (>120)	F (>120)
SB Left		F (>120)	F (>120)
SB Thru		F (>120)	F (>120)
SB Right		F (>120)	F (>120)
WB Left		F (>120)	F (110.9)
WB Thru		F (>120)	F (83.9)
WB Right		F (>120)	E (76.1)
US-69 SB Ramp/167th St.	1-Way Stop	**F (>120)**	**F (>120)**
SB Left		F (>120)	F (>120)
SB Right		F (>120)	F (>120)
WB Thru		F (99.3)	A (4.2)
EB Thru		F (>120)	F (>120)
US-69 NB Ramp/167th St.	1-Way Stop	**F (>120)**	**F (89.7)**
WB Right		F (63.8)	A (6.2)
WB Thru		F (86.9)	A (8.1)
EB Thru		F (>120)	E (40.3)
EB Left		F (82.2)	F (89.7)
167th St./Lowell Ave.	1-Way Stop	**F (>120)**	**F (>120)**
EB Thru		F (>120)	F (>120)
EB Left		F (>120)	F (>120)
EB Right		F (>120)	F (>120)
WB Thru		F (>120)	C (20.5)
WB Right		F (>120)	C (17.4)
WB Left		F (>120)	D (28.2)
SB Left		F (119.6)	F (>120)
SB Right		F (70.9)	F (>120)
SB Thru		F (77.4)	F (>120)
NB Right		D (34.1)	D (27.2)
NB Left		E (39)	D (31.2)
NB Thru		C (22.4)	D (27)

Table 4 - Continued
Future (2040) No-Build Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)
167th St./KDOT Facility Dr.	1-Way Stop	**F (>120)**	**F (113.1)**
WB Thru		F (81.5)	A (5.6)
WB Right		F (82.4)	C (16.9)
WB Left		F (78.6)	A (6.7)
EB Thru		F (>120)	E (49)
EB Left		F (>120)	F (113.1)
EB Right		F (>120)	E (40.3)
SB Right		F (53.8)	D (29)
SB Left		F (114.3)	F (83.9)
SB Thru		F (64.9)	D (27)
NB Left		C (23)	C (17.2)
NB Right		F (110.3)	E (35.5)
NB Thru		E (38)	D (27.6)
US-69 SB Ramp/179th St.	Signal	**B (13.8)**	**C (27.4)**
EB Right		B (14.6)	B (11.3)
EB Thru		B (15.7)	B (17.2)
WB Left		D (38.3)	C (27.4)
WB Thru		A (7.9)	A (9.6)
SB Right		B (10.5)	A (7.9)
SB Left		C (24.1)	C (20.7)
US-69 NB Ramp/179th St.	Signal	**B (19.5)**	**C (32.9)**
NB Right		D (45.2)	B (12.3)
NB Left		D (41.4)	C (24.5)
WB Right		A (7.6)	A (6.3)
WB Thru		C (20.1)	B (15.1)
EB Left		D (41.2)	C (32.9)
EB Thru		A (7.1)	A (6.1)

Source: VISSIM Model using HCM 2010 methodology. LOS E and F conditions are highlighted.

Due to the poor level of service at the study intersections along 167th Street, the Future No-Build condition also creates poor level of service along 159th Street at Antioch Road, Metcalf Road and US-69 as well as along US-69 between 159th Street and 167th Street. These results demonstrate that the existing facility cannot satisfactorily accommodate the design-year traffic demands.

2.2 Transportation System Management and Alternatives Analysis

FHWA Policy Point Two: ***Current need is not met by alternative transportation solutions. Alternative solutions are presented.***

> *The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).*

Two objectives of the improvements at this interchange are to accommodate future travel demands and improve safety. Alternative transportation system management solutions such as mass transit, HOV, improved signal timing, and minor geometric enhancements were considered early in the study process. After evaluating the anticipated future needs of this interchange, alternative transportation solutions by themselves cannot adequately address the purpose and need for the following reasons:

- Alternative transportation solutions do not address the lack of access to and from the south side of 167th Street.
- Currently no transit routes exist south of 151st Street, nor are there any plans for expansion to 167th Street, making options for improved transit travel to the area limited in the future.
- Addressing the general capacity and safety issues at the existing interchange will require more substantial improvements than can be accomplished through minor geometric enhancements such as adding turn lanes, improving intersection controls, etc.

Since the needs at this interchange cannot be adequately met by alternative transportation solutions, an Interchange Selection Study (ISS) was performed to determine a preferred alternative for this interchange. The preliminary analysis occurred in two phases. Phase 1 considered a variety of interchange types with the intent to narrow potential solutions through a qualitative evaluation process. The following potential interchange configurations were considered as part of this first phase:

- **Folded Diamond Interchange**
- **Modified Diamond Interchange**
- **Diverging Diamond Interchange (DDI)**
- **Modified Diamond with Roundabout Interchange**
- **Oval Roundabout Interchange**
- **Single Point Urban Interchange**

The Oval Roundabout and Single Point interchanges were dismissed early in the evaluation process simply due to their higher construction cost. The remaining four configurations were carried forward as potential cost-effective options and were analyzed qualitatively at a high level. Through this qualitative evaluation, the Modified Diamond with Roundabout interchange was dismissed due to potential new ADA regulations requiring the signalization of multilane roundabouts. If these potential regulations

move forward, the addition of signals on the roundabouts would likely reduce the performance of the interchange below desired levels in the design year. The Folded Diamond interchange was dismissed due to significant right-of-way impacts. The remaining two alternatives, the Modified Diamond and the Diverging Diamond were selected to move forward into Phase 2 of the Interchange Selection Study.

Phase 2 of the Interchange Selection Study then analyzed a Modified Diamond interchange and a Diverging Diamond interchange, shown below in Figures 4 and 5, in more detail. These two alternatives were evaluated based on the following factors:

- **Acceptable Level of Service**
- **Construction Cost**
- **Phasing Flexibility**
- **Right-of-Way Impacts**
- **Utility Impacts**
- **Maintenance of Traffic**
- **Safety**
- **Multi-modal Connectivity**

The Modified Diamond differentiated itself from the Diverging Diamond relative to several of the evaluation factors as discussed below:

- **Acceptable Level of Service** – Both interchange alternatives provide an acceptable level of service and address the purpose and need.

- **Safety** – The Modified Diamond is a more familiar interchange type.

- **Maintenance of Traffic** – The Modified Diamond is easier to construct and maintain 167th Street traffic and connectivity to the existing interchange ramps during construction due to the less complex configuration of the ramp terminals.

- **Phasing Flexibility** – There is the potential that 167th Street is improved prior to constructing the new south ramps and completing the full interchange. In that scenario, where no south ramps exist, the Diverging Diamond would require drivers to maneuver the crossovers at the ramp terminals with no potential to access a ramp to southbound US-69. The Modified Diamond does not present that complication under a phased scenario as the interchange would essentially function as it does today.

For these reasons, the Modified Diamond was selected as the Preferred Alternative.

Figure 4
Alternative 1 - Modified Diamond Interchange

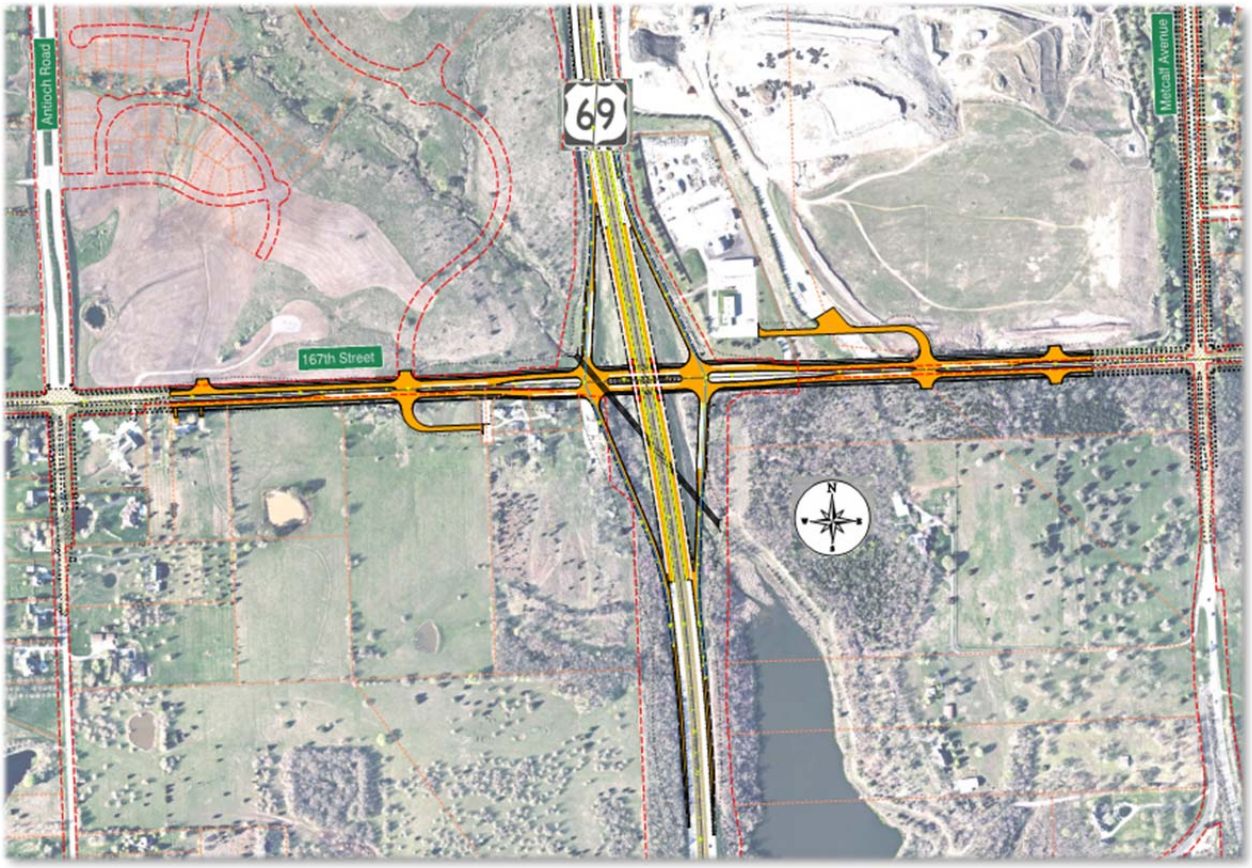
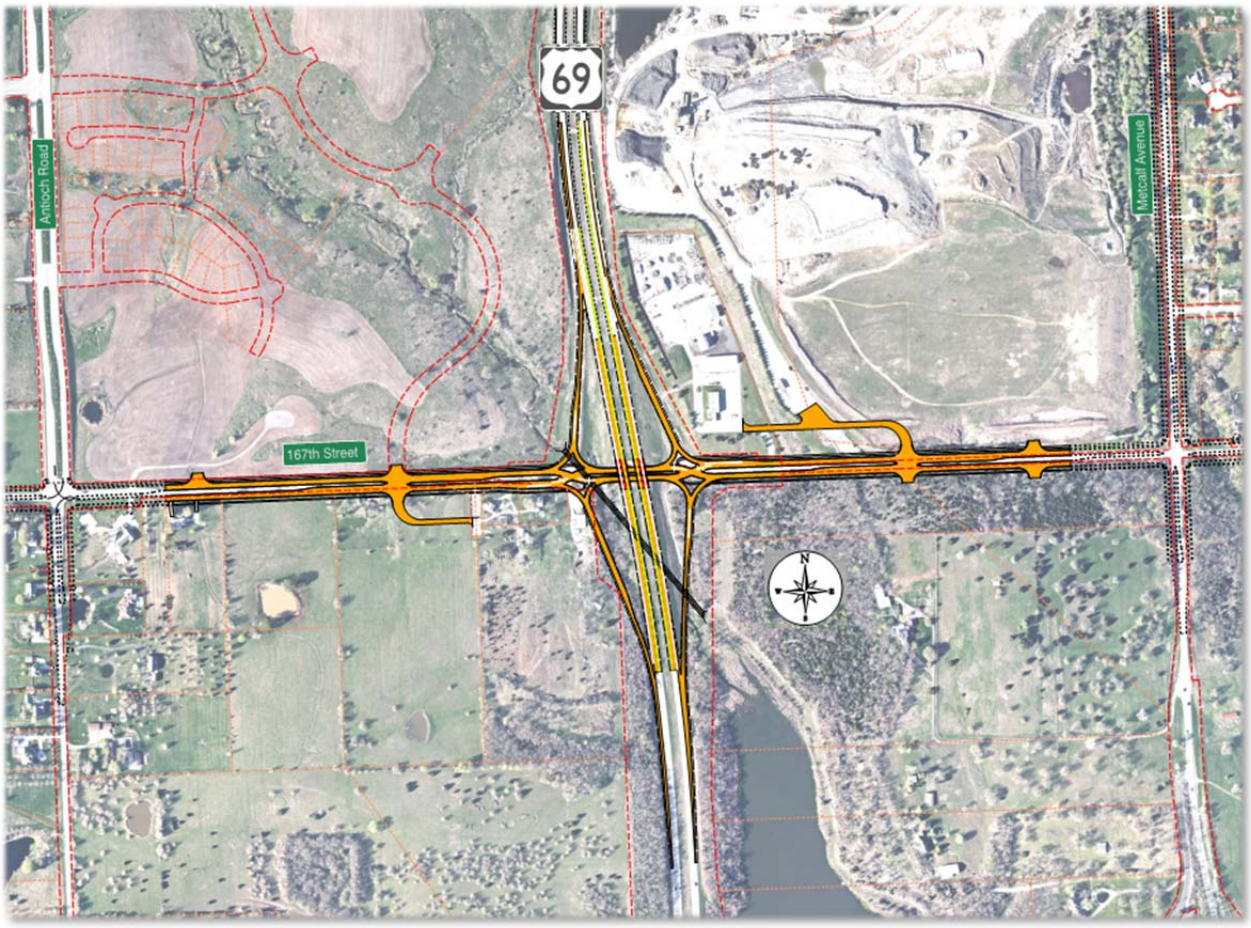


Figure 5
Alternative 2 - Diverging Diamond Interchange



2.3 Operational Analysis

FHWA Policy Point Three: *Operational and safety analysis of the proposed alternatives*

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street

network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

2.3.1 US-69 and 167th Street Interchange

Traffic analysis for the 2040 Build condition for the Diverging Diamond and Modified Diamond concepts was performed. These improvements are shown in Figures 4 and 5 above and do not include any improvements to US-69 or the intersections at Antioch Road and Metcalf Avenue with 167th Street. The table below compares the level of service and delay results for the Diverging Diamond and Modified Diamond interchange with no additional improvements to the study area.

Table 5 - Future (2040) Build Intersection Level of Service (LOS)

Intersection	Intersection Control	Diverging Diamond		Modified Diamond	
		AM LOS (Delay)	PM LOS (Delay)	AM LOS (Delay)	PM LOS (Delay)
US-69 SB Ramp/151st St.	Signal	**C (22.6)**	**D (43.1)**	**C (23.2)**	**C (22.5)**
WB Left		D (45.5)	D (52.6)	D (45.8)	E (57.1)
WB Thru		B (12.5)	B (10.6)	B (13.6)	B (11.8)
SB Left		C (31.6)	C (34.8)	C (31.9)	C (34)
SB Right		A (6.8)	A (8.5)	A (6.9)	A (8.6)
EB Right		B (11)	F (82.7)	B (11.4)	B (16.9)
EB Thru		C (27.4)	F (83)	C (28.4)	C (25.9)
US-69 NB Ramp/151st St.	Signal	**D (39.3)**	**C (27.2)**	**D (38.4)**	**C (28)**
WB Right		F (86)	D (39.9)	E (79)	C (28.2)
WB Thru		D (47.1)	D (40.6)	D (48.8)	D (38.6)
NB Left		D (47)	D (38.7)	D (47.8)	D (45.9)
NB Right		B (13.7)	A (6.1)	B (15.4)	B (11.2)
EB Left		D (48.9)	D (51.5)	D (53.7)	E (59.6)
EB Thru		A (9.8)	A (8.7)	A (9.2)	A (9)
US-69 SB Ramp/159th St.	Signal	**C (29.9)**	**C (24.5)**	**C (29.1)**	**C (24.5)**
SB Left		D (46)	C (33.2)	D (45.4)	C (33.4)
SB Right		B (12)	B (12.1)	B (11.7)	B (12.7)
WB Left		E (59.3)	D (36.7)	E (62.4)	D (39.4)
WB Thru		B (11.9)	A (8.6)	B (11)	B (11.3)
EB Thru		C (34.7)	C (30.8)	C (32.8)	C (30.5)
EB Right		C (31.8)	C (24.2)	C (31.6)	C (24.3)

Table 5 - Continued
Future (2040) Build Intersection Level of Service (LOS)

Intersection	Intersection Control	Diverging Diamond		Modified Diamond	
		AM LOS (Delay)	PM LOS (Delay)	AM LOS (Delay)	PM LOS (Delay)
US-69 NB Ramp/159th St.	Signal	**C (22.5)**	**C (27.8)**	**C (21.6)**	**C (26.9)**
NB Left		D (52.2)	D (38.2)	D (48.7)	D (36.1)
NB Right		B (15.9)	B (17.6)	C (31)	B (16.7)
EB Left		E (58.2)	D (47.7)	D (54.6)	D (48.7)
EB Thru		B (10.2)	B (12)	A (6.7)	B (11.8)
WB Thru		C (27.7)	D (35.6)	C (28.8)	C (35)
WB Right		C (24.6)	C (33.8)	C (25.8)	C (30.7)
167th St./Metcalf Ave.	Signal	**E (75)**	**F (91.8)**	**E (76.4)**	**F (90.4)**
WB Right		E (59.6)	F (91.6)	E (56.3)	E (68.8)
WB Thru		E (67.3)	E (77.1)	E (64.5)	E (75.9)
WB Left		E (78.7)	F (108.1)	E (79.4)	F (104.6)
EB Left		F (81.1)	F (116.2)	F (88.5)	F (114.3)
EB Thru		D (38.8)	D (54.9)	D (45.3)	E (59.8)
EB Right		C (33.3)	D (48.2)	D (36.1)	D (50.2)
NB Thru		F (>120)	E (65.5)	F (115.4)	E (64.3)
NB Right		F (>120)	E (68.1)	F (113.6)	E (57.5)
NB Left		F (>120)	F (>120)	F (>120)	F (>120)
SB Left		E (64.7)	F (92.2)	E (67.4)	F (91.3)
SB Right		C (28.3)	F (88.4)	C (27.5)	F (91.4)
SB Thru		C (32.5)	F (88.1)	C (32.3)	F (88.3)
167th St./Antioch Rd.	Signal	**F (>120)**	**F (85.8)**	**F (>120)**	**F (86.4)**
NB Right		F (>120)	B (14)	F (>120)	B (15.4)
NB Thru		F (>120)	D (41.6)	F (>120)	D (41.8)
NB Left		F (>120)	F (83.6)	F (>120)	E (67.2)
EB Thru		D (49)	D (42.6)	D (48.4)	D (41.6)
EB Right		D (45.3)	D (49.8)	D (50.3)	D (40.2)
EB Left		F (>120)	E (61.7)	F (>120)	E (62.6)
SB Left		F (>120)	F (95.4)	F (>120)	F (102.9)
SB Thru		D (45.8)	F (>120)	D (50.7)	F (>120)
SB Right		C (27.2)	F (>120)	D (35.4)	F (>120)
WB Left		E (72.5)	F (81.8)	E (73.7)	F (89.3)
WB Thru		E (61.1)	E (65.6)	E (62.9)	E (68.8)
WB Right		E (72.9)	D (53.4)	E (74.4)	E (59.6)

Table 5 - Continued
Future (2040) Build Intersection Level of Service (LOS)

Intersection	Intersection Control	Diverging Diamond		Modified Diamond	
		AM LOS (Delay)	PM LOS (Delay)	AM LOS (Delay)	PM LOS (Delay)
167th St./Lowell Ave.	1-Way Stop	**C (18.9)**	**C (21.6)**	**C (20.1)**	**D (34.4)**
EB Thru		A (0.6)	A (0.7)	A (0.9)	B (12.7)
EB Left		A (5.1)	A (9.2)	A (7.4)	B (13.1)
EB Right		A (0.7)	A (0.4)	A (0.5)	A (6.1)
WB Thru		A (0.5)	A (0.7)	A (0.6)	A (0.7)
WB Right		A (1.1)	A (0.7)	A (0.9)	A (0.9)
WB Left		A (7.9)	B (12)	A (8.6)	B (10.1)
SB Left		B (11)	B (10.3)	B (10.6)	C (16.8)
SB Right		A (7.3)	A (7)	A (5.7)	A (8.2)
SB Thru		C (15.6)	C (18)	B (13.9)	C (22.8)
NB Right		A (7.6)	B (14.8)	A (8.1)	B (12.5)
NB Left		C (15.9)	B (12.6)	B (13.3)	C (21)
NB Thru		C (18.9)	C (21.6)	C (20.1)	D (34.4)
167th St./KDOT Facility Dr.	1-Way Stop	**C (21.8)**	**C (19.5)**	**C (22)**	**C (20.8)**
WB Thru		A (0.6)	A (1)	A (0.5)	A (1)
WB Right		A (0.1)	A (0)	A (3.4)	A (0.4)
WB Left		A (6)	A (0)	A (6)	A (1.1)
EB Thru		A (0.9)	A (0.8)	A (0.6)	A (0.4)
EB Left		A (8.5)	B (11.3)	A (7.7)	A (7.8)
EB Right		A (1)	A (1.3)	A (0.9)	A (1.4)
SB Right		A (7.5)	A (10)	A (7)	B (10.1)
SB Left		B (14)	C (15.1)	C (15.9)	B (12.5)
SB Thru		C (17.6)	C (19)	B (15)	B (14.6)
NB Left		A (8)	A (7.8)	A (7.3)	A (7.1)
NB Right		A (7.5)	A (7.5)	A (7.7)	A (5.4)
NB Thru		C (21.8)	C (19.5)	C (22)	C (20.8)
US-69 SB Ramp/167th St.	Signal	**B (17)**	**B (16.9)**	**C (27.8)**	**D (38)**
SB Left		C (20.9)	C (21.7)	D (40.1)	E (60.8)
SB Right		C (20.7)	B (19.4)	B (19.6)	C (27.8)
WB Thru		B (16)	B (17.3)	B (13.5)	B (10.4)
EB Thru		B (17.8)	B (19.5)	D (35.5)	E (58.1)
US-69 NB Ramp/167th St.	Signal	**B (10.1)**	**B (13.6)**	**B (17.4)**	**C (29.3)**
WB Right		A (3.9)	A (5.4)	B (18.3)	C (27.8)
WB Thru		B (14.1)	B (17.3)	C (21)	D (36.3)
EB Thru		B (11.4)	B (15.9)	A (5.3)	A (4.8)
EB Left		A (5.5)	A (7)	C (34.7)	D (49.9)

Table 5 - Continued
Future (2040) Build Intersection Level of Service (LOS)

Intersection	Intersection Control	Diverging Diamond		Modified Diamond	
		AM LOS (Delay)	PM LOS (Delay)	AM LOS (Delay)	PM LOS (Delay)
US-69 SB Ramp/179th St.	Signal	**B (13.5)**	**B (13.5)**	**B (13)**	**B (13.4)**
EB Right		B (14)	B (11)	B (12.6)	B (11.4)
EB Thru		B (15.3)	B (17.2)	B (14.7)	B (17.2)
WB Left		C (31.5)	C (29.5)	C (31.8)	C (28.2)
WB Thru		A (9.8)	A (9.5)	B (10.4)	A (9.5)
SB Right		B (10.5)	A (8.2)	B (10.8)	A (8.1)
SB Left		C (21.3)	B (19.7)	C (22.1)	B (19.3)
US-69 NB Ramp/179th St.	Signal	**B (12.3)**	**B (12.5)**	**B (12.4)**	**B (12.3)**
NB Right		C (20.3)	A (10)	C (21)	A (9.4)
NB Left		D (39.6)	C (27.8)	D (41.9)	C (25.7)
WB Right		A (6.6)	A (5.9)	A (6.5)	A (5.9)
WB Thru		B (12.2)	B (12.8)	B (12.1)	B (12.9)
EB Left		C (31.2)	C (25.7)	C (32.4)	C (25.1)
EB Thru		A (4.9)	A (4.7)	A (4.6)	A (5)

Source: HNTB VISSIM Model using HCM 2010 methodology. LOS E and F conditions are highlighted.

As shown in the table above, both interchange alternatives experience unacceptable level of service at the Antioch Road and Metcalf Avenue intersections with 167th Street as well as numerous movements along 151st, 159th and 167th Street. The level of service and delay problems are a result of the unimproved Antioch and Metcalf intersections with 167th Street which results in long delays for turning vehicles at the intersections. However, the levels of service at the ramp terminals for the entire intersection are acceptable for both the DDI and Modified Diamond alternatives with only two unacceptable movements at the southbound ramp terminal for the Modified Diamond. Given that both interchange alternatives operate acceptably, the Modified Diamond interchange was selected as the preferred alternative due to its safety benefits, maintenance of traffic, and phasing flexibility.

To further improve the level of service, the study team then evaluated the Modified Diamond preferred alternative with additional enhancements. These enhancements include adding an additional through lane on US-69 through the study area and improvements to the Antioch Road and Metcalf Avenue intersections with 167th Street. Metcalf is assumed to be a six-lane facility with turn lanes and Antioch is assumed to be a four-lane facility with turn lanes. The results in the table below represent 2040 levels of service with these additional enhancements.

Table 6 - Future (2040) Modified Diamond with Additional Enhancements Preferred Build Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)
US-69 SB Ramp/151st St.	Signal	**C (22)**	**C (25.9)**
WB Left		D (46.9)	E (60.5)
WB Thru		B (12.3)	B (15.1)
SB Left		C (32.2)	D (36.2)
SB Right		A (6.8)	B (10.1)
EB Right		B (11.4)	C (21.4)
EB Thru		C (27.1)	C (34.8)
US-69 NB Ramp/151st St.	Signal	**D (41.4)**	**C (22.6)**
WB Right		E (69.2)	B (17.7)
WB Thru		D (52.4)	C (28.3)
NB Left		D (39.9)	D (40.5)
NB Right		B (10.2)	A (5.4)
EB Left		D (43.5)	C (33.7)
EB Thru		B (13.5)	A (7.5)
US-69 SB Ramp/159th St.	Signal	**D (37.1)**	**C (27.5)**
SB Left		D (53)	D (35.1)
SB Right		A (9.7)	B (13.4)
WB Left		E (57.1)	D (41.6)
WB Thru		B (17.6)	B (11.8)
EB Thru		D (47.3)	D (39.5)
EB Right		D (44.9)	C (32.4)
US-69 NB Ramp/159th St.	Signal	**C (34.8)**	**C (27.8)**
NB Left		E (61.9)	D (36.8)
NB Right		E (75.5)	B (19)
EB Left		E (55.3)	D (49.6)
EB Thru		B (11.5)	B (13.5)
WB Thru		D (44)	D (35.8)
WB Right		D (39.5)	C (32.7)
167th St./Metcalf Ave.	Signal	**D (53.1)**	**D (52.2)**
WB Right		B (19.5)	C (29)
WB Thru		D (53.2)	F (98.1)
WB Left		E (62.5)	F (107.6)
EB Left		D (53.8)	E (73.7)
EB Thru		D (42.9)	E (59.7)
EB Right		A (8.8)	C (30.4)
NB Thru		E (71)	E (64)
NB Right		D (46.5)	A (7.9)
NB Left		F (99)	F (108.1)
SB Left		E (62.9)	D (42.5)
SB Right		A (9.8)	C (29.7)
SB Thru		C (23.9)	D (40.3)

Table 6 - Future (2040) Modified Diamond with Additional Enhancements Preferred Build Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)
167th St./Antioch Road	Signal	**D (48.3)**	**D (46.7)**
NB Right		C (29.3)	B (11.5)
NB Thru		E (68.6)	D (35.3)
NB Left		E (73.6)	E (60.1)
EB Thru		D (42.6)	D (41.8)
EB Right		B (13.1)	C (22.8)
EB Left		E (55.2)	D (54.6)
SB Left		D (54.3)	D (54.2)
SB Thru		C (23)	E (62.4)
SB Right		A (4.5)	C (22.7)
WB Left		E (57.8)	E (63.4)
WB Thru		D (47.5)	D (50.3)
WB Right		B (19.7)	B (10.8)
167th St./Lowell Ave.	1-Way Stop	**C (19.5)**	**D (29.2)**
EB Thru		A (0.8)	A (4.4)
EB Left		A (6.6)	A (9.8)
EB Right		A (1.1)	A (2.4)
WB Thru		A (0.7)	A (1)
WB Right		A (0.7)	A (1.1)
WB Left		A (6.7)	A (9.1)
SB Left		B (14.1)	C (19.5)
SB Right		A (9.7)	B (10.8)
SB Thru		C (19.5)	D (29.2)
NB Right		A (8.8)	A (9.7)
NB Left		B (14.4)	B (14.8)
NB Thru		C (19.2)	D (28.2)
167th St./KDOT Facility Dr.	1-Way Stop	**C (17.8)**	**C (19.1)**
WB Thru		A (0.9)	A (1)
WB Right		A (1)	A (0.8)
WB Left		A (4.2)	A (1.6)
EB Thru		A (0.8)	A (0.6)
EB Left		A (5)	A (6.8)
EB Right		A (1)	A (1.1)
SB Right		A (8.7)	B (12.4)
SB Left		C (16.8)	C (15.6)
SB Thru		C (17.8)	C (17.5)
NB Left		A (7.2)	A (7.4)
NB Right		A (7.2)	A (5.6)
NB Thru		C (17.3)	C (19.1)

Table 6 - Future (2040) Modified Diamond with Additional Enhancements Preferred Build Intersection Level of Service (LOS)

Intersection	Intersection Control	AM LOS (Delay)	PM LOS (Delay)
US-69 SB Ramp/167th St.	Signal	**B (14.1)**	**C (29.1)**
SB Left		B (19.9)	D (40.4)
SB Right		B (10.8)	C (23.1)
WB Thru		A (9)	A (9.1)
EB Thru		B (17.5)	D (50.2)
US-69 NB Ramp/167th St.	Signal	**C (25.7)**	**C (22.8)**
WB Right		B (17.5)	C (23.5)
WB Thru		D (43.9)	C (30.7)
EB Thru		A (5.7)	A (2.8)
EB Left		C (33.6)	D (35.2)
US-69 SB Ramp/179th St.	Signal	**B (13.7)**	**B (13.2)**
EB Right		B (13)	B (13)
EB Thru		B (15.6)	B (20)
WB Left		C (32.1)	C (31.1)
WB Thru		B (10.6)	B (12.4)
SB Right		B (10.8)	A (9.2)
SB Left		C (21.5)	B (19.6)
US-69 NB Ramp/179th St.	Signal	**B (14.4)**	**A (8.8)**
NB Right		B (15.3)	A (9.6)
NB Left		C (30.7)	C (26.5)
WB Right		A (7.3)	A (5.9)
WB Thru		B (15.9)	B (13.1)
EB Left		D (37.5)	C (26.5)
EB Thru		A (7)	A (4.8)

Source: HNTB VISSIM Model using HCM 2010 methodology. LOS E and F conditions are highlighted.

As shown in the table above, the Modified Diamond interchange with additional enhancements greatly improves levels of service. The level of service and delay problems at 159th Street and 167th Street are a result of individual movements with very high turn volumes which results in long delays for turning vehicles at the intersections. However, the overall intersection level of service remains acceptable and these delays exist regardless of the interchange type selected.

Vehicle queues were also analyzed as it is important to design the roadway so that vehicle queues do not back up into adjacent signalized intersections or through the off-ramps onto the mainline as this can cause additional delay and safety concerns. Travel time results and vehicle queue results are graphically shown in the Appendix. Queue results indicate that vehicle queues do not back up into adjacent signalized intersections or onto the freeway mainline.

2.3.2 US 69 Mainline

US-69 operations were analyzed for 2040 conditions by increasing existing traffic based on historical US-69 growth rates. Table 7 shows the results of the VISSIM analysis considering the scenarios of the Future No-Build compared with the Future Build that includes the modified diamond interchange at 167th Street, six-lanes on US-69, and signalized intersections at Antioch Road and Metcalf Avenue with 167th Street.

Table 7 - US-69 Mainline Level of Service - 2040

US-69 Segment	2040 No-Build			2040 Build		
AM Peak Hour	Peak Density	Peak Speed	LOS	Peak Density	Peak Speed	LOS
Southbound						
North of 151st Off Ramp	204.53	1.66	F	21.36	57.26	C
Between 151st Off and On Ramps	213.66	1.66	F	20.66	57.76	C
Between 159th Off and On ramps	216.81	1.56	F	15.98	65.75	B
Between 159th On and 167th Off	227.01	1.52	F	12.91	66.12	B
Between 167th Ramps	---	---	---	12.66	66.64	B
167th On Ramp	---	---	---	11.82	65.39	B
Between 167th and 179th	18.44	61.65	C	14.11	65.52	B
North of 179th Off ramp	16.35	64.33	B	11.76	65.51	B
Between 179th Off and On Ramps	12.06	66.45	B	9.87	67.04	A
South of 179th On ramp	13.50	63.11	B	9.79	65.58	A
Northbound						
South of 179th Off ramp	85.17	19.14	F	28.27	60.60	D
Between 179th Off and On Ramps	106.24	14.86	F	31.58	59.08	D
North of 179th On ramp	64.16	34.84	F	34.24	50.26	D
Between 167th and 179th	35.68	57.87	E	37.48	56.75	E
167th Off Ramp	---	---	---	30.22	60.33	D
Between 167th Ramps	---	---	---	32.95	60.64	D
167th On Ramp	25.05	63.74	C	23.83	59.92	C
Between 167th On and 159th Off	27.04	59.32	D	28.74	60.13	D
South of 159th Off Ramp	27.66	58.15	D	23.10	61.17	C
Between 159th Off and On ramps	37.35	56.73	E	33.61	61.86	D
Between 159th On ramp and 151st Off ramp	33.07	54.84	D	33.24	56.50	D
Between 151st Off and On Ramps	38.76	54.64	E	33.91	55.41	D
North of 151st On Ramp	36.42	56.03	E	31.46	56.22	D

Table 7 - Continued
US-69 Mainline Level of Service – 2040

US-69 Segment	2040 No-Build			2040 Build		
PM Peak Hour	Peak Density	Peak Speed	LOS	Peak Density	Peak Speed	LOS
Southbound						
North of 151st Off Ramp	184.65	3.14	F	34.19	54.86	D
Between 151st Off and On Ramps	185.87	3.22	F	34.71	56.14	D
Between 159th Off and On ramps	190.69	4.14	F	29.59	63.14	D
Between 159th On and 167th Off	117.70	43.28	F	26.13	61.15	D
Between 167th Ramps	---	---	---	29.20	63.18	D
167th On Ramp	---	---	---	29.84	55.48	D
Between 167th and 179th	30.96	59.37	D	34.34	57.55	D
North of 179th Off ramp	22.56	58.94	C	23.84	61.63	C
Between 179th Off and On Ramps	22.41	64.98	C	23.09	64.48	C
South of 179th On ramp	25.69	59.99	C	21.55	64.14	C
Northbound						
South of 179th Off ramp	25.27	63.32	C	16.67	65.94	B
Between 179th Off and On Ramps	26.09	61.45	D	16.12	64.56	B
North of 179th On ramp	35.24	48.91	E	15.63	62.84	B
Between 167th and 179th	31.71	60.64	D	20.62	65.04	C
167th Off Ramp	---	---	---	16.77	64.83	B
Between 167th Ramps	---	---	---	18.89	65.19	C
167th On Ramp	24.19	62.17	C	16.20	63.49	B
Between 167th On and 159th Off	24.65	61.72	C	18.12	64.82	C
South of 159th Off Ramp	176.00	27.98	F	15.57	64.87	B
Between 159th Off and On ramps	30.93	61.62	D	21.14	64.80	C
Between 159th On ramp and 151st Off ramp	28.17	56.52	D	20.90	60.85	C
Between 151st Off and On Ramps	35.40	56.11	E	24.19	57.72	C
North of 151st On Ramp	33.04	57.03	D	25.28	57.52	C

Source: HNTB VISSIM Model

As shown in the table above, there are numerous locations expected to operate at LOS E or F for the No-Build scenario. For the 2040 Build scenario only one location is expected to operate at LOS E in 2040 – NB US-69 between 167th Street and 179th Street during the AM peak hour. The Kansas Department of Transportation has agreed that several factors, including differences in actual versus projected traffic and the LOS E being close to the LOS D range, make this single level of service E acceptable for the 2040 design year despite the typical LOS threshold being LOS D.

Safety within the study area is expected to improve in the future with the proposed improvements discussed above.

Conceptual Signing Plan

A conceptual signing plan depicting the type and location of the signs proposed to support the preferred alternative is shown in the Appendix C.

2.3.3 Conclusion

An operational and safety analysis concluded that the proposed change in access does not have an adverse impact on the safety and operation of the highway facility in the 2040 design year. The Modified Diamond interchange provides a desirable overall level of service D or better for all intersections in the study area. One segment of US-69 is expected to operate at an undesirable level of service in the design year. Traffic and safety is expected to improve throughout the study area as a result of the proposed improvements compared to the No-Build condition.

2.4 Access Connections and Design

FHWA Policy Point Four: ***Proposed access connects to a public road only and will provide for all traffic movements***

> *The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).*

The proposed US-69 and 167th Street interchange provides full access between US-69 and 167th Street. Plan plates of the interchange study area and Preferred Alternative are shown in the Appendix.

The preferred alternative maintains access to the adjacent properties along 167th Street. The local access configurations shown in the plan plates have been discussed with KDOT Road Design Staff and the operational analysis indicates acceptable traffic operations.

The preferred alternative meets or exceeds current AASHTO Green Book guidance, and KDOT, and City of Overland Park design standards. The preliminary design criteria established for the proposed improvements are shown in the Table below. The design criteria will be revisited in the design phase to address any changes in design standards.

Table 8 - US-69 and 167th Street Design Criteria

Design Feature	US-69		Ramps						167th Street
			Regular Ramps						
			At Gores		Intermediate		Departing/ Approaching Side Rd.		
	Desirable	Minimum	Entrance	Exit	Desirable	Minimum	Desirable	Minimum	
Design Speed (mph)	75	70	50	55	45	40	35	30	50
Design Vehicle	WB-67		WB-67		WB-67		WB-67		WB-50 (Ck WB-67)
Typical Section									
-Lane Width (ft)	12		16 (1 lane), 12 each (2 or more lanes)						Varies (see Typical Sections)
-Pavement Cross Slope	1.60% NC		1.60% NC		1.60% NC		1.60% NC		2.10%
-Shoulders/Curbs (ft)	Shoulders		Shoulders						Curbs
-Outside (Rt.)[1]	10		8		8		8		OP Type B
-Median (Lt.)[1]	6		2		2		2		OP Type E
-Percent Grade									
-Minimum Desirable	0.50% (0.30% min.)		0.50% (0.30% min.)		0.50% (0.30% min.)		0.50% (0.30% min.)		1%
-Maximum Desirable	3%		5%		5%		3%		6%
-Min. Stopping Sight Dist. (ft)	820	730	425	495	360	305	250	200	425
-Min. K Values									
-Sag Vertical	206	181	96	115	79	64	49	37	96, Comfort OK
-Crest Vertical	312	247	84	114	61	44	29	19	84
-Horizontal Curvature[2]									
-Des. Minimum Radius (ft)	3620	3150	1560	1920	1250	965	715	510	1200
-Des. Max. Superelevation[3]	6% (7.2% max.)		8.0%		8.0%		8.0%		N/A
Vertical Clearance									
-Over highways & local roads w/ I/C	16'-4"		16'-4"		16'-4"		16'-4"		16'-4"
-Over local roads	15'-4"		15'-4"		15'-4"		15'-4"		15'-4"
Miscellaneous									
-Curb Return Radii (ft)	N/A		N/A		N/A		60 (sho.)/ 75 (c&g)		30 (sidestreets)/ 50 (thoroughfare)
-Clear Zone (ft)	34		24 (22 min.)	24	24	16	16	16	2 (from back of curb)

167th Street DDI Criteria[4]	Design Speed (mph)	Crossing Angle	Tangent Length (Before Crossover)	Tangent Length (After Crossover)	Curve Radii (at Crossover)
	30 (25 Posted)	40°-50°	15'-20'	10'-15'	150'-300'

Design Criteria based on 2011 AASHTO Green Book and 2014 KDOT Road Manual

1. Rt. & Lt. Is referenced looking in the direction of traffic.
2. Desired maximum superelevation is 6.0%
3. Use e_{max} = 8% AASHTO table
4. Design criteria for Diverging Diamond Interchange is based on MoDOT's Engineering Policy Guide section 234.6.

2.5 Consistency with Transportation Plans

FHWA Policy Point Five: *Consistent with local and regional land use and transportation plans*

The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in

an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.

The US-69 and 167th Street Preferred Alternative is consistent with other local and regional land use and transportation plans. Plans include:

1. MARC Transportation Improvement Program 2014 - 2018 is an important document for budgeting the funds needed to make transportation improvements possible in the Kansas City metropolitan area. It represents an agency's intent to construct or implement a specific project and the anticipated flow of federal funds and matching state or local contributions. The improvement of Metcalf Avenue and US-69 north of 167th Street is included in the MARC TIP as follows:

   TIP Number 350214
   Project Name: Metcalf Avenue, 159th Street to 167th Street
   Project Category: Reconstruction (Added Capacity)

   Project Description: Reconstruct unimproved 2-lane roadway to 4-lane thoroughfare with curb and gutter, sidewalks, raised median, turn lanes, storm sewers and street lighting.

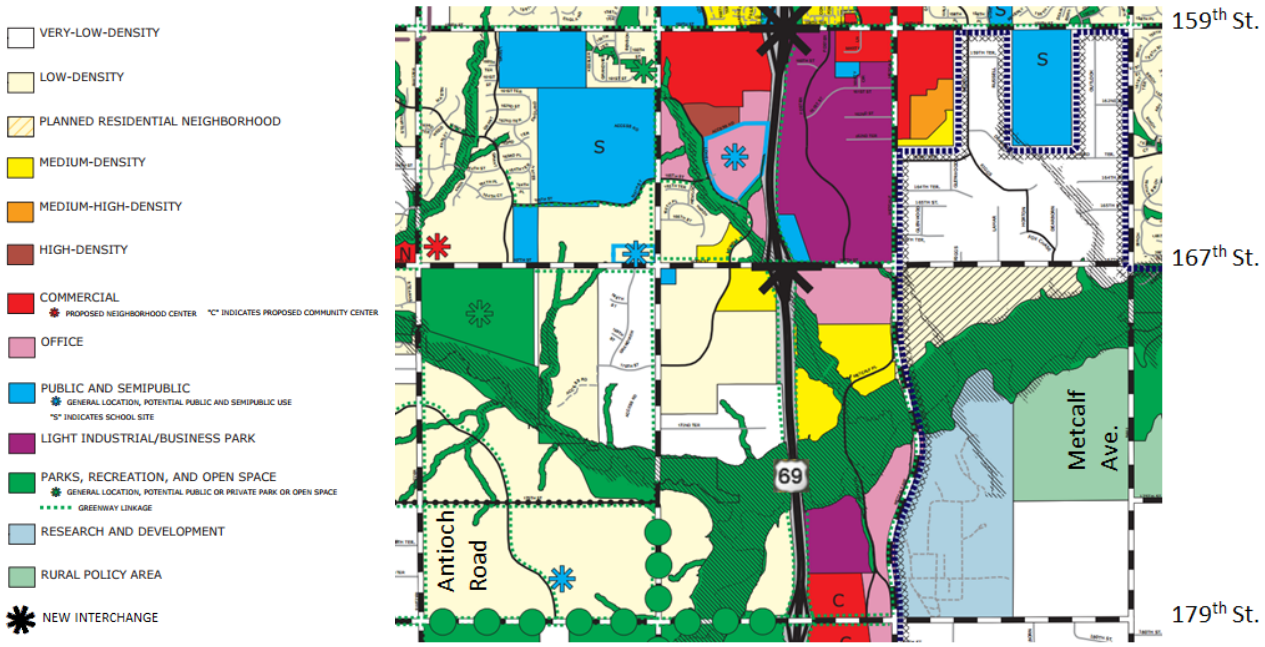
   TIP Number 350224 (Combined with 350219)
   Project Name: US-69 from 167th Street to 151st Street
   Project Category: Widening & Resurfacing (Added Capacity)

   Project Description: Construct auxiliary lanes on US-69 (NB and SB) from 167th Street north to 151st Street.

2. Overland Park Master Plan

   The City of Overland Park has identified the area around US-69 and 167th Street as a light to medium growth area, but overall the US-69 and 167th Street corridors will experience high levels of growth over the next 30 years. Areas immediately adjacent to the proposed interchange are designated as light industrial/business park, medium density housing and parks and recreation land use.

Figure 6 - Overland Park Future Development Plan



3. I-35/US-69 Major Investment Study

The I-35/US-69 MIS was sponsored by KDOT in coordination with MARC and several cities in Johnson County. The purpose of the study, with a design year of 2020, was to identify needed future improvements for the I-35 and US-69 highway corridors. The MIS southern study terminus along US-69 was 179th.

4. Overland Park South Streets Study

The Overland Park South Streets Study was initiated in the Spring of 2014 in order to analyze all of the thoroughfare roadways from 159th Street to 215th Street in the Overland Park area. One of the main goals of the study was to right size the roadways given lower density development and the abundance of parks and floodplain areas. There was also a desire to increase the investment in bicycle and pedestrian accommodations in the study area.

5. 167th Street Preliminary Engineering Study

The 2003 City of Overland Park Preliminary Engineering Study (PES) analyzed the proposed configurations of Pflumm Road from 159th Street to 175th Street, 167th Street from Pflumm Road to Metcalf Avenue, and Quivira, Switzer, and Antioch Roads between 159th Street and 167th Street. The portion that is pertinent to the current study, 167th Street between Antioch Road and Metcalf Avenue,

was proposed to be a four-lane arterial roadway. This is in conformance with what this current study recommends.

Taken collectively, these plans and studies highlight coordination between the City of Overland Park, KDOT and the regional planning agency, MARC.

2.6 Consistency with Future Access Plans

FHWA Policy Point Six: *The Concept Study considered regional impacts*

> *In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).*

There are no plans for any new access along US-69 between 151st Street and 199th Street. However, the I-35/US-69 Major Investment Study (MIS) identified that US-69 would need to be a six lane facility south to 179th Street and that 167th Street should be constructed as a full diamond interchange. The study had also identified the need for a full access 159th Street interchange which is set to open in 2015.

2.7 Coordination with Future Development

FHWA Policy Point Seven: *The Proposed Concept is to serve regional transportation needs.*

> *When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).*

The preferred alternative provides adequate collection and dispersion of the traffic resulting from the development at 159th Street as well as the improvements to Metcalf Avenue and US-69. The preferred alternative also completes a full access interchange alleviating congestion on Metcalf Avenue and 159th Street. During initial evaluation of the Preferred Concept, it was determined that additional capacity was needed on US-69 through the project area. The I-35/US-69 MIS had also expected US-69 to eventually be improved to a six-lane facility to 179th Street by 2020. The current recommendation is to improve US-69 to a six-lane facility past 179th Street by 2040. The Preferred Concept has an acceptable level of service and improves the interchange to full direct access.

2.8 Status of NEPA

FHWA Policy Point Eight: ***The Preferred Concept will be evaluated using NEPA guidelines.***

> *The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).*

During this study, a preliminary assessment of environmental impacts was performed. This evaluation included a desktop survey and one field visit. Through this investigation, it is anticipated that environmental impacts will be limited to Corp-Jurisdictional streams and wetlands only.

At this time, funding has not been identified for design or construction of these improvements. When identified, initial activities will include preparing the appropriate environmental documentation in accordance with NEPA. It is anticipated that a Categorical Exclusion will be sufficient to satisfy NEPA requirements.

2.9 Conclusion

The current partial interchange cannot satisfactorily meet the future purpose and need for the following reasons:

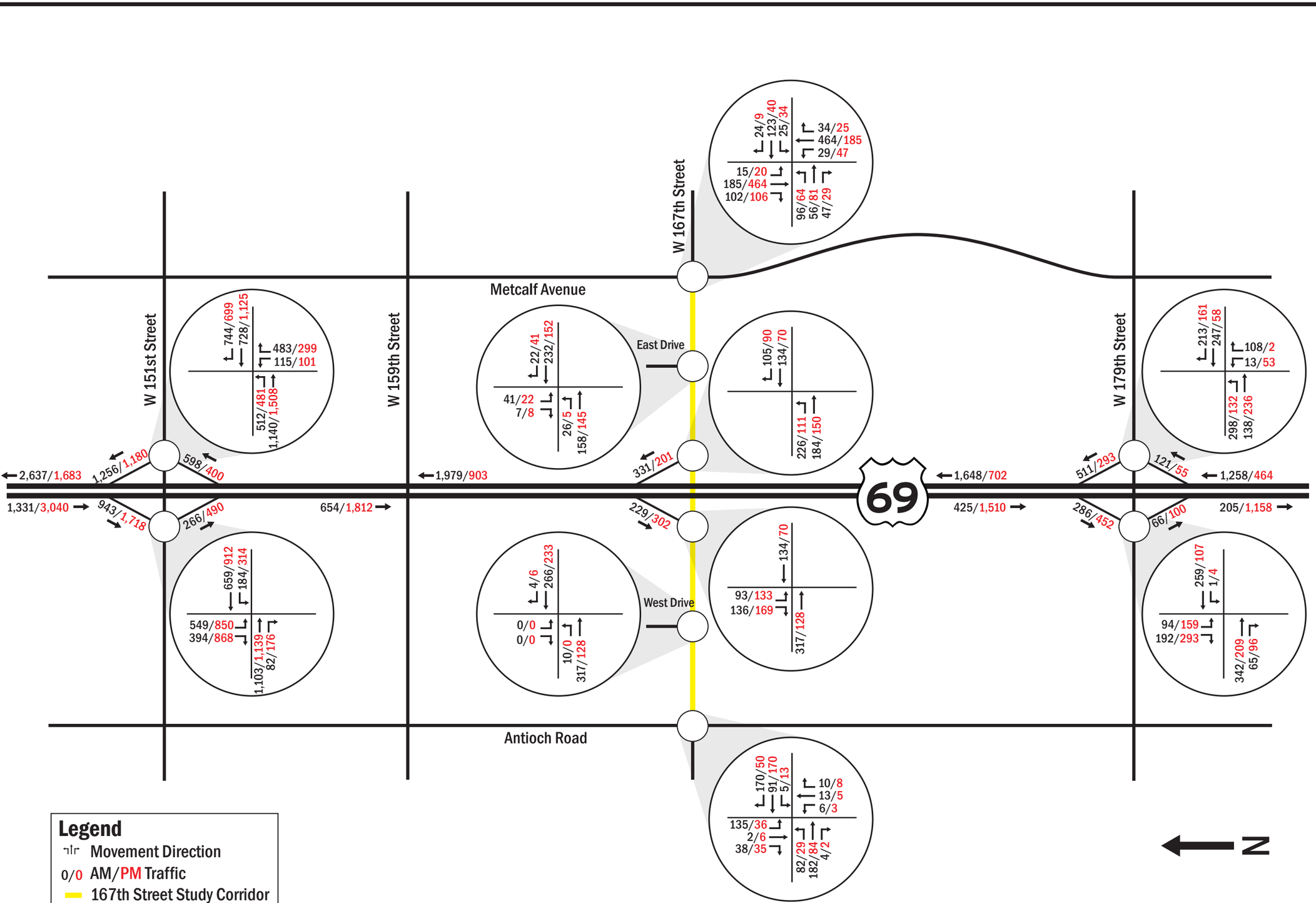
- It cannot adequately accommodate the design-year traffic demands due to the development trends south along US-69.
- Lack of access to 167th Street from northbound US-69 or access to southbound US-69 from 167th Street.
- The existing interchange has roadway geometric deficiencies, bridge deficiencies, flooding issues, and safety concerns. The general capacity and safety issues at the existing interchange will require more substantial improvements than can be accomplished through minor geometric enhancements such as adding turn lanes, improving intersection controls, etc. or other alternative transportation solutions.

The proposed improvements to the US-69 and 167th Street interchange are expected to mitigate the existing and future issues presented in this request and meet the future purpose and need. Therefore, the City of Overland Park requests approval from KDOT for a modification in access to the US-69 and 167th Street interchange consistent with the Preferred Concept developed through this study.

This request documents that the modified access point at US-69 and 167th Street satisfies the requirements outlined in the Federal Register.

Appendix A

Traffic Analysis



Legend

- ⌐|⌐ Movement Direction
- 0/0 AM/PM Traffic
- 167th Street Study Corridor

EXHIBIT

1

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Existing (2014) AM/PM Peak Hour Traffic

HNTB

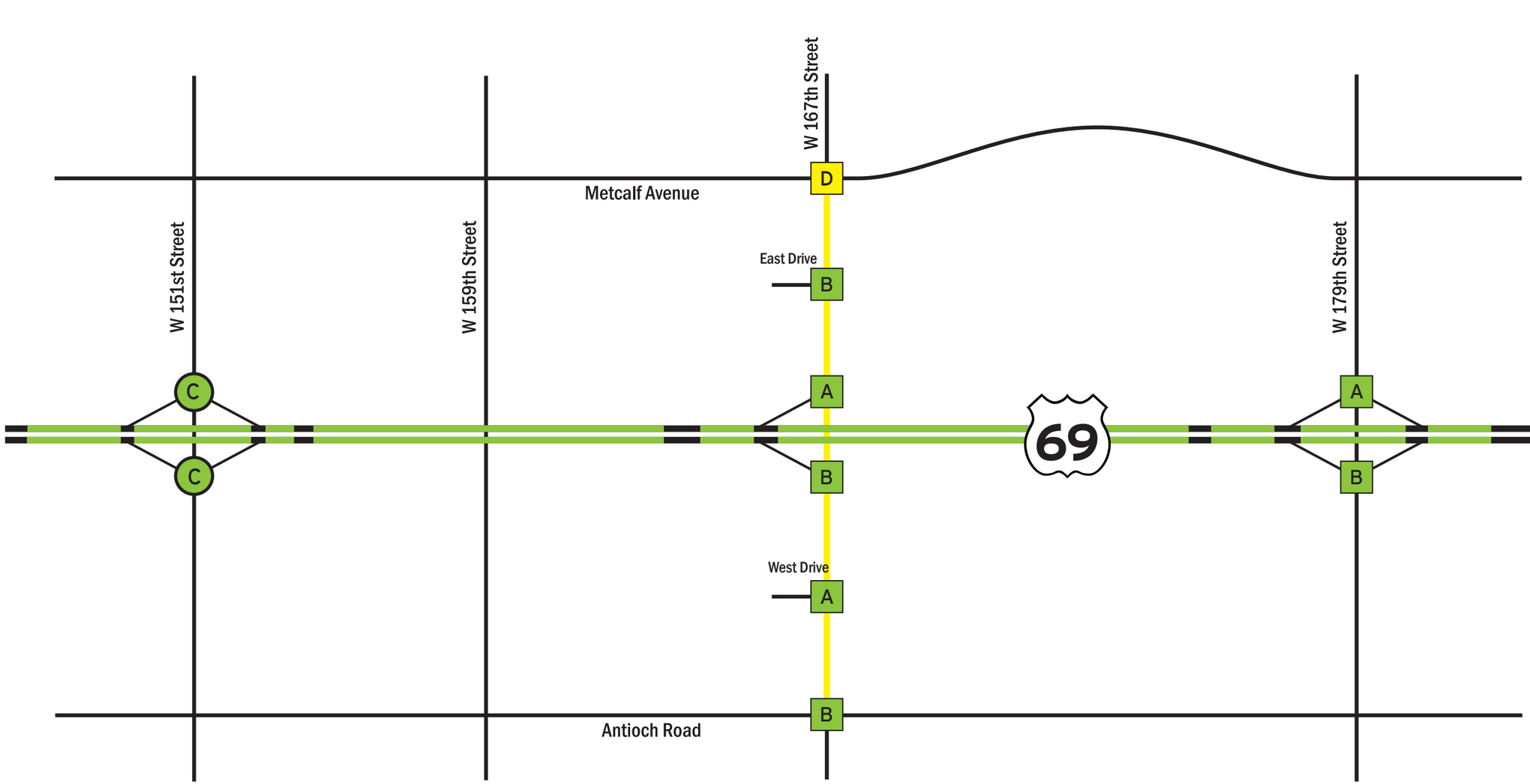
EXHIBIT

2

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Existing (2014) AM Peak Level of Service



Legend
167th Street Study Corridor

	Freeway (Density, pc/mi/ln)	Intersection Signalized (Delay, Sec)	Unsignalized (Delay, Sec)
A - C	≤ 26	A - C ≤ 35	A - C ≤ 25
D	26.1–35	D 35.1–55	D 25.1–35
E	35.1–45	E 55.1–80	E 35.1–50
F	> 45	F > 80	F > 50

N

HNTB

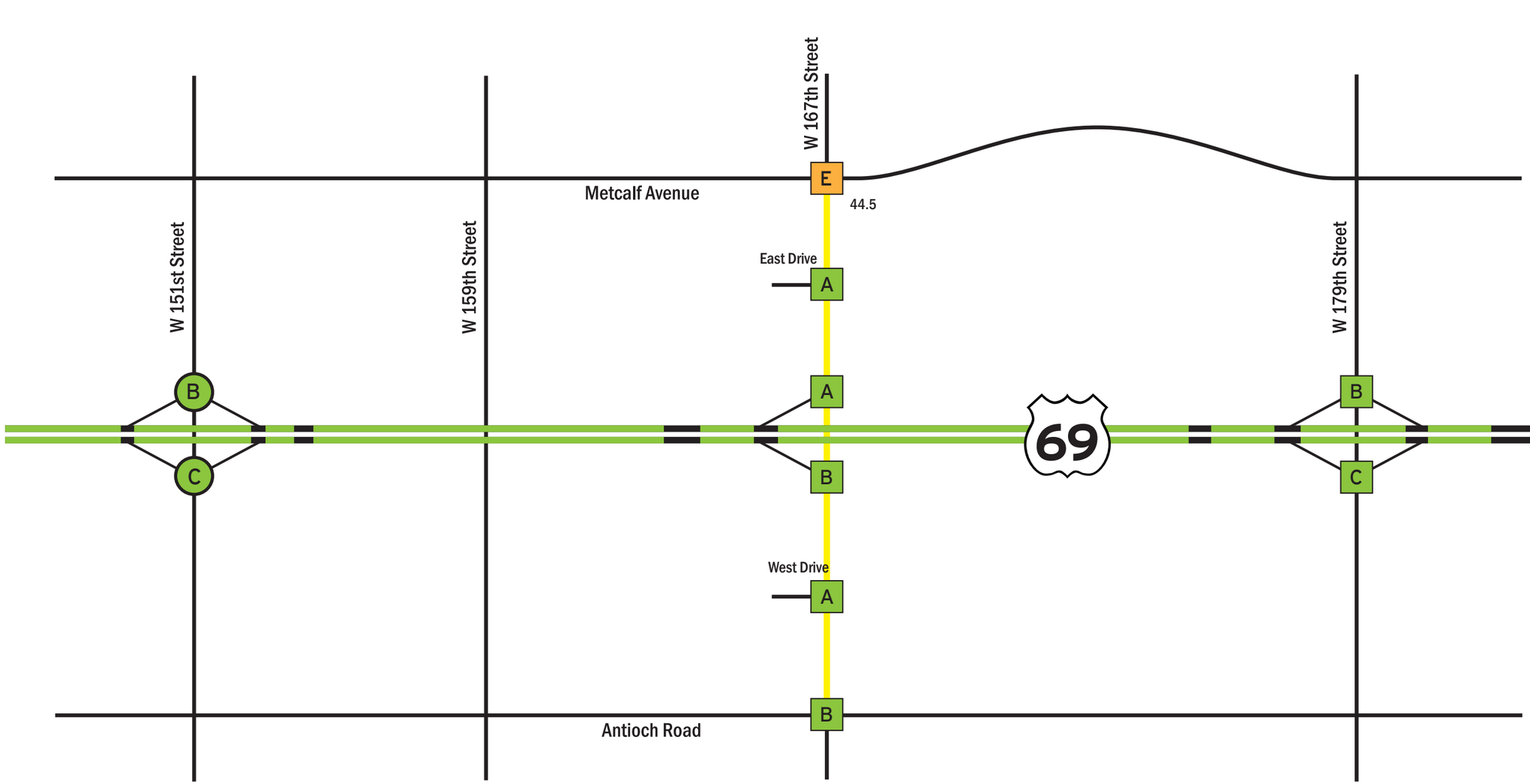
EXHIBIT

3

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Existing (2014) PM Peak Level of Service



Legend
167th Street Study Corridor

	Freeway (Density, pc/mi/ln)	Intersection Signalized	(Delay, Sec) Unsignalized
A - C	≤ 26	A - C ≤ 35	A - C ≤ 25
D	26.1–35	D 35.1–55	D 25.1–35
E	35.1–45	E 55.1–80	E 35.1–50
F	> 45	F > 80	F > 50

N

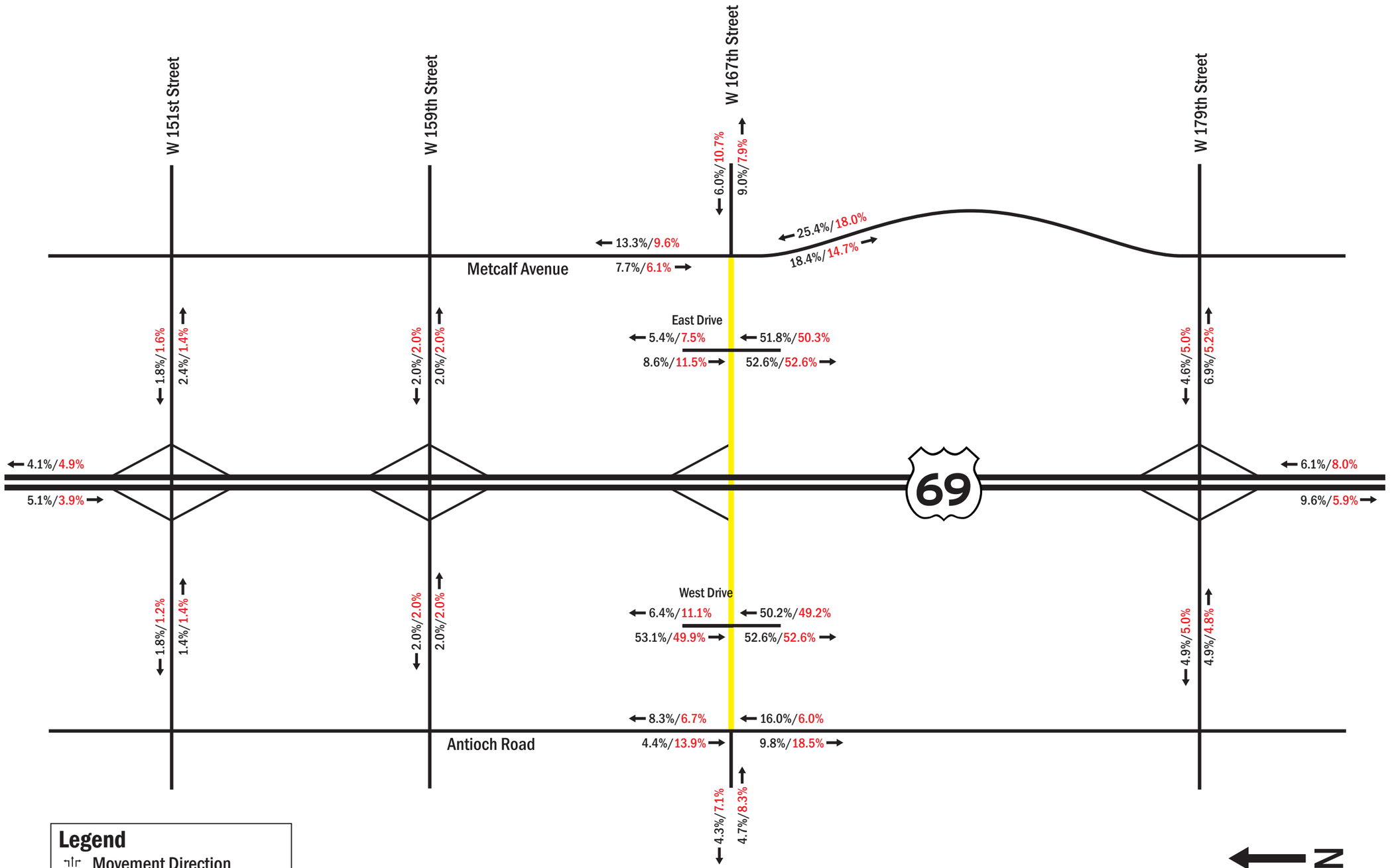
HNTB

EXHIBIT 4

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

AM/PM Annual Growth Rates



HNTB

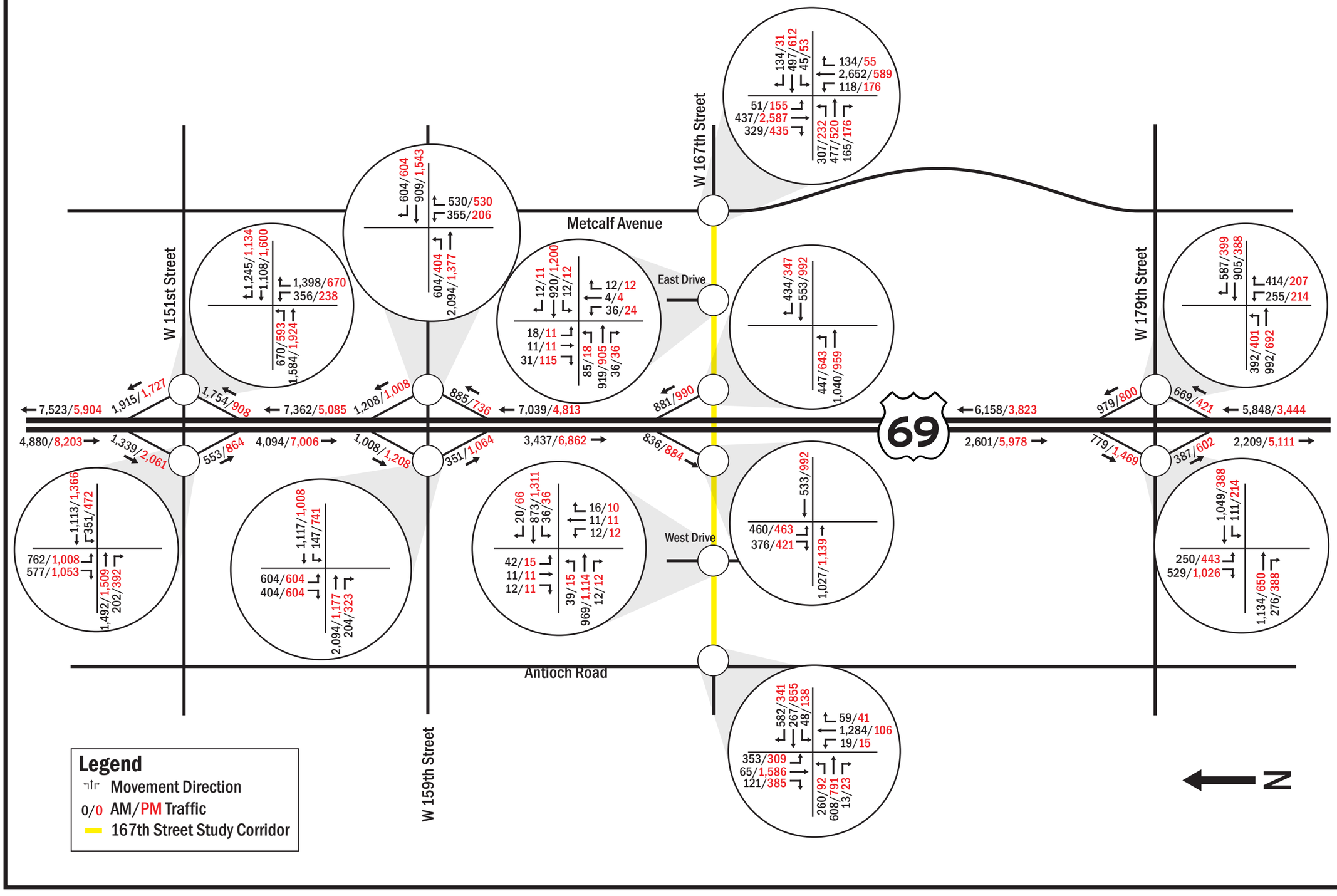
EXHIBIT

5

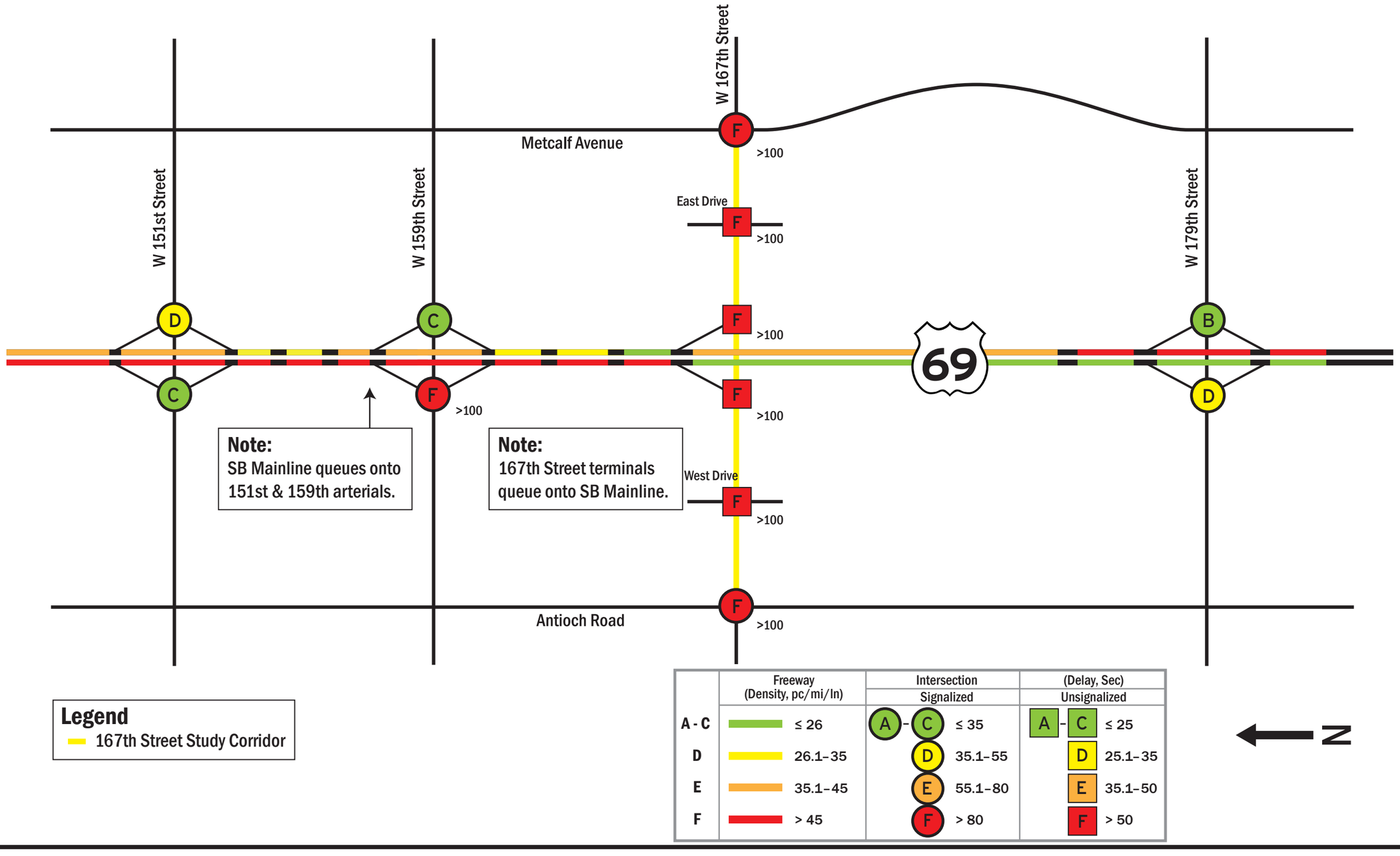
TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) No-Build AM/PM Peak Hour Traffic



HNTB



EXHIBIT

6

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) No-Build AM Peak Level of Service

HNTB

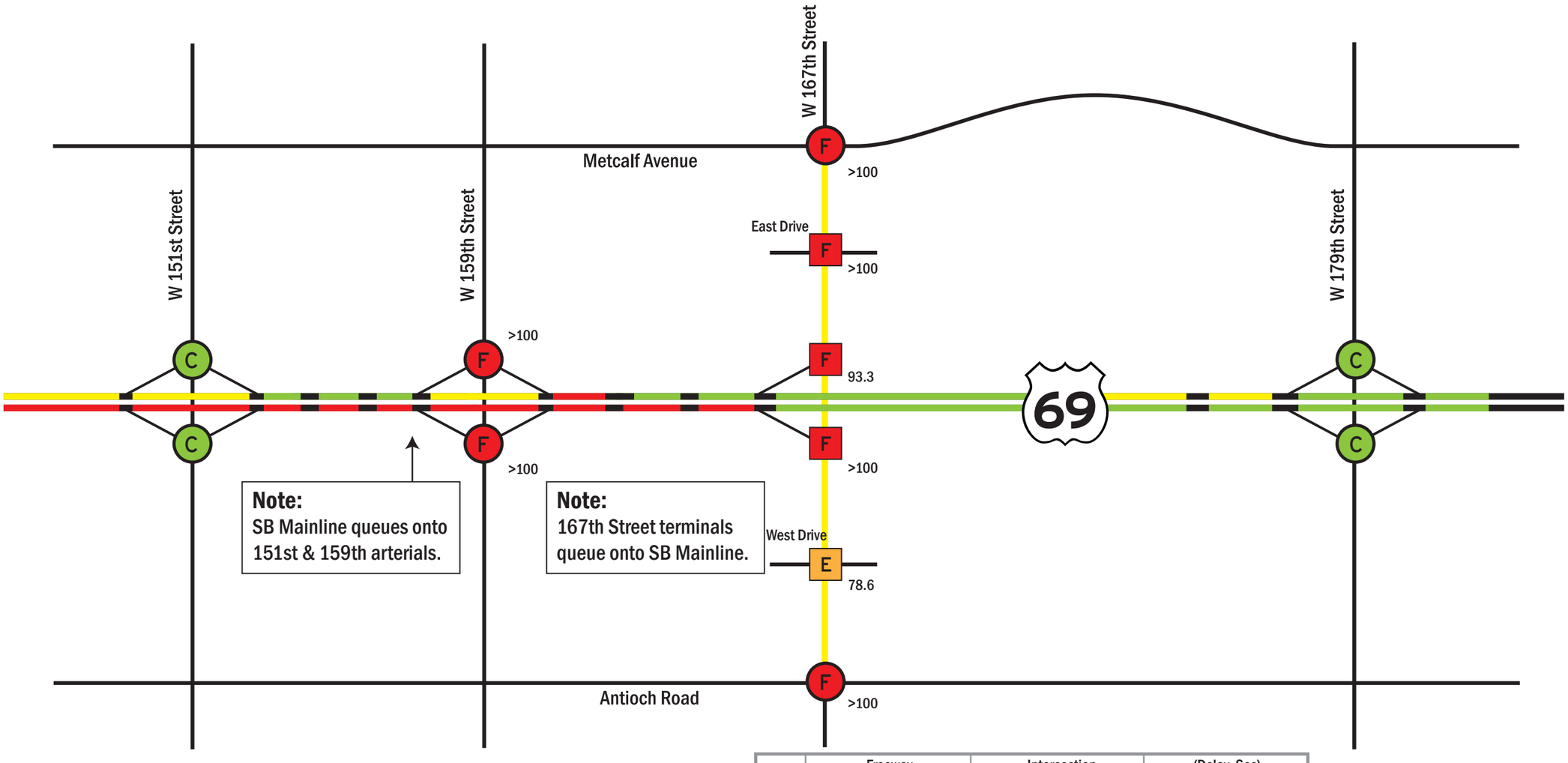
EXHIBIT

7

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) No-Build PM Peak Level of Service



	Freeway (Density, pc/mi/ln)	Intersection Signalized	(Delay, Sec) Unsignalized
A - C	≤ 26	A - C ≤ 35	A - C ≤ 25
D	26.1–35	D 35.1–55	D 25.1–35
E	35.1–45	E 55.1–80	E 35.1–50
F	> 45	F > 80	F > 50

HNTB

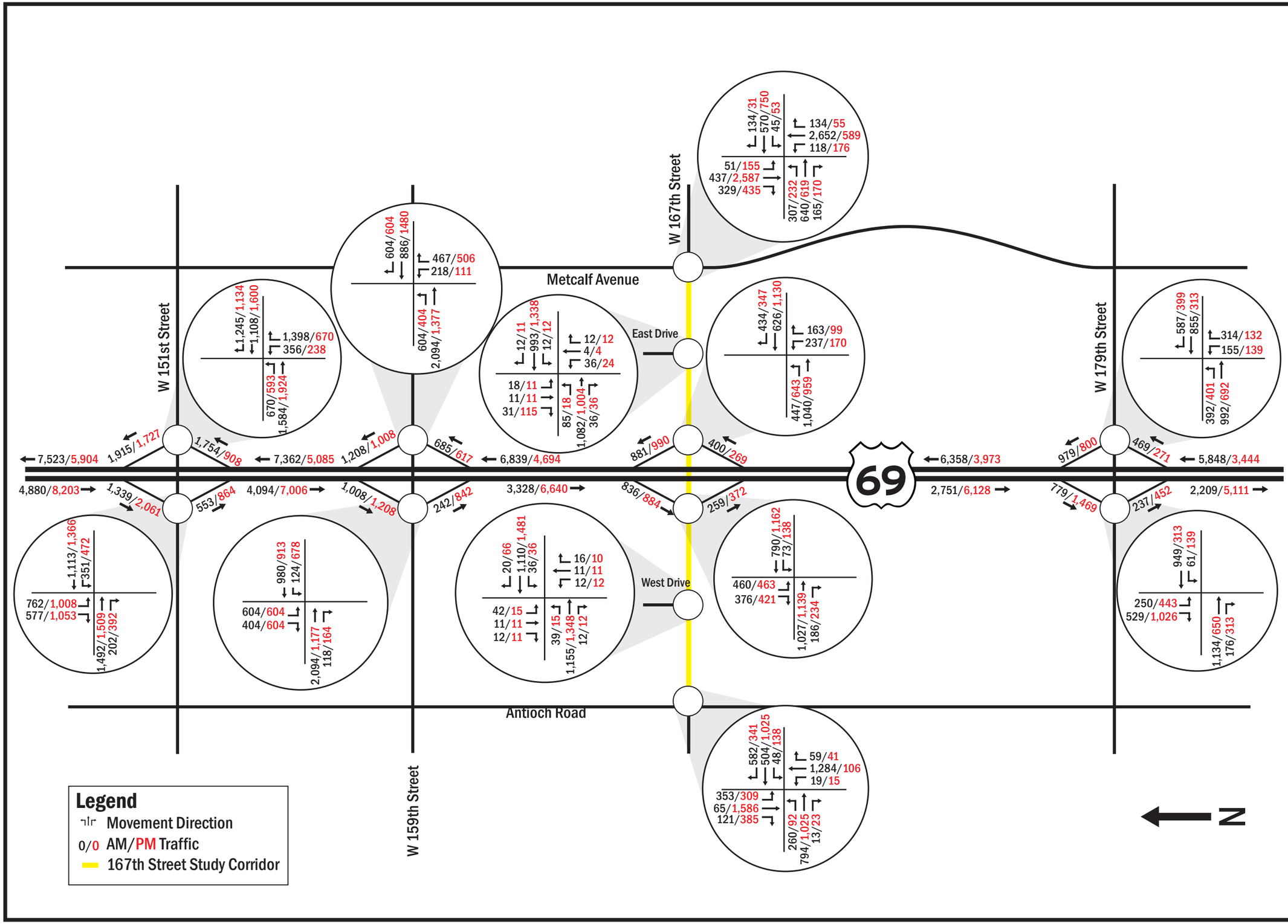


EXHIBIT 8

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) Build AM/PM Peak Hour Traffic

HNTB

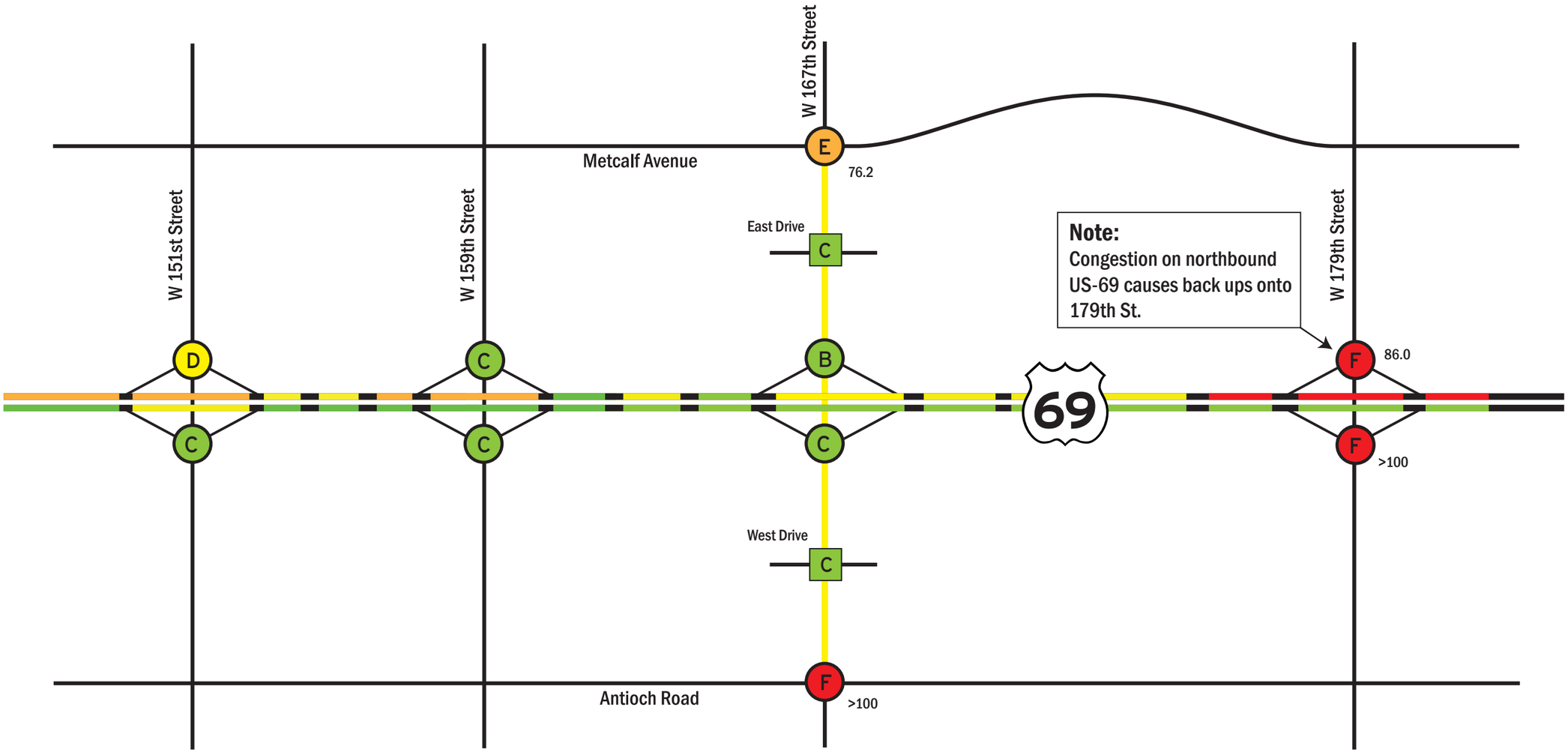
EXHIBIT

9

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) Modified Diamond AM Peak Level of Service



Legend
- 167th Street Study Corridor

	Freeway (Density, pc/mi/ln)	Intersection Signalized (Delay, Sec)	Unsignalized (Delay, Sec)
A - C	≤ 26	A - C ≤ 35	A - C ≤ 25
D	26.1–35	D 35.1–55	D 25.1–35
E	35.1–45	E 55.1–80	E 35.1–50
F	> 45	F > 80	F > 50

N

HNTB

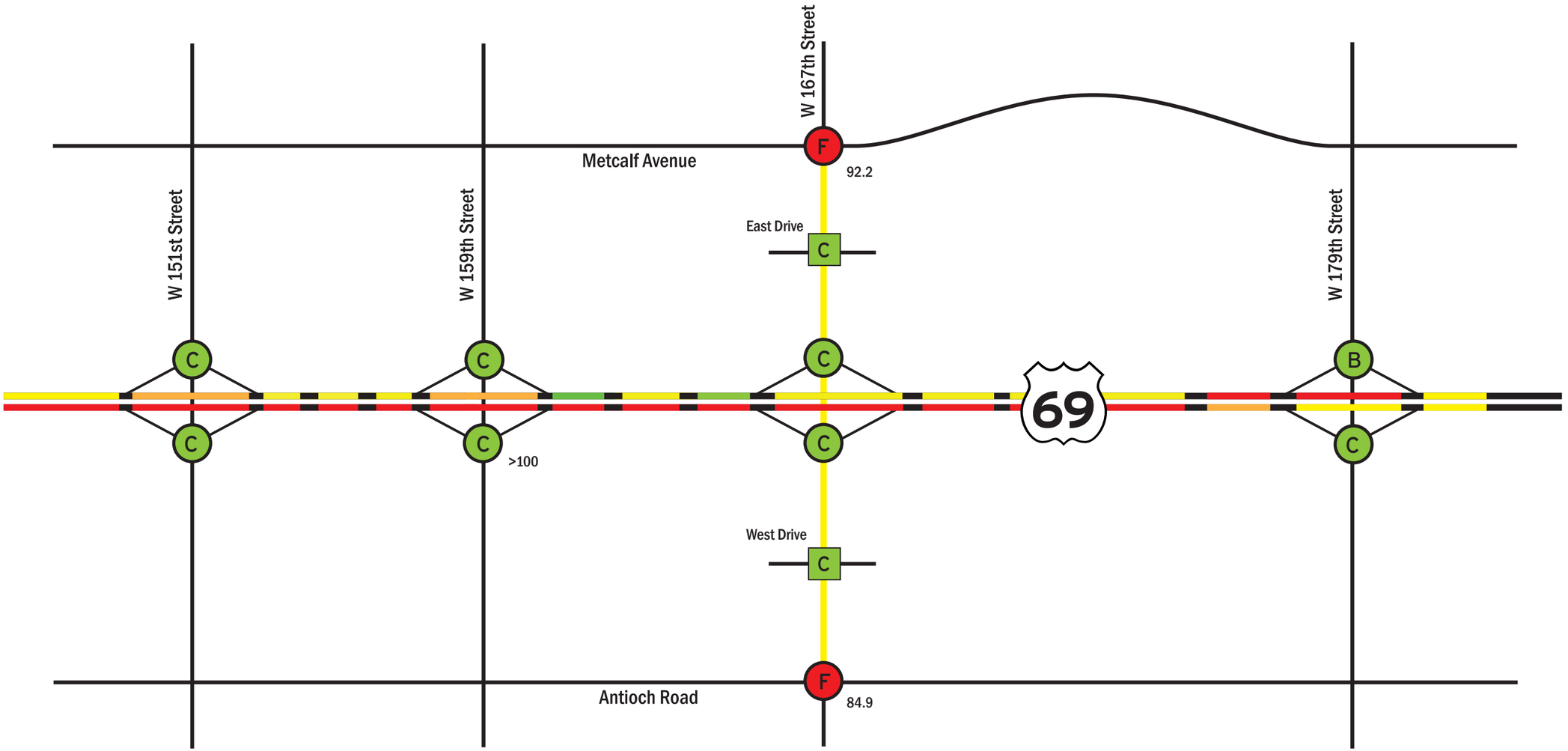
EXHIBIT

10

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) Modified Diamond PM Peak Level of Service



Legend
167th Street Study Corridor

	Freeway (Density, pc/mi/ln)	Intersection Signalized	(Delay, Sec) Unsignalized
A - C	≤ 26	A - C ≤ 35	A - C ≤ 25
D	26.1–35	D 35.1–55	D 25.1–35
E	35.1–45	E 55.1–80	E 35.1–50
F	> 45	F > 80	F > 50

N

HNTB

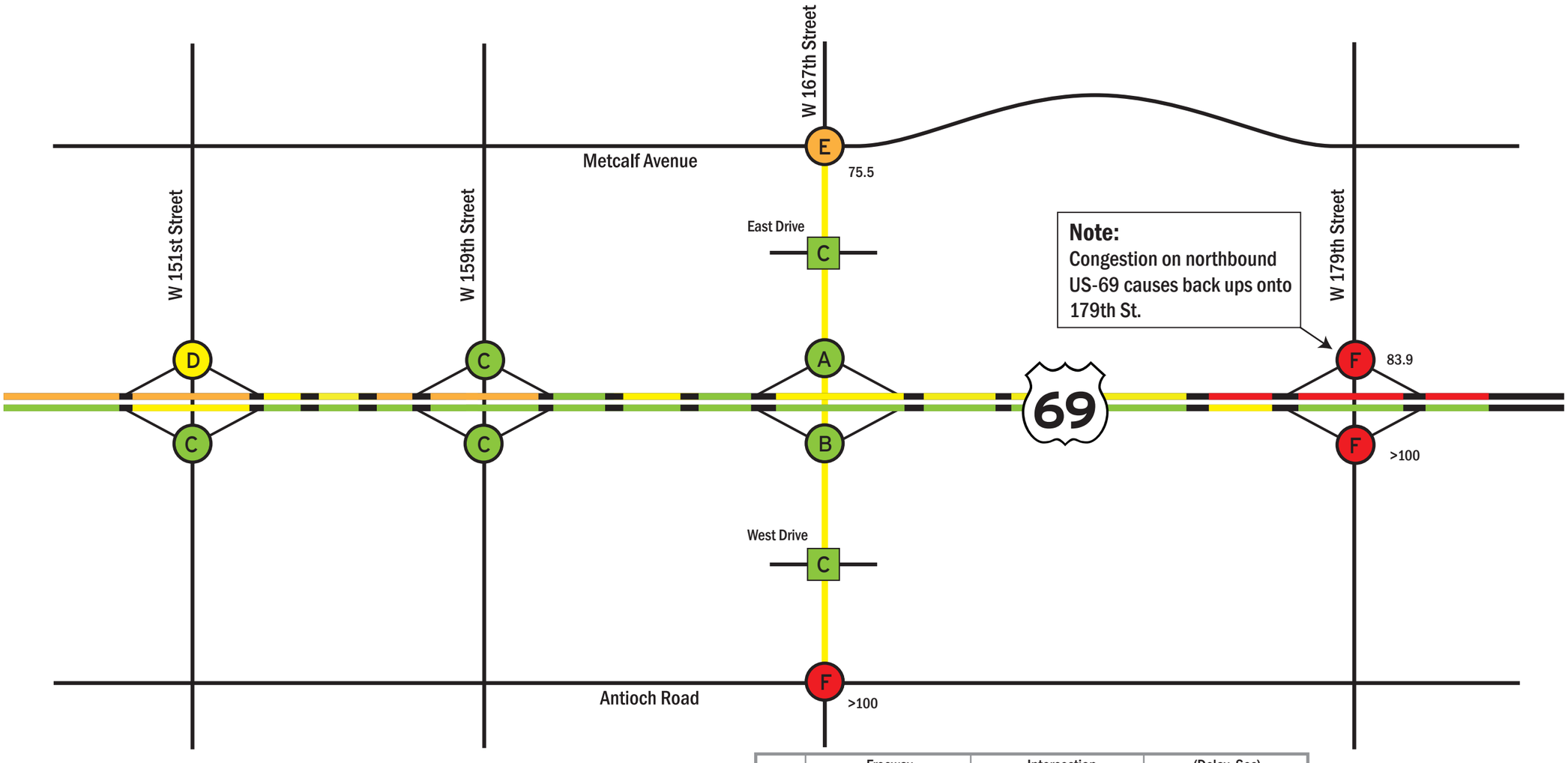
EXHIBIT

11

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) DDI AM Peak Level of Service

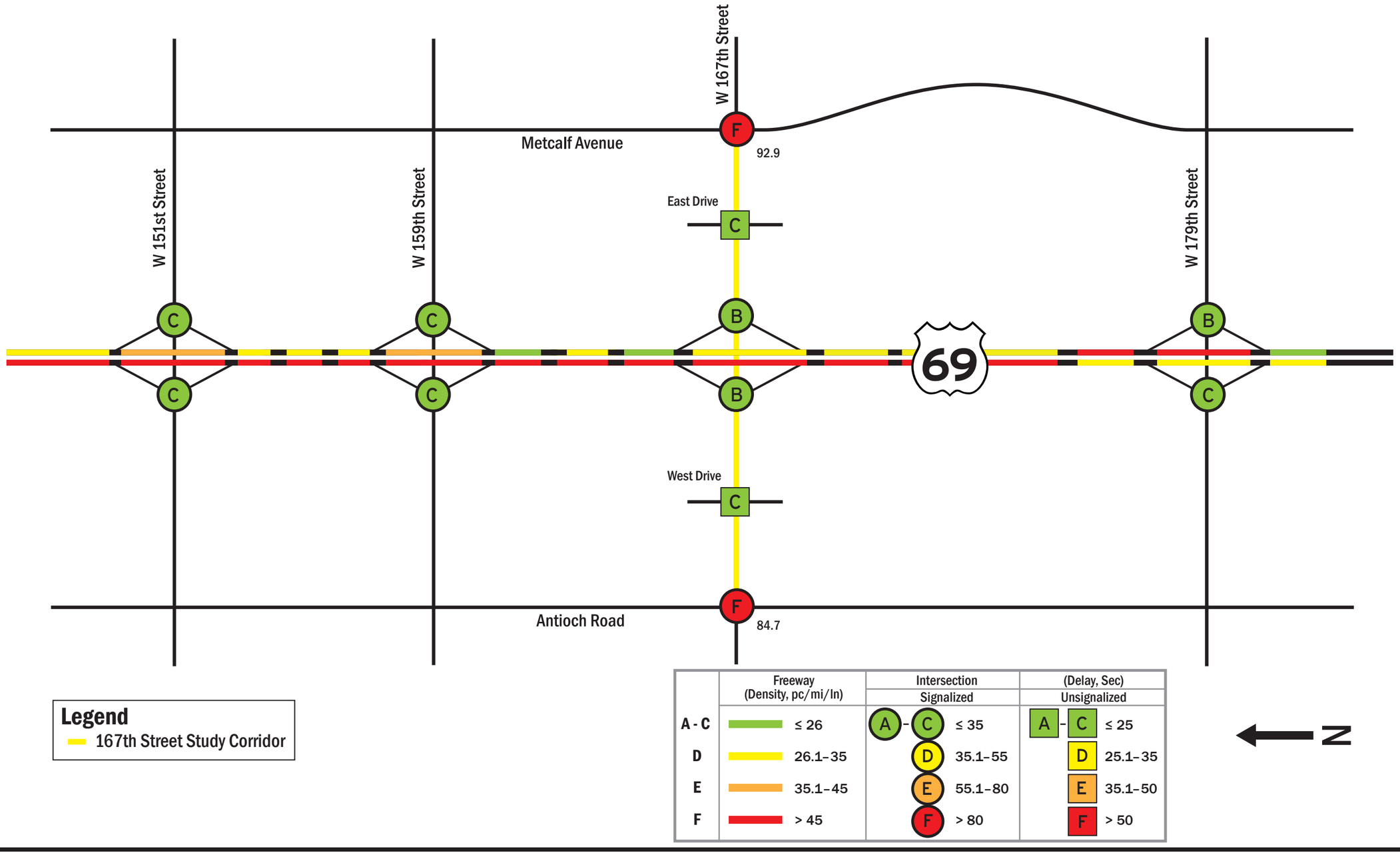


Legend
167th Street Study Corridor

	Freeway (Density, pc/mi/ln)	Intersection Signalized	(Delay, Sec) Unsignalized
A - C	≤ 26	A - C ≤ 35	A - C ≤ 25
D	26.1–35	D 35.1–55	D 25.1–35
E	35.1–45	E 55.1–80	E 35.1–50
F	> 45	F > 80	F > 50

N

HNTB



Legend
- 167th Street Study Corridor

	Freeway (Density, pc/mi/ln)	Intersection Signalized	(Delay, Sec) Unsignalized
A - C	≤ 26	A - C ≤ 35	A - C ≤ 25
D	26.1–35	D 35.1–55	D 25.1–35
E	35.1–45	E 55.1–80	E 35.1–50
F	> 45	F > 80	F > 50

N

EXHIBIT 12

TRAFFIC STUDY
167TH St.
Interchange

Overland Park, KS

Future (2040) DDI PM Peak Level of Service

HNTB

Appendix B

Vehicle Queues

Existing (2014) Queue Lengths

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
US-69 SB Ramp/151st St.	Signal				
WB Left		196.3	19.1	239.1	35.2
WB Thru		216.0	23.4	253.8	39.9
SB Left		161.5	34.3	281.4	67.1
SB Right		178.8	18.8	316.6	75.0
EB Right		72.1	0.8	168.4	4.7
EB Thru		154.8	26.2	208.8	41.3
US-69 NB Ramp/151st St.	Signal				
WB Right		658.3	198.4	470.9	83.3
WB Thru		642.8	188.5	455.3	79.2
NB Left		141.0	29.0	130.0	23.1
NB Right		91.3	7.9	80.3	6.1
EB Left		216.7	33.5	259.2	35.9
EB Thru		274.8	25.5	307.4	25.6
167th St./Metcalf Ave.	4-Way Stop				
WB Right		136.1	19.1	86.0	6.0
WB Thru		125.5	20.4	75.9	8.6
WB Left		124.2	19.8	74.7	8.2
EB Left		176.7	39.3	196.5	50.1
EB Thru		179.2	40.9	198.9	51.9
EB Right		188.3	41.4	208.0	52.3
NB Thru		34.0	0.4	17.3	0.3
NB Right		34.0	0.4	17.3	0.3
NB Left		74.5	1.3	82.2	2.6
SB Left		64.9	1.4	45.7	0.4
SB Right		14.2	0.5	7.9	0.1
SB Thru		14.2	0.5	7.9	0.1
167th St./Antioch Road	4-Way Stop				
NB Right		0.0	0.0	0.0	0.0
NB Thru		0.0	0.0	0.0	0.0
NB Left		0.0	0.0	0.0	0.0
EB Thru		10.9	0.1	0.0	0.0
EB Right		10.9	0.1	0.0	0.0
EB Left		10.9	0.1	0.0	0.0
SB Left		9.4	0.2	0.0	0.0
SB Thru		9.4	0.2	0.0	0.0
SB Right		9.4	0.2	0.0	0.0
WB Left		29.0	0.5	12.6	0.1
WB Thru		29.0	0.5	12.6	0.1
WB Right		29.0	0.5	12.6	0.1

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
167th St./Lowell Ave.	2-Way Stop				
EB Thru		9.5	0.1	0.0	0.0
EB Left		33.8	0.3	0.0	0.0
WB Thru		0.0	0.0	0.0	0.0
WB Right		0.0	0.0	0.0	0.0
SB Left		0.0	0.0	0.0	0.0
SB Right		0.0	0.0	0.0	0.0
167th St./KDOT Facility Dr.	2-Way Stop				
WB Thru		0.0	0.0	0.0	0.0
WB Right		0.0	0.0	0.0	0.0
EB Thru		4.6	0.0	0.0	0.0
EB Left		27.7	0.3	7.8	0.0
SB Right		72.9	2.9	69.5	2.0
SB Left		43.4	1.8	40.3	1.1
US-69 SB Ramp/167th St.	2-Way Stop				
SB Left		109.2	6.4	118.6	7.3
SB Right		109.7	6.2	123.5	7.6
WB Thru		0.0	0.0	0.0	0.0
EB Thru		0.0	0.0	0.0	0.0
US-69 NB Ramp/167th St.	2-Way Stop				
WB Right		0.0	0.0	0.0	0.0
WB Thru		0.0	0.0	0.0	0.0
EB Thru		2.4	0.0	0.0	0.0
EB Left		53.2	1.3	25.6	0.2
US-69 SB Ramp/179th St.	2-Way Stop				
EB Right		0.0	0.0	0.0	0.0
EB Thru		0.0	0.0	0.0	0.0
WB Left		7.1	0.0	14.3	0.1
WB Thru		2.7	0.0	8.7	0.0
SB Right		174.7	17.7	264.4	37.5
SB Left		167.7	13.7	257.4	32.1
US-69 NB Ramp/179th St.	2-Way Stop				
NB Right		86.4	5.9	28.7	0.1
NB Left		62.3	1.1	62.7	3.0
WB Right		0.0	0.0	0.0	0.0
WB Thru		0.0	0.0	0.0	0.0
EB Left		150.6	8.9	47.6	0.5
EB Thru		107.2	3.9	13.2	0.0

Future (2040) No-Build Queue Lengths

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
US-69 SB Ramp/151st St.	Signal				
WB Left		312.5	74.3	361.5	99.7
WB Thru		307.3	58.3	356.3	80.4
SB Left		291.5	195.7	283.3	68.5
SB Right		316.8	160.5	188.8	17.1
EB Right		602.3	94.6	1044.0	261.1
EB Thru		537.0	83.2	998.1	250.8
US-69 NB Ramp/151st St.	Signal				
WB Right		1162.1	562.9	552.9	137.8
WB Thru		1159.8	462.9	552.9	138.5
NB Left		764.5	69.1	312.7	45.6
NB Right		646.7	86.5	241.1	14.9
EB Left		369.6	647.1	334.3	93.6
EB Thru		399.9	643.4	364.1	49.3
US-69 SB Ramp/159th St.	Signal				
SB Left		359.5	396.9	199.3	50.0
SB Right		370.7	397.0	210.5	55.3
WB Left		435.3	1635.6	439.0	416.5
WB Thru		435.4	1635.7	439.0	416.6
EB Thru		1673.9	1488.6	1673.9	1649.6
EB Right		1673.9	637.7	1673.9	1649.2
US-69 NB Ramp/159th St.	Signal				
NB Left		285.3	86.7	273.3	75.2
NB Right		289.6	89.5	281.7	78.2
EB Left		446.6	279.5	327.9	76.7
EB Thru		453.8	276.4	335.1	75.3
WB Thru		696.7	894.8	1673.9	1648.5
WB Right		697.5	882.6	1673.9	1649.3

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
167th St./Metcalf Ave.	Signal				
WB Right		1383.1	882.6	1500.1	1062.0
WB Thru		1372.9	1304.9	1493.4	1053.1
WB Left		1372.9	1304.9	1493.4	1053.1
EB Left		1384.9	1334.6	1102.6	741.0
EB Thru		1384.9	1427.5	1102.6	741.0
EB Right		1414.6	1426.2	1132.3	769.1
NB Thru		1673.9	1443.4	441.8	171.6
NB Right		1673.9	1444.8	450.3	154.2
NB Left		1673.9	1443.9	436.2	167.4
SB Left		683.2	377.7	1672.0	1432.5
SB Right		701.9	1236.0	1672.1	1431.7
SB Thru		690.0	1231.2	1672.0	1432.9
167th St./Antioch Road	Signal				
NB Right		1673.8	1236.3	140.1	34.8
NB Thru		1673.8	1530.7	138.6	39.1
NB Left		49.6	1530.8	64.6	7.8
EB Thru		1672.0	1531.3	1668.4	1573.6
EB Right		1672.1	1621.6	1669.4	1573.3
EB Left		1672.1	1620.3	1668.4	1573.5
SB Left		1672.0	1621.0	1673.9	1560.9
SB Thru		1672.0	1215.2	1673.9	1560.0
SB Right		1672.0	1324.5	1673.9	1560.9
WB Left		1394.4	1259.0	1151.4	567.3
WB Thru		1393.9	1258.5	1150.8	566.4
WB Right		1396.9	1261.6	1153.5	568.9
167th St./Lowell Ave.	2-Way Stop				
EB Thru		1348.8	1084.7	1342.7	1027.6
EB Left		1403.5	1006.1	1397.4	1081.5
EB Right		1348.8	1022.6	1342.7	1027.6
WB Thru		1132.5	1022.6	437.6	131.8
WB Right		1132.5	1070.6	437.6	131.8
WB Left		1180.6	1067.2	476.1	144.3
SB Left		112.2	34.1	103.3	51.4
SB Right		125.5	29.6	116.6	58.3
SB Thru		113.6	24.7	104.8	51.1
NB Right		74.7	5.6	65.0	3.6
NB Left		52.2	585.7	42.5	2.4
NB Thru		53.8	605.8	44.1	2.4

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
167th St./KDOT Facility Dr.	2-Way Stop				
WB Thru		1198.8	605.8	187.2	37.2
WB Right		1198.8	973.2	187.2	37.2
WB Left		1232.2	1025.4	173.2	34.9
EB Thru		1040.7	1014.1	228.3	80.6
EB Left		1093.0	969.7	251.0	91.5
EB Right		1040.7	918.3	228.3	80.6
SB Right		136.5	26.5	132.4	37.4
SB Left		107.0	18.3	102.9	25.2
SB Thru		107.4	17.7	103.2	25.0
NB Left		68.7	6.2	63.5	4.6
NB Right		70.7	1651.3	65.4	3.2
NB Thru		70.5	1651.6	65.4	3.0
US-69 SB Ramp/167th St.	2-Way Stop				
SB Left		1673.9	1651.1	1673.8	1649.6
SB Right		1673.8	1651.6	1673.9	1649.5
WB Thru		569.5	789.6	66.8	21.4
EB Thru		1053.9	710.4	1051.3	759.6
US-69 NB Ramp/167th St.	2-Way Stop				
WB Right		891.4	422.8	166.7	34.0
WB Thru		891.4	499.6	166.7	34.0
EB Thru		561.2	472.4	557.4	374.1
EB Left		640.5	441.0	636.7	448.5
US-69 SB Ramp/179th St.	Signal				
EB Right		267.8	44.7	202.6	38.8
EB Thru		267.8	44.7	174.9	29.5
WB Left		273.3	32.7	106.2	21.8
WB Thru		273.3	32.7	106.2	21.8
SB Right		126.0	55.8	142.4	27.6
SB Left		112.8	55.8	127.8	20.3
US-69 NB Ramp/179th St.	Signal				
NB Right		228.6	52.0	175.8	37.1
NB Left		228.6	52.0	144.7	25.7
WB Right		260.3	39.1	73.3	5.5
WB Thru		256.6	51.5	80.9	13.3
EB Left		223.5	54.5	159.2	40.4
EB Thru		219.1	49.1	150.1	33.7

Future (2040) Diverging Diamond Queue Lengths

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
US-69 SB Ramp/151st St.	Signal				
WB Left		293.2	70.0	345.2	96.3
WB Thru		288.0	55.7	340.0	78.3
SB Left		281.2	71.3	266.5	68.1
SB Right		186.7	18.8	172.0	17.4
EB Right		235.3	7.5	484.5	191.1
EB Thru		285.1	65.2	475.1	227.5
US-69 NB Ramp/151st St.	Signal				
WB Right		928.1	486.8	673.2	263.7
WB Thru		928.3	484.9	673.3	264.0
NB Left		762.2	112.7	422.6	49.4
NB Right		691.1	73.3	351.0	18.5
EB Left		392.2	109.4	405.5	129.8
EB Thru		420.2	69.0	436.2	98.8
US-69 SB Ramp/159th St.	Signal				
SB Left		352.8	91.3	181.6	44.0
SB Right		364.0	98.1	192.8	49.5
WB Left		318.9	47.5	342.9	88.0
WB Thru		319.0	47.0	343.0	87.6
EB Thru		994.0	247.5	436.1	99.1
EB Right		996.5	247.0	439.0	94.7
US-69 NB Ramp/159th St.	Signal				
NB Left		196.2	39.7	258.2	50.4
NB Right		204.3	37.0	266.0	52.9
EB Left		434.7	139.1	336.6	77.0
EB Thru		441.9	140.6	343.8	77.2
WB Thru		608.9	122.0	950.5	234.1
WB Right		611.2	122.6	953.0	234.0

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
167th St./Metcalf Ave.	Signal				
WB Right		432.3	172.3	566.1	219.7
WB Thru		404.8	150.4	538.6	197.9
WB Left		404.8	150.4	538.6	197.9
EB Left		484.7	181.0	450.6	179.1
EB Thru		484.7	181.0	450.6	179.1
EB Right		528.9	215.8	494.7	216.3
NB Thru		1673.8	1433.8	742.2	549.6
NB Right		1673.8	1433.4	761.8	566.4
NB Left		1673.8	1433.8	742.2	549.6
SB Left		354.1	87.1	1667.3	1299.4
SB Right		376.3	100.1	1667.3	1299.4
SB Thru		354.1	87.1	1667.3	1299.4
167th St./Antioch Road	Signal				
NB Right		1673.8	1358.0	150.3	28.5
NB Thru		1673.9	1358.0	119.4	30.3
NB Left		1673.9	1358.0	119.4	30.3
EB Thru		924.9	412.0	683.3	182.3
EB Right		954.3	428.3	720.1	210.6
EB Left		924.9	412.0	683.3	182.3
SB Left		1276.8	1037.2	1673.9	1461.2
SB Thru		1276.8	1037.2	1673.9	1461.2
SB Right		1311.8	1073.0	1673.9	1460.7
WB Left		747.1	296.7	693.8	259.9
WB Thru		747.1	296.7	693.8	259.9
WB Right		783.3	326.6	729.9	288.9
167th St./Lowell Ave.	2-Way Stop				
EB Thru		0.0	0.0	0.0	0.0
EB Left		51.2	0.9	41.1	0.7
EB Right		0.0	0.0	0.0	0.0
WB Thru		3.0	0.0	0.0	0.0
WB Right		3.0	0.0	0.0	0.0
WB Left		52.5	1.5	51.3	2.3
SB Left		84.5	4.8	74.0	2.7
SB Right		86.1	4.0	74.5	2.4
SB Thru		85.2	4.2	74.8	2.6
NB Right		51.3	2.0	53.2	1.8
NB Left		51.5	2.2	53.4	1.9
NB Thru		51.8	2.2	53.8	2.1

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
167th St./KDOT Facility Dr.	2-Way Stop				
WB Thru		3.1	0.0	4.2	0.0
WB Right		3.1	0.0	0.0	0.0
WB Left		37.6	0.3	0.0	0.0
EB Thru		0.0	0.0	0.0	0.0
EB Left		73.7	2.4	30.3	0.6
EB Right		0.0	0.0	0.0	0.0
SB Right		62.7	2.8	91.5	9.8
SB Left		63.0	3.1	91.2	8.9
SB Thru		63.7	3.0	91.9	8.5
NB Left		81.7	3.3	71.1	2.4
NB Right		62.0	2.2	55.6	1.7
NB Thru		64.1	2.4	57.8	1.9
US-69 SB Ramp/167th St.	Signal				
SB Left		299.5	55.9	229.2	38.3
SB Right		364.6	45.6	262.0	33.7
WB Thru		267.9	33.9	469.6	67.1
EB Thru		342.3	53.7	478.7	74.4
US-69 NB Ramp/167th St.	Signal				
WB Right		121.2	2.8	320.5	19.4
WB Thru		253.7	22.5	453.2	48.1
EB Thru		335.7	32.4	371.3	47.2
EB Left		182.4	5.4	254.5	11.9
US-69 SB Ramp/179th St.	Signal				
EB Right		255.0	47.7	196.8	33.4
EB Thru		227.3	38.2	169.2	27.4
WB Left		204.7	22.2	89.6	17.0
WB Thru		204.7	22.2	89.6	17.0
SB Right		145.1	32.8	134.5	33.1
SB Left		130.6	23.6	119.6	23.4
US-69 NB Ramp/179th St.	Signal				
NB Right		165.6	28.4	128.9	22.5
NB Left		134.4	20.8	97.8	17.1
WB Right		119.9	15.1	75.8	5.4
WB Thru		125.0	21.1	83.4	9.8
EB Left		216.4	40.4	155.2	29.6
EB Thru		207.4	32.9	146.2	24.3

Future (2040) Preferred Modified Diamond Queue Lengths

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
US-69 SB Ramp/151st St.	Signal				
WB Left		317.7	72.9	375.6	127.1
WB Thru		312.6	56.7	370.4	111.9
SB Left		290.6	74.0	383.3	110.5
SB Right		196.3	22.3	288.8	50.9
EB Right		238.2	8.2	486.6	45.1
EB Thru		304.1	62.6	491.6	110.1
US-69 NB Ramp/151st St.	Signal				
WB Right		851.7	407.8	498.1	108.3
WB Thru		853.2	407.6	497.9	112.0
NB Left		192.5	51.5	126.9	32.9
NB Right		205.3	50.2	134.8	18.9
EB Left		419.7	110.6	380.0	73.5
EB Thru		467.3	96.4	410.7	47.1
US-69 SB Ramp/159th St.	Signal				
SB Left		363.6	101.2	243.5	63.7
SB Right		370.6	104.1	254.7	70.7
WB Left		360.5	61.3	352.2	99.3
WB Thru		360.6	61.7	352.3	98.5
EB Thru		1331.6	474.4	468.2	132.9
EB Right		1336.3	475.5	473.2	128.3
US-69 NB Ramp/159th St.	Signal				
NB Left		425.9	204.6	227.0	58.2
NB Right		432.9	211.1	237.5	61.7
EB Left		457.0	153.9	371.2	87.3
EB Thru		463.6	150.1	378.4	86.2
WB Thru		787.7	227.8	936.6	226.3
WB Right		788.3	227.3	938.9	226.1

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
167th St./Metcalf Ave.	Signal				
WB Right		302.2	106.0	580.1	260.6
WB Thru		280.2	92.7	563.5	247.1
WB Left		280.2	92.7	563.5	247.1
EB Left		327.9	97.5	461.0	134.8
EB Thru		327.9	97.5	461.0	134.8
EB Right		364.2	126.4	499.2	166.6
NB Thru		1329.9	760.0	300.0	144.1
NB Right		1353.2	782.3	320.0	138.4
NB Left		1329.9	760.0	300.0	144.1
SB Left		154.3	38.5	1063.5	318.2
SB Right		154.3	38.5	1083.8	333.7
SB Thru		154.3	38.5	1063.5	318.2
167th St./Antioch Road	Signal				
NB Right		863.5	386.6	124.8	11.3
NB Thru		836.0	365.6	104.1	22.6
NB Left		836.0	365.6	104.1	22.6
EB Thru		302.2	103.2	356.9	122.0
EB Right		340.9	133.0	395.6	154.6
EB Left		302.2	103.2	356.9	122.0
SB Left		189.5	60.6	1274.4	540.2
SB Thru		189.5	60.6	1274.4	540.2
SB Right		235.2	63.1	1309.6	583.3
WB Left		268.4	80.5	669.6	181.4
WB Thru		268.4	80.5	669.6	181.4
WB Right		302.3	95.7	700.1	197.5
167th St./Lowell Ave.	2-Way Stop				
EB Thru		3.7	0.0	110.0	9.2
EB Left		55.7	1.2	165.8	16.1
EB Right		3.7	0.0	110.0	9.2
WB Thru		0.0	0.0	0.0	0.0
WB Right		0.0	0.0	0.0	0.0
WB Left		48.4	1.5	45.6	2.2
SB Left		90.8	6.0	77.5	3.8
SB Right		92.1	5.2	80.5	3.6
SB Thru		91.4	5.3	79.9	4.0
NB Right		52.0	2.1	52.0	1.9
NB Left		52.1	2.3	52.1	2.2
NB Thru		52.8	2.4	52.3	2.6

Intersection	Intersection Control	AM Queue		PM Queue	
		Maximum (feet)	Average (feet)	Maximum (feet)	Average (feet)
167th St./KDOT Facility Dr.	2-Way Stop				
WB Thru		0.0	0.0	0.0	0.0
WB Right		0.0	0.0	0.0	0.0
WB Left		32.4	0.2	0.0	0.0
EB Thru		7.2	0.1	0.0	0.0
EB Left		65.5	1.8	45.3	1.0
EB Right		7.2	0.1	0.0	0.0
SB Right		66.1	3.8	94.8	10.4
SB Left		66.8	4.0	94.8	9.3
SB Thru		68.5	3.8	95.5	9.4
NB Left		80.9	2.9	71.2	2.1
NB Right		61.1	1.9	27.5	0.1
NB Thru		63.2	2.1	67.3	2.0
US-69 SB Ramp/167th St.	Signal				
SB Left		184.6	31.4	308.0	79.7
SB Right		212.9	43.4	341.4	101.2
WB Thru		218.2	24.7	401.0	60.1
EB Thru		387.7	46.0	735.6	253.6
US-69 NB Ramp/167th St.	Signal				
WB Right		294.4	58.6	643.8	135.2
WB Thru		513.9	94.0	599.6	115.4
EB Thru		430.9	87.8	524.2	162.4
EB Left		430.9	87.8	524.2	162.4
US-69 SB Ramp/179th St.	Signal				
EB Right		264.7	51.4	209.5	41.9
EB Thru		237.1	40.9	182.0	33.2
WB Left		223.5	28.3	92.4	19.1
WB Thru		223.5	28.3	92.4	19.1
SB Right		130.2	32.1	175.9	44.7
SB Left		114.4	22.4	155.6	31.5
US-69 NB Ramp/179th St.	Signal				
NB Right		202.6	47.6	132.8	22.0
NB Left		171.4	32.6	101.7	16.0
WB Right		145.3	22.7	72.7	5.2
WB Thru		150.3	30.0	75.6	9.9
EB Left		219.4	50.7	161.5	31.0
EB Thru		210.3	42.8	152.5	26.4

Appendix C

Plan Plates

Ex. R/W
Const. Limits
Prop. R/W
Const. Limits
Ex. R/W
69
Const. Limits
Ex. R/W
Approximately 1500'
167th St
EXIT 1 MILE
159th St
EXIT 1 MILE
167th St
EXIT ONLY
EXIT
Temp. Const. Esmt.
167TH STREET
Const. Limits
Ex. R/W

Interchange Improvements

N

200' 0 200'

167th Street & US 69 Interchange Study

2040 Build

OVERLAND PARK KANSAS

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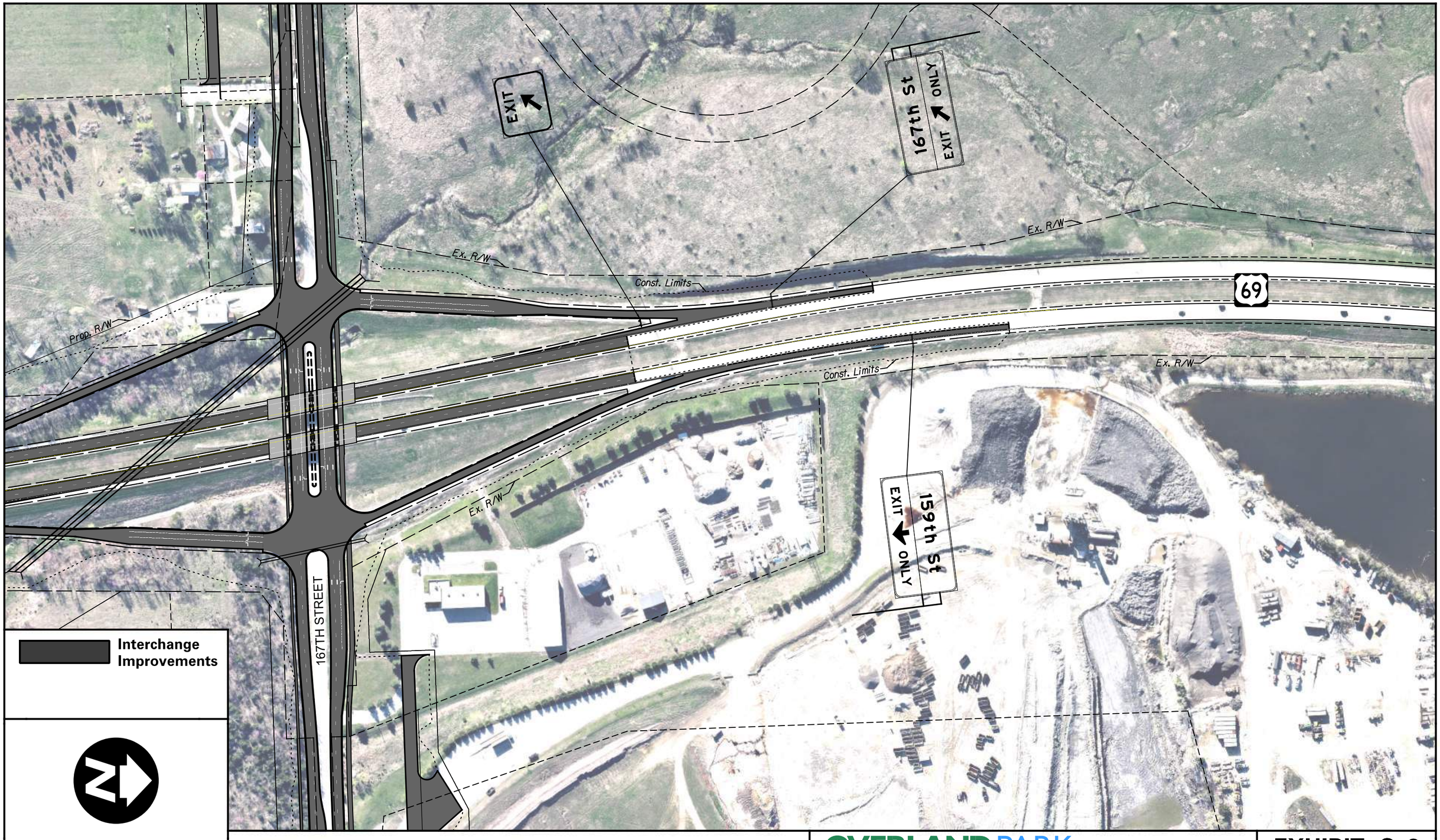
EXHIBIT C–1



167th Street & US 69 Interchange Study

2040 Build

OVERLAND PARK KANSAS

ABOVE AND BEYOND. BY DESIGN.

HNTB

EXHIBIT C–2

167th Street & US 69 Interchange Study

2040 Build

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EXHIBIT C–3

69

MM 4

SOUTH 69

NORTH 69

Mount On Signal Arm

Temp. Const. Esmt.

Prop. R/W

Ex. R/W

Const. Limits

167TH STREET

Interchange Improvements

N

200′ 0 200′

167th Street & US 69 Interchange Study

2040 Build

OVERLAND PARK KANSAS

ABOVE AND BEYOND. BY DESIGN.

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EXHIBIT C–4

167th Street & US 69 Interchange Study

2040 Build

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EXHIBIT C–5

US 69
Corridor Study

Phase 1 Report

City of Overland Park, KS
June 22, 2018

Submitted by
HNTB Corporation

OVERLAND PARK
KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

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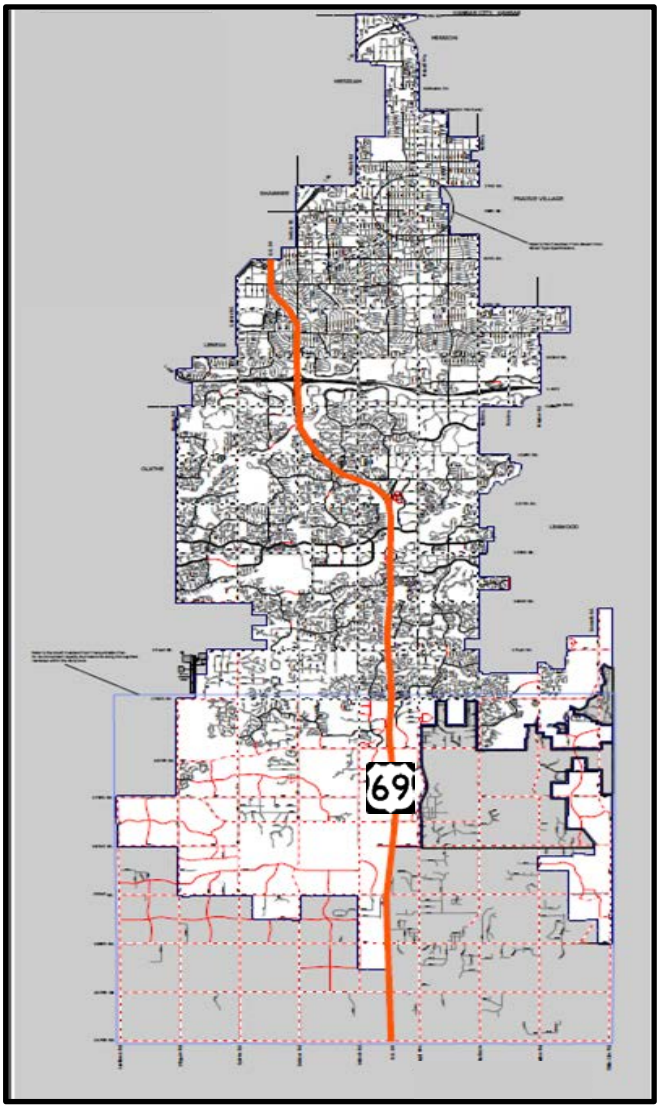
1.0 Study Background and Purpose

Figure 1 – US 69 Corridor



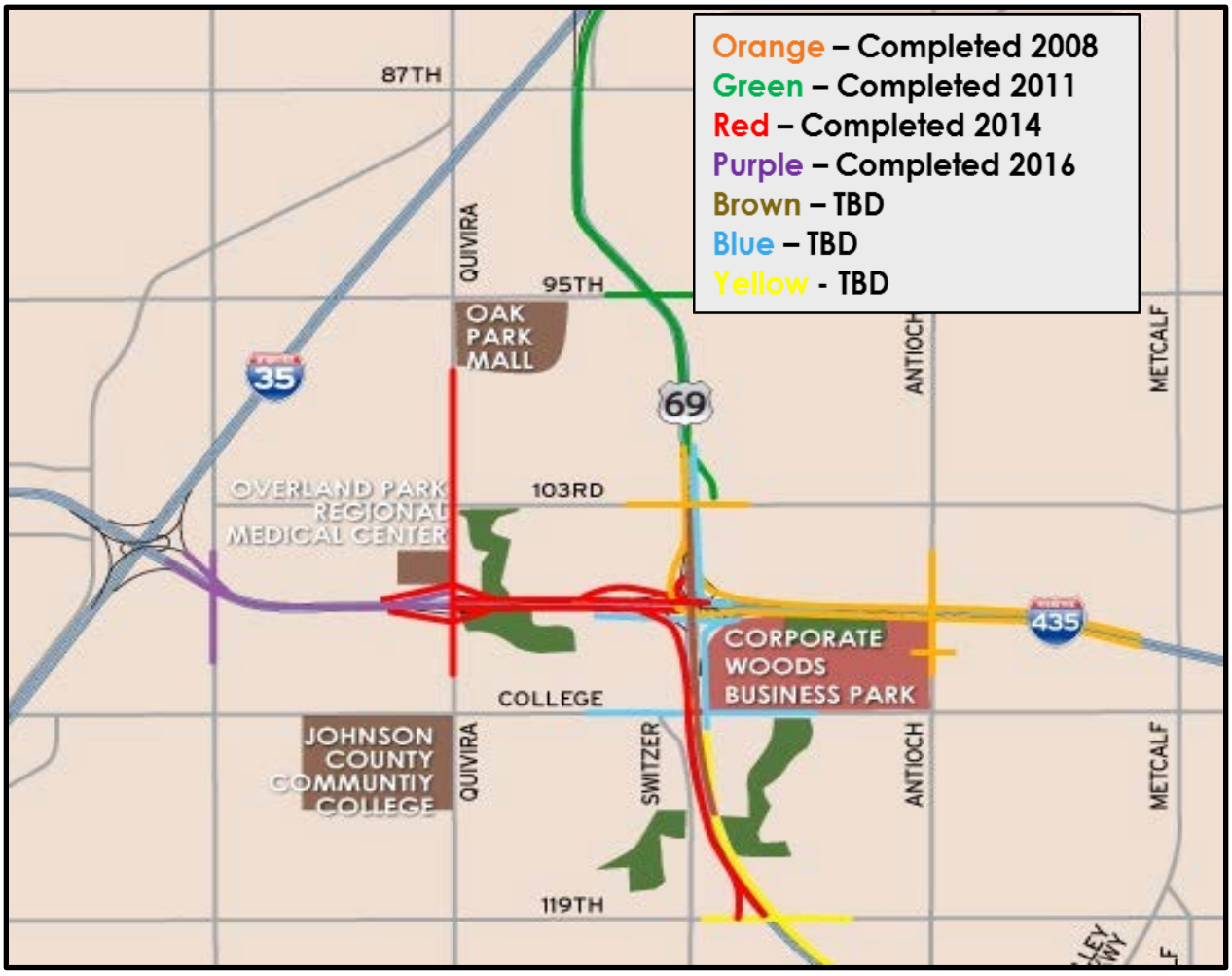
Source: HNTB

United States Highway 69 (US 69) is a vital component of the transportation network in the State of Kansas, the Kansas City metropolitan area and the City of Overland Park (City). Often referred to as the backbone of Overland Park, US 69 extends through the City between the junction with Interstate 35 (I-35) to the southern city limit (Figure 1). It feeds many of the primary east-west arterial corridors in the City providing connectivity to major employment centers and residential areas.

Over the course of the last two decades, significant investments have been made in upgrading and rehabilitating roadway infrastructure in response to the increasing congestion from continued commercial and residential development in the City and the region. The focus of much of this investment has been on the I-435 and US 69 interchange improvements. Four major projects in this interchange have been completed (Figure 2), representing approximately $375M of construction investment. These projects have been accomplished through the strong partnership between the City of Overland Park and the Kansas Department of Transportation (KDOT) with both entities contributing to various aspects of project planning, development, and construction. The improvements made to date have resulted in significant benefits to the traveling public. Access to major traffic generators such as Corporate Woods, the Sprint Campus, and Johnson County Community College, have been improved, along with the elimination of several freeway bottlenecks, and safety improvements in areas with above average crash history.

However, these improvements have not kept pace with the current demand within the corridor. As the City and the region continue to develop, new transportation needs are emerging south of 119th St where no comprehensive study of roadway safety and operations has been conducted since the I-35/US 69 Major Investment Study (MIS) in 2001.

Figure 2 – I-435 & US 69 Improvements



Source: HNTB

To better understand the existing and future challenges within the corridor, the City initiated a concept study focused on a corridor along US 69 from 103rd St. to 179th St., as well as a supporting arterial roadway network approximately 0.5 miles on both sides of US 69. Phase 1 of this study focused on answering the following questions:

1. What are the existing problems within the corridor from a traffic operations and safety perspective, as well as the condition of the existing infrastructure?
2. What are the effects of continued traffic growth if no improvements are made in the corridor?
3. What long-term transportation improvements are needed to address existing and future traffic, safety, and infrastructure issues? Specifically, do the recommendations in the I-35/US 69 MIS still represent a valid solution?
4. How should improvements be implemented over time?

Multimodal transportation issues were identified but only at a high level. This report documents Phase 1 of this study and recommends next steps for advancing improvements within the corridor.

2.0 Existing Conditions

What are the existing problems within the corridor, from a traffic operations and safety perspective, as well as the condition of the existing infrastructure?

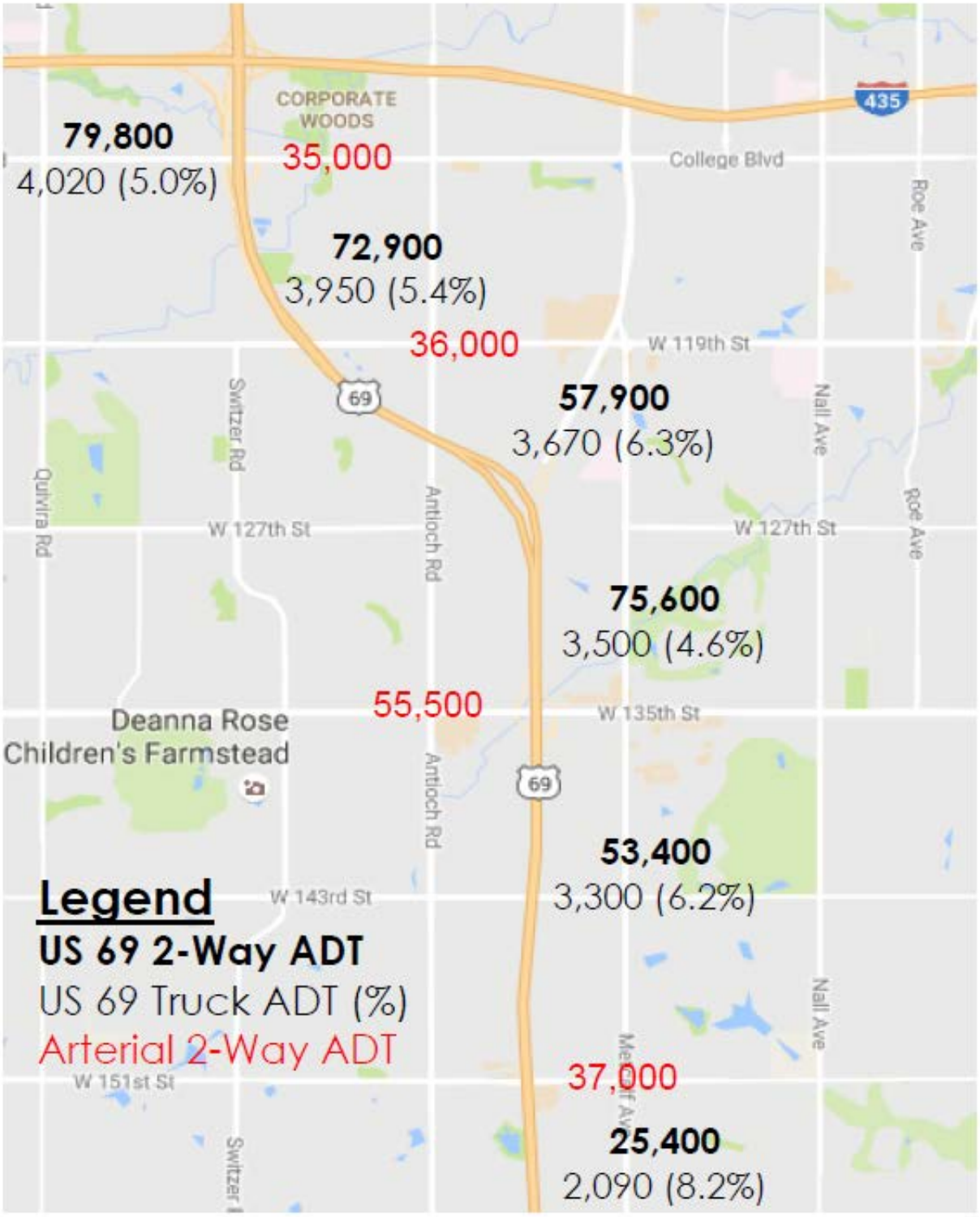
2.1 Traffic Data Collection and Calibration

Analysis of existing 2016 traffic operations began with collection of traffic count data from KDOT and the City. New counts were obtained at selected ramp intersections to supplement incomplete data. Additionally, 2015 origin/destination (O/D) data was obtained from INRIX. The primary purpose of the O/D data was to understand motorists travel routes in a complex segment between 135th Street and Blue Valley Parkway as well as between other interchanges. This data, summarized in Figure 3, was then input into a VISSIM model of the existing corridor. VISSIM is a microsimulation traffic operations model used to understand travel characteristics. The model was calibrated through multiple iterations using field travel time runs along with publicly available data from Google and KC SCOUT. The model underwent an in-depth quality review by KDOT, their independent consultant, and City staff.

2.2 Existing Operations

Using the calibrated VISSIM model, operations of the existing facility were analyzed. The analysis focused on the AM and PM peak travel periods; the AM peak period being 7:00 a.m. - 9:00 a.m., and the PM peak period being 4:00 p.m. - 6:00 p.m. To better understand the operational characteristics of the existing facility, it is illustrative to consider directional conditions at specific points in the corridor.

Figure 3 – Existing 2016 Daily Traffic Volumes



Source: HNTB

2.2.1 Existing Northbound Operations

At the southern limits of the corridor, existing volumes are low and traffic moves freely during the peak periods compared to the northern limits. Further north, during the AM peak hour, volumes increase through the interchanges at 167th St. and 159th St., and the operations of US 69 begin to degrade resulting in queues extending as far south as the 151st St. interchange.

The most significant area of congestion on northbound US 69 is between 135th St. and Blue Valley Pkwy. This is a result of:

- The high volume of entering vehicles from both the WB 135th St. and the EB 135th St. US 69 on-ramps, particularly the traffic from the low-speed eastbound to northbound loop ramp,
- The already congested mainline lanes of northbound US 69, and
- The high volume of weaving vehicles exiting to Blue Valley Pkwy.

Congestion within the segment between 135th St. and Blue Valley Pkwy. is the #2 ranked traffic bottleneck in northeast Kansas, as described by KDOT. Congestion is experienced daily with US 69 northbound speed reductions to approximately 20-30 mph during the AM peak period.

Between Blue Valley Pkwy. and College Blvd., congestion is moderate during the AM peak periods. The bottleneck between 135th St. and Blue Valley Pkwy. acts as a meter which restricts northbound traffic. The result is that the segment between Blue Valley Pkwy. and College Blvd. operates better today than it did 10 years ago. Continuing north of I-435, where US 69 has already been improved through the I-435 & US 69 “Green” project, US 69 operates without congestion through the study limits.

2.2.2 Existing Southbound Operations

Beginning in 2005, improvements were made to southbound US 69 from I-35 to 103rd St. as part of the I-435 & US 69 “Orange”, “Green” and “Red” projects. These improvements helped alleviate congestion and safety issues as far south as College Blvd. by increasing mainline capacity as well as adding a southbound collector/distributor (C/D) road system. As the southbound C/D road connects to US 69 between College Blvd. and 119th St., it introduces a concentrated volume of traffic into the existing 2-lane section that causes daily congestion near the 119th St. interchange. This is an interim condition, necessitated by available funding limits, that will improve as additional improvements are completed on southbound US 69.

Similarly to what is experienced in the northbound AM peak direction, the southbound segment between Blue Valley Pkwy and 135th St. is the most significant area of congestion during the PM peak period. This is a result of:

- The high volume of entering vehicles originating from Blue Valley Pkwy.,
- The left entrance from Blue Valley Pkwy. and the weave with traffic exiting to 135th St.,
- The already congested mainline lanes of US 69,
- The lane continuity of southbound US 69 – The outside lane drops at 135th St., and
- The high volume of traffic exiting to 135th St.

Southbound congestion in this segment is not as pronounced during the PM peak as the northbound during the AM peak period, but speed reductions to approximately 40 mph are experienced daily. Further south, after emerging from the southbound bottleneck between Blue Valley Pkwy. and 135th St., traffic operations improve during the PM peak periods.

2.3 Existing Safety

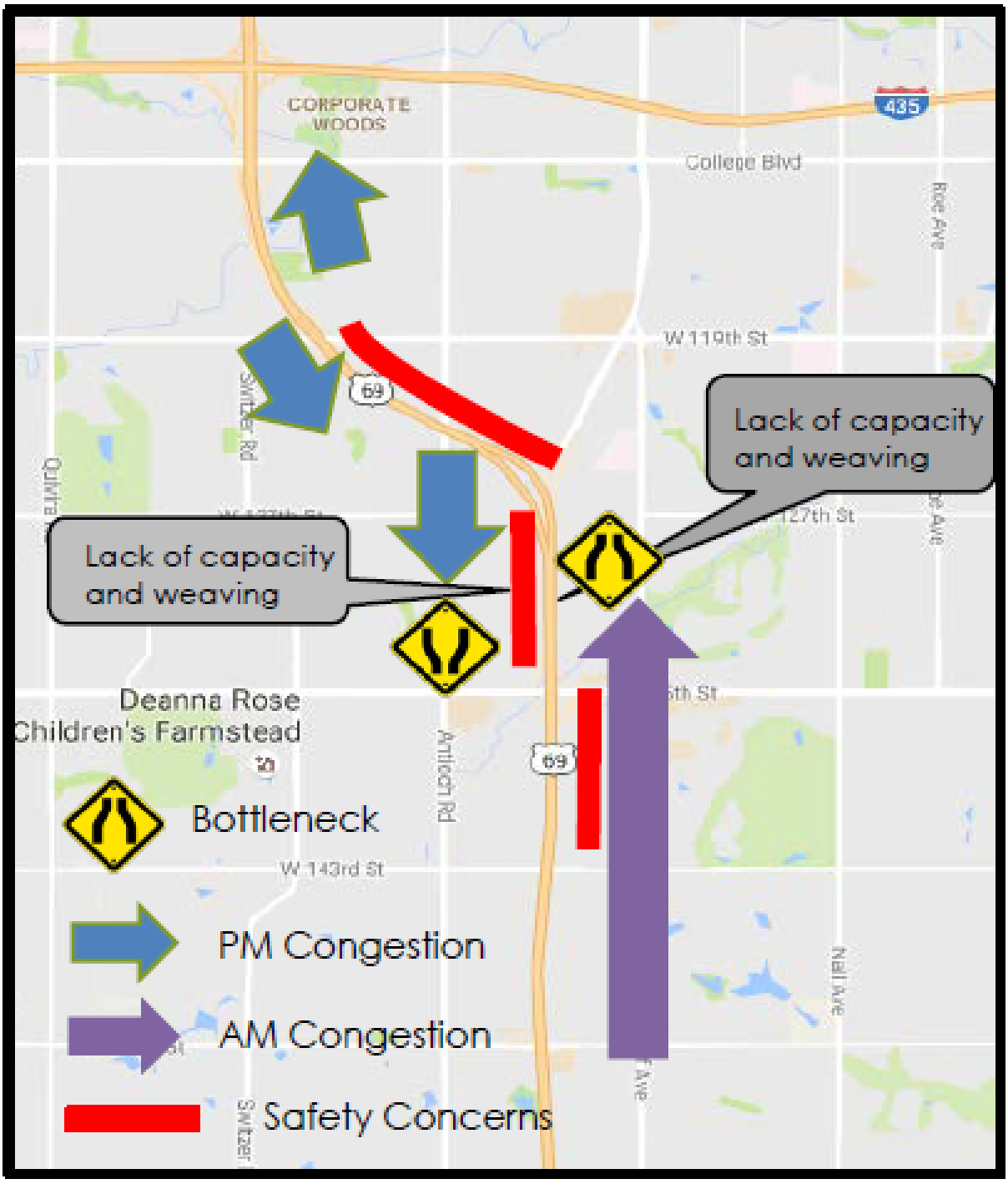
Crash data for the 5-year period from 2011-2015 was analyzed for the study area. Within this period there were 569 reported crashes which is approximately one crash every three days. Rear-end crashes, typically associated with congestion, represented 44% of reported crashes. Crash severity data showed that 80% of crashes resulted in property damage only (455 crashes), 19.7% resulted in injuries (112 crashes), and 0.4% resulted in fatalities (2 crashes).

The areas in the corridor experiencing the most significant safety issues are located within the same areas experiencing the worst operational performance. The three locations with the highest number of crashes are:

1. Southbound: Between Blue Valley Pkwy. and 135th St. – Due to the left-hand entrance and weave. The crash rate in this segment is 53% higher than the statewide average for US highways in Kansas,
2. Northbound: 151st St. to 135th St. – Drivers approaching the back of the vehicle queue at the bottleneck between 135th St. and Blue Valley Pkwy., and
3. Northbound: Between Blue Valley Pkwy and 119th St. – Vehicles emerging from the bottleneck south of Blue Valley Pkwy.

Figure 4 below depicts a summary of the existing traffic and safety issues present within the study area. As traffic continues to increase on US 69, it is expected that these locations will see safety conditions worsen as well as new problem areas emerge.

Figure 4 – Existing Traffic and Safety Issues



Source: HNTB

2.4 Existing Infrastructure Conditions

US 69 pavement and bridges within the study limits were constructed in the late 1960s and early 1970s in a series of KDOT projects. Generally, segments of US 69 south of 127th St. turned 50 years old in 2017 and segments north of 127th St. will turn 50 years old in 2025. Together, this represents 46 lane miles of pavement and 21 bridges that are reaching the end of their design life.

US 69 within the study limits has received various maintenance actions in the last 10 years. On average KDOT currently spends $2M per year on roadway patching, overlays and bridge rehabilitations within the study limits. The cost of maintaining this facility in a state of good repair will rise as it ages and as traffic, including truck traffic, continues to increase. KDOT estimates that within 10 to 15 years maintenance will no longer be sufficient and US 69 will need to be reconstructed. To replace the existing roadway and bridges within the study limits, without any safety or capacity improvements, is estimated to cost approximately $230 million in construction (2016 dollars).

Given the age and condition of the US 69 Corridor infrastructure, a comprehensive plan for implementing and funding improvements is needed. When condition issues require action to be taken, this plan will provide a roadmap for improving US 69 while minimizing spending on items incompatible with the long-term solution.

3.0 Future No-Build Conditions

What are the effects of continued traffic growth if no US 69 corridor improvements are made within the study limits?

3.1 Future No-Build Traffic Projections

To evaluate future traffic operational characteristics, the study team established future growth rates and resulting anticipated future traffic volumes out to a design year of 2040. This design year was chosen to be consistent with the current MARC adopted Long-Range Transportation Plan. The process of developing traffic projections began with assembling historical traffic growth data and compiling information from the many traffic studies previously performed in this corridor. To the right is a list of previous studies performed in this corridor in the last 20 years. The team determined that applying uniform growth rates throughout the entire study area was not a valid approach. Some areas are nearly fully developed, particularly north of Blue Valley Pkwy., whereas other areas are relatively undeveloped such as south of 159th St. As a result, two locations were chosen on US 69 to develop independent traffic forecasts:

Previous US 69 Studies

- *I-35/US 69 Major Investment Study*
- *I-35/US 69 Preferred Strategy Report*
- *I-435 and US 69 Design Study*
- *159th St and US 69 Break in Access*
- *167th St and US 69 Break in Access*
- *Overland Park South Streets Study*
- *Five County Regional Transportation Study*

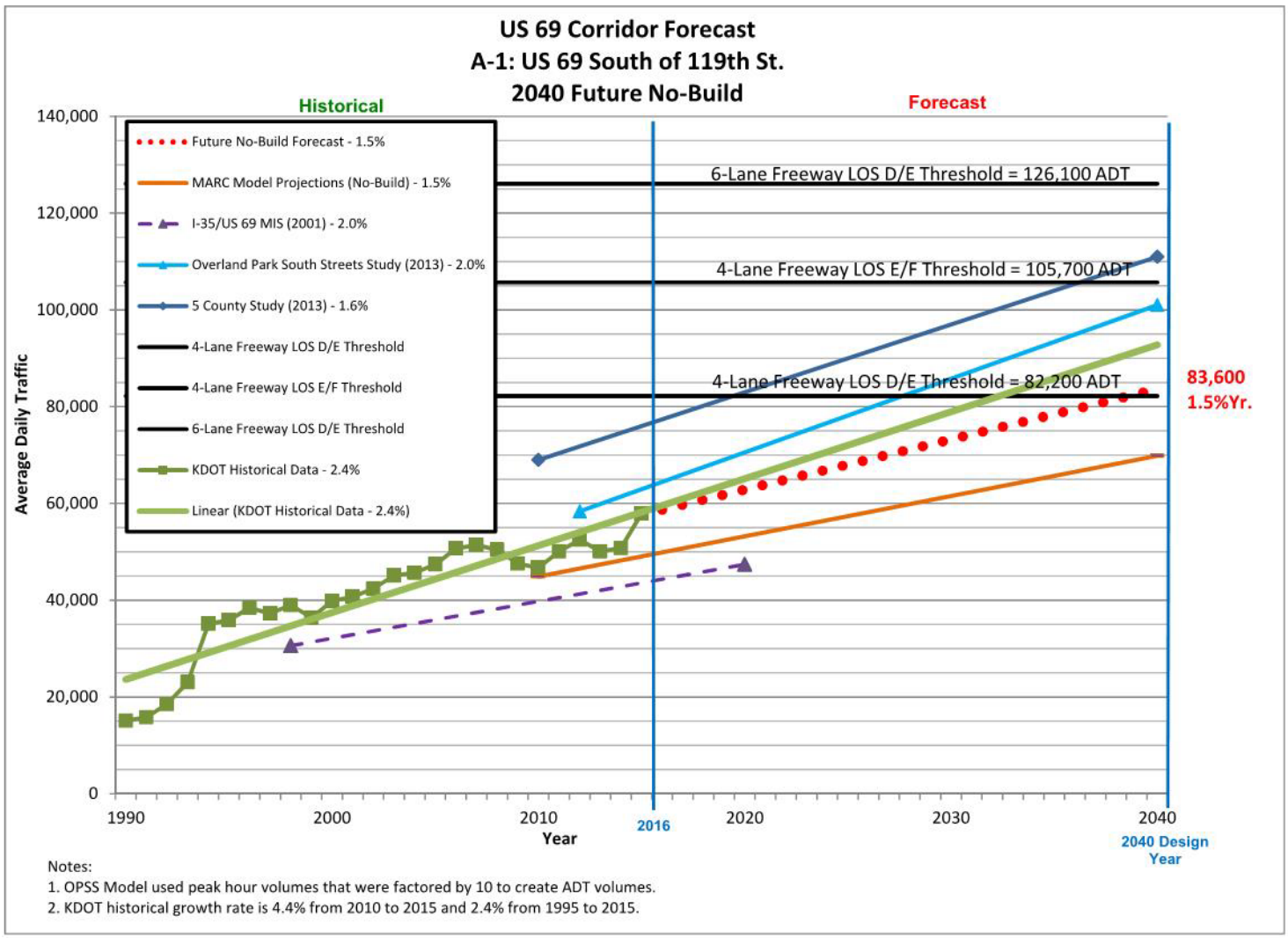
- Location A-1 – Between Blue Valley Pkwy. and 119th St.
- Location A-2 – South of 167th St.

Using a combination of the traffic forecasts from the previous studies, the current MARC regional model, Overland Park's travel demand model, and considerable coordination with the City, KDOT, FHWA, and MARC staff, the following No-Build growth rates were established:

- Location A-1: 1.5%/year
- Location A-2: 4.9%/year

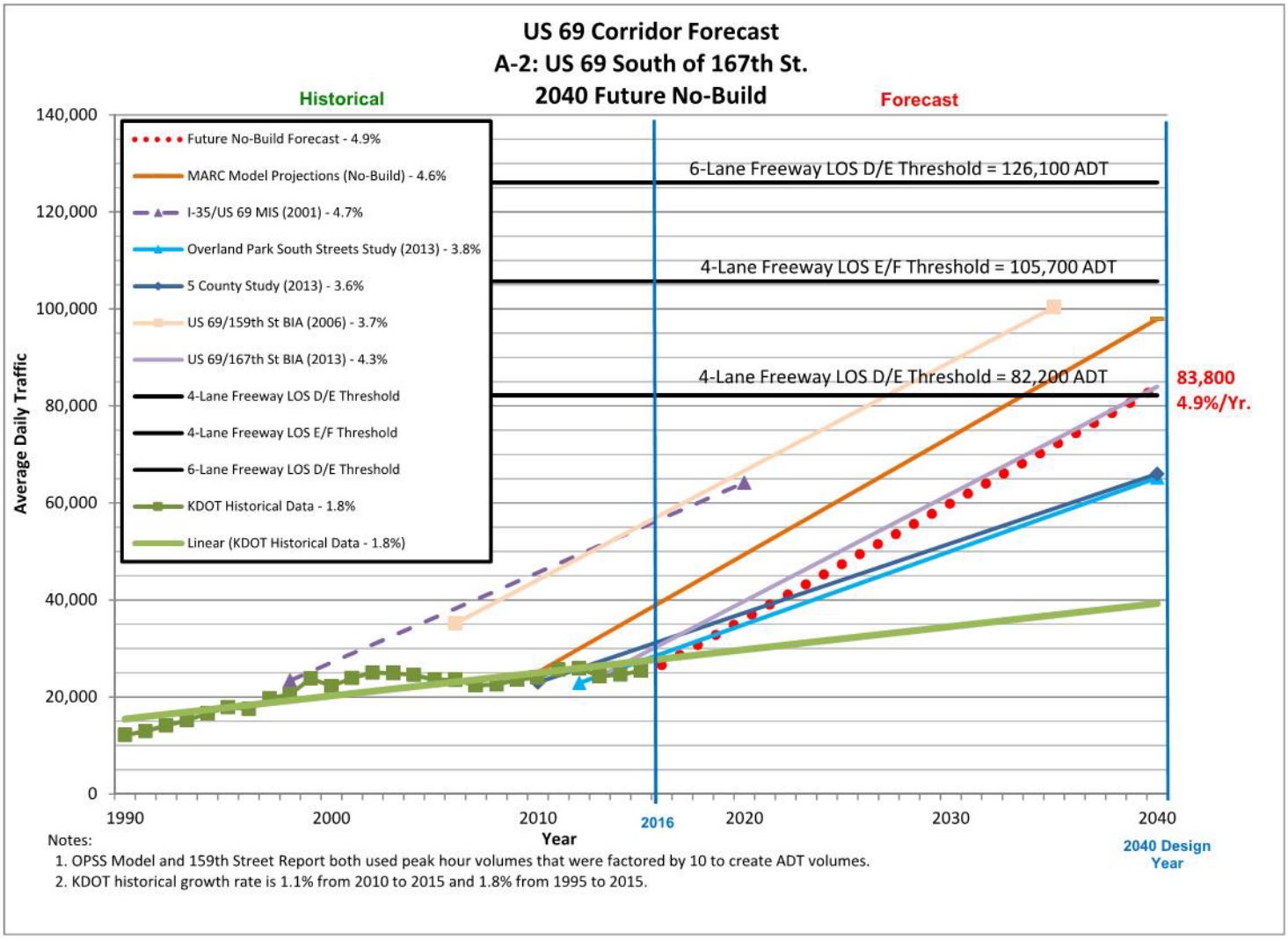
A graphical depiction of historical traffic volumes, shown in green, as well as the forecasts from the various studies discussed above, are illustrated in Figure 5 for location A-1, and in Figure 6 for location A-2. The agreed upon future No-Build growth rates for this study and resulting 2040 No-Build 2-way ADTs are shown in red.

Figure 5 – 2040 No-Build Traffic Forecast
Location A-1



Source: HNTB

Figure 6 – 2040 No-Build Traffic Forecast
Location A-2



Source: HNTB

Applying these growth rates to existing traffic volumes results in future No-Build 2-way volumes of 83,600 vehicles per day at location A-1 and 83,800 vehicles per day at location A-2. The growth rates at both locations are restricted by the capacity of a 4-lane freeway.

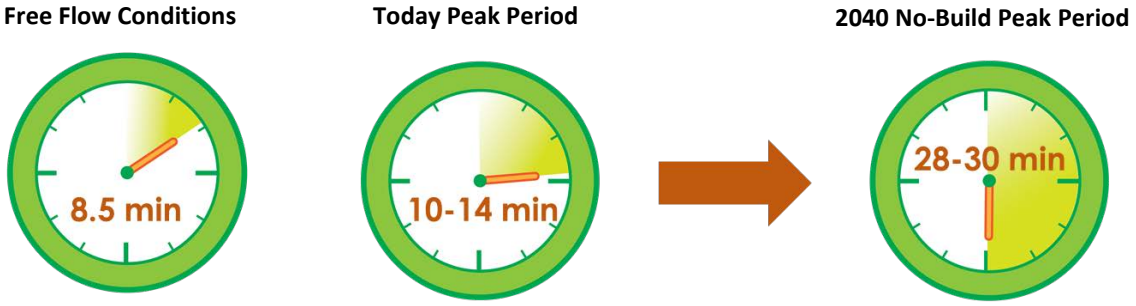
3.2 Future No-Build Operations

Using the 2040 No-Build forecasts, VISSIM was again used to evaluate the traffic operational effects in the corridor if no US 69 improvements are made through 2040. The results from this analysis can be summarized as follows:

- Locations where significant congestion exists today continued to degrade,
- New bottlenecks emerged at the northbound and southbound segments between 119th St. and I-435 and the northbound segment south of 151st St., and
- Operations of ramp terminal intersections and various arterial streets experienced significant delay, specifically the interchanges at 151st St., 135th St., and College Blvd.

Future No-Build traffic conditions are expected to provide poor levels of service by 2040 resulting in widespread increases in motorists' delay. To demonstrate the Future No-Build conditions, comparative travel times were developed for a trip through the corridor beginning at 179th St. and ending at College Blvd. during the AM peak period. As illustrated below in Figure 7, travel times for this trip grow from approximately 10-14 minutes today to nearly 30 minutes in 2040.

Figure 7 – AM Peak Hour Travel Time Comparison
(Northbound from 179th St. to College Blvd.)



Source: Project VISSIM Model

3.3 Future No-Build Safety

A high-level safety assessment was performed for the future No-Build condition. This analysis was performed by keeping the existing US 69 mainline crash rate constant and increasing the traffic to 2040 based on the future No-Build growth rates described in Section 3.1.

Table 1
Existing and 2040 Future No-Build US 69 Mainline Annual Crashes

	Fatal	Injury	PDO	Total	Change
Existing	2	112	455	569	--
2040 Future No-Build	4	233	948	1,185	108%

PDO = Property Damage Only

As shown in Table 1, 1,185 annual crashes would be expected to occur in the study area. This represents an increase of 108% or 616 crashes in 2040 compared to existing conditions. Conclusions from this high-level assessment include:

- Today, SB US-69 from BVP to 135th is the only segment that exceeds the statewide average. In the future No-Build, this segment would continue to degrade and other segments in the corridor would likely exceed the statewide average crash rate.
- Crashes are expected to significantly increase as traffic increases and congestion worsens.

4.0 Future Build Conditions

Allowing the traffic operations of US 69 to degrade to the degree illustrated by the 2040 No-Build analysis is likely to result in a negative effect on future growth, quality of life, and economic competitiveness of Overland Park and the Kansas City region. To better understand the type and magnitude of improvements needed to provide acceptable future operations, the team focused on answering the question:

What long-term transportation improvements are needed to address existing and future traffic, safety, and infrastructure issues?

The team focused on developing a highway solution to achieve operational and safety conditions that are improved from today's operating conditions. The team started with the last US 69 corridor plan, the I-35/US 69 Major Investment Study completed in 2001. This study did not evaluate other non-highway alternatives. As part of a more comprehensive evaluation of alternatives in conjunction with a future NEPA and Break-in-Access study, other alternatives will be considered. These may include:

- Improved accommodation for transit either on US 69 or on other routes, leading to a greater modal shift,
- Improvements to the local street network,
- Implementation of managed lanes on US 69 as a congestion mitigation strategy,
- Ramp metering and deployment of Intelligent Transportation Systems (ITS) technology as part of a broader integrated corridor management strategy, and
- Consideration of emerging technologies such as connected and autonomous vehicles (CAVs) and their effect on operations and mobility.

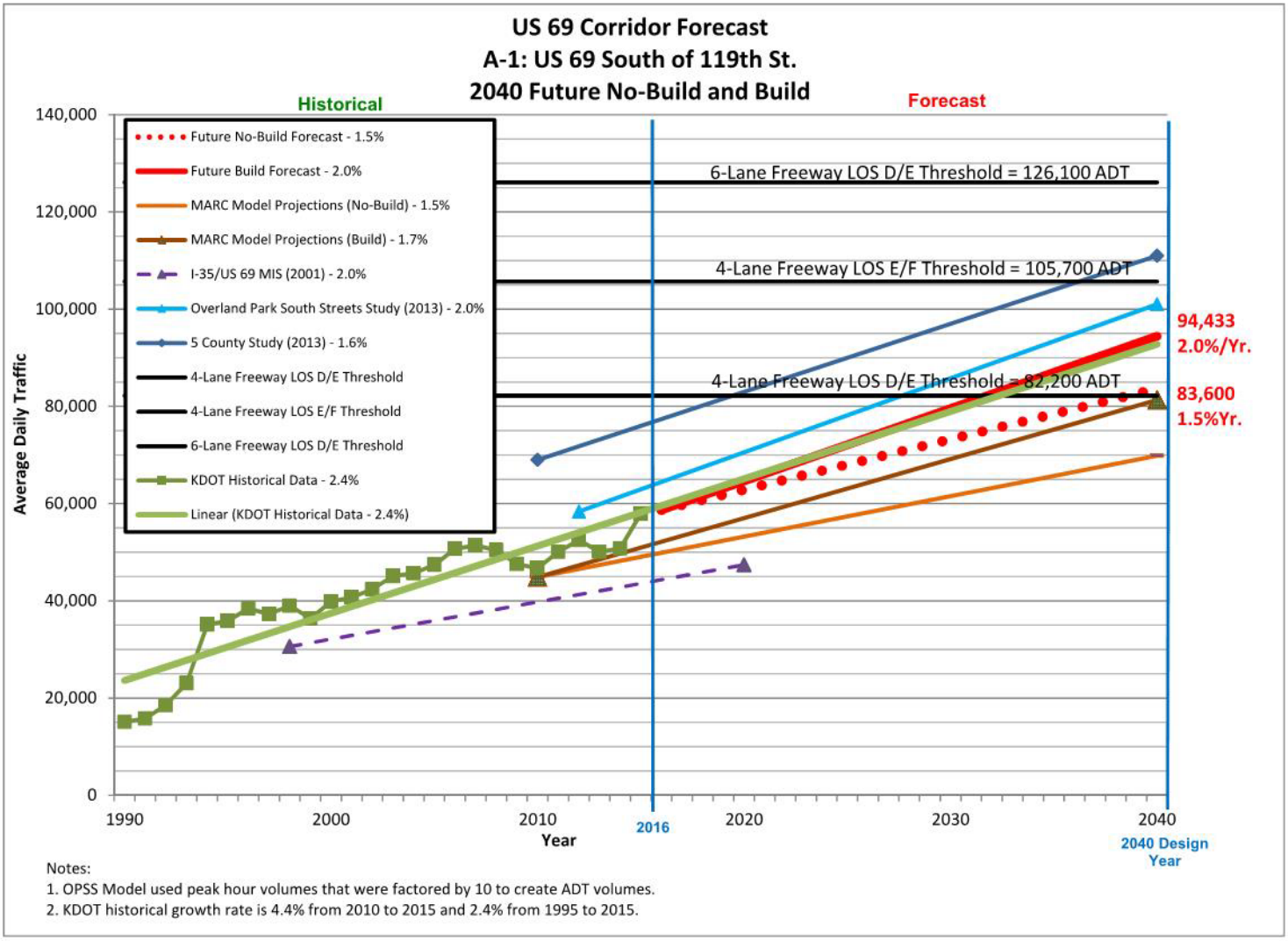
4.1 Future Build Traffic Projections

To evaluate the traffic operations of various Build improvement concepts, the team developed traffic forecasts for the Build conditions. The team used the same methodology to develop the Build growth rates as the No-Build growth rates. Through considerable coordination with the City, KDOT, FHWA, and MARC staff, the following 2040 Build growth rates were established:

- Location A-1: 2.0%/year
- Location A-2: 5.4%/year

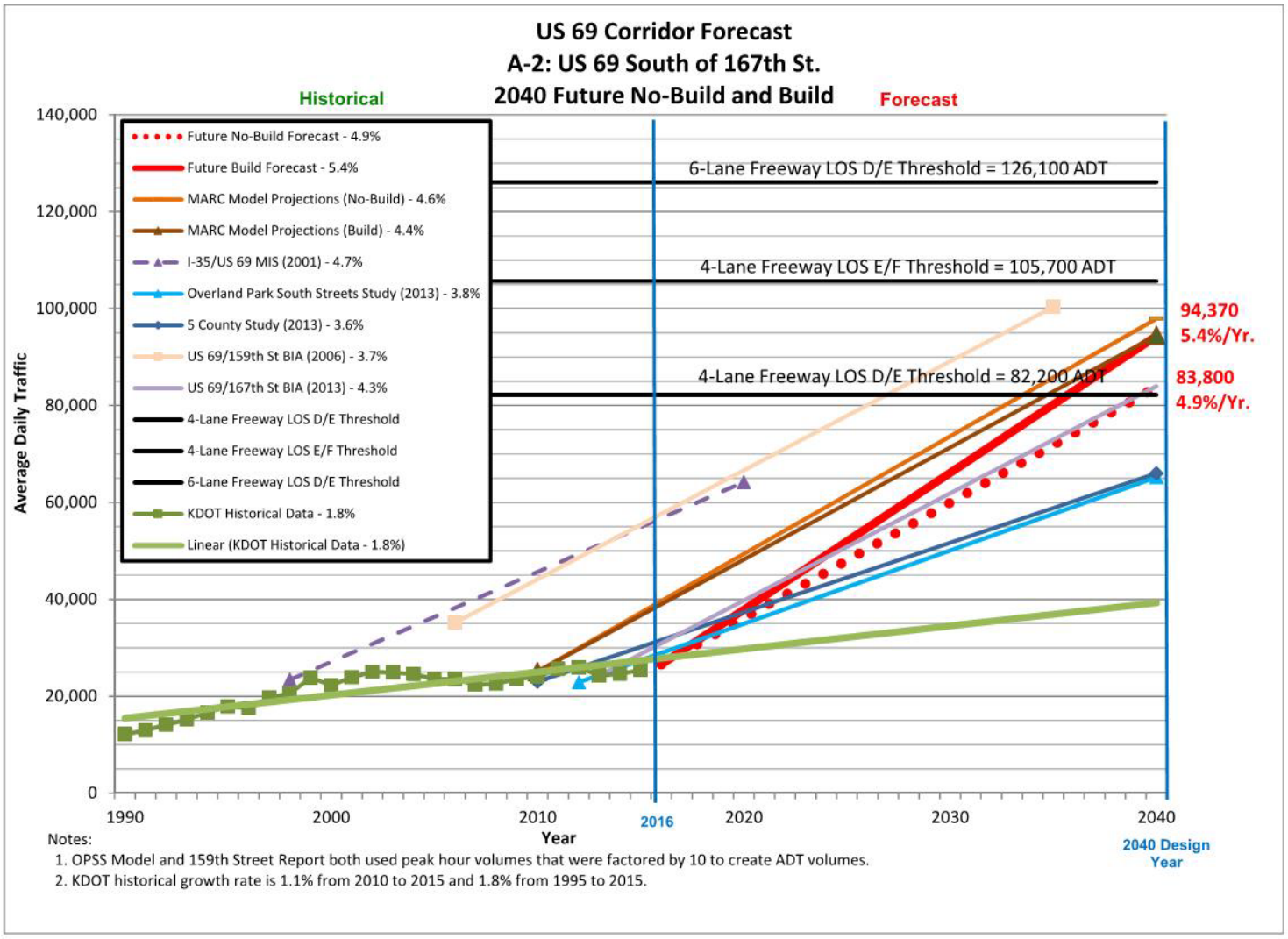
Figures 8 and 9 show the Build traffic forecasts for locations A-1 and A-2 respectively.

Figure 8 – 2040 Build Traffic Forecast
Location A-1



Source: HNTB

Figure 9 – 2040 Build Traffic Forecast
Location A-2



Source: HNTB

Applying these growth rates to existing traffic volumes results in future Build 2-way volumes of 94,433 vehicles per day at location A-1 and 94,370 vehicles per day at location A-2. Because Build traffic forecasts assume a 6-lane US 69 and the No-Build forecast assumes a 4-lane US 69, traffic forecasts for the Build condition are higher than the No-Build. This is a direct result of the capacity restriction of a 4-lane freeway being removed and induced demand attracting vehicles to US 69. These are motorists that preferred to use the corridor in the No-Build alternative but did not because of the severe congestion.

4.2 Ultimate Improvement Concept

The evaluation of a long-term (ultimate) improvement concept for the corridor began with an assessment of concepts previously developed. For the purposes of this evaluation, the corridor was divided into two segments based on where US 69 crosses Antioch Road.

4.2.1 North of Antioch Road Segment (I-435 & US 69 Interchange Improvements)

The US 69 segment north of Antioch Road consists of highway capacity improvements associated with the I-435 & US 69 interchange colored projects as shown in Figure 2. The I-435 & US 69 interchange project has been an area of focus for KDOT, MARC, Johnson County and Overland Park with considerable investment over the last two decades. These improvements have already been through a comprehensive alternatives study, a NEPA Study which resulted in a Finding of No Significant Impact (FONSI), and an approved Break-in-Access. Approximately 60% of the improvements recommended from those activities have been constructed and design of the remaining improvements has been developed to various levels ranging from 30%-90% complete depending on the specific component.

The team evaluated the anticipated traffic operational performance of the planned improvements north of Antioch Road using updated 2040 traffic forecasts developed through this study. That evaluation confirmed the remaining I-435 & US 69 improvements north of Antioch Road will operate at an acceptable level. Therefore, no modifications to the planned improvements north of Antioch Road are recommended at this time.

4.2.2 South of Antioch Road Segment

The segment south of Antioch Road has not had the same level of planning and design as the segment north of Antioch Road, except for work associated with the 159th St. Interchange and 167th St. Interchange. The I-35/US 69 Major Investment Study, 2001, stands as the most recent comprehensive corridor study for this area. Given its age and the 2020 design year of the study, the recommendations from the MIS require a re-evaluation. The MIS improvements generally consist of the following:

- Expansion of the US 69 mainline from two to three through mainline lanes in each direction,
- Construction of auxiliary lanes between the 151st St. and 135th St. interchanges,
- Improvements to ramps and arterial streets within the interchanges at 151st St. and 167th St. (e.g. added ramp terminal and arterial capacity and intersection control)

A more detailed depiction of these improvements can be found in Section 1 of the appendix.

The team started the Build analysis by evaluating the MIS concept using the 2040 Build traffic developed through the methodology discussed above. This analysis confirmed that with additional traffic growth, the improvements recommended in the MIS south of Antioch Rd. will operate acceptably with the exception of the segment between 135th St. and Antioch Rd.

In the southbound direction, the MIS concept proposed a C/D road to address the weave between Blue Valley Pkwy. southbound on-ramp traffic and traffic exiting to 135th St. However, in the northbound direction, the MIS concept did not include a C/D road, but rather an auxiliary lane between 135th St. and Blue Valley Pkwy. Given the significantly higher traffic volumes projected with this study and high weave volumes between these two interchanges, the auxiliary lane solution did not operate acceptably and the addition of a northbound C/D road is recommended. This study's recommended improvements for the segment that includes the 135th St. interchange and the Blue Valley Pkwy. interchange generally consist of the following:

- Expansion of the US 69 mainline from two to three through lanes in each direction
- Construction of a braided ramp to eliminate the left entrance of southbound Blue Valley Pkwy. to southbound US 69
- Construction of C/D roads in both the northbound and southbound directions between 135th St. and Blue Valley Pkwy., and
- Improvements to ramps and arterial street within the 135th St interchange. (e.g. added ramp terminal and arterial capacity and intersection control)

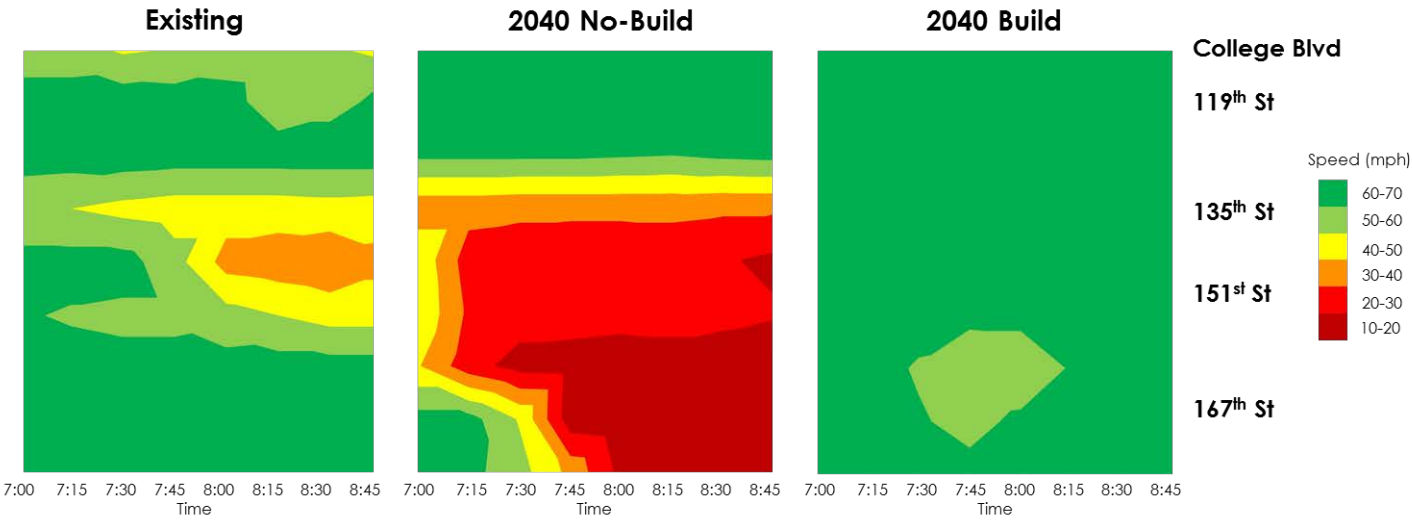
A more detailed depiction of these improvements can be found in Section 2 of the appendix.

4.3 Future Build Operations

The Ultimate Improvement Concept described above and depicted in Section 2 of the appendix, operates acceptably during 2040 peak periods. While reduced speeds are anticipated in the design year peak periods, significant reductions in corridor travel times, and improvements in safety are expected. The effect of these improvements is illustrated using speed profiles in the figures below.

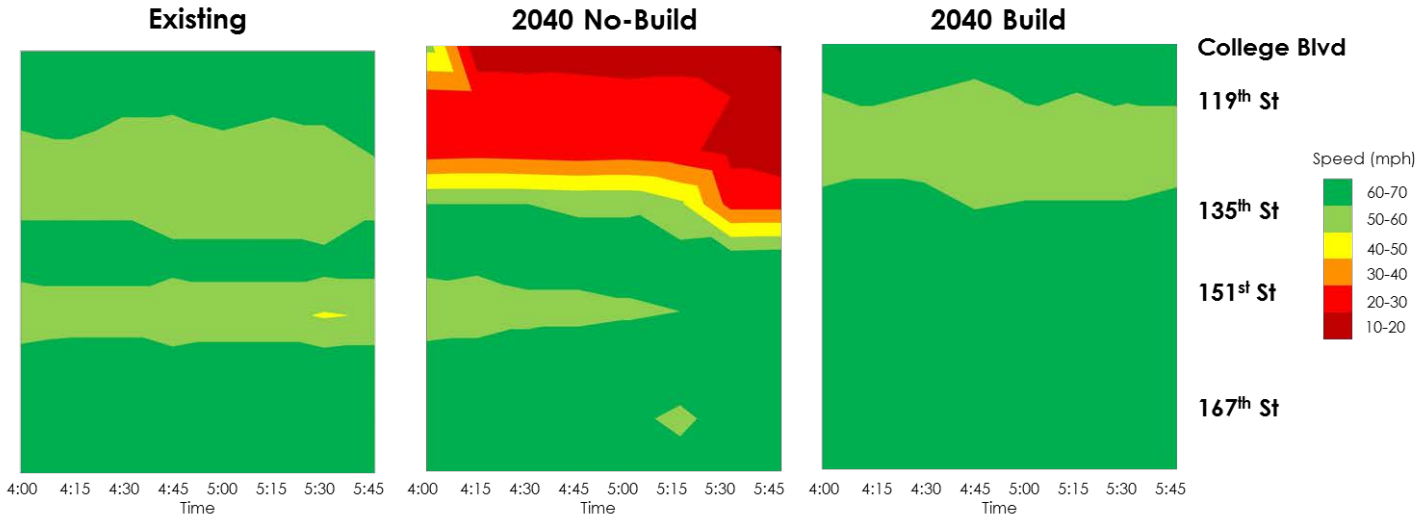
Figure 10 depicts anticipated travel speeds for northbound US 69 during the AM peak period comparing existing, 2040 No-Build, and 2040 Build conditions. Along the X-axis is the time of day from 7:00 am to 8:45 am, and along the Y axis are interchanges along the corridor. The color gradient represents average speeds across the roadway segment at each location at that time of day. Figure 11 depicts the same information for southbound US 69 during the PM peak period from 4:00 pm to 5:45 pm. As illustrated by Figures 10 and 11, the No-Build condition shows significant degradation of travel speeds, and the construction of the Ultimate Improvement Concept will result in improved travel speeds.

Figure 10 – Northbound AM Peak Period



Source: Project VISSIM Model

Figure 11 – Southbound PM Peak Period



Source: Project VISSIM Model

4.4 Future Build Safety

A future Build safety analysis was not performed in this high-level study. However, in a Build condition, the primary contributors of crashes in the study corridor would be eliminated which are the weave between Blue Valley Parkway and 135th Street as well as congestion caused by limited mainline capacity. Once these needs are addressed, it is expected that safety would improve to below statewide average conditions for comparable Kansas state highways.

4.5 Corridor Aspects Not Analyzed

The Future Build analysis was considered to be high-level from all aspects of traffic, safety and infrastructure assessment. Integrated Corridor Management (ICM), managed lanes and multimodal issues were discussed with the study team but a detailed assessment was not performed. More detailed analysis is planned for the next phase of the study.

5.0 Implementation Strategy

The ultimate improvements represent a significant investment in the US 69 Corridor. In 2016 dollars, these improvements are estimated to have a total construction cost of approximately $430M. With a cost of this magnitude it is unlikely that these improvements can be constructed in a single construction project unless there are significant changes in Federal, State, Local, or other revenues that can be directed towards improving US 69. It is more realistic that the ultimate improvements will be constructed in smaller, more manageable construction projects. This is consistent with how KDOT has approached other projects of comparable size and complexity in this region and across the state. Recognizing this, the team evaluated three different approaches for constructing the ultimate improvements in phases with the objective of answering the question:

How should these improvements be implemented over time?

- **Approach #1 – North to South Progression -** The first approach is a continuation of the practice currently in place for completing the I-435 & US 69 improvements. Improvements within the I-435 & US 69 family of projects have already been through the NEPA process and have progressed well into design with certain elements already developed to a near "shovel ready" state. Approach #1 would complete the I-435 & US 69 improvements and then continue working from the north to the south as funding is available. The primary advantage of this approach is the speed at which improvements could begin in the corridor. The disadvantage is that the most significant existing operational issues are in the segment between 135th St. and Blue Valley Pkwy., and significant time and resources will be expended before they are addressed. Minimal noticeable benefit in overall corridor traffic operations will be realized until the segment between 135th St. and Blue Valley Pkwy. is addressed.

- **Approach #2 – Operational Priority Approach -** The second approach focused on addressing the most pressing operational and safety issues as early in the implementation schedule as possible. With this approach, the initial improvements in the corridor would be focused in the segment between 135th St. and Blue Valley Pkwy. However, alleviating the bottlenecks at this location without additional improvements throughout the corridor will simply move the bottleneck to a new location. For that reason, the first phase of Approach #2 continues the southward expansion of US 69 to three through lanes in each direction from I-435 to 135th St. The break out of the ultimate improvements into phases for Approach #2 is illustrated in Section 3 of the appendix. The primary advantage of this approach is that the most significant traffic and safety issues are addressed early, which provides the greatest improvement in corridor operations. The most significant disadvantage of this approach is project readiness for any improvements south of Antioch Rd. for which Federal approvals have not been secured.

- **Approach #3 – Corridor Preservation Approach -** Recognizing the age and condition of the existing US 69 infrastructure, the team evaluated an approach focused on systematically replacing the existing pavement and bridges. With this approach, the existing pavement and bridges are reconstructed to be compatible with the ultimate improvements, not simply replaced in kind. The primary advantage is that this approach focuses on removing aging infrastructure from KDOT's system and will reduce the cost of ongoing maintenance and rehabilitation. The disadvantage of this approach is that significant time and resources will be expended in the corridor before the most significant traffic congestion and safety issues are fully addressed.

After consideration of these approach strategies and in coordination with the KDOT, the City, and FHWA, Approach #2 - Operational Priority Approach, was selected as the preferred implementation approach for the corridor. This approach addresses the most urgent traffic operational and safety issues as early as possible.

6.0 Recommended Future Activities

The work performed in Phase 1 of this study illustrates the existing and emerging traffic, safety and infrastructure condition issues within the corridor, provides insight into the circumstances that may develop without improvements, and identifies a viable ultimate improvements alternative that addresses existing and future needs within the corridor. The study results were approved by the City of Overland Park, FHWA, KDOT and MARC and the recommendations were used to update the MARC Long-Range Transportation Plan in the fall of 2017.

This study did not consider all potential improvement strategies that could be employed, nor did it include all preparatory activities necessary to advance improvements to construction. To continue the progress made in Phase 1, the team recommends the following next steps to be included in a future Phase 2 of this study:

- A NEPA and Break-in-Access study including the development of a formal Purpose and Need statement in relation to MARC's long-range planning objectives,
- A more thorough consideration of other multimodal alternative improvement strategies including non-highway solutions,
- Activities to engage stakeholders and the public in the evaluation of various improvement alternatives,
- Economic impact analysis, and
- Evaluation of alternatives for funding future improvements

US 69 is a critical transportation asset for the City of Overland Park, Johnson County, the greater Kansas City metropolitan area, and the state of Kansas. The importance of this corridor to the future of the region cannot be understated given the anticipated increases in both population and employment served by US 69. The future activities noted above will continue the progress begun through this study, establish a direction for the future of US 69, and position the region for continued growth and mobility.

Appendix

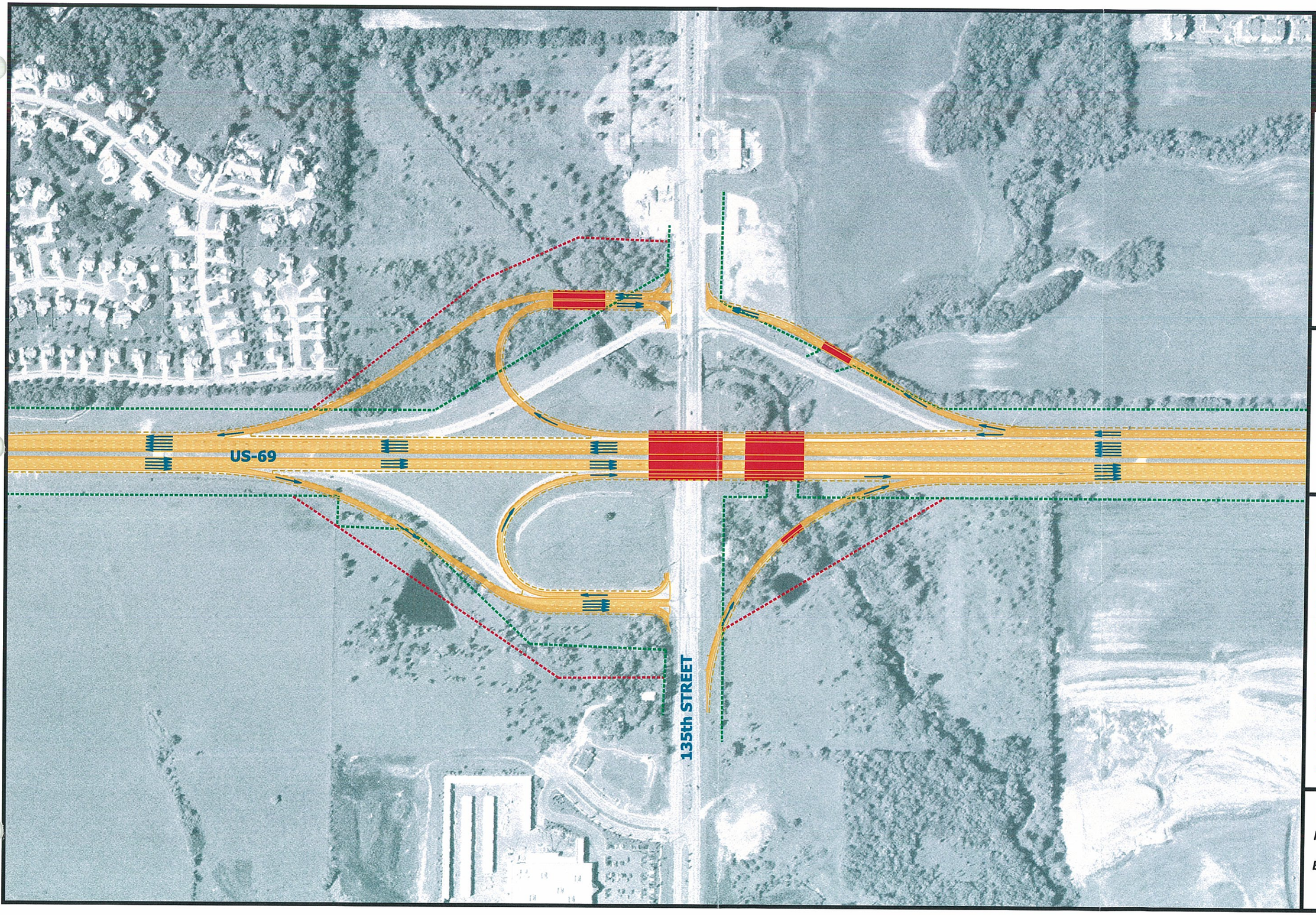
Section 1 – I-35/US 69 Major Investment Study – Relevant Plan Plate Drawings

Section 2 – Ultimate Improvement Concept Plate Drawings

Section 3 – Implementation Plan Exhibits

Appendix

Section 1
I-35/US 69 Major Investment Study
Relevant Plan Plate Drawings



I-35/US69

MAJOR INVESTMENT STUDY

Kansas Department of Transportation

PREFERRED ALTERNATIVES

US-69 CORRIDOR

PLATE #8

December, 2000

W S N E

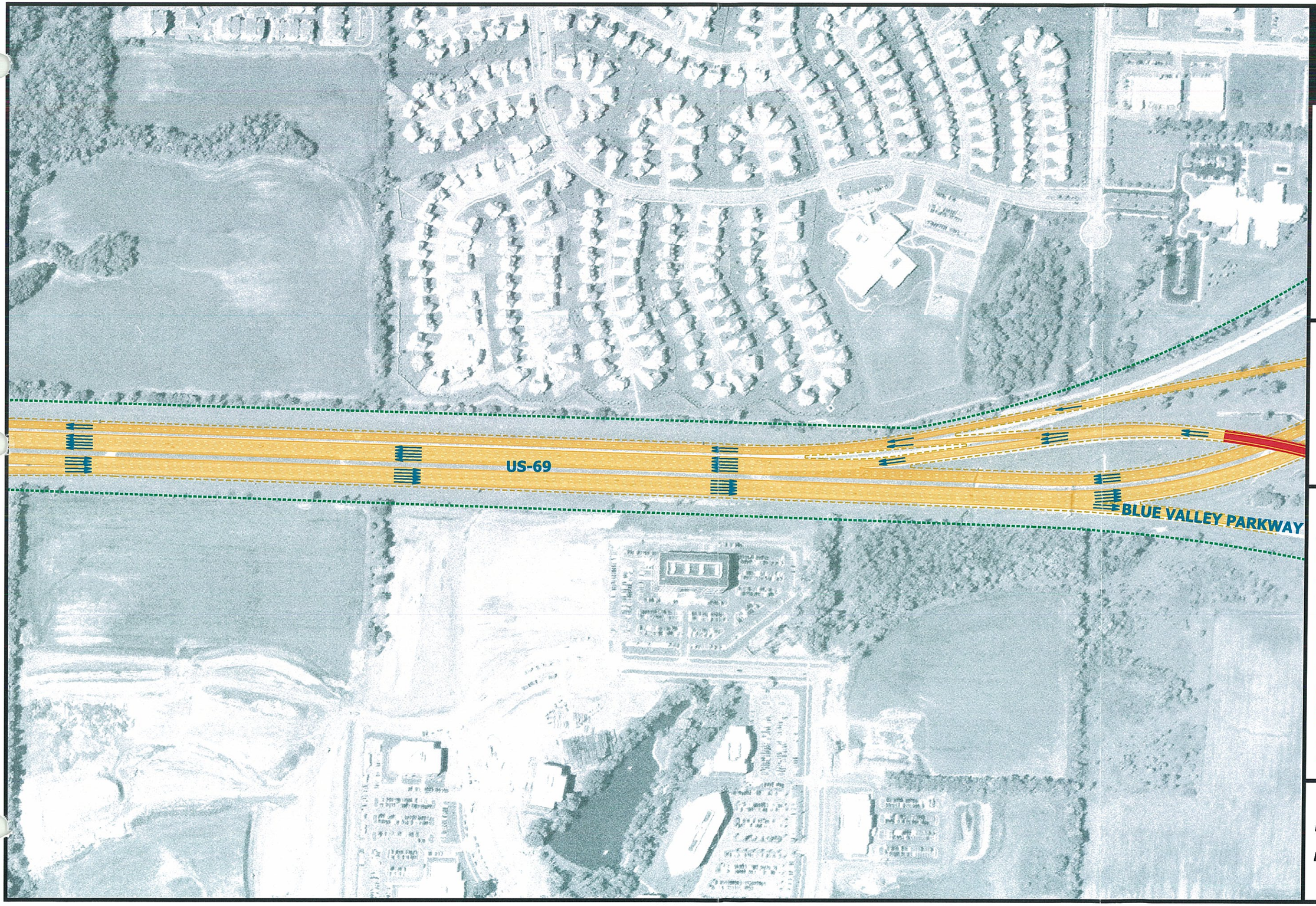
SCALE = 1:4000

LEGEND

- Bridge Improvements
- Lane Arrow
- New Pavement (KDOT)
- New Pavement (Others)
- Pavement Edge
- Pavement Removal
- Shoulders
- Existing R/W
- Minimum R/W

HNTB

In Association with Transystems Burns & McDonnell The Technology Group



I-35/US69
MAJOR INVESTMENT STUDY

Kansas Department of Transportation

PREFERRED ALTERNATIVES

US-69 CORRIDOR

PLATE #9

December, 2000

W
S
N
E

SCALE = 1:4000

LEGEND

- Bridge Improvements
- Lane Arrow
- New Pavement (KDOT)
- New Pavement (Others)
- Pavement Edge
- Pavement Removal
- Shoulders
- Existing R/W
- Minimum R/W

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I-35/US69
MAJOR INVESTMENT STUDY

Kansas Department of Transportation

PREFERRED ALTERNATIVES

US-69 CORRIDOR

PLATE #10

December, 2000

SCALE = 1:4000

LEGEND

- Bridge Improvements
- Lane Arrow
- New Pavement (KDOT)
- New Pavement (Others)
- Pavement Edge
- Pavement Removal
- Shoulders
- Existing R/W
- Minimum R/W

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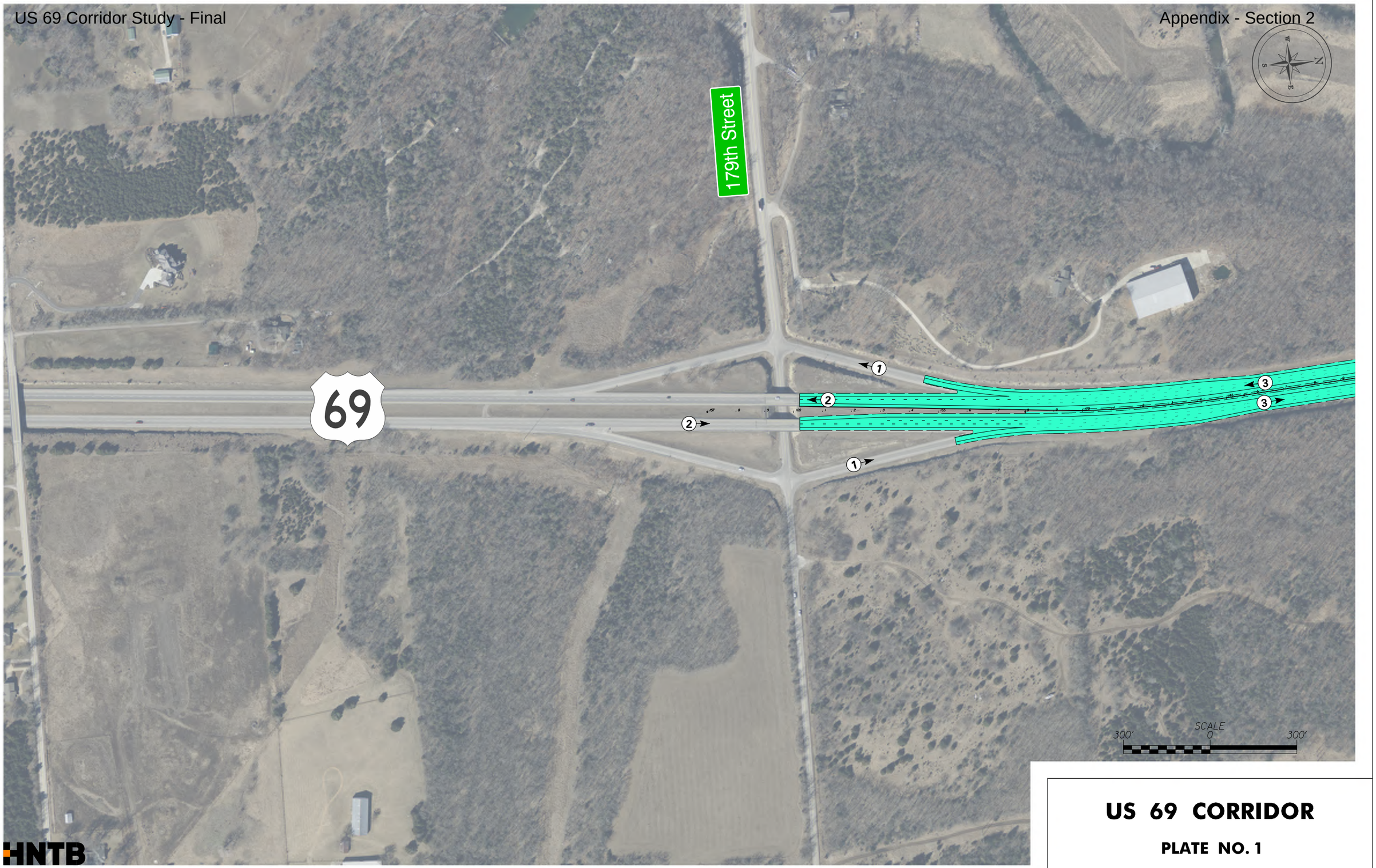
Appendix

Section 2
Ultimate Improvement Concept
Plate Drawings



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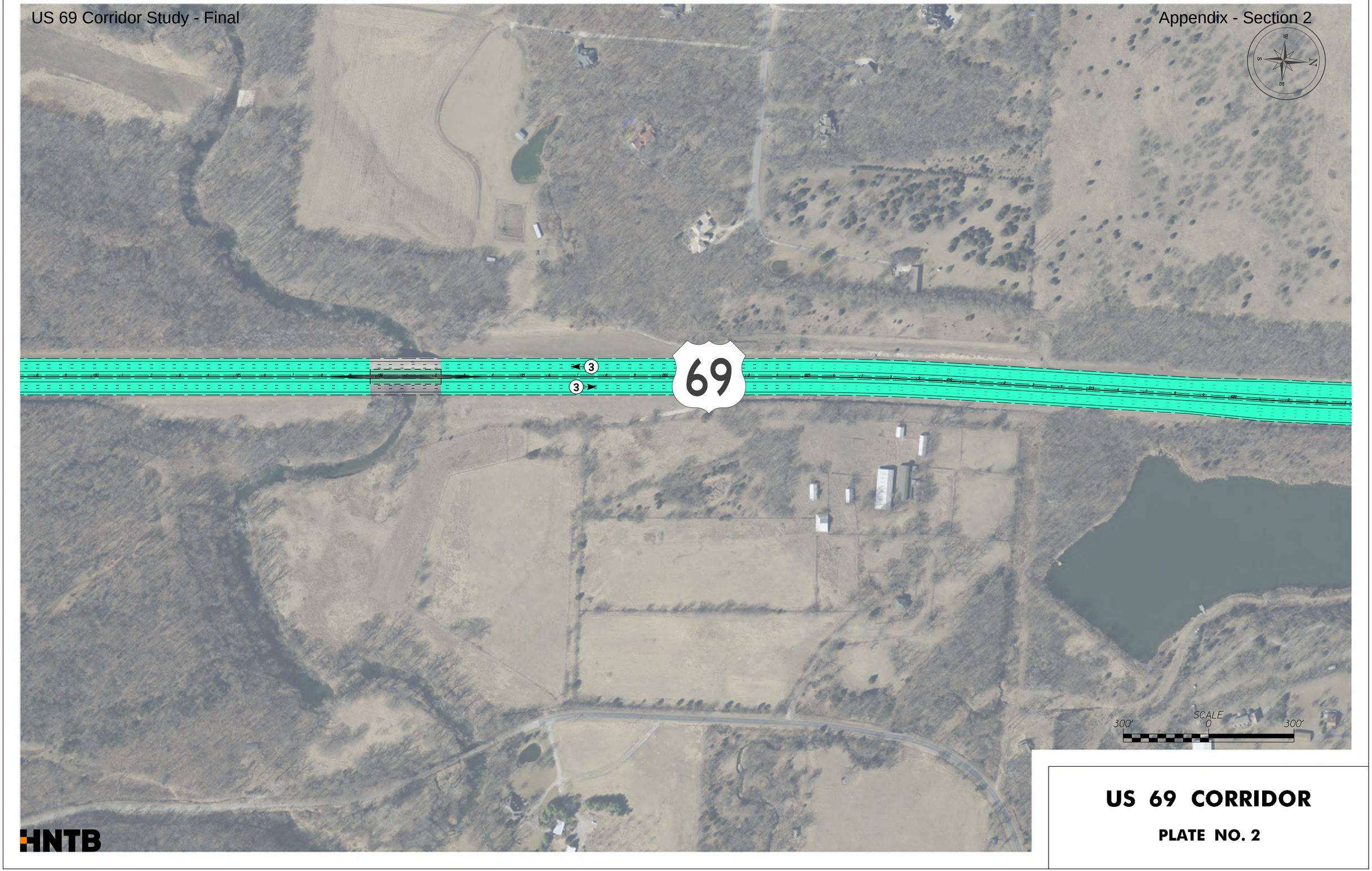
US 69 CORRIDOR

PLATE NO. 1



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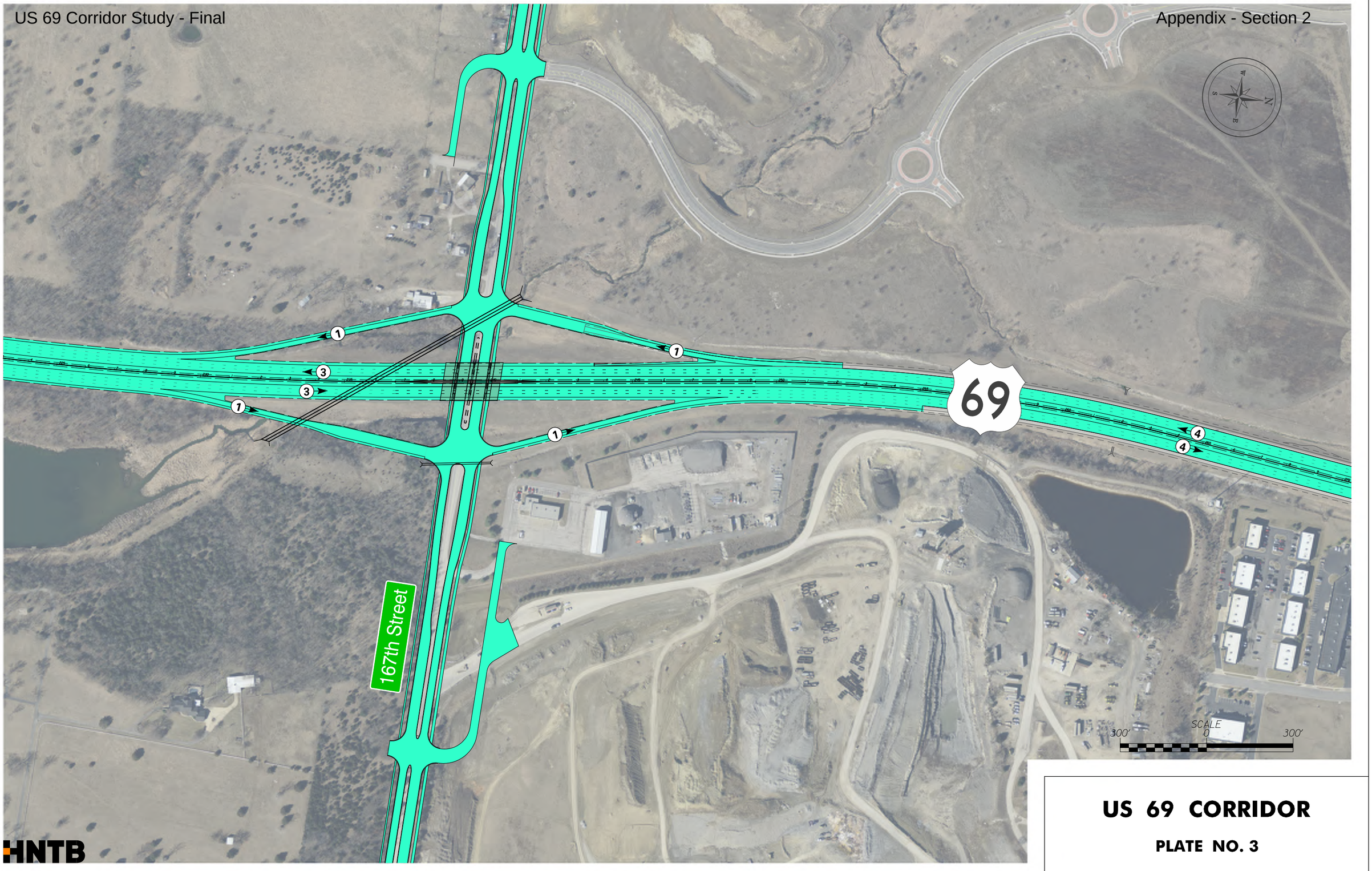
US 69 CORRIDOR

PLATE NO. 2



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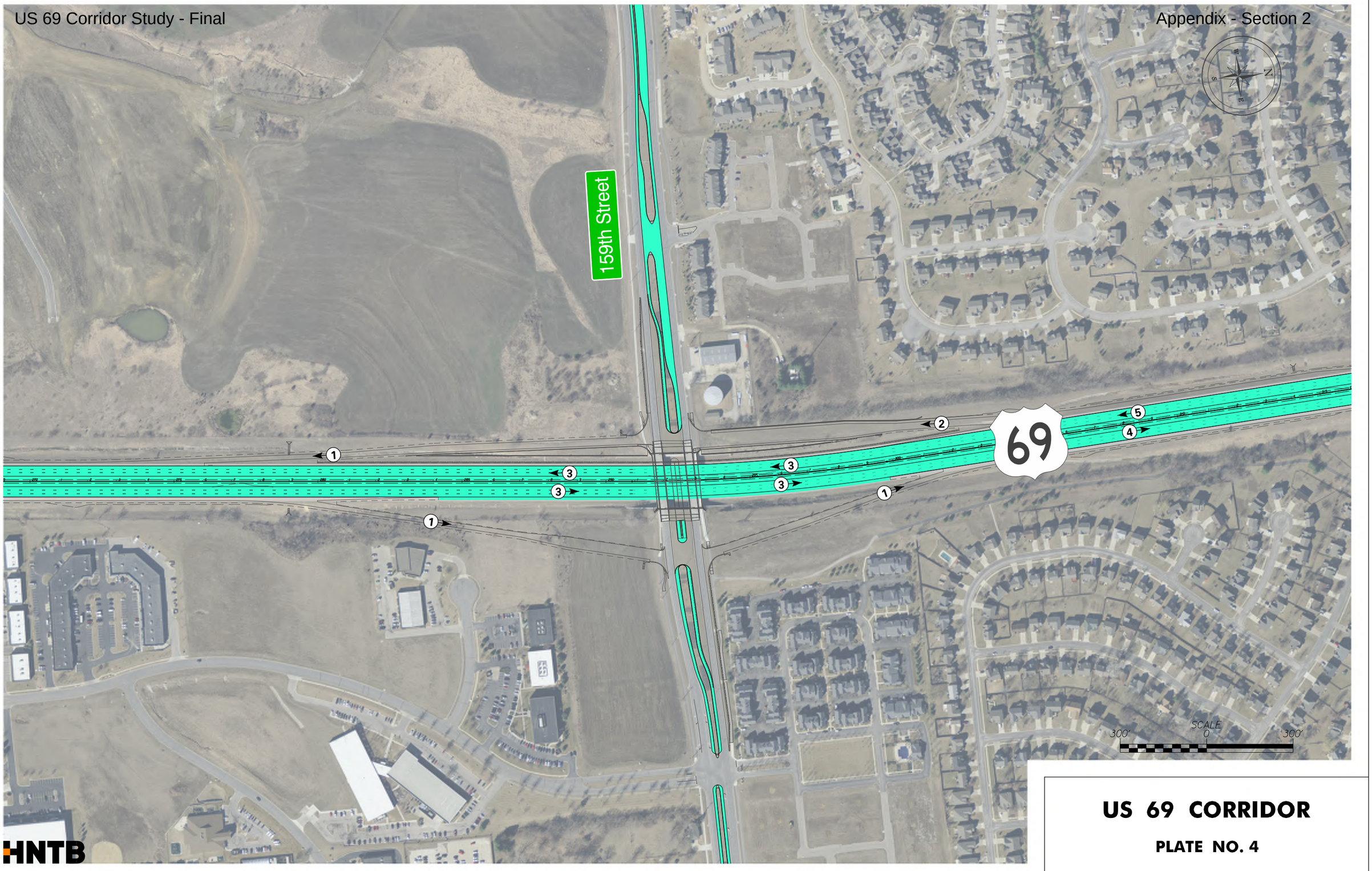
US 69 CORRIDOR

PLATE NO. 3



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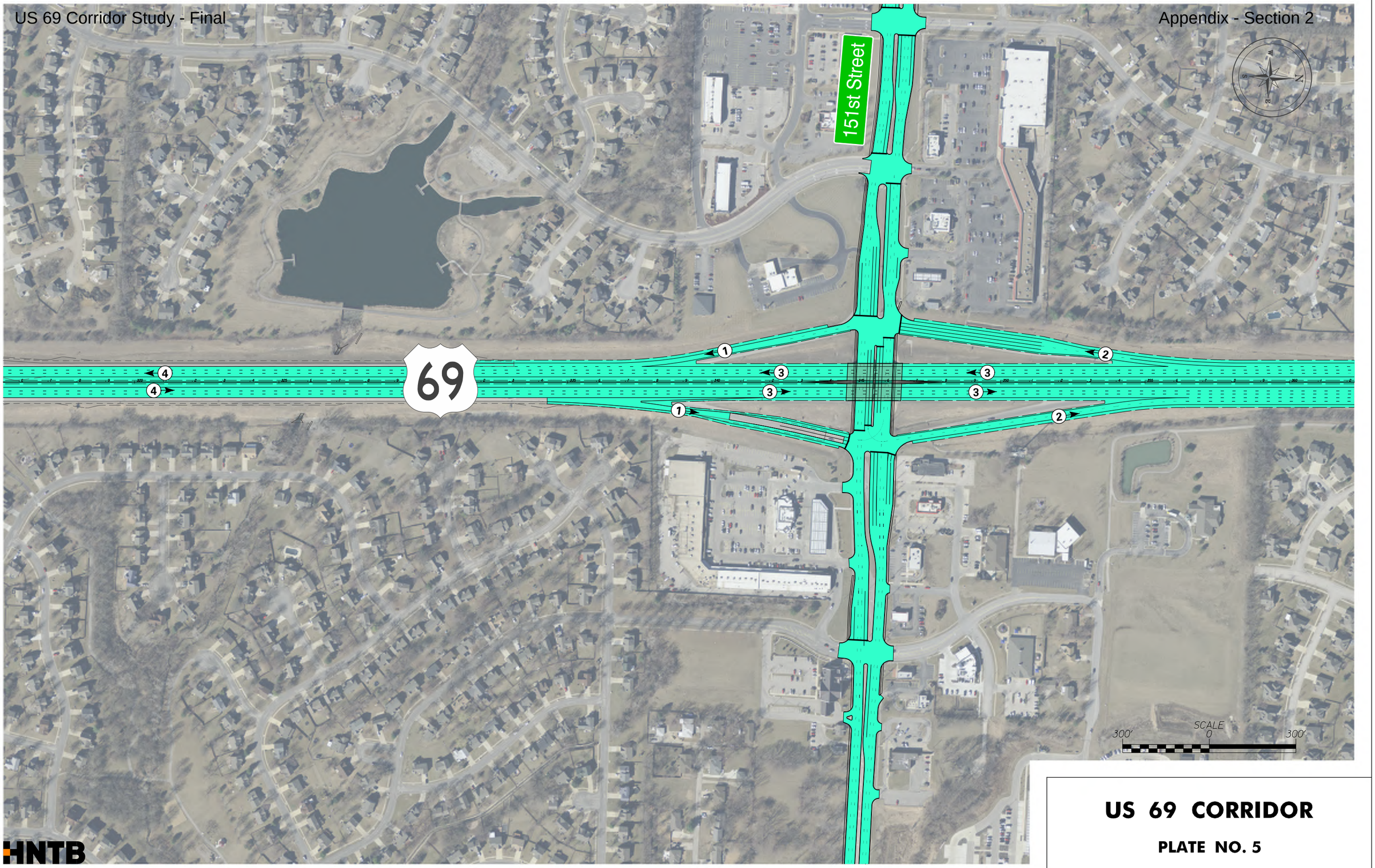
US 69 CORRIDOR

PLATE NO. 4



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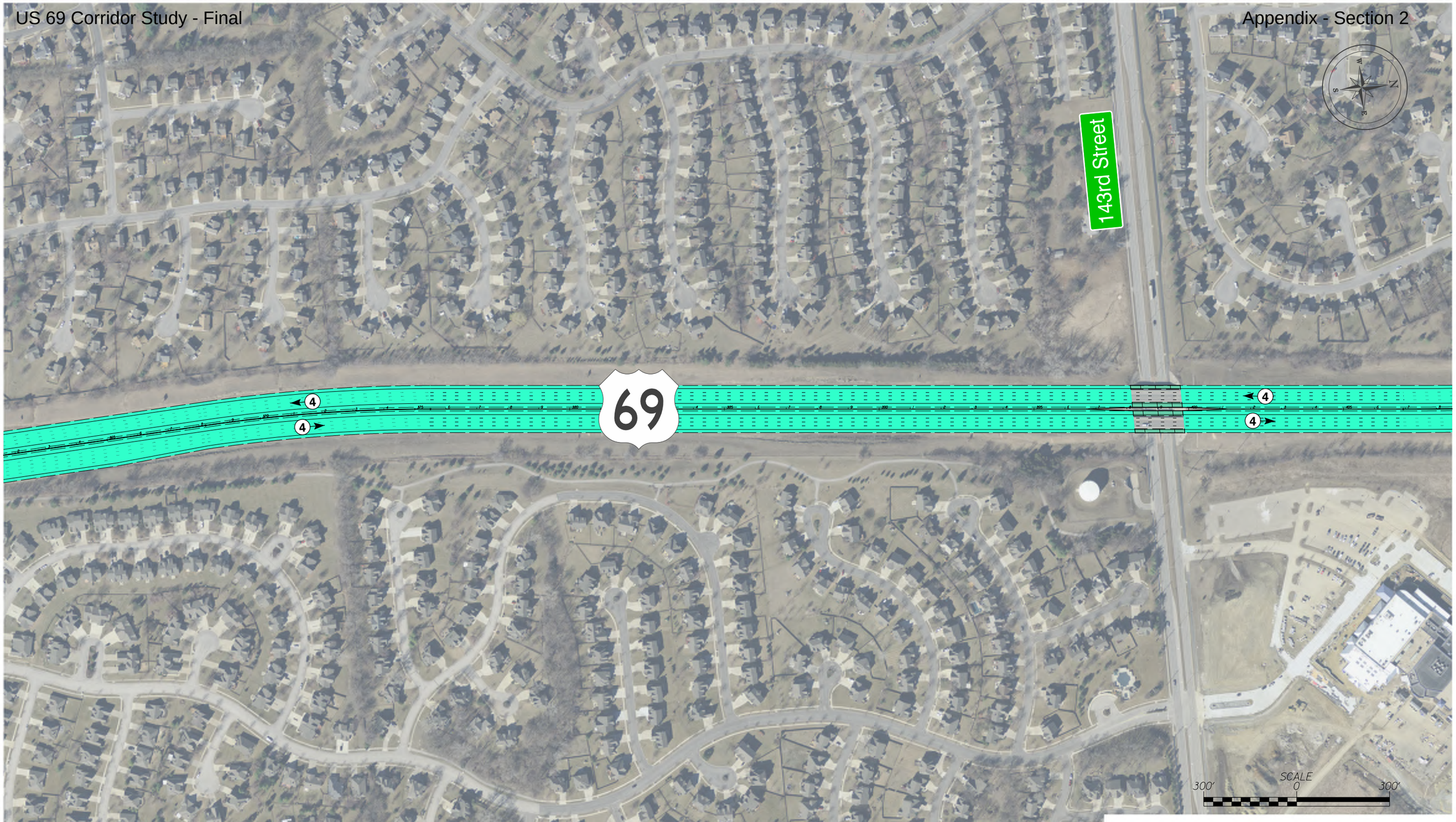
US 69 CORRIDOR

PLATE NO. 5



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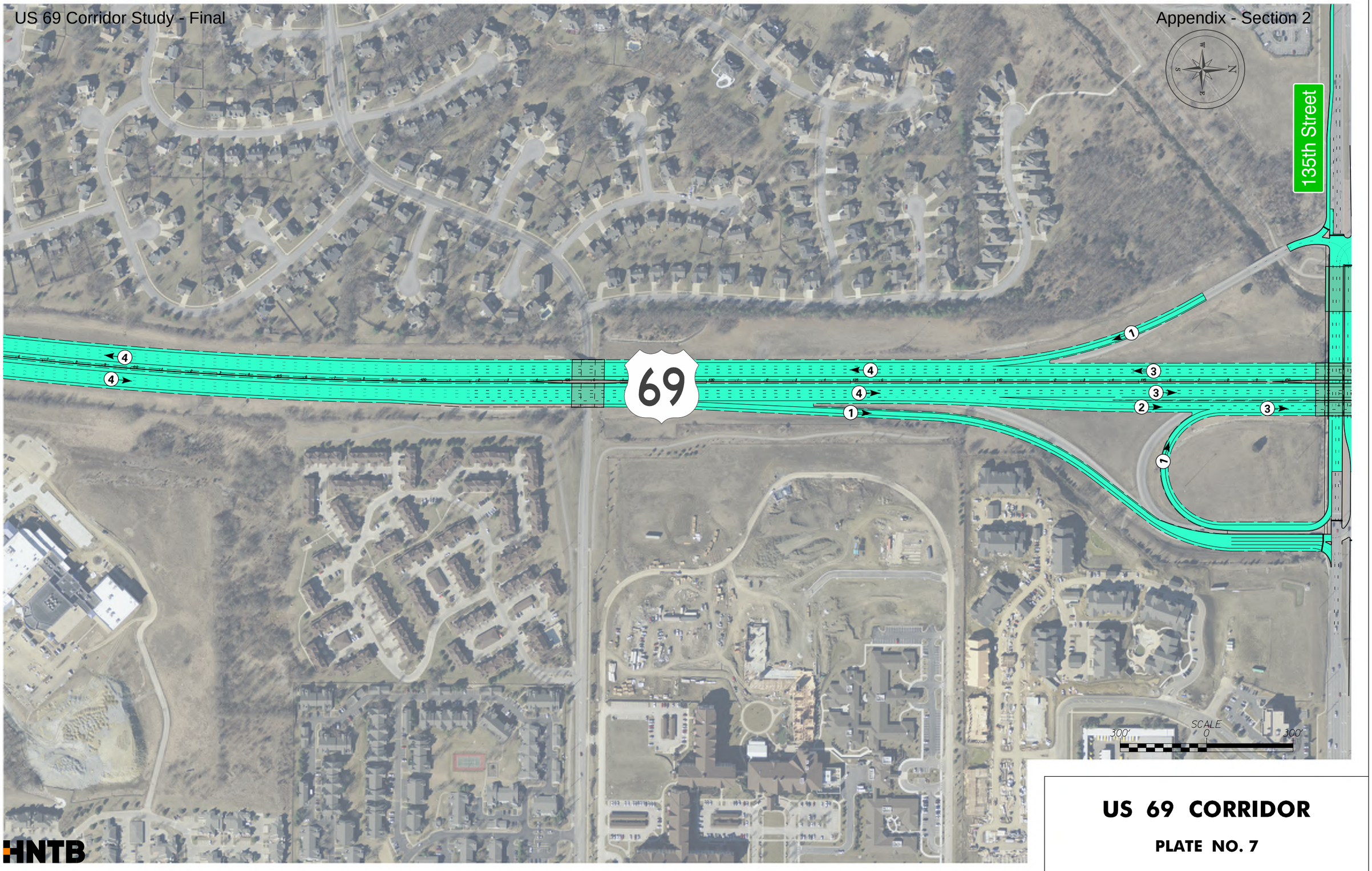
US 69 CORRIDOR

PLATE NO. 6



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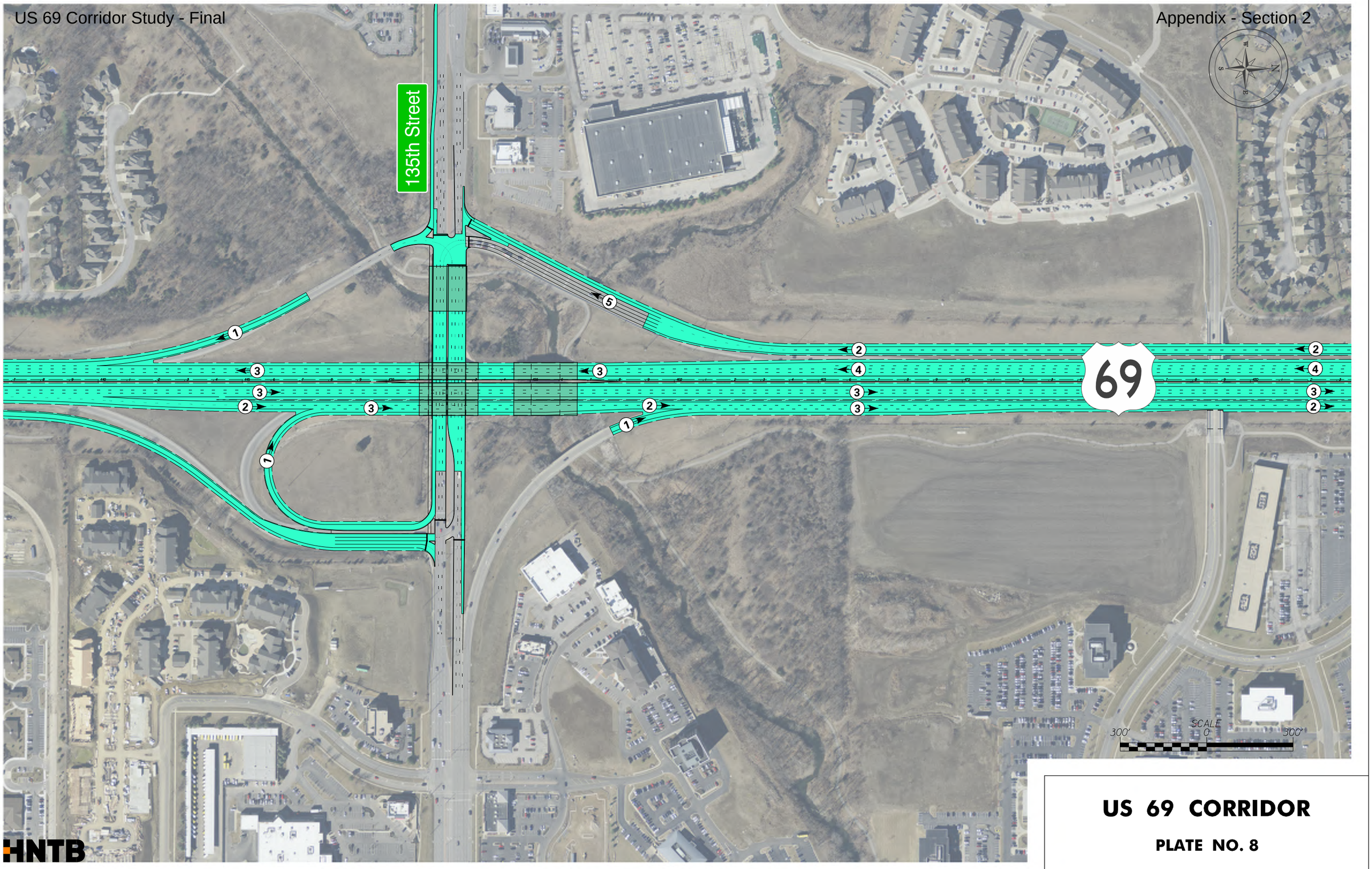
US 69 CORRIDOR

PLATE NO. 7



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US 69 CORRIDOR

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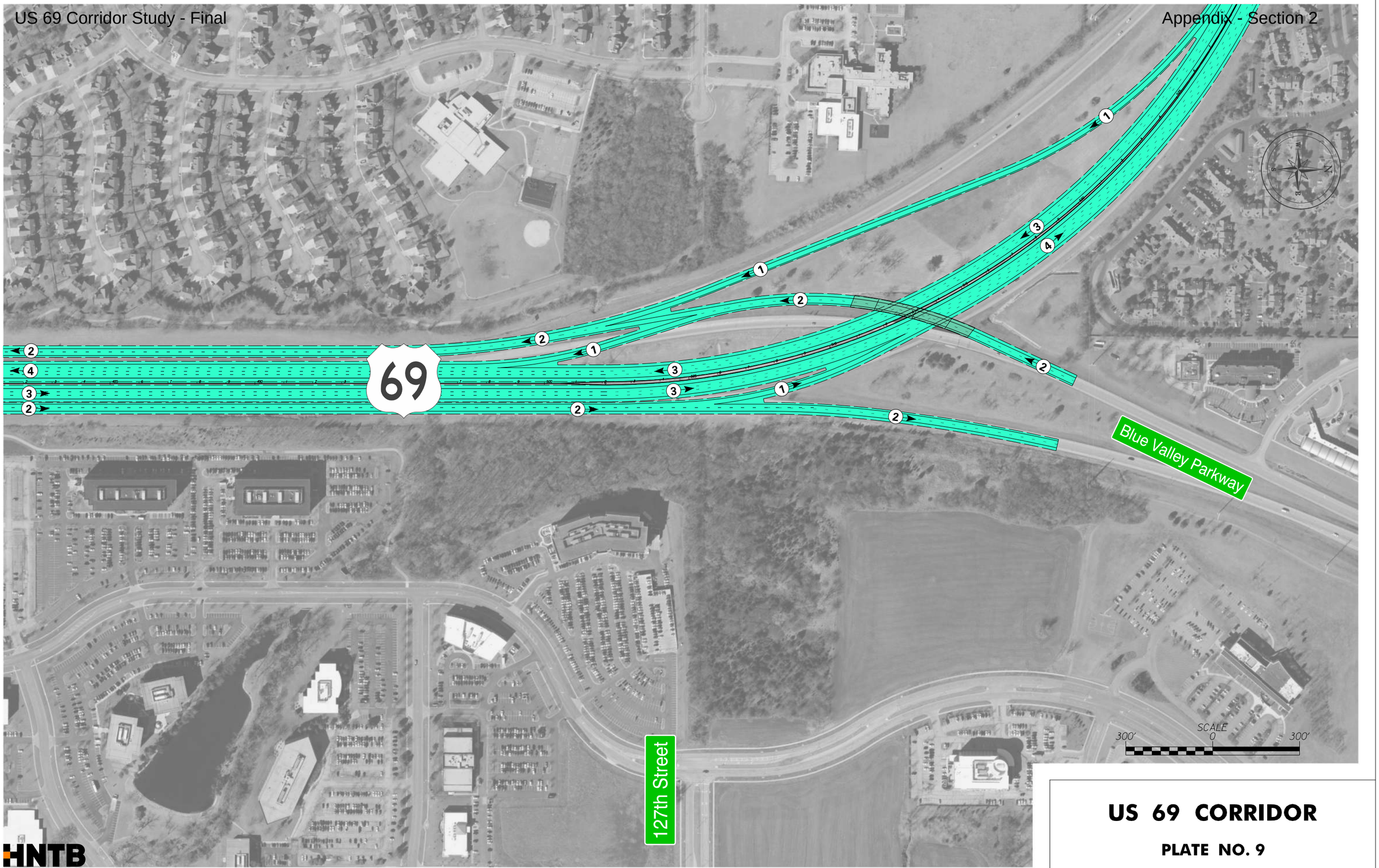

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US 69 CORRIDOR

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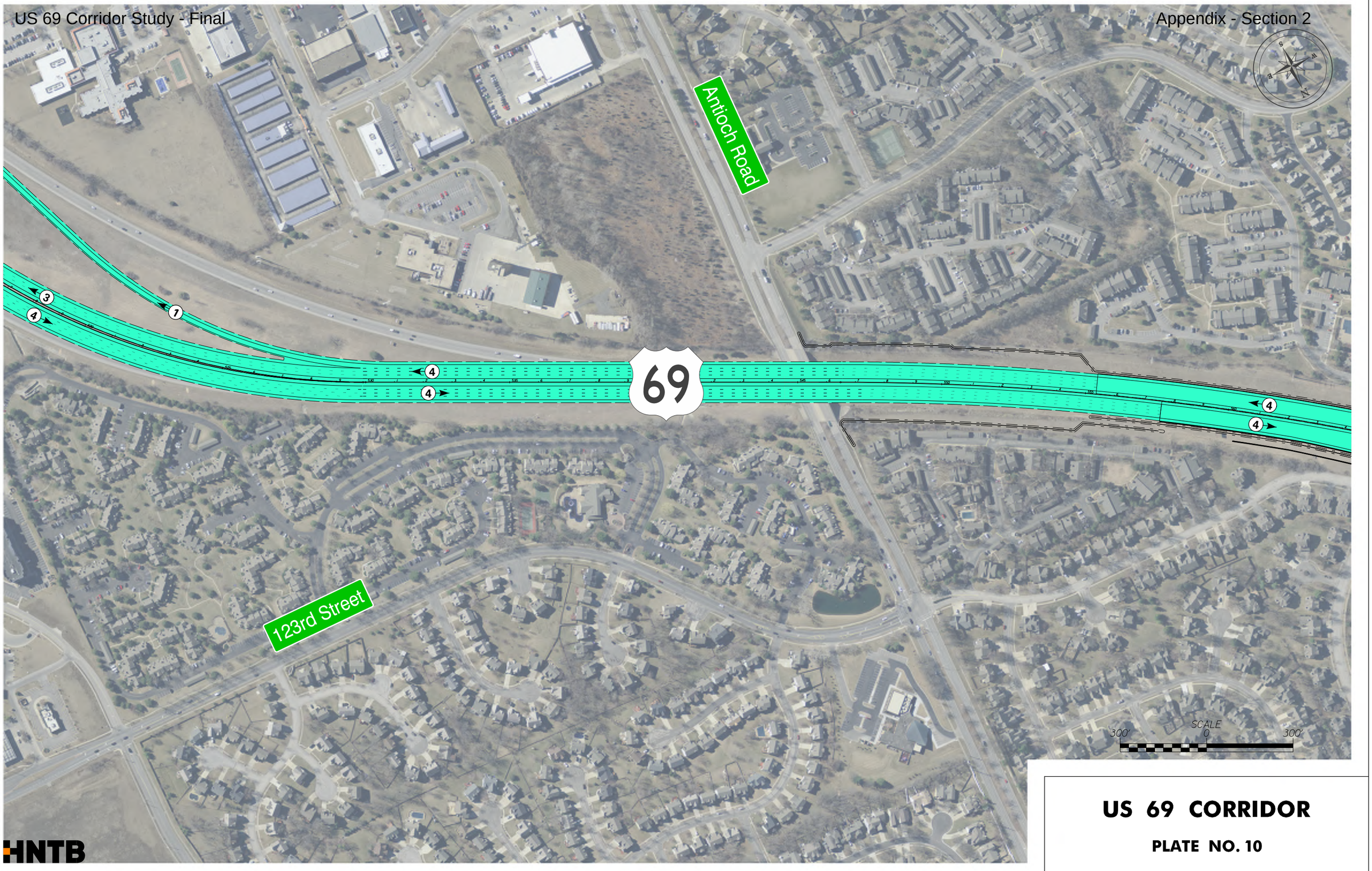

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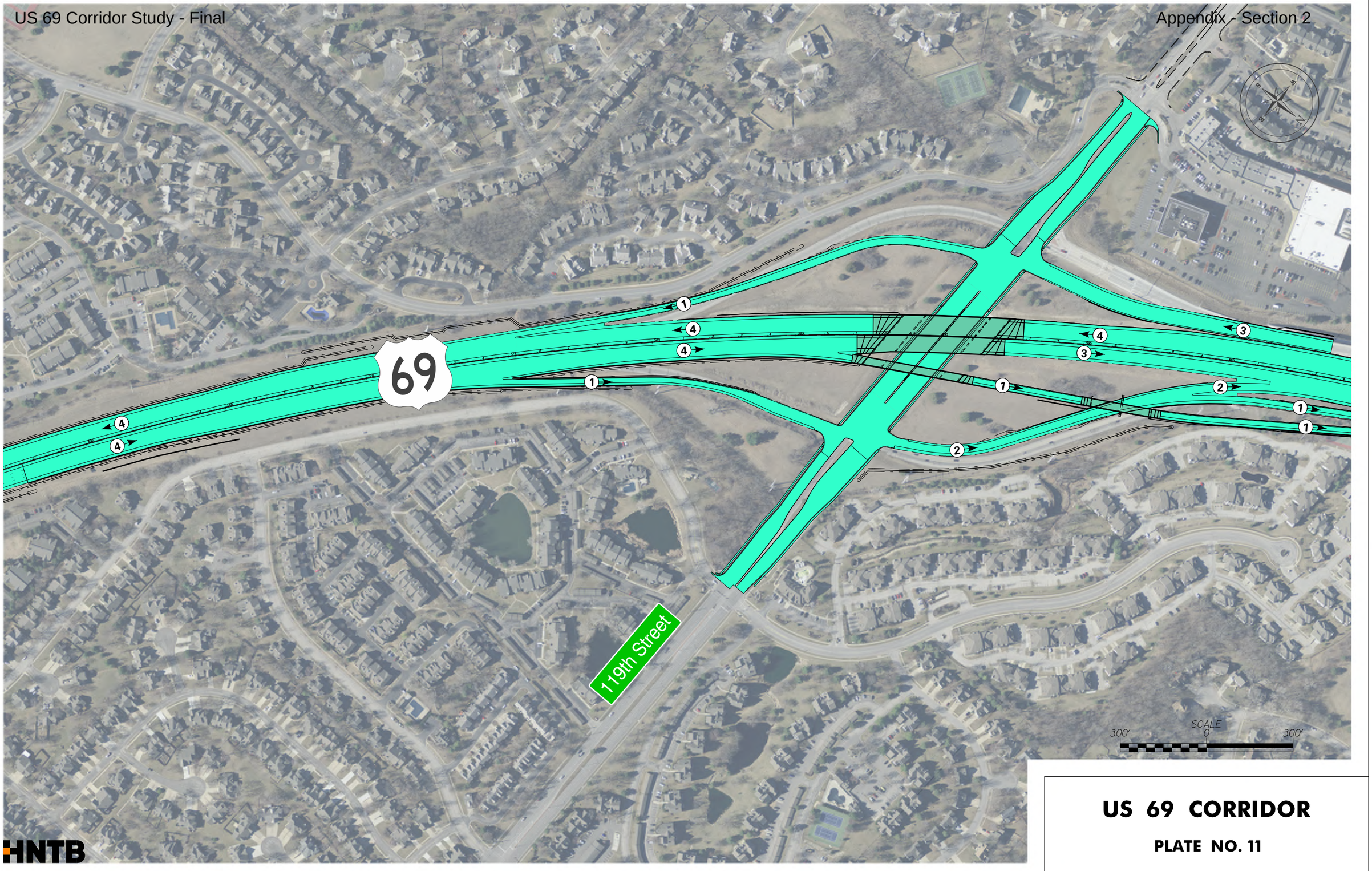
US 69 CORRIDOR

PLATE NO. 10



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US 69 CORRIDOR

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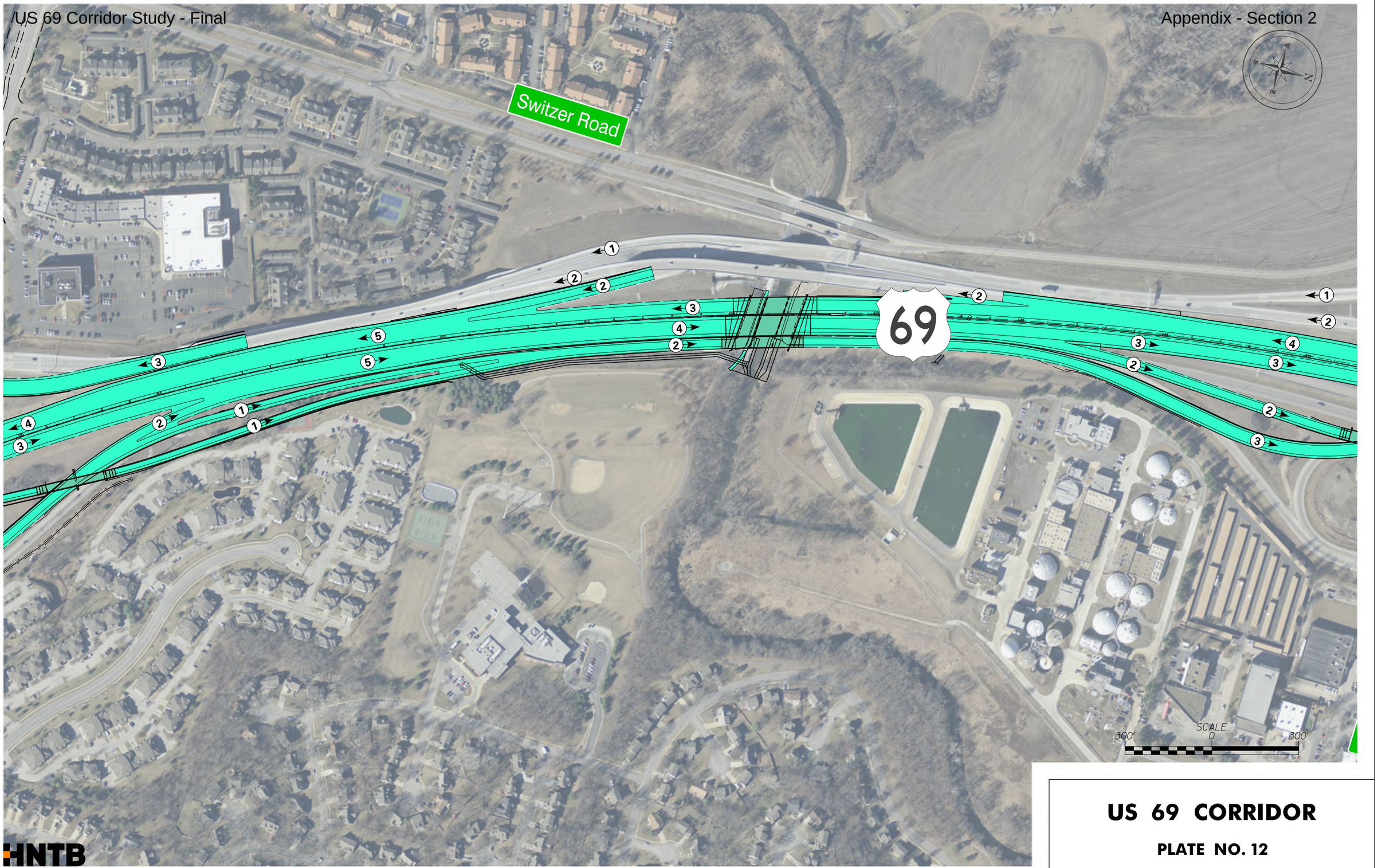

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US 69 CORRIDOR

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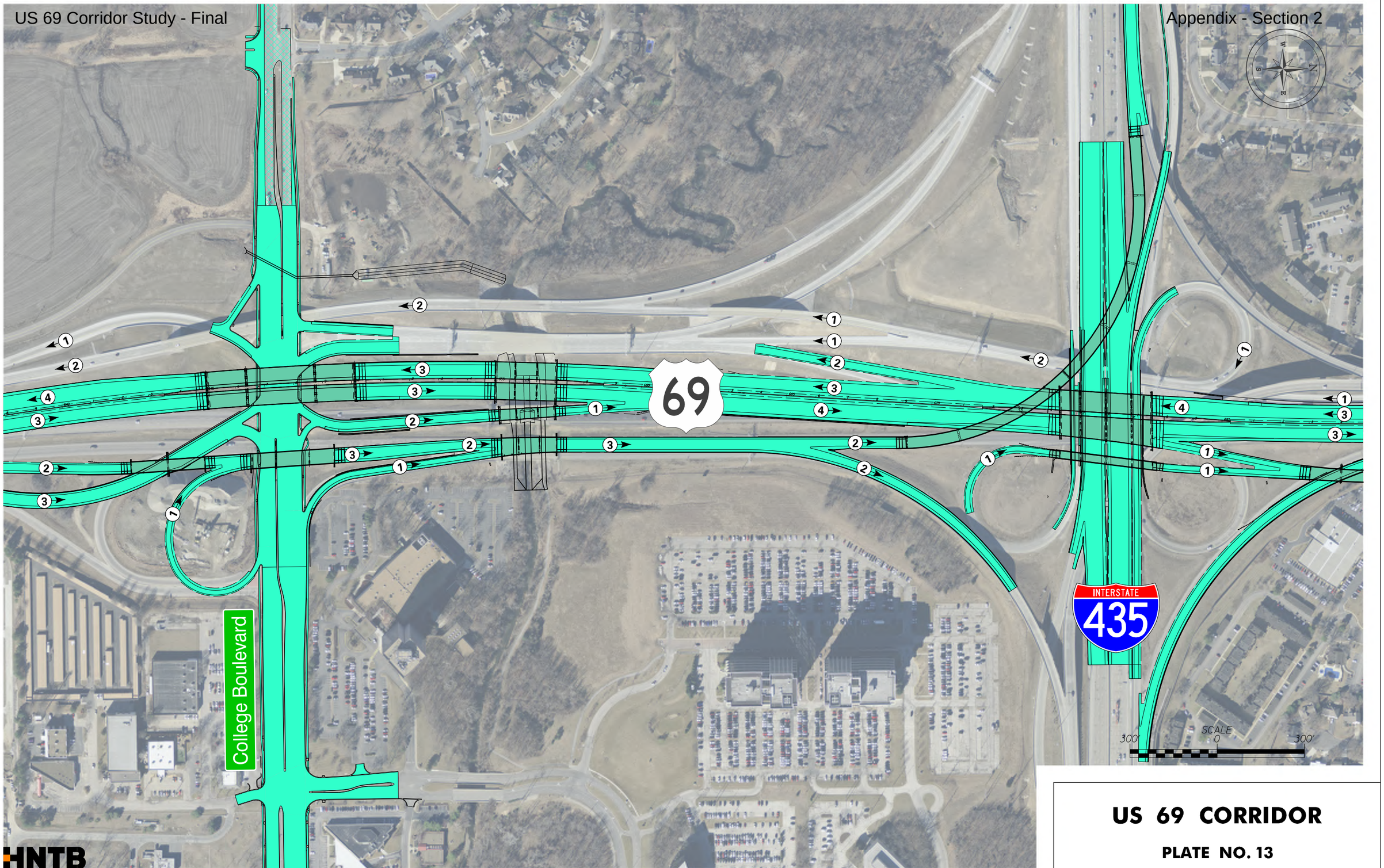

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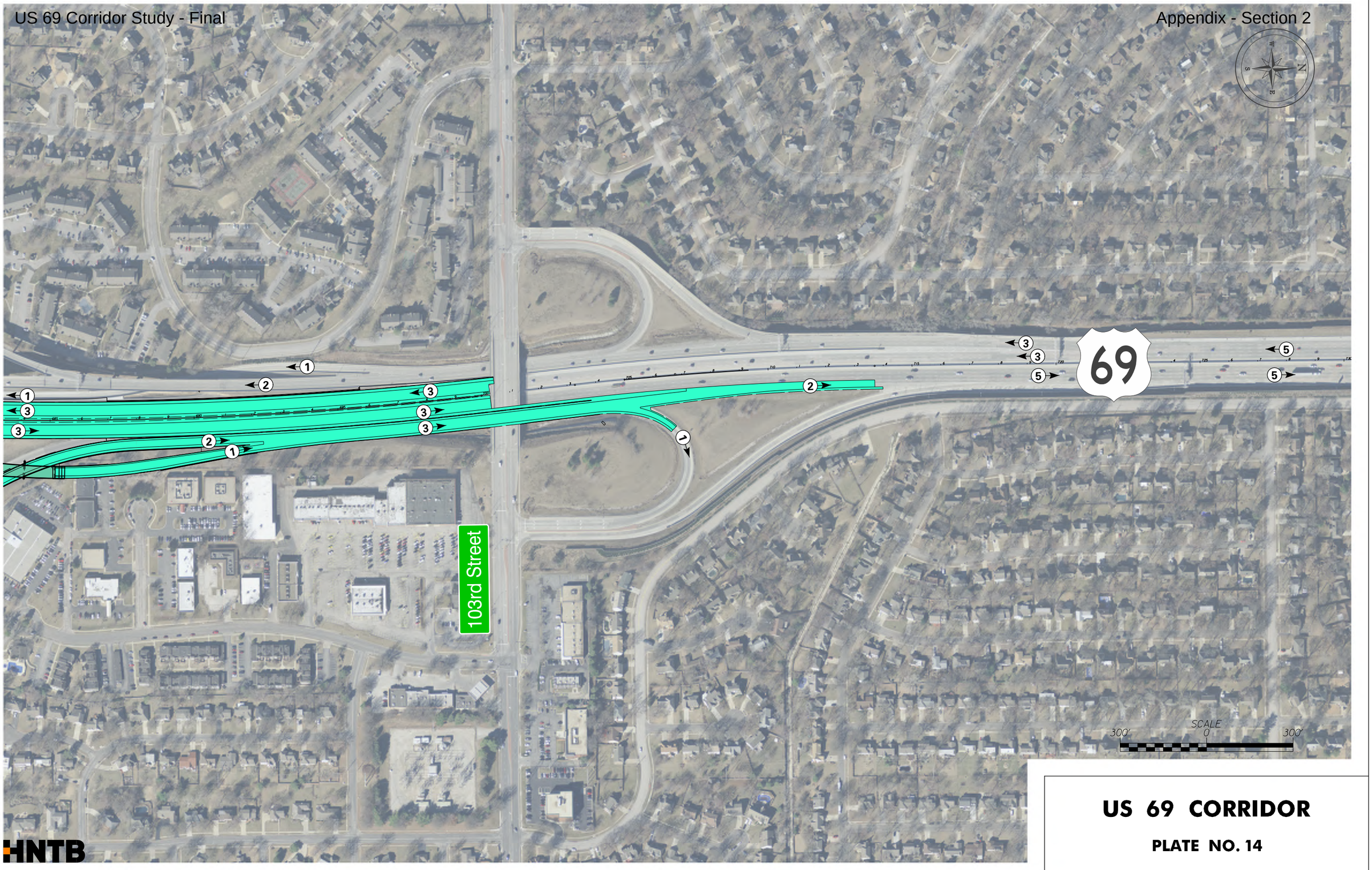
US 69 CORRIDOR

PLATE NO. 13



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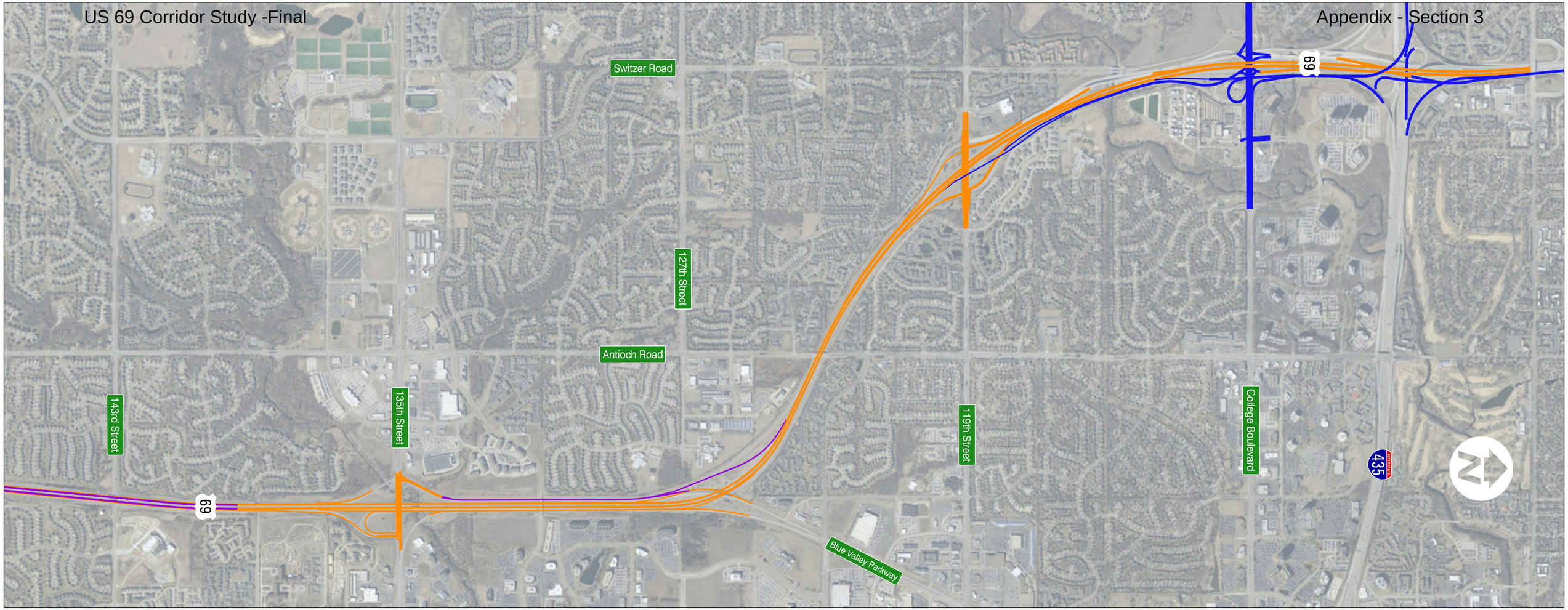
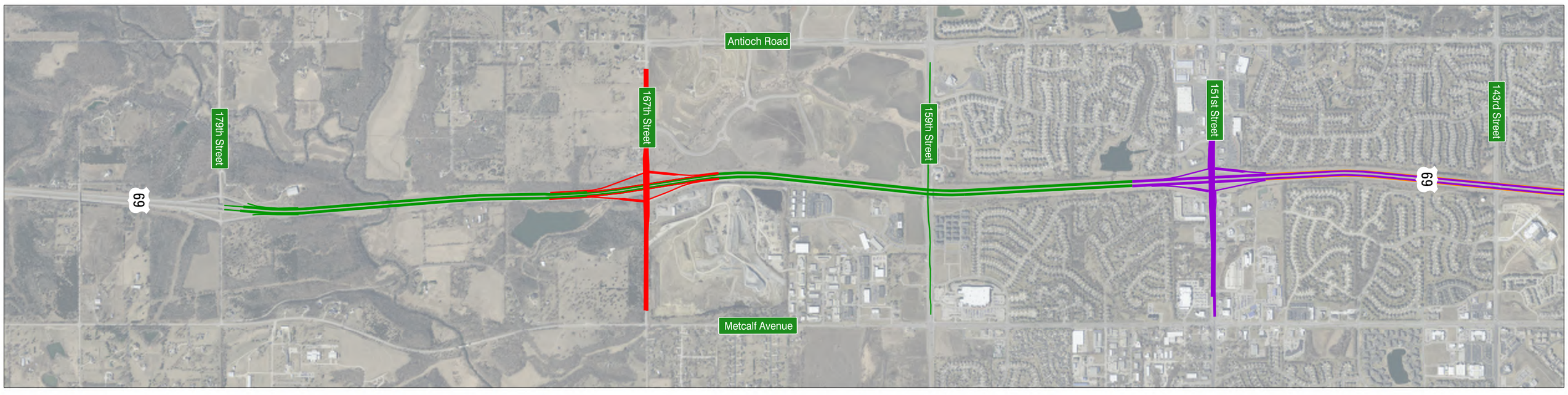
US 69 CORRIDOR

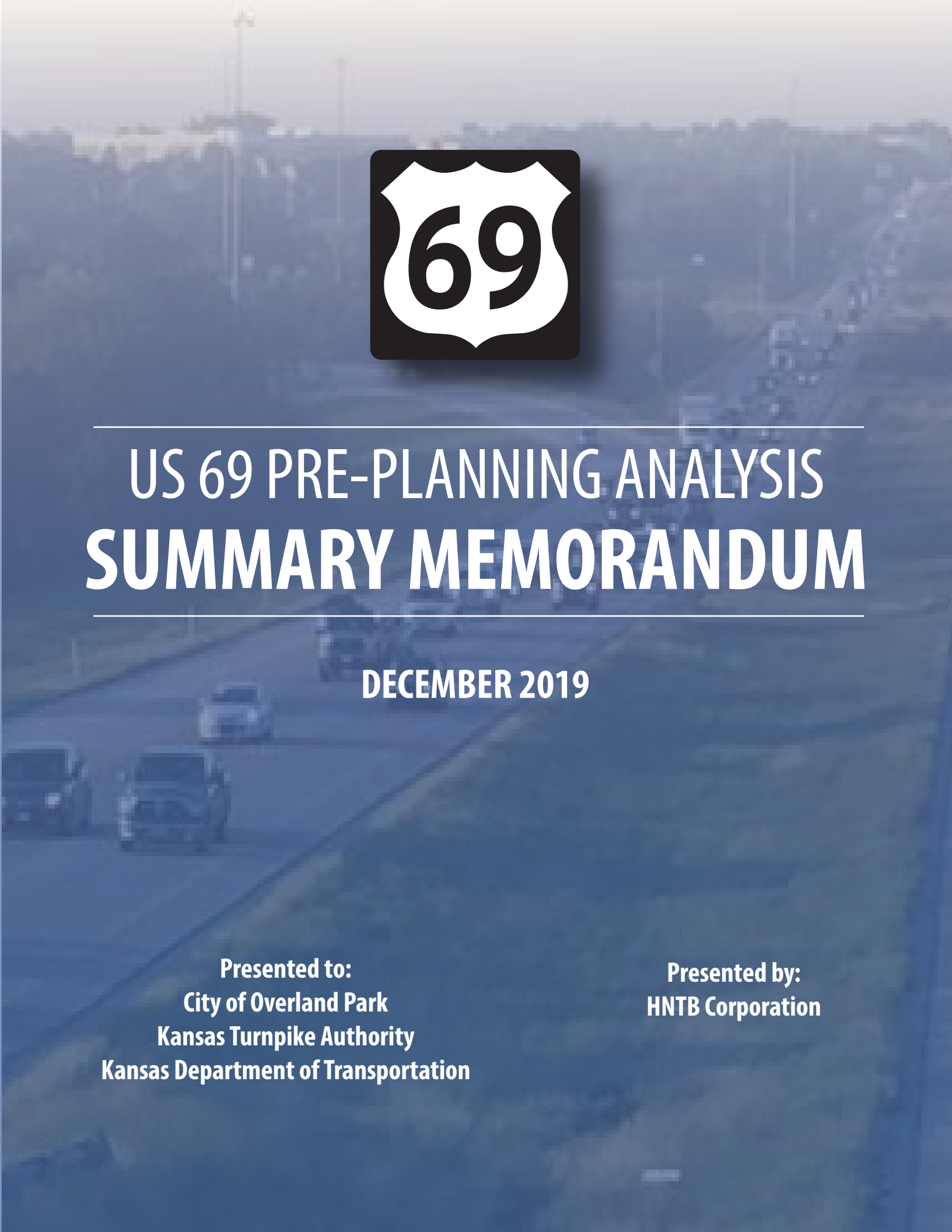
PLATE NO. 14

Appendix

Section 3
Implementation Plan Exhibits


Switzer Road
127th Street
Antioch Road
143rd Street
135th Street
119th Street
College Boulevard
69
435
Blue Valley Parkway


Antioch Road
179th Street
167th Street
159th Street
151st Street
143rd Street
69
Metcalf Avenue



US 69 PRE-PLANNING ANALYSIS
SUMMARY MEMORANDUM

DECEMBER 2019

Presented to:
City of Overland Park
Kansas Turnpike Authority
Kansas Department of Transportation

Presented by:
HNTB Corporation

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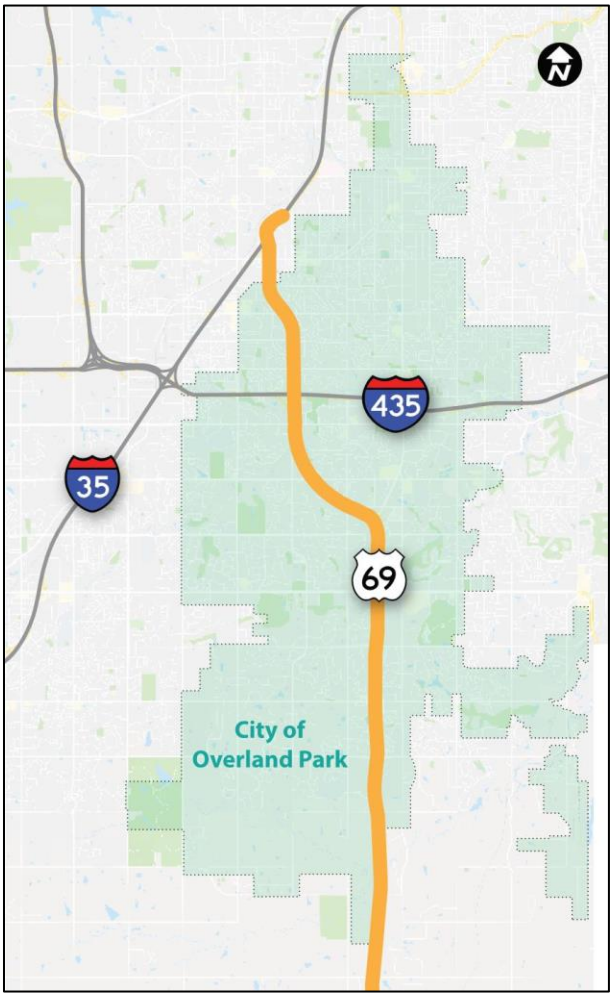
1.0 Introduction

1.1 Purpose

The purpose of this summary memorandum is to document the methodology, analysis, conclusions, and recommendations of the US 69 Pre-Planning Analysis. This analysis conducted by the City of Overland Park is intended to assist the partner agencies of the Kansas Department of Transportation (KDOT) and the Kansas Turnpike Authority (KTA) to answer two primary questions for the US 69 corridor:

- How much gross toll revenue can express toll lanes generate?
- Are the express toll lanes able to support construction, maintenance, and/or operations of the US 69 corridor?

Figure 1: US 69 Corridor

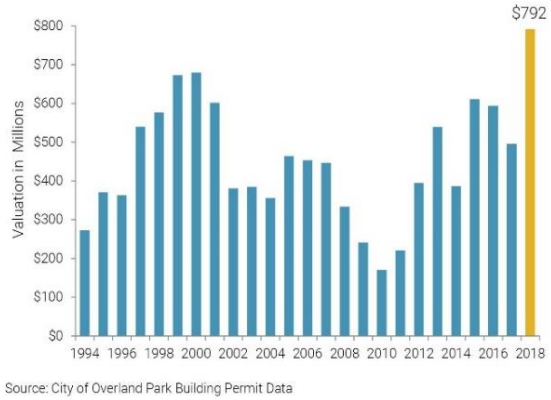


1.2 Background and Previous Studies

US 69 is a vital component of the transportation network in the City of Overland Park, the Kansas City metropolitan area and eastern Kansas. Often referred to as the backbone of Overland Park, US 69 extends through the City between the junction with Interstate 35 (I-35) to the southern city limit. It connects many of the primary east-west arterial streets in the City providing connectivity to major employment centers and residential areas. More than 225,000 people and 10,000 businesses are located within five miles of US 69. Additionally, Overland Park is a growing community. Since 2015, new private development in the City of Overland Park has exceeded $500M per year - with a new all-time high of $792M in 2018.

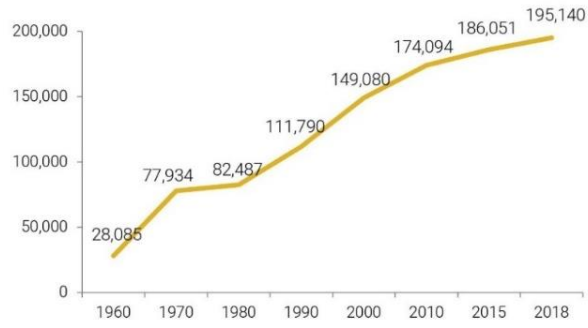
Overland Park also continues to be one of the fastest growing communities in the state of Kansas and the Kansas City metropolitan area. Between 2013 and 2017 Overland Park population grew at a rate of approximately 5.5% per year adding nearly 10,000 new residents.

Figure 2: Overland Park New Construction Annual Valuation (1994-2018)



Source: City of Overland Park Building Permit Data

Figure 3: Overland Park Population Growth (1960 – 2018)



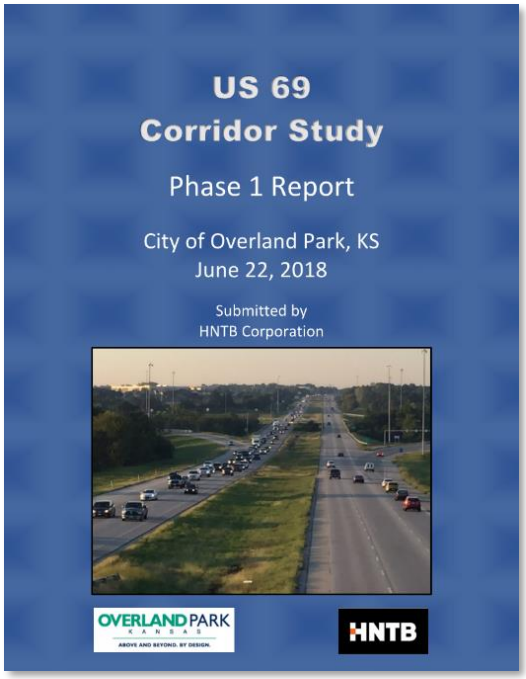
Source: US Census; City of Overland Park Population Estimates (2010-current)

However, the resulting traffic demand generated by ongoing development and increasing population continues to deteriorate operational conditions in the US 69 corridor. In 2016 the City, in coordination with KDOT, initiated the US 69 Corridor Study in order to:

- Understand the existing problems within the corridor from a traffic operations and safety perspective, as well as understand the condition of the existing infrastructure;
- Evaluate the effects of continued traffic growth if no improvements are made in the corridor;
- Revisit and update the improvement concepts last studied as part of the 1999 I-35/US 69 Major Impact Study; and
- Explore various phased implementation strategies for the corridor.

The US 69 Corridor Study, completed in June 2018, recommended the following improvements in the corridor:

- Expand US 69 mainline from two to three through lanes in each direction from 179th St to 103rd St;
- Reconstruct the existing pavement and bridges;
- Construct a braided ramp to eliminate the left entrance of southbound Blue Valley Parkway to southbound US 69;
- Construct C-D roads in segments with high weave volumes;
- Construct auxiliary lanes between interchanges in lower volume segments; and
- Construct various improvements to ramps and arterial streets at the interchanges within the corridor.



However, the Corridor Study did not consider all potential improvement strategies that could be employed, nor did it include all preparatory activities necessary to advance improvements to construction. Rather, the study team recommended the following next steps a part of a future, more comprehensive evaluation:

- Conduct NEPA and a Break-in-Access study;
- More thoroughly evaluate other improvement strategies including multimodal alternatives and non-highway solutions;
- Engage stakeholders and the public in the evaluation of various improvement alternatives;
- Conduct an economic impact analysis to support the need for improvements in the corridor; and
- Evaluate alternatives for funding future improvements.

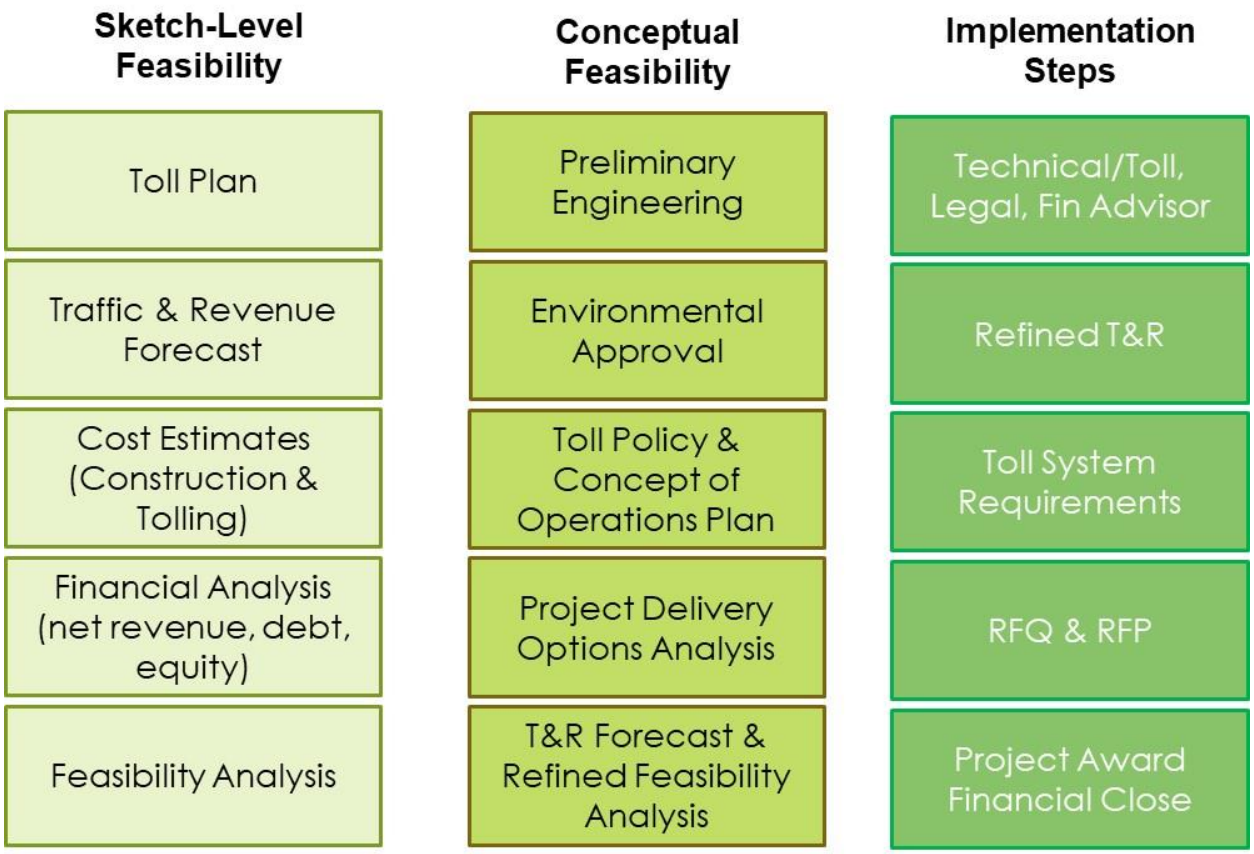
In the 2019 legislative session, the Kansas Legislature passed, and Governor Laura Kelly signed into law, HB2369. HB2369 grants additional authority to KDOT to use tolling on a limited basis. Key components of HB2369 include:

- Authority to use tolling to offset a *portion* of a project's costs for construction, maintenance, and operations;
- Limitations on tolling only new roadways or bridges or *only additional capacity* on existing roadways; and
- Establishes a process for review and approval of any new toll project.

With the additional authority provided to KDOT through HB2369, the City of Overland Park initiated this pre-planning analysis to better understand the range of potential revenue generation from express toll lanes (ETL) on US 69. The results of the pre-planning analysis are discussed in the following pages of this memorandum.

This pre-planning analysis was conducted at a sketch-planning level based on industry best practices for toll traffic and revenue feasibility assessments and is the first of potentially three phases of feasibility analysis. Subsequent levels of feasibility analysis typically include activities shown in **Figure 4**. The pre-planning analysis was not developed at a level necessary to meet investment-grade traffic and revenue and cost requirements in support of actual toll revenue bond financing. Rather, it was developed at a sufficient precision level to provide the City of Overland Park, KTA and KDOT a level of confidence that various tolling scenarios are worthy of further study.

Figure 4: Levels of Toll Feasibility Analysis



2.0 Methodology

The following section discusses the study methodology for the following pre-planning tasks:

Task 1 – Establish Baseline Conditions
Task 2 – Corridor Concepts and Cost Estimates
Task 3 – High-level Financial Analysis
Task 4 – Scenario Evaluation and Screening

2.1 Establish Baseline Conditions

Task 1 activities included a review of the toll-free traffic forecasts developed during the 2018 US 69 Corridor Study and establishment of design criteria for corridor improvements concepts. Additionally, the partner agencies discussed desired objectives with potential express toll lane implementation and developed the following objectives in order of priority:

1. Corridor safety
2. Trip reliability
3. Corridor sustainability

4. Mobility
5. Revenue generation
6. Promotion of transit and/or multi-occupant trips
7. Technology

The remainder of the pre-planning analysis, in particular the traffic and revenue and resulting financial analysis, was guided by the partner agencies' prioritization of trip reliability and mobility above revenue generation.

2.2 Corridor Concepts and Cost Estimates

The conceptual engineering concepts and layouts previously developed for the US 69 Corridor Study served as a starting point for express toll lane concepts. Evaluation of express toll lane concepts was limited and considered two alternative improvement strategies:

- **Alternative 1** - Incorporation of one express toll lane in each direction into the configurations previously developed with the US 69 Corridor Study.

- **Alternative 2** - A reduced-scope, lower-cost alternative for incorporation of one express toll lane in each direction in the corridor while reusing as much existing infrastructure as practical.

For the purpose of this pre-planning analysis, the reduced-scope, Alternative 2, was dismissed by the partner agencies and activities focused on incorporation of express toll lanes into the previously developed improvement concepts. With this direction, two scenarios were developed for Alternative 1, with the subsequent development of cost estimates, traffic and revenue projections, revenue analysis, and financial analysis developed for two scenarios shown in the table below.

Table 1: **Scenarios Evaluated**

Scenario Number	Limits	Type	Comments
1	103rd St to 179th St	Express Toll Lanes	Toll one express lane of capacity from south of 103rd St to 179th St
2	103rd St to 151st St	Express Toll Lanes	Toll one express lane of capacity from south of 103rd St to 151st St

Scenario 1 represents a full-build scenario where the ultimate improvements are constructed from 103rd St to 179th Street. Scenario 2 represents a partial-build scenario within the anticipated limits of an initial construction project from 103rd Street to 151st Street.

2.3 High-level Financial Analysis

Toll-free traffic forecasts developed for the US 69 Corridor Study were used to establish tolled daily traffic projections for a 30-year period. Tolled projections were developed to represent an opening year 2025 and a bonding year of 2055.

Tolled traffic and toll revenue estimates were developed for the two improvement scenarios shown in Table 1. An analytical spreadsheet model was used to develop forecasted volumes of tolled traffic and corresponding gross toll revenue on an annualized basis. The following assumptions were the primary drivers of forecasted tolled traffic and revenue:

- Traffic will be managed to a target Level of Service of C or better in the express toll lane;
- Pricing in the express toll lane will be variable and adjusted to maintain the desired Level of Service;
- Pricing for the express toll lane was calculated using a value of time corresponding to a median household income of $81,000/year (U.S. Census); and
- No high-occupancy vehicle (HOV) or discounted trips.

Using the forecasted 30-year gross revenue stream, estimates of anticipated net revenue were developed accounting for annual costs for toll collection and toll operations, maintenance of the toll systems and express toll lanes, and anticipated replacement costs over the 30-year period. The resulting 30-year net revenue stream was then analyzed to determine proceeds potentially available through toll revenue bonding to finance the initial construction. Projected bond proceeds were developed for both a stand-alone toll project as well as with gross revenue and net revenue system pledges, whereby a shortfall in actual toll revenues is backed by revenue from other sources.

An analytical spreadsheet model was used to develop reasonable ranges of forecasts to represent the likely order-of-magnitude of toll volumes and revenue. A number of traffic and revenue assumptions were reviewed with the partner agencies and then used in the analysis. These assumptions are shown in **Table 2**.

Table 2: Traffic and Revenue Assumptions

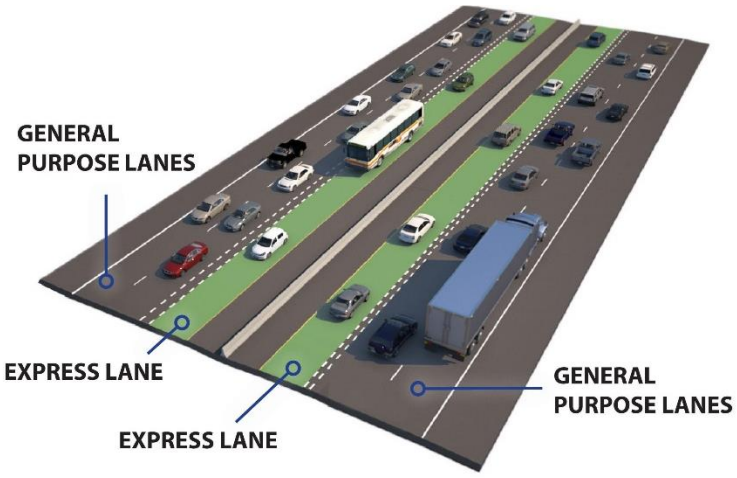
Number of Lanes	One express toll lane in each direction
Permitted Users	Passenger cars, transit vehicles, and emergency responders permitted Commercial trucks and cars with trailers prohibited
Toll-Free/Tolled Usage	All passenger vehicles pay the full toll rate; No discount for HOV Transit and emergency vehicles permitted toll-free
Toll Collection	Tolls collected through electronic toll collection (ETC) only All vehicles must have a K-TAG or similar, interoperable transponder Cash and video license plate tolling not accepted
Maximum Volume in Express Toll Lanes	Traffic managed through variable pricing to target LOS C or better operations in the express toll lane
Toll Rates	$0.30 - $0.40 / mile during peak demand periods $0.00 - $0.10 / mile during off-peak periods

Value of Time	Value of time corresponding to median household income of ~$81,000 (Johnson County, KS). Sources: US Census
Revenue Adjustments	Revenue projections assume uncollected revenue (leakage) of 5%
Annualization Factors	Traffic and revenue annualized using 300 equivalent weekdays

2.4 Scenario Evaluation and Screening

Using the cost estimates and results from the revenue analysis and financial analysis, the two improvement scenarios were compared against each other using a combination of quantitative and qualitative factors. This is summarized in Section 6 of this memorandum. **Figure 5** shows an express lane typical layout.

Figure 5: Express Toll Lane Typical Layout



3.0 Concepts and Cost Estimates

The following section discusses the express toll lane concepts and cost estimates. The concept cost estimate is a significant factor in the toll feasibility analysis.

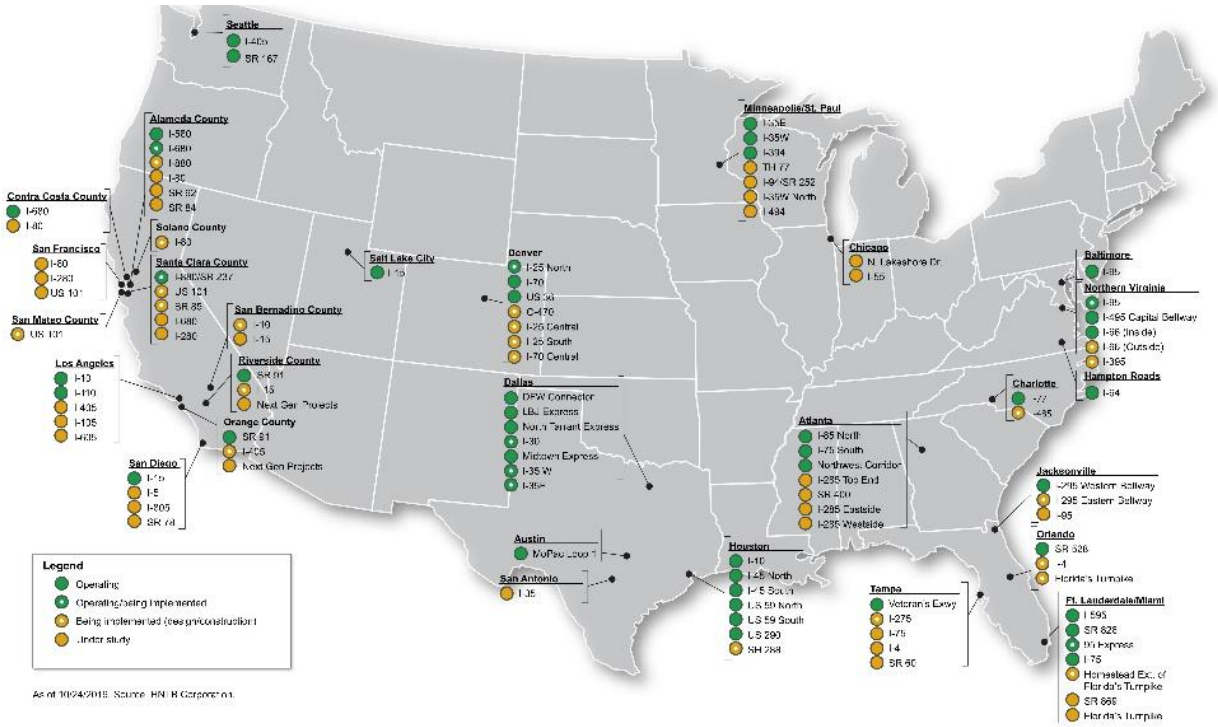
3.1 General Corridor Improvements

As was noted in **Section 1**, the conceptual engineering concepts and layouts previously developed for the US 69 Corridor Study served as a starting point for express toll lane concepts. Concepts developed for this pre-planning analysis maintain these same recommended improvements but with the additional mainline through lanes (one lane each direction) constructed as express toll lanes.

3.2 Express Toll Lane Configuration

The number of operational express toll lanes the United States is growing with more in various stages of study, planning, and project development as shown by **Figure 6**.

Figure 6: Express Toll Lanes Across the United States



Configurations, permitted usage, toll collection method, and pricing structure vary significantly based on the objectives of the operating agency, traffic characteristics, surrounding environment, and other factors. For the purpose of this analysis the partner team was presented with alternative roadway configurations for elements that have the greatest impact on capital cost. Those include:

- Separation type
- Access Type

Separation Type

Separation between the express toll lanes and the general purpose (toll-free) lanes is commonly accomplished in one of three ways:

- Positive separation using concrete safety barrier or another barrier system;
- Delineation with flexible markers; and
- Buffer separation with pavement markings only – no physical barrier.

Examples of each approach are shown in **Figure 7**. Separation using concrete safety barrier is the most expensive approach and has the greatest impact on roadway footprint due to the addition of shoulders on both sides of the barrier. However, because of the physical separation that prevents users from entering or exiting the express toll lanes except where permitted, enforcement and toll collection are simplified.

Delineation with flexible markers is a common solution that is less expensive than hard barrier, has less impact on roadway footprint, and still deters drivers from entering or existing the express toll lanes except where permitted. However, in states where snowfall is common, snow removal operations often damage the flexible markers creating a perpetual maintenance challenge for the operating agency.

Buffer separation is the least expensive alternative and has the least impact on roadway footprint. However, since there is no physical barrier that prevents users from entering or exiting the express toll lanes, enforcement is more difficult and requires a higher level of technology deployment. Uncollected toll revenue, or leakage, is also typically higher with buffer separation only.

For the purposes of this analysis, the partner agencies selected buffer separation as the preferred separation approach.

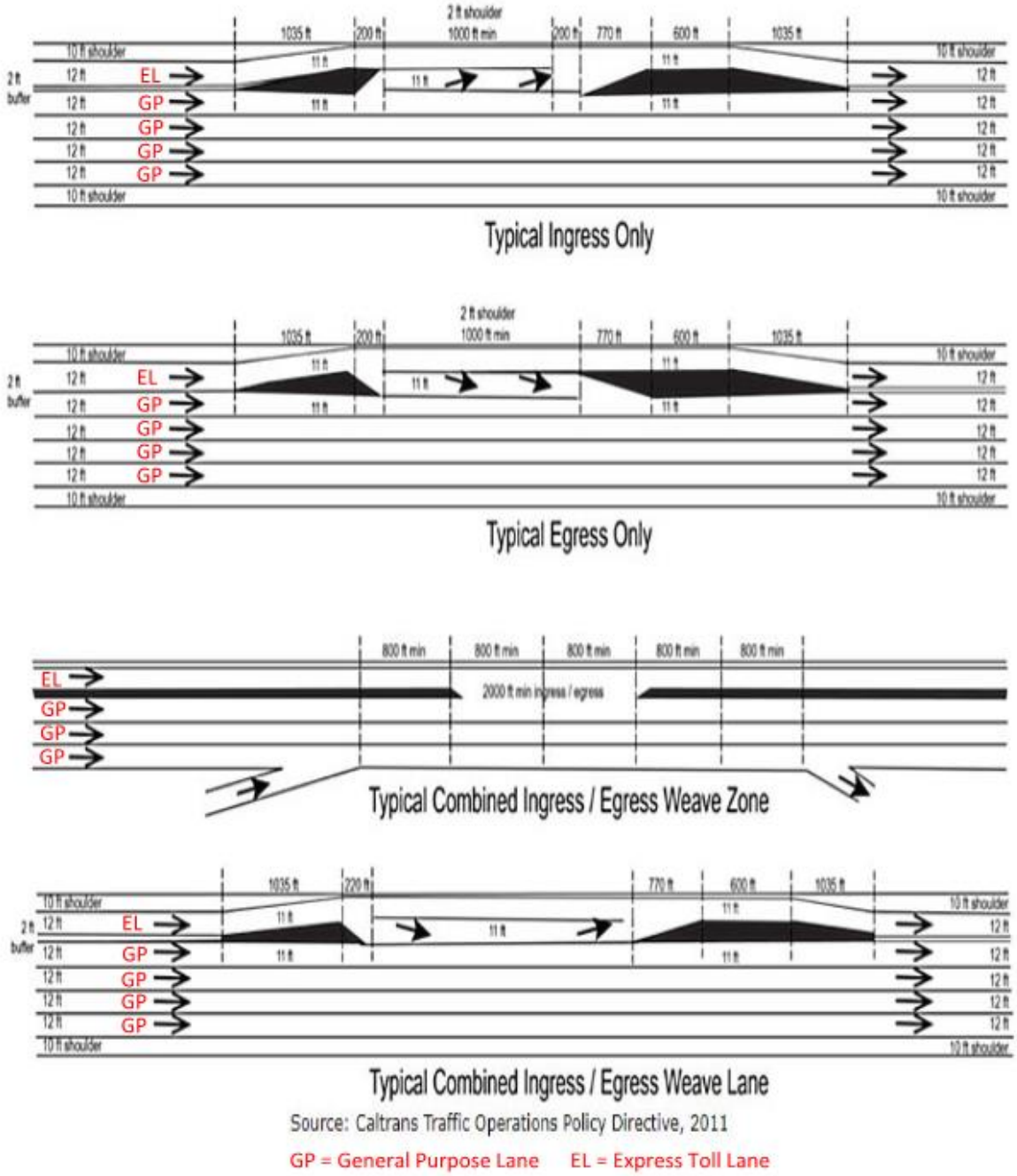
Figure 7: ETL Separation Examples

Access Type

Access strategy can also dramatically impact project cost. Common access approaches include at-grade access where vehicles enter and exit the express toll lanes from the adjacent general-purpose lanes, and grade-separated access with direct connections to and from the express toll lanes. The partner agencies

selected at-grade access as the preferred approach as this the most economical. There are a variety of ways at-grade access can be provided as shown schematically in **Figure 8**.

Figure 8: Typical Express Toll Lane Access Configurations



Source: Caltrans Traffic Operations Policy Directive, 2011

GP = General Purpose Lane EL = Express Toll Lane

Access configurations should be carefully selected based on considerations for safety, operational performance, right-of-way limitations, and cost. The partner agencies selected at-grade weave zone access as the preferred approach for this analysis because it provided the most economical approach and requires the least amount of revision of the previously developed toll-free improvement concepts. Note that no operational analysis or safety analysis of this configuration was performed.

Weave zone locations were evaluated based on the spacing guidance shown in **Figure 8**. Typical distances needed to safely introduce weaving between the express toll lanes and the general-purpose lanes limits locations to corridor segments with interchanges spaced greater than 1.5 miles apart. Below are the anticipated US 69 weave zone locations within the limits of this analysis:

- Between 179th St and 167th St
- Between 151st St and 135th St
- Between Blue Valley Parkway & 119th St
- Between 119th St & I-435 (Northbound Only)

Improvement Scenario 1 includes all weave zone locations listed above. Scenario 2 would not include the weave zone between 179th St and 167th St as this is beyond the southern limit of Scenario 2. Weave zone locations are shown in greater detail in the Appendix for the two improvement scenarios.

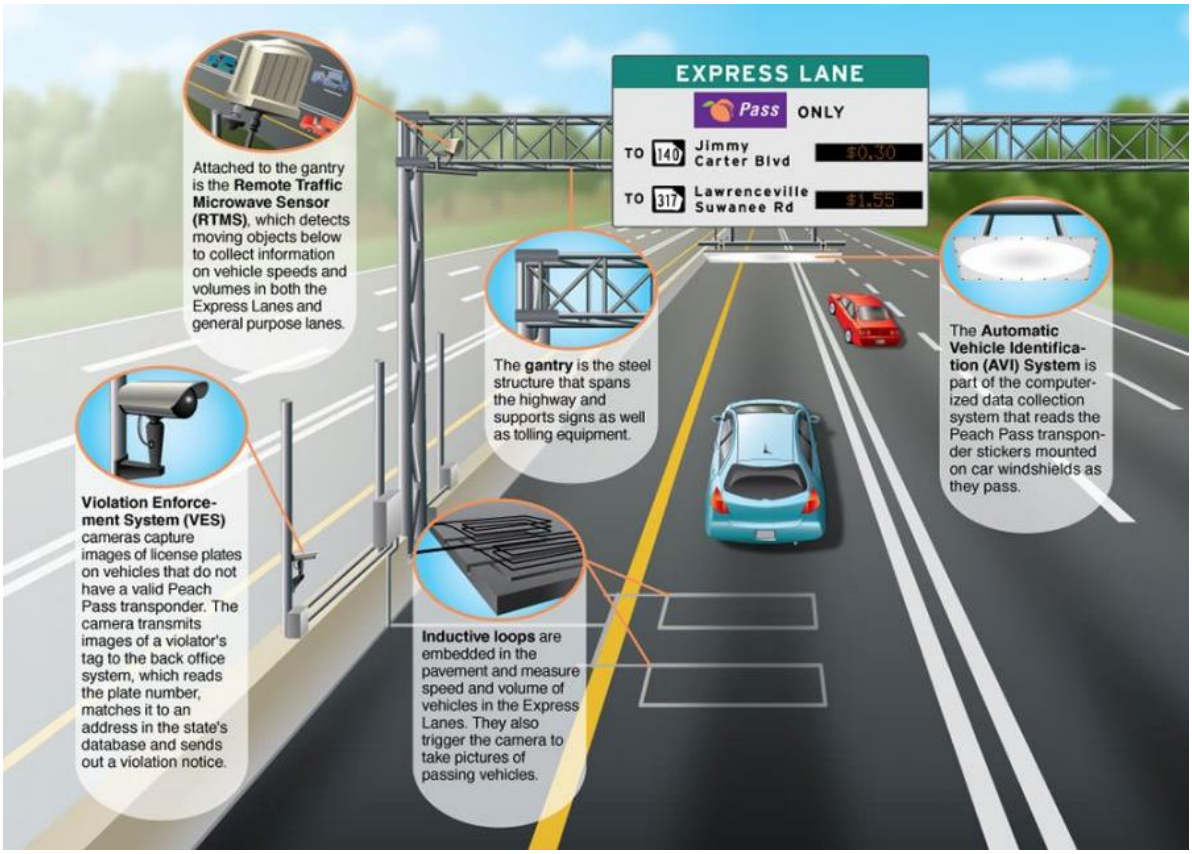
3.3 Roadside Toll Systems & Signing

Express toll lane roadside toll systems typically include the following components:

- Automatic Vehicle Identification Systems (AVI) for reading electronic toll tags, such as KTA's K-TAG;
- Cameras to capture images of vehicle license plates - typically front and rear facing;
- Sensors for detecting vehicle speeds;
- Dynamic signs for communicating pricing;
- Static signs communicating distances to various access points;
- Structures or gantries to support toll equipment and signing;
- Cabinets housing controllers for the roadside equipment; and
- Fiber optic cable.

Figure 9 is an illustrative example from the I-85 Express Lanes in Atlanta, GA and is similar to the configuration anticipated for US 69. The selected access configuration (buffer-separated, at-grade weave zone access) typically requires more frequent spacing of roadside toll equipment in order to deter unwanted movement into and out of the express toll lane. This analysis assumed roadside toll system installations spaced every ½ mile through the segments where ingress/egress is prohibited.

Figure 9: Roadside toll System & Signing Illustrative Example



Source: GDOT, I-85 Express Lanes in Atlanta, GA

3.4 Capital Cost Estimates

Capital cost estimates were developed using the US 69 Corridor Study as a baseline. The partner agencies' decision to maintain the same overall roadway improvement scope as was developed during the US 69 Corridor Study, and decisions relative to express toll lane separation and access, meant that the estimates from the previous study could be used with minor modification.

Capital cost estimates were developed for the two improvement scenarios. Scenario 1 represents a full-build scenario where the ultimate improvements are constructed from 103rd St to 179th St. Scenario 2 represents a partial-build scenario within the anticipated limits of an initial construction project from 103rd St to 151st St. Capital costs for all scenarios were inflated at 2.5% per year to Year 2025 dollars for consistency with estimates developed by KDOT for the 2019 local consult meetings. Improvements included in Scenario 2 are similar in scope to a combination of two projects discussed during 2019 local consult meetings:

- Project ID #809 - $98M
- Project ID # 835 - $228M

Capital cost estimates include contingencies of 35% for the toll systems and for roadway improvements south of 119th St where no design has been completed, and 7% for roadway improvements north of 119th St where some design has been completed. Capital costs for both improvement scenarios under tolled and toll-free conditions are summarized in **Table 3**.

Table 3: Capital Cost Estimates

Item	Toll-Free		Express Toll Lanes	
	Scenario 1 (Full-Build)	Scenario 2 (Partial-Build)	Scenario 1 (Full-Build)	Scenario 2 (Partial-Build)
Roadway Construction (2016 Dollars)	$441,000,000	$208,000,000[1]	$441,000,000	$232,000,000[1]
Inflation	$34,000,000	$16,000,000	$34,000,000	$18,000,000
Roadway Construction (2019 Dollars)	$475,000,000	$224,000,000	$475,000,000	$250,000,000
Toll Systems (2019 Dollars)	$0	$0	$16,000,000	$10,000,000
Total Capital Cost (2019 Dollars)	**$475,000,000**	**$224,000,000**	**$491,000,000**	**$260,000,000**
Inflation	$72,000,000	$34,000,000	$74,000,000	$39,000,000
Total Capital Cost (2025 Dollars)	**$547,000,000**	**$258,000,000**	**$565,000,000**	**$299,000,000**

Source: HNTB preliminary costs.

[1]The original $208M project from the US 69 Corridor Study did not include additional through lanes to 151st St. The tolled project does, thus the additional cost.

3.5 Operations, Maintenance, and Replacement Reserve Costs Estimates

Processing of toll transactions, collection of toll revenues, maintenance and periodic replacement of the roadside toll systems all have costs above those of a toll-free facility. Estimates of these costs over a 30-year period were developed for the two scenarios based on the following assumptions:

- Toll operations, or cost to collect = $0.07/ETC toll tag transaction
- Maintenance of the roadside toll systems = $10,000/year/gantry
- Toll system replacement costs = 75% of the initial capital cost every 10 years

Additionally, it was assumed toll revenues would be used to offset the roadway maintenance and replacement reserve costs for the express toll lanes only. Costs for maintenance and replacement of the toll-free infrastructure would continue to be covered from other KDOT revenues. Costs for roadway maintenance and roadway replacement reserve were developed for the two scenarios based on the following assumptions:

- Roadway maintenance costs
  - Years 1-10 = $6,000/lane-mile/year
  - Years 11+ = $20,000/lane-mile/year

- Roadway replacement reserve costs
  - Years 1-10 = $0/year
  - Years 11+ = variable percentage of initial roadway capital cost ranging from 0.05%/year to 0.75%/year

Cost assumptions listed above are shown in 2025 dollars. A 2%/year cost escalation is incorporated into the 30-year anticipated operations, maintenance, and replacement reserve costs summarized in **Table 4** for the two improvement scenarios.

Table 4: Operation, Maintenance and Replacement Reserve Cost Estimates

Item	Express Toll Lanes	
	Scenario 1 (Full-Build)	Scenario 2 (Partial-Build)
Toll Operations	$133,000,000	$104,000,000
Toll Systems Maintenance	$18,000,000	$11,000,000
Toll Systems Replacement Reserve	$80,000,000	$53,000,000
Roadway Maintenance (express toll lanes only)	$16,000,000	$10,000,000
Roadway Replacement Reserve (express toll lanes only)	$19,000,000	$14,000,000
Total Operations, Maintenance, and Replacement Reserve Costs	**$266,000,000**	**$192,000,000**

Note: HNTB preliminary costs.

4.0 Traffic and Revenue

This section describes the methodology and results of the preliminary traffic and revenue estimates for the proposed US 69 express toll lanes. These traffic and revenue projections along with the corridor program costs are the primary data inputs into the toll feasibility financial analysis. The data and analysis used for the traffic and revenue estimation is preliminary in nature. As such, the estimates included herein are not suitable for use directly in project financing. A more comprehensive data collection and analysis (including additional stated-preference surveys and an independent economic analysis of the region) should be undertaken for this purpose.

The traffic and revenue estimation process included the development of future toll-free traffic estimates, a high-level assessment of toll traffic volumes on the express lanes by time of day, and the estimation of the total toll revenue potential of the US 69 corridor for two different scenarios. The outcome of the traffic and revenue estimation process is an annual traffic and revenue stream from the opening year 2025 to year 2055 for the two scenarios.

4.1 Traffic

Traffic forecasts developed in the 2018 US 69 Corridor Study were used to establish toll-free daily traffic projections for the US 69 corridor between 2025 and 2055. The Corridor Study assumed an average annual global traffic growth rate of 2% per year. Since the Corridor Study was started in 2016, actual traffic growth was reviewed using KDOT daily traffic counts. KDOT's historical AADT (Annual Average Daily Traffic) data was used to produce current traffic growth between the years of 2015 to 2017. Over the two-year period, the average increase in traffic volume was 7,600 vehicles (6.5%), with the highest traffic growth of 15,400 vehicles (10.6%) between College Boulevard and 119th Street, as shown in **Table 5**. The corridor annual average growth rate of 6.5% is well above the 2% average growth rate assumed in the

Corridor Study. The original 2% annual growth rate north of 135th Street and 4.2% annual growth south of 135th Street was maintained for the pre-planning analysis. However, future feasibility analysis should revisit these growth assumptions and, in coordination with Mid-America Regional Council, develop more detailed, non-linear traffic forecasts.

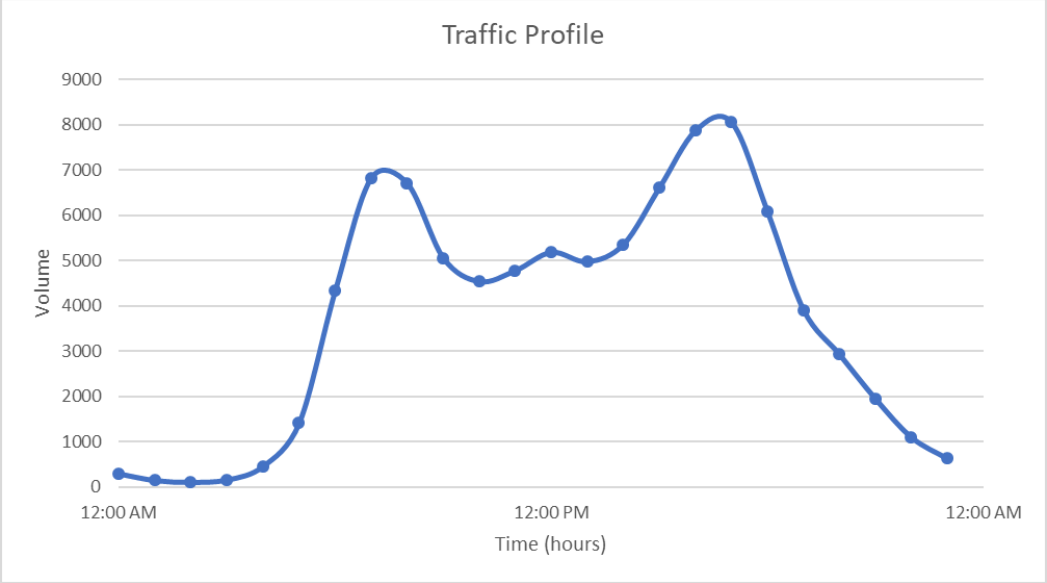
Table 5: US 69 Historical Two-Way Daily Traffic

US 69 Segment	KDOT Calendar Year AADT			Total Two-Year Volume Increase	Annual Average Percent Increase
	2015	2016	2017		
103rd to I-435	80,400	83,100	84,600	4,200	2.5%
I-435 to College	79,800	82,500	84,000	4,200	2.6%
College to 119th	72,900	75,400	88,300	15,400	10.6%
119th to BVP	57,900	59,900	66,400	8,500	7.3%
BVPW to 135th	75,600	78,200	88,300	12,700	8.4%
135th to 151st	53,400	56,700	59,400	6,000	5.6%
151st to 167th	33,600	34,700	40,900	7,300	10.9%
167th to 179th	25,400	26,200	27,700	2,300	4.2%
			Average	**7,600**	**6.5%**

Source: KDOT Historical traffic count.

In order to understand the current US 69 traffic demand and daily traffic profile along US 69, a single 24-hour traffic count was collected in October 2019 between Blue Valley Parkway and 135th Street. The October two-way daily traffic volume was 89,514 vehicles. This is a one-day count but is in line with the KDOT AADT traffic growth projections at this location shown in **Table 5** above. Review of the data indicates that the AM peak hour is 7.7% and the PM peak hour is 9.1% of the total daily volume. These values are indicative of congestion and peak-hour spreading occurring in the corridor.

Figure 10: US 69 2019 Two-Way Daily Traffic Profile between Blue Valley Parkway and 135th Street



Source: October 2019 US 69 traffic count between Blue Valley Parkway and 135th Street.

Table 6 below shows the global traffic demand in the US 69 corridor for future year 2025 and 2040. This future corridor demand was estimated by applying growth rates (based off traffic growth assumptions from the 2018 US 69 Corridor Study, 2% north 135th Street and 4.2% south of 135th Street) to the existing 2016 counts in the Corridor Study. The volumes show the global toll-free demand for the opening year 2025 and future year 2040 for key sections of the US 69 corridor. Beyond 2040, the express lane traffic was extrapolated at 50% of the annual growth rate through 2055. The same global demand estimates were assumed for both Scenario 1 and 2.

Table 6: US 69 Two-Way Daily Toll-Free Traffic Volumes

Segment	2025	2040
103rd St - College Blvd	98,400	116,200
College Blvd - Blue Valley Pkwy	69,600	82,400
Blue Valley Pkwy - 151st St	70,000	92,600
151st St - 179th St	30,000	45,300

Rounded to nearest 100.

4.2 Gross Annual Traffic and Revenue Estimates

Toll traffic and revenue estimates were developed for the two improvement scenarios. First, the share of the corridor global demand that is anticipated to use the proposed express lanes was estimated by time period for each scenario. The average weekday tolled transactions and revenue for each scenario were then annualized by applying an annualization factor of 300 to the average weekday express lanes traffic and revenue estimates. The first two years are expected to have slightly lower revenue due to toll use

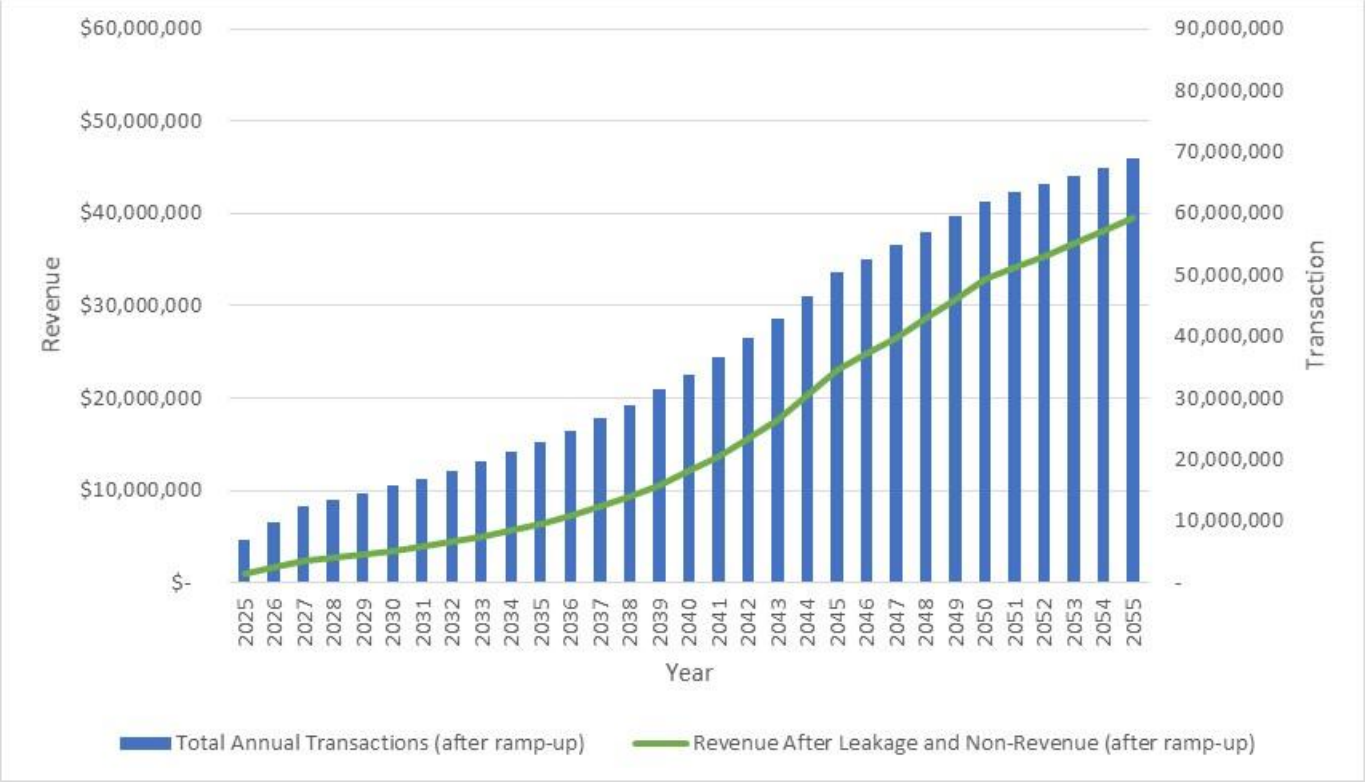
ramp-up, with the subsequent years showing no-ramp up. For every forecast year, a revenue leakage of 5% was assumed. A comprehensive list of other traffic and revenue assumptions was included previously in **Table 2**.

Gross revenue was calculated for the two improvement scenarios based on the traffic forecasts and assumptions described above. The resulting aggregate gross revenues between years 2025 and 2055 are shown below (in nominal dollars):

- Scenario 1 = $504M
- Scenario 2 = $435M

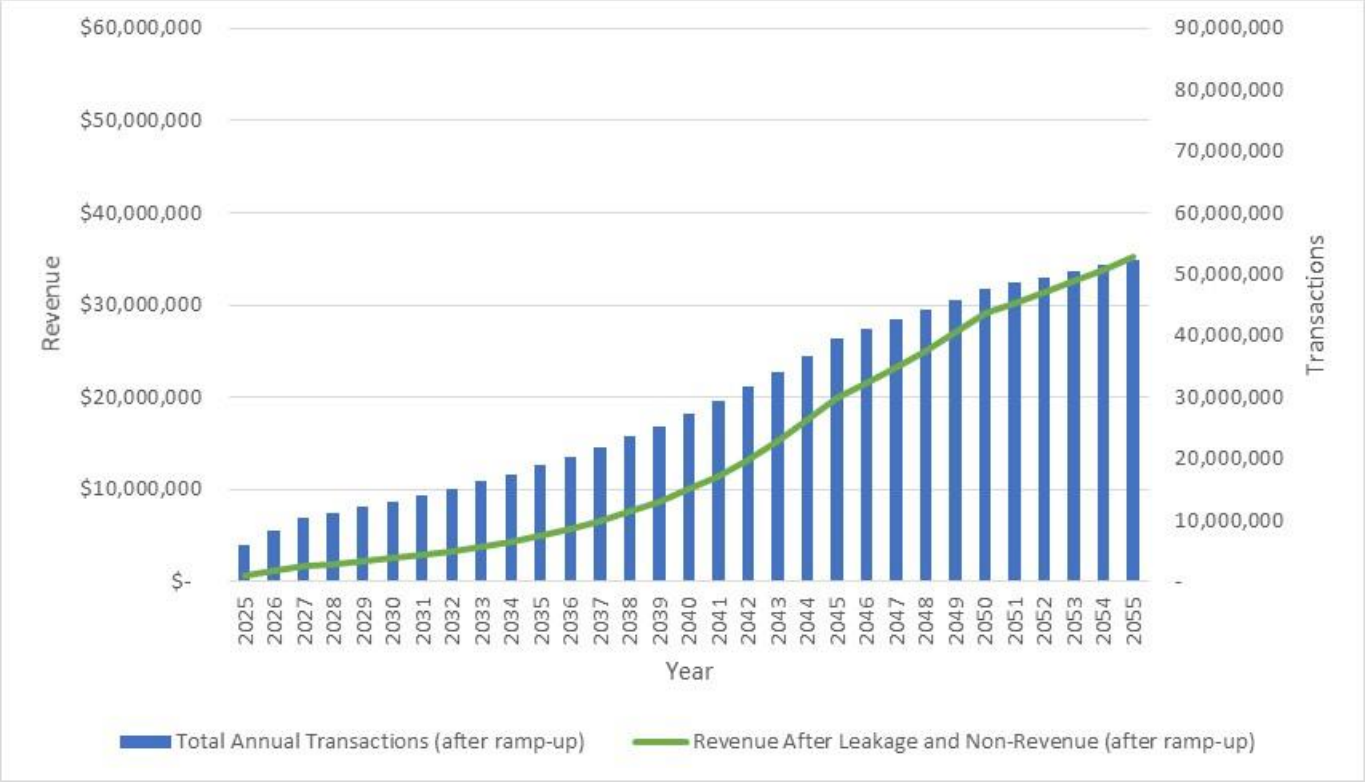
Calculated annual gross revenue and total annual toll transactions are shown in graphically in **Figure 11** for Scenario 1 and **Figure 12** for Scenario 2.

Figure 11: Scenario 1 (Full Build)



Source: HNTB

Figure 12: Scenario 2 (Partial Build)



Source: HNTB

4.3 Net Revenue

As was noted in **Section 3.5**, operating an express toll facility has additional expenses for operations, maintenance, and replacement reserves. Net revenue is the remaining revenue once these additional costs have been covered from the gross toll revenues collected. **Table 7** below summarizes the gross revenue and anticipated net revenues for the two improvement scenarios.

Table 7: Net Revenue Comparison (30-Years, 2025 – 2055, 2025 Dollars)

	Scenario 1 Full Build	Scenario 2 Partial Build
Gross Revenue	**$504M**	**$435M**
Toll Operations	-$133M	-$104M
Toll System Maintenance	-$18M	-$11M
Toll System R&R	-$80M	-$53M
Roadway Maintenance	-$16M	-$10M
Roadway R&R	-$19M	-$14M
Net Revenue	**$238M**	**$243M**

Source: HNTB

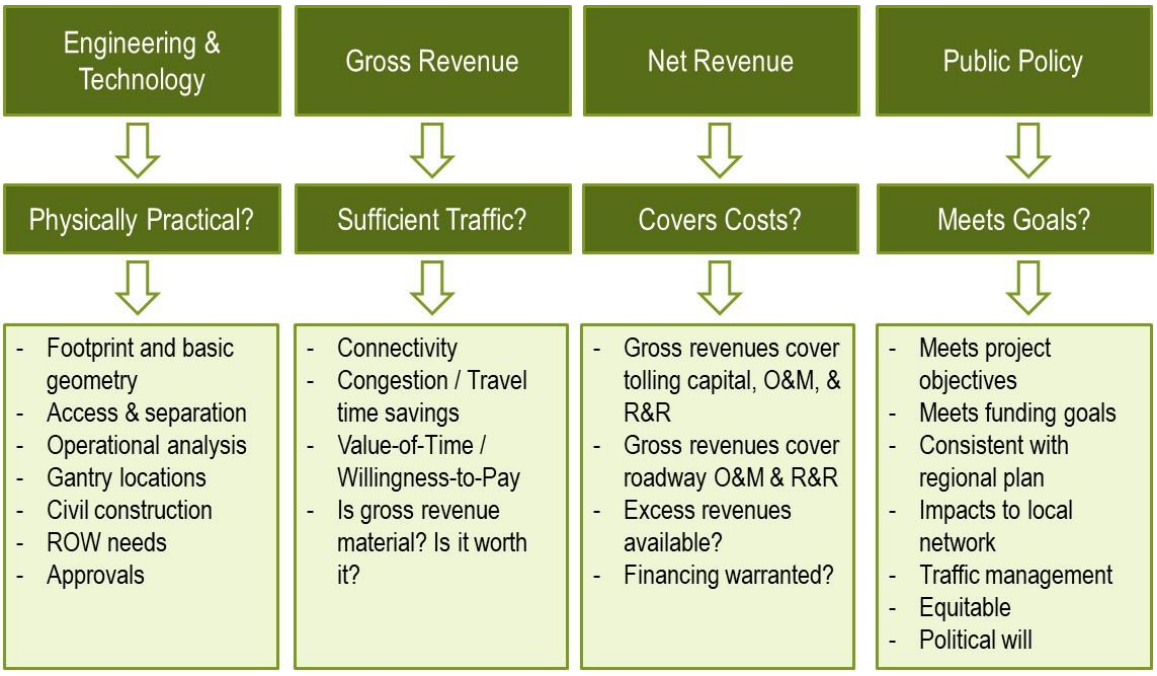
Net revenue calculations in **Table 7** show that both Scenarios 1 and 2 have positive net revenue over the assumed 30-year period and can support ongoing costs for operations, maintenance, and replacement reserves. Scenario 2 produces a slightly higher net revenue despite generating a lower anticipated gross revenue. This can be attributed to two causes:

- The southern limit of Scenario 2 is 151st St and therefore has fewer miles of express toll lanes in operation. This results in lower costs for operations, maintenance, and replacement reserve, as compared to Scenario 1.
- Projected traffic volumes are lower in the segments south of 151St St. Lower volumes result in less congestion, and less incentive for motorists to use the express toll lanes. Therefore, there is less gross revenue produced to offset the costs of operating additional lane miles.

5.0 Financial Feasibility

Financial feasibility is one component in understanding the viability and benefits of a new toll facility (**Figure 13**). Policy objectives and operating decisions directly influence the revenue and cost forecasts for a facility. This section analyzes the upfront financing potential of the forecasted gross and net revenues to provide a preliminary indication of toll revenue bonding proceeds that can offset a portion of a project's capital costs.

Figure 13: Feasibility Components



Source: HNTB

This pre-planning financial feasibility analysis evaluated the scenario's ability to (1) support operations and maintenance (O&M) and lifecycle costs with toll revenue and (2) the level of upfront financing proceeds that each scenario can generate towards capital construction costs. All analysis was conducted at a sketch-planning level and is not intended to represent or recommend a toll financing plan, but rather to identify whether one or more scenarios warrant more detailed toll feasibility analysis and further refinement in future studies.

HNTB used an in-house proprietary financial model to evaluate various debt instruments and structuring options. The model is designed to evaluate preliminary feasibility by structuring debt against a net revenue stream. As an outcome, Scenario 1 does not generate enough net revenues in the early years to support a toll revenue financing. Only Scenario 2 generates positive and more stable annual cash flows to sufficiently support annual roadway and tolling O&M costs, periodic replacement and reserve (R&R) needs in all years and can partially contribute to toll financings for the upfront capital costs.

Two revenue pledge scenarios were evaluated for Scenario 2:

- Net Revenue Pledge: this revenue pledge assumes the project supports its own O&M and R&R costs before repaying its debt service obligations.
- Gross Revenue Pledge: this revenue pledge provides more upfront bonding capacity because it assumes the project repays its debt service obligations first before supporting O&M and R&R costs. A third party is required to pay for or "back-stop" O&M and R&R costs if toll revenues are insufficient to cover all annual obligations.

Two types of debt instruments commonly used for toll projects were analyzed: current interest bonds (CIBs) and Capital Appreciation Bonds (CABs). CIBs interest is paid semi-annually and can be capitalized

during construction. CABs, or zero-coupon bonds, accrete the interest and pay it upon maturity of the bonds. CABs are commonly used to maximize the amount of debt that can be issued for a greenfield project since revenues are constrained during the ramp-up phase but grow over time.

Financing assumptions for debt instruments consider the current market conditions and a conservative, stressed interest rate environment to allow for upward interest rate movement. Debt service coverage ratio (ratio of annual net or gross revenue to the annual debt service) is the primary metric used to measure the amount of debt a project can support. **Table 8** provides a summary of financing structures and assumptions, interest rates and financial metrics.

Table 8: Financing Scenario Assumptions

Item	Assumption
Traditional Toll Debt	35-year CIBs & CABs; Capitalized Interest, Reserve Funds, Costs of Issuance
Toll Bond Rate	Current Market: 4.0 %; Conservative Market: 5.0%
Coverage	1.75x – 2.25x
Range of Financing Results	Lower bound reflects conservative market rates and conservative 2.25x coverage Upper bound reflects current (attractive) market rates at 1.75x coverage (optimistic)

Under the net revenue pledge scenario, Scenario 2 net revenues can support between $22 and $36 million of financing through CABs issuances, supporting between 21% and 34% of upfront capital costs. Additional funding will be required to support remaining construction costs. While the results illustrate that tolling can cover all roadway and tolling O&M and lifecycle costs and contribute to some of the capital costs, a small toll financing with all CABs is likely not marketable in the capital markets. Investors might not be attracted due to the size of the transaction.

Under the gross revenue pledge scenario, Scenario 2 can support significantly more debt, with up to $72 million in proceeds from combined CIBs and CABs issuances. The gross revenue pledge scenario indicates that the project can support about 42% - 68% of capital costs, depending on market rates and selected debt instruments. With the gross pledge, the larger pledge of gross toll revenues produces more toll financing proceeds, but a public entity would be responsible for back-stopping all O&M and R&R costs if toll revenues are insufficient to fund them. While the results illustrate that tolling can provide upfront capital costs, a small toll financing with a considerable share of CABs might not be marketable in the capital markets. In addition, it is projected that the gross revenue pledge will require $12-$19 million of R&R subsidy in the first 15 years.

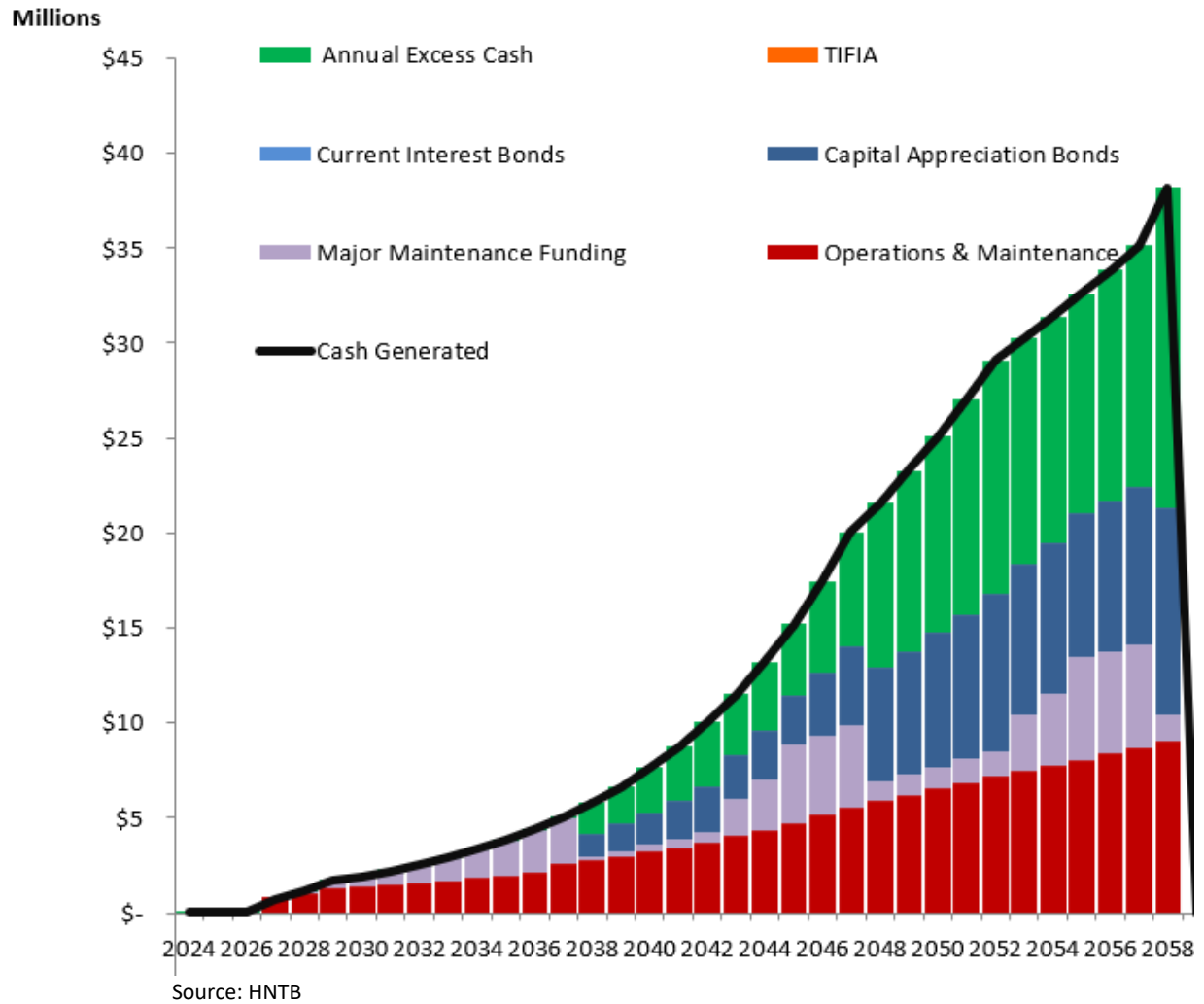
Table 9 shows financial feasibility results and **Figures 14** and **15** show the annual net revenue components of Scenario 2.

Table 9: Financial Feasibility Results

	Net Revenue Pledge	Gross Revenue Pledge
Debt Instrument	CABs	CIBs and CABs
Capital Cost	$106M	$106M
Bond Proceeds	$22M - $36M	$44M - $72M
Gap Funding	$70M - $84M	$34M - $62M
Financial Feasibility	20% - 35%	40% - 65%
Findings	• Small toll financing with all CABs is likely not marketable • Size of transaction not likely to attract investors	• Small toll financing with considerable CABs might not be marketable • Requires $12-$19 million of R&R subsidy in the first 15 years

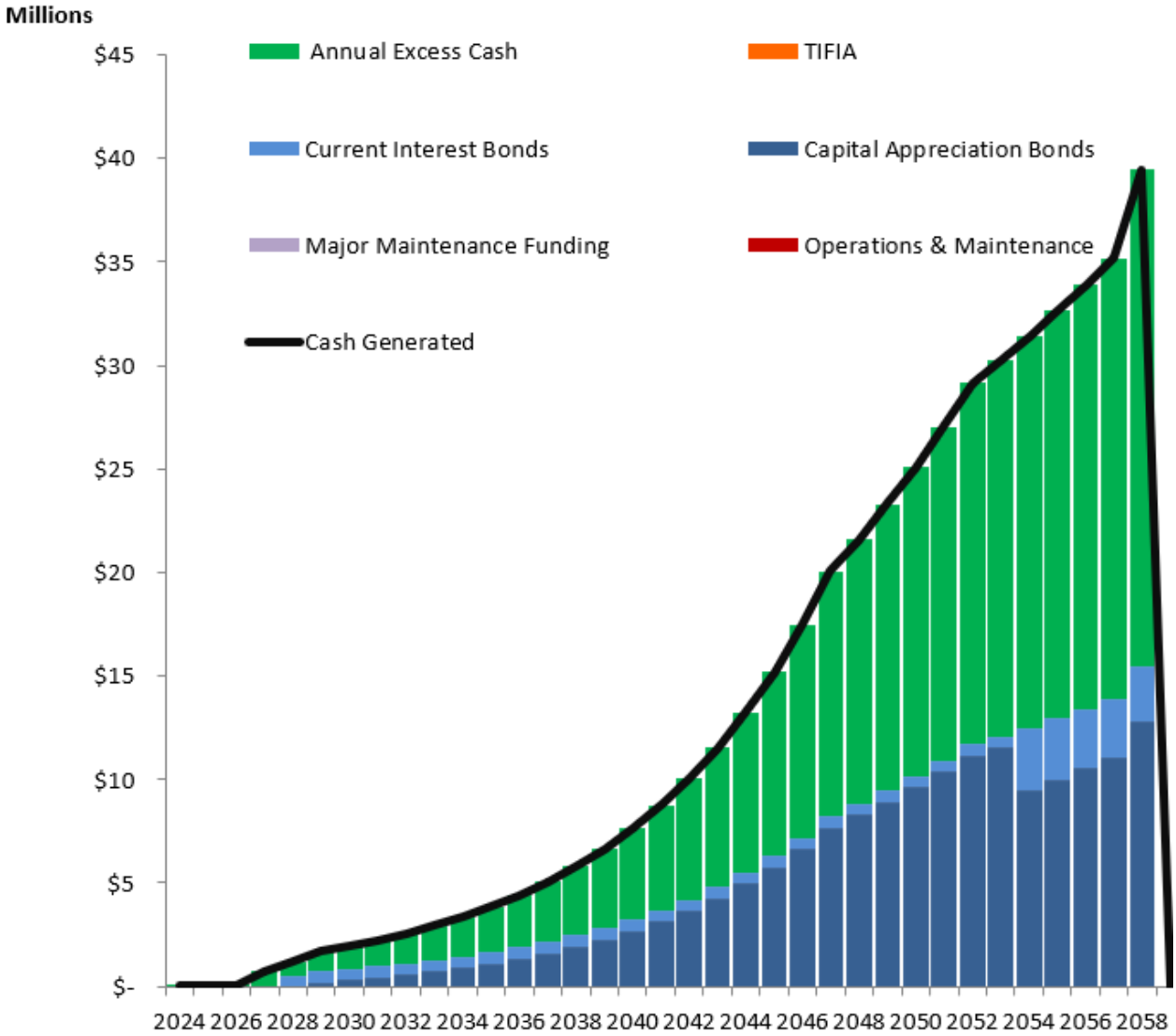
Notes and Disclaimers. All nominal dollars. Financing proceeds presented as a range for each scenario (conservative and current market). Illustrative results intended to provide preliminary planning-level feasibility indication. Results do not represent or recommend a financing structure.

Figure 14: Net Revenue Pledge



Source: HNTB

Figure 15: Gross Revenue Pledge



Source: HNTB

6.0 Scenario Evaluation and Screening

Using the results from the gross and net revenue analysis and the financial analysis, the two improvement scenarios were evaluated using a combination of quantitative and qualitative factors. Factors include cost, net revenue potential, financial feasibility, mobility benefits, and safety benefits. For the purpose of this comparison all costs were adjusted to 2025 dollars and the net revenue potential aggregated for the first 30 years of operation. **Table 10** below summarizes the two scenarios against these factors.

Table 10: Scenario Evaluation

Evaluation Factors	Scenario 1 Full Build	Scenario 2 Partial Build
Capital Costs (2025 Dollars)		
All Improvements	$565 M	$299 M
Toll Lanes and Systems Only	$152 M	$106 M
30-Year Toll Revenue		
Gross Revenue	$504 M	$435 M
Net Revenue	$238 M	$243 M
Financial Feasibility*		
Net Revenue Pledge	N/A	20% - 35%
Gross Revenue Pledge	N/A	40% - 65%
Qualitative Factors		
Mobility Benefit	++++	+++
Safety Benefit	++++	+++

Note: Feasibility shown is a percentage of the $106M capital cost for the toll lanes and toll systems only.
Source: HNTB

7.0 Conclusions

The pre-planning analysis was conducted at a sketch-planning level based on industry toll traffic and revenue feasibility assessment best practices and is the first of potentially three phases of feasibility analysis. The pre-planning analysis was intended to assist the partner agencies with answers to two primary questions:

- **How much gross toll revenue can express toll lanes generate?**
  - The US 69 corridor express toll lanes can generate approximately $504M (Scenario 1) and $435M (Scenario 2) gross toll revenue between 2025 and 2055.

- **Are the express toll lanes able to support construction, maintenance, and/or operations of the US 69 corridor?**
  - Yes, express toll lanes are able to support toll system and roadway operations, maintenance and recovery. In addition, Scenario 2 is able to pay for a portion of the project's capital costs with toll revenue bond financing.

Results from this pre-planning analysis yield the following conclusions:

1. Express toll lanes are feasible from an engineering perspective and can be incorporated into safety, geometric and capacity improvements in the US 69 Corridor. However, since no operational analysis was performed, the mobility and trip reliability benefits of the express toll lanes cannot be quantified from this pre-planning analysis. Additionally, this analysis did not include a comprehensive evaluation or value engineering of improvement concepts. Further evaluation by the study team may determine that overall mobility and trip reliability objectives can be achieved through the incorporation of express toll lanes in coordination with a reduction in overall project scope as compared to what was evaluated during the prior US 69 Corridor Study.

2. Both Scenarios 1 and 2 are net revenue positive and likely can fully support ongoing operations, maintenance, and replacement reserve costs for the express lanes from toll revenues.

3. Scenario 2 has higher anticipated net revenues for the reasons discussed in section 4.3. When considering the significantly lower capital costs, Scenario 2 is a more viable initial express toll lane project.

4. While net revenues are positive over a 30-year period, net revenues in the first 10 years are low with the assumptions made. This significantly limits the feasibility of financing through toll revenue bonding.

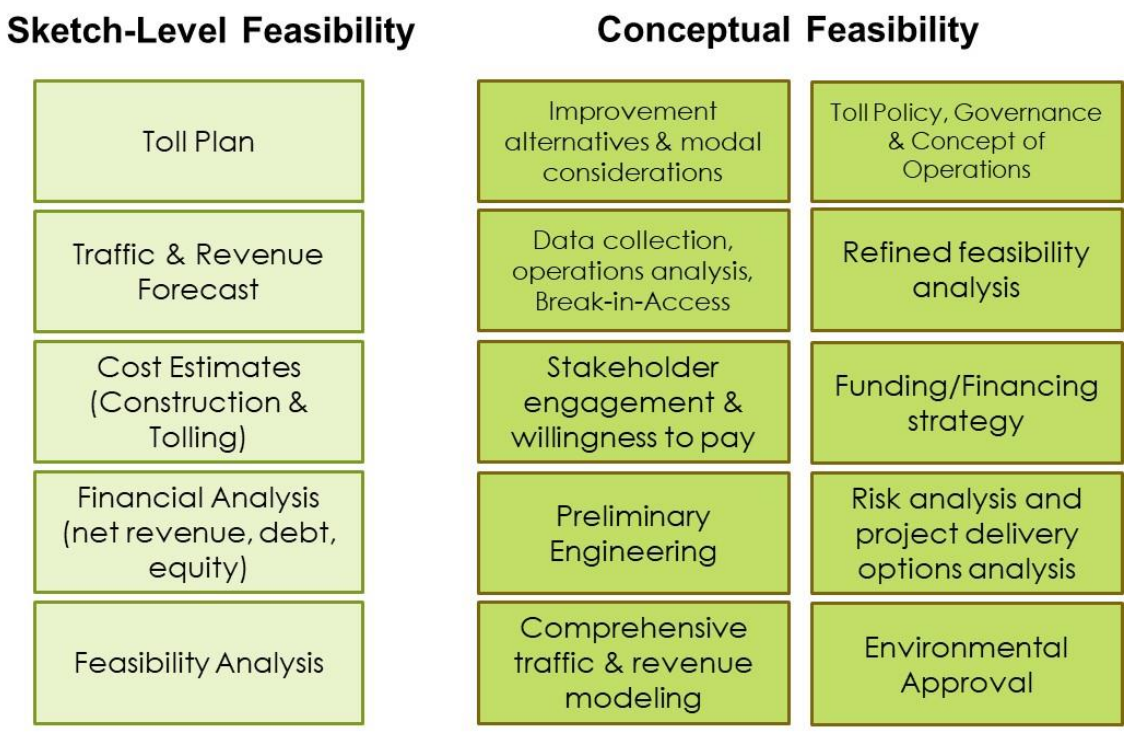
5. Several factors indicate that the overall financial results are not as favorable as what may result from more detailed traffic and revenue analysis. These factors include:

    a. Traffic growth in the corridor is currently growing faster than the 2% and 4% linear projection used in this analysis. Development of a non-linear traffic forecast, consistent with the observed recent growth, will likely result in higher revenues in the first 10 years of operation as well as throughout the 30-year outlook of the project.

    b. Pricing in the express toll lanes was based on a simplified value of time calculation rather than on traveler preference surveys or engagement with likely users on their wiliness to pay. The partner agencies anticipate the willingness to pay to be higher than the $0.30-$0.40 per mile rates used in the revenue calculations.

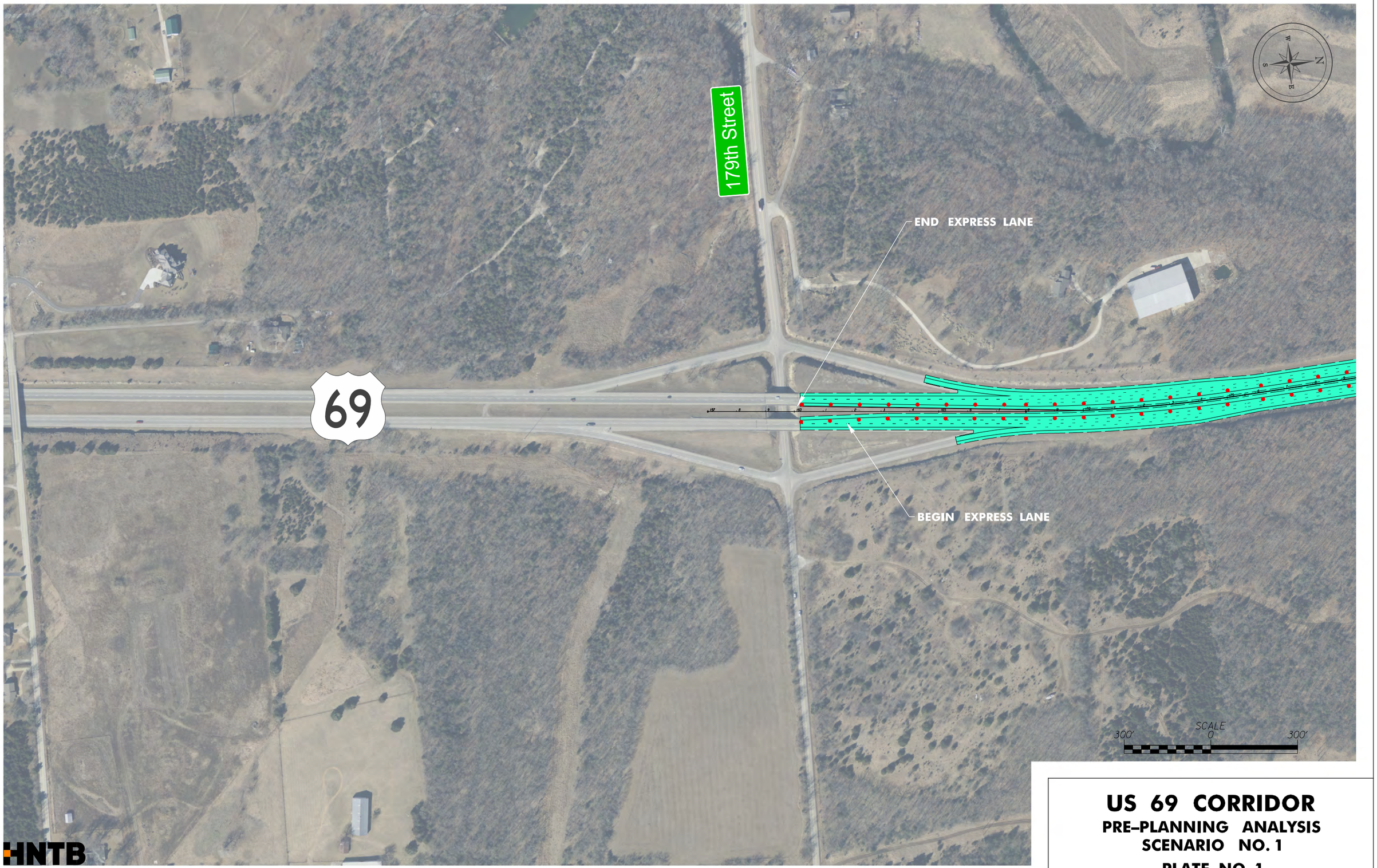
In summary, the pre-planning analysis was performed at a sketch-planning level and intended to inform the partner agencies in future decision-making. The initial results are positive and warrant additional study through all or part of the activities shown below under “Conceptual Feasibility” which represents the next step in the toll feasibility process.

Figure 16: Sketch-Level and Conceptual Feasibility



Appendix

- Plan Plates – Scenario 1
- Plan Plates – Scenario 2



HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

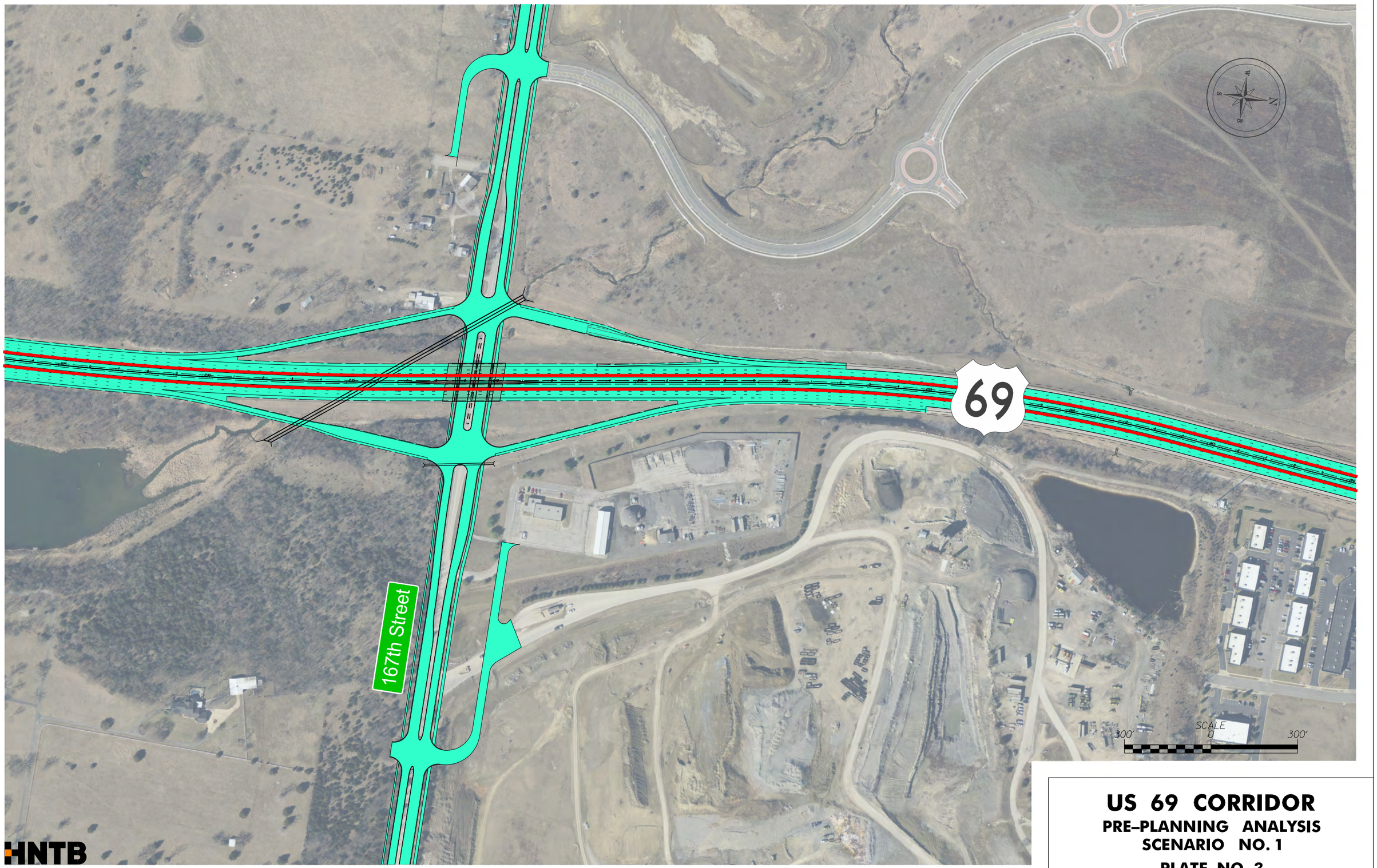
PLATE NO. 1

HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 2



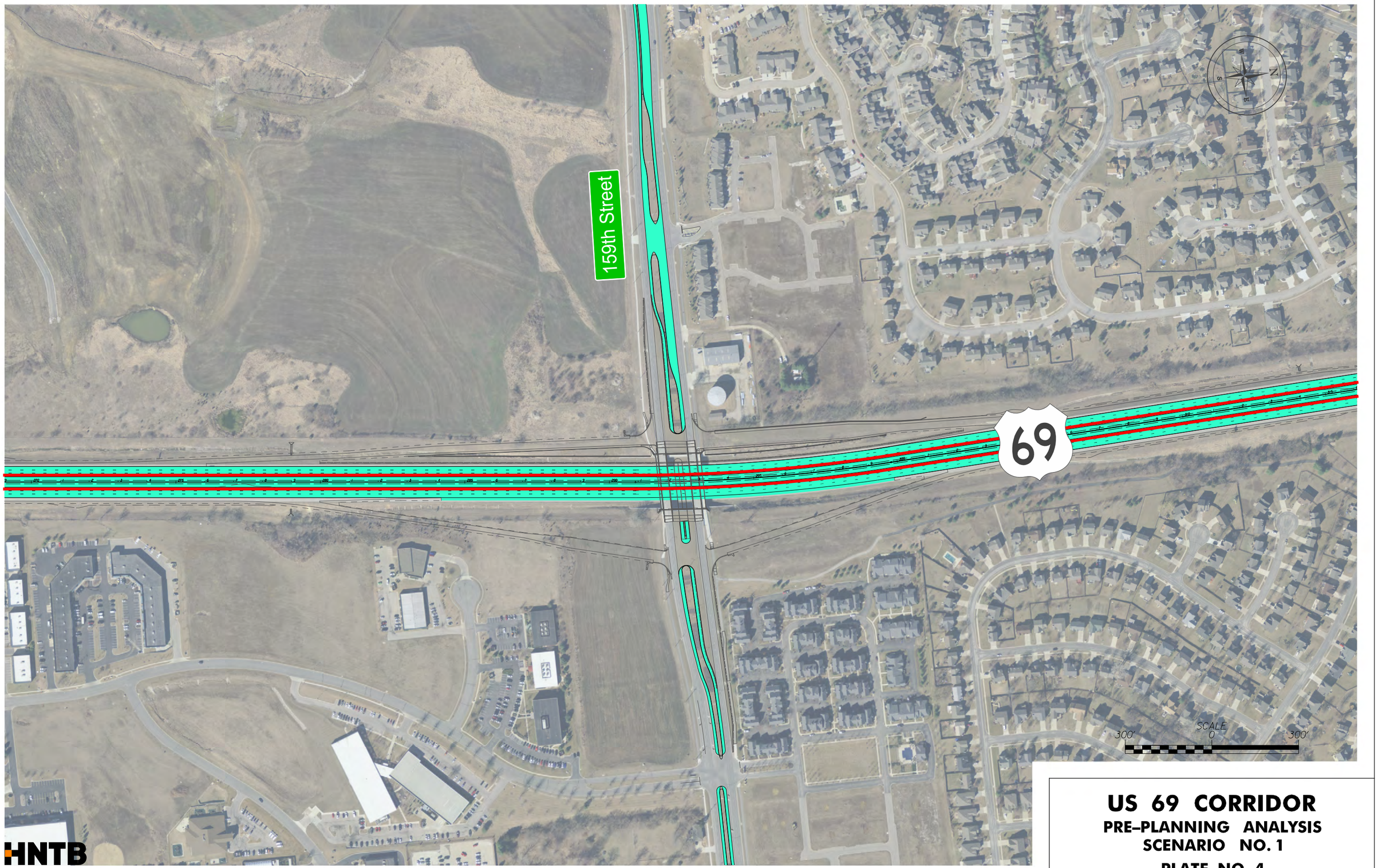
HNTB

US 69 CORRIDOR

PRE-PLANNING ANALYSIS

SCENARIO NO. 1

PLATE NO. 3



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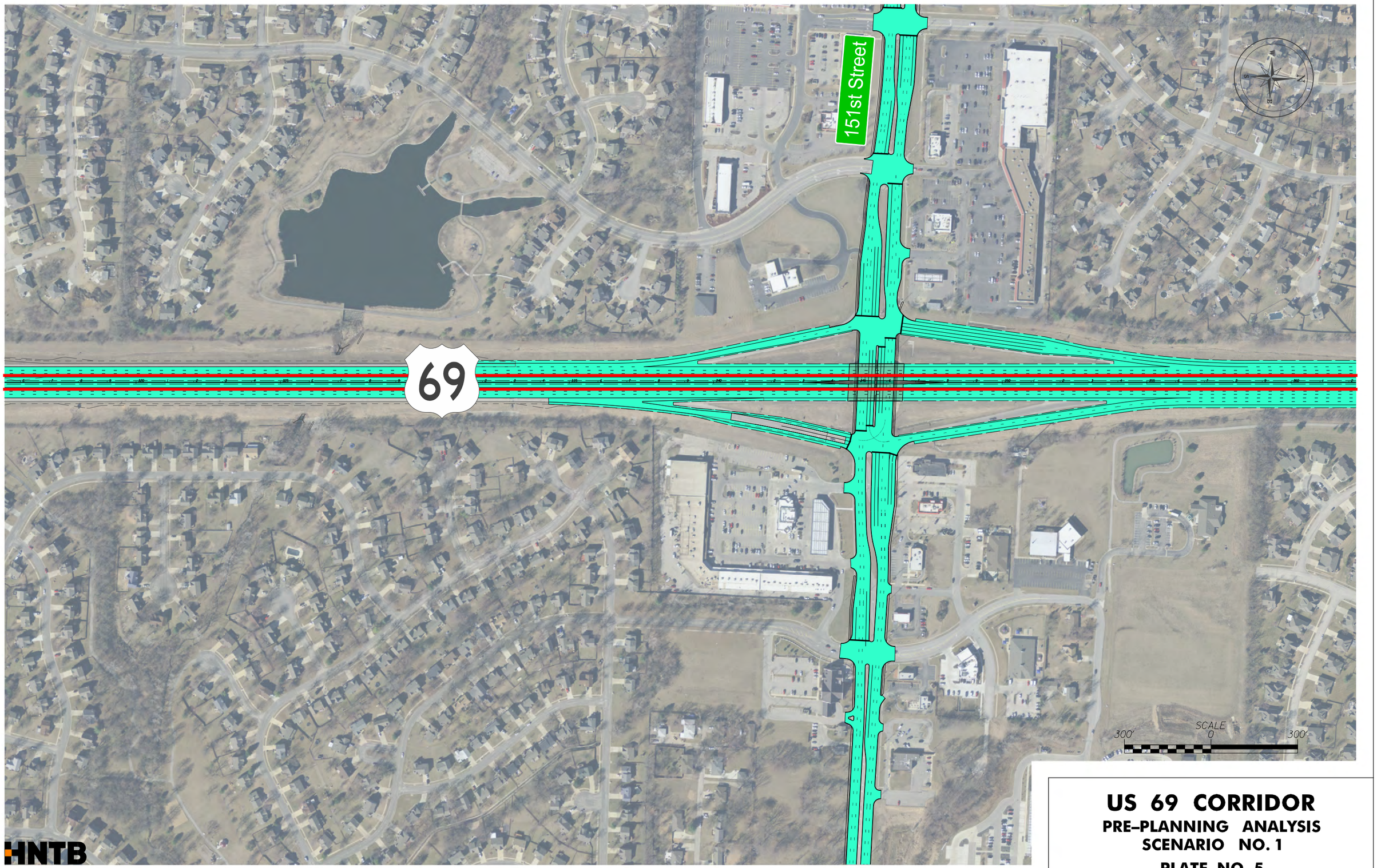
US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 4



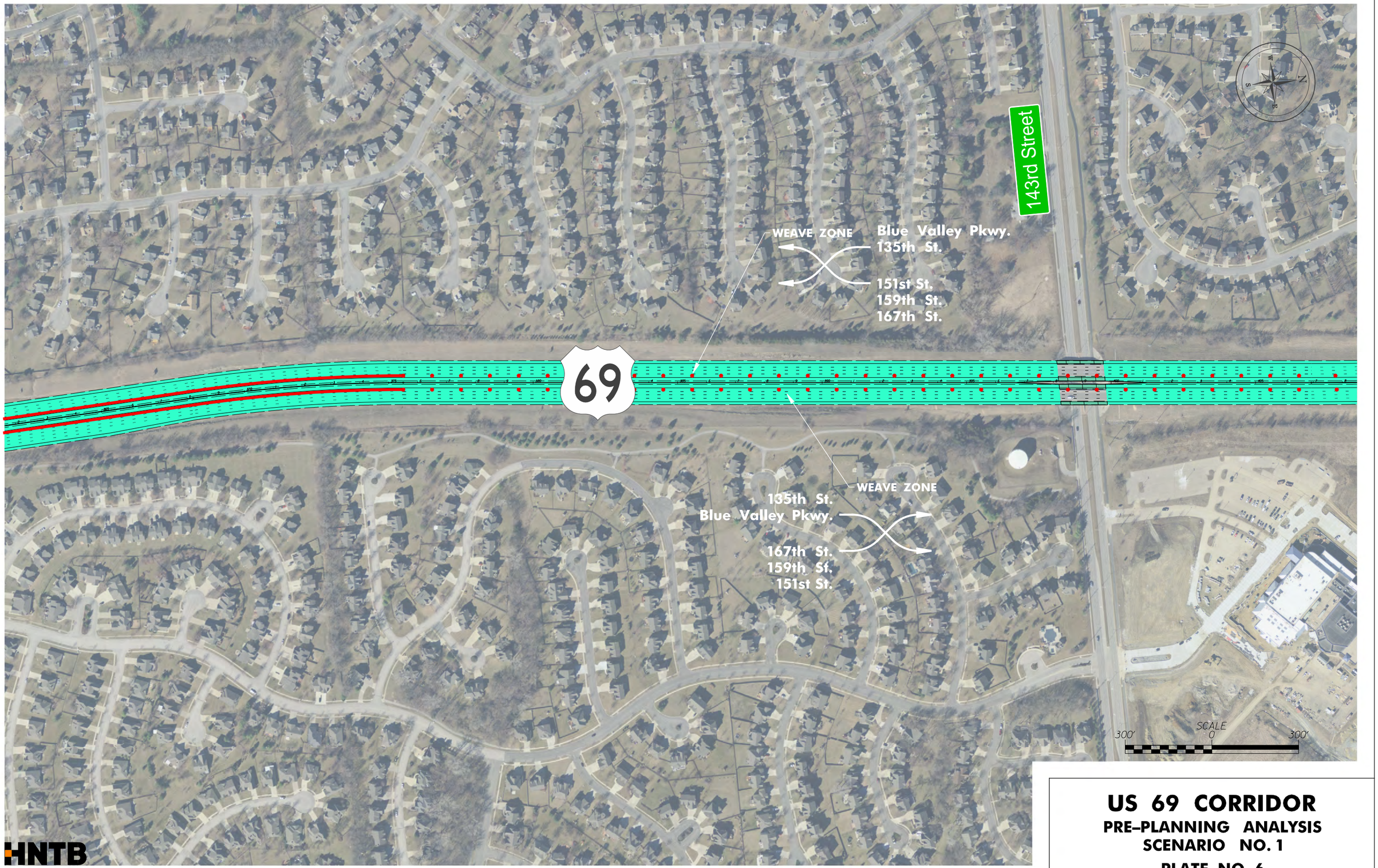
HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS

SCENARIO NO. 1

PLATE NO. 5



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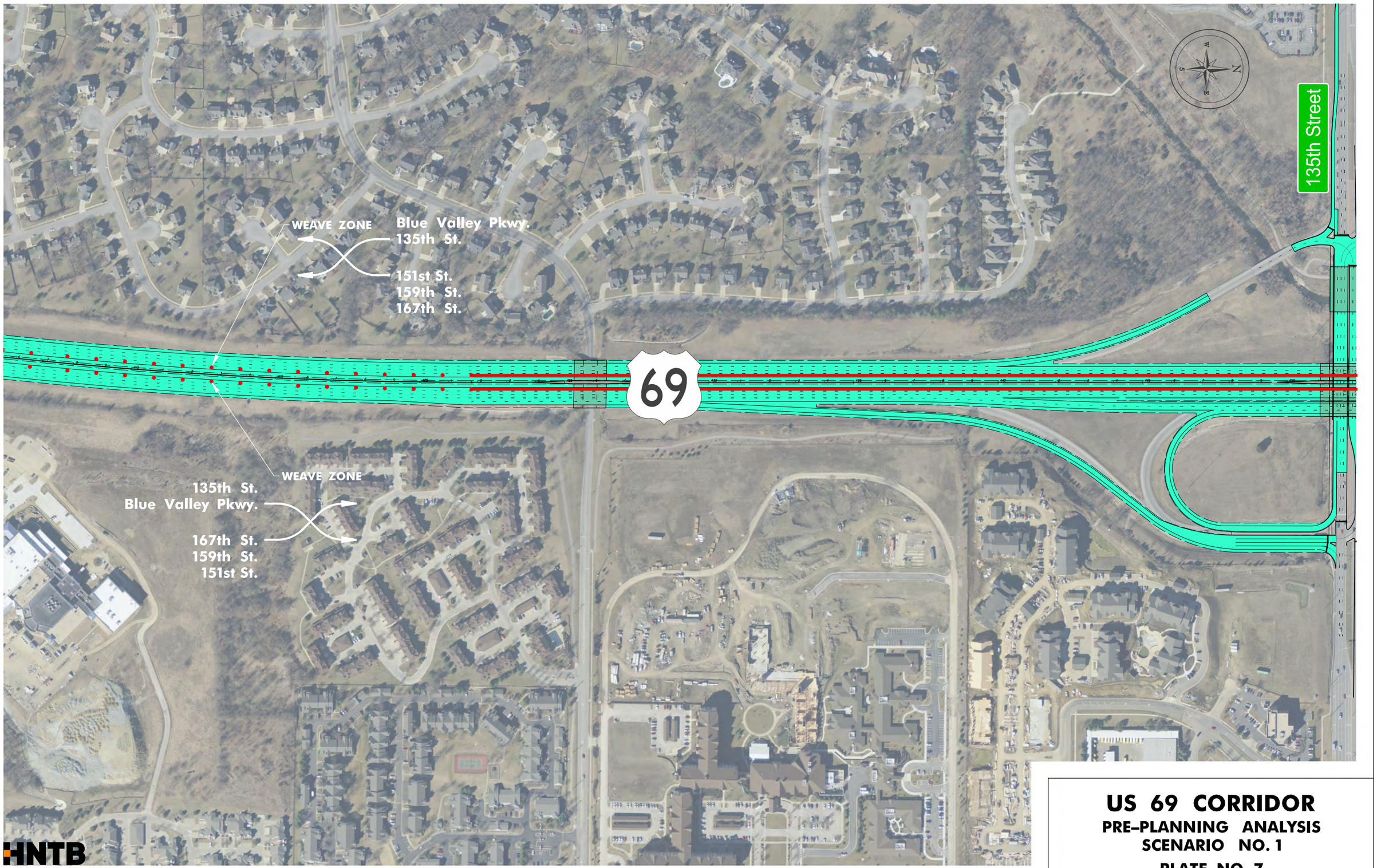
US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 6



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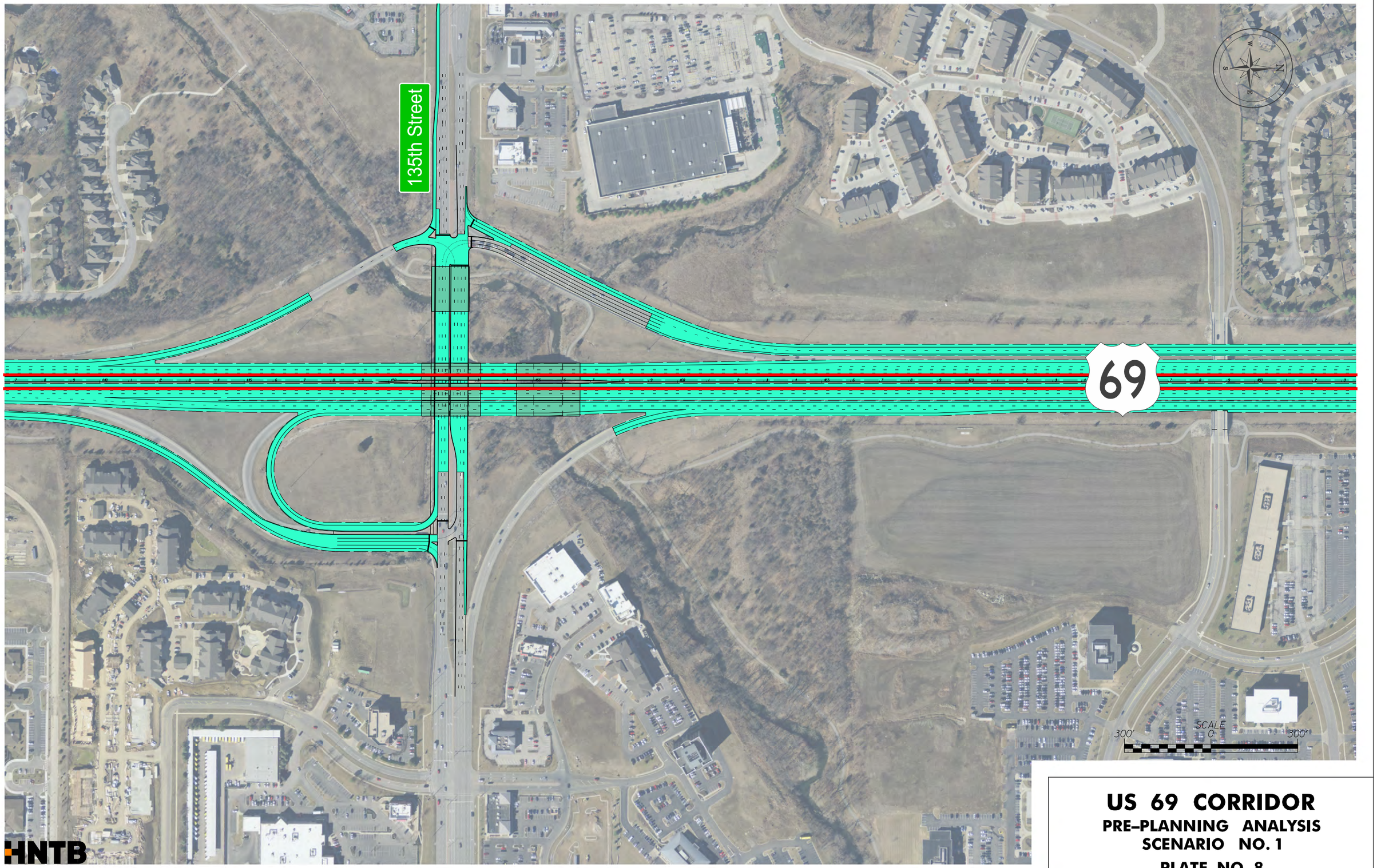
US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 7



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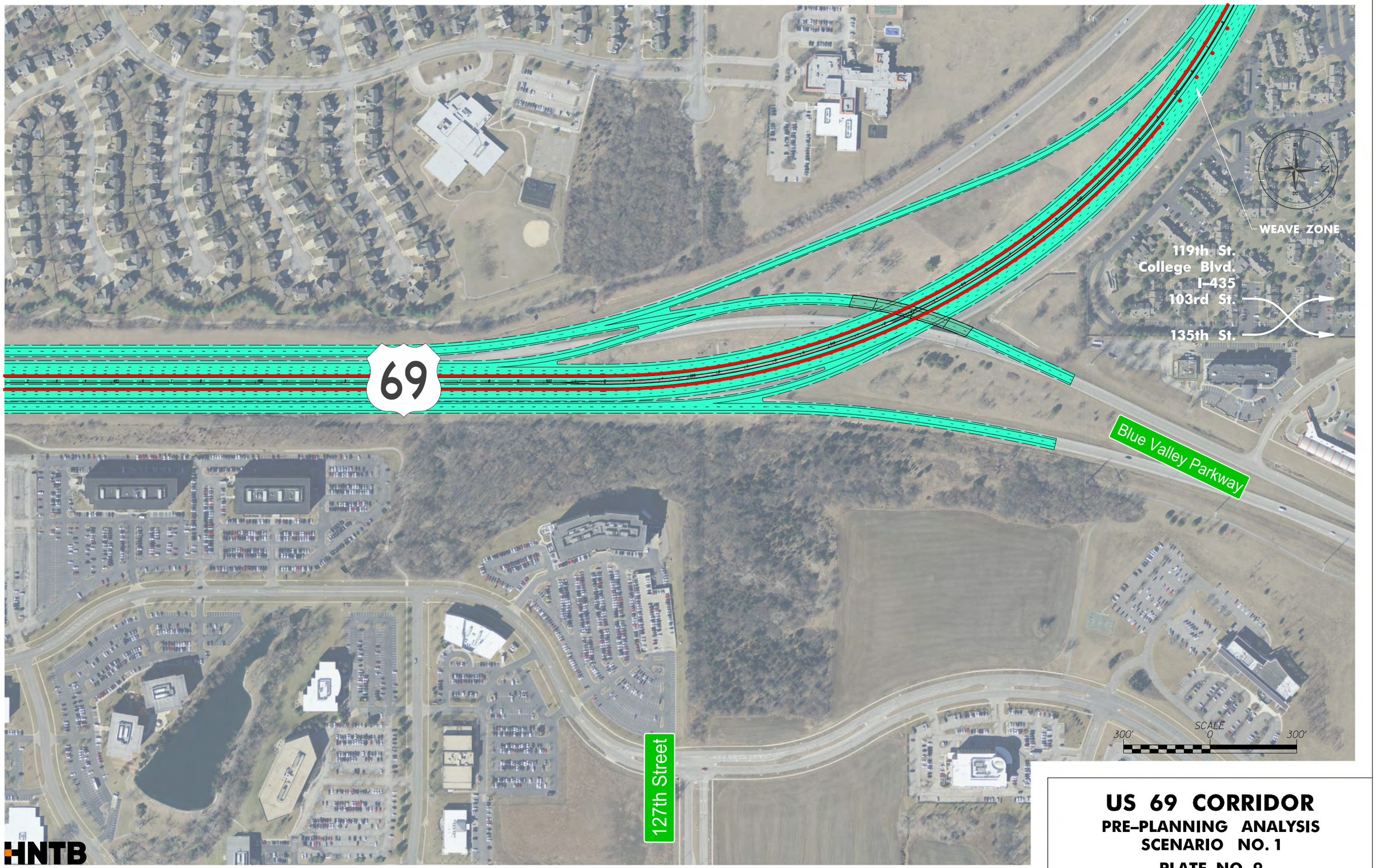
US 69 CORRIDOR

PRE-PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 8



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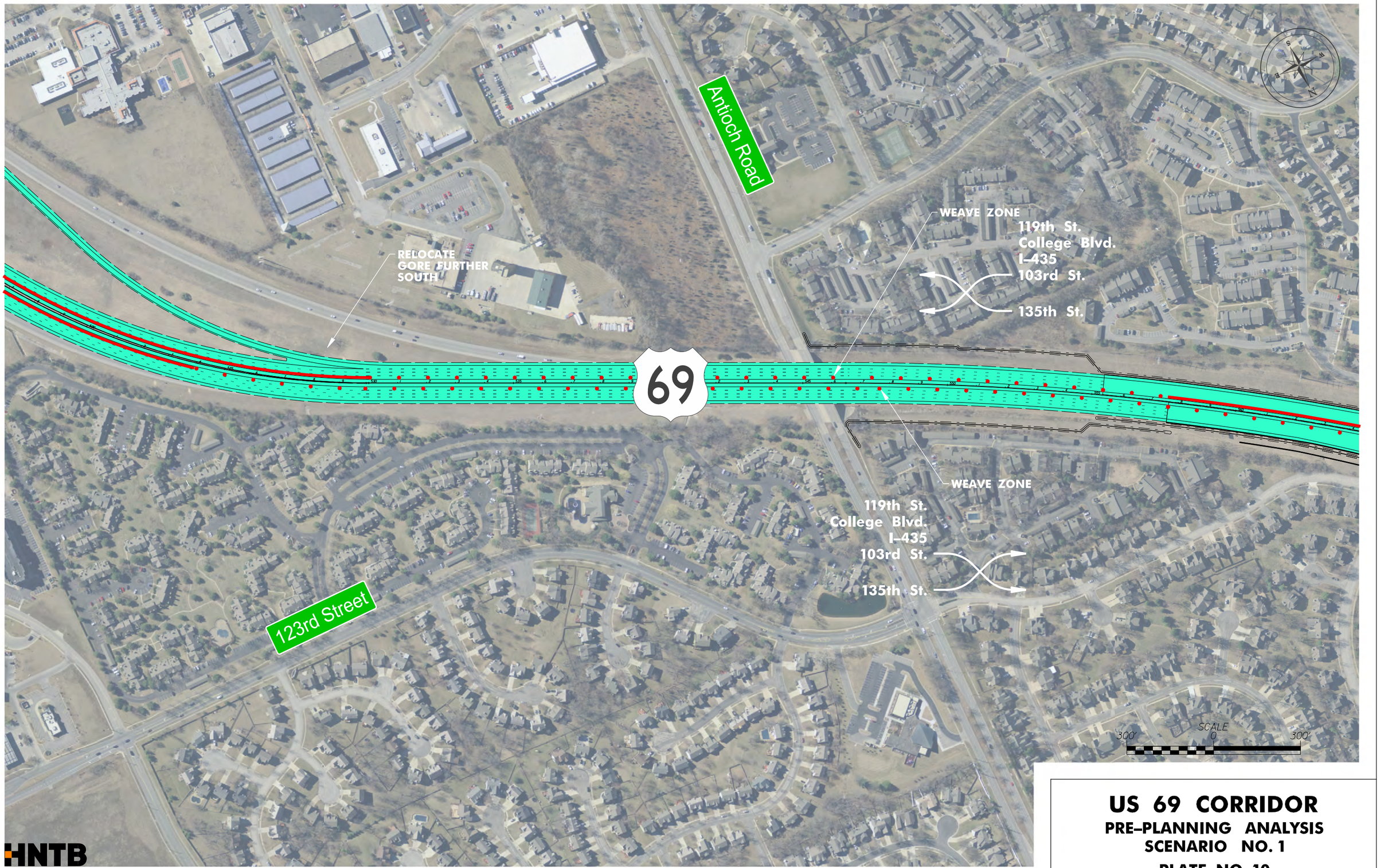
US 69 CORRIDOR

PRE-PLANNING ANALYSIS

SCENARIO NO. 1

PLATE NO. 9



HNTB

US 69 CORRIDOR

PRE-PLANNING ANALYSIS
SCENARIO NO. 1
PLATE NO. 10

69

WEAVE ZONE

119th St.
College Blvd.
I–435
103rd St.

135th St.

119th Street

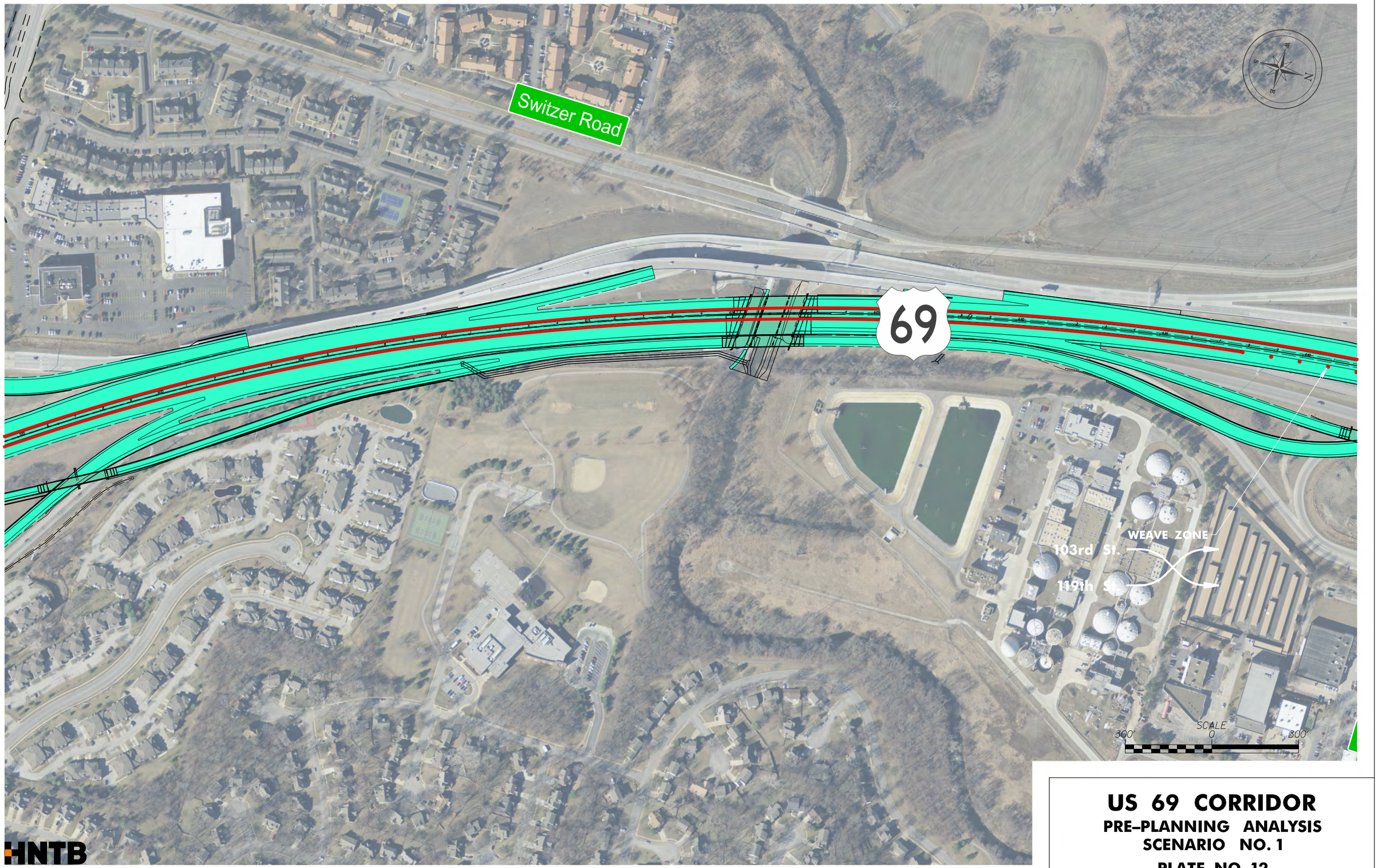
SCALE
300' 0 300'

HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 11



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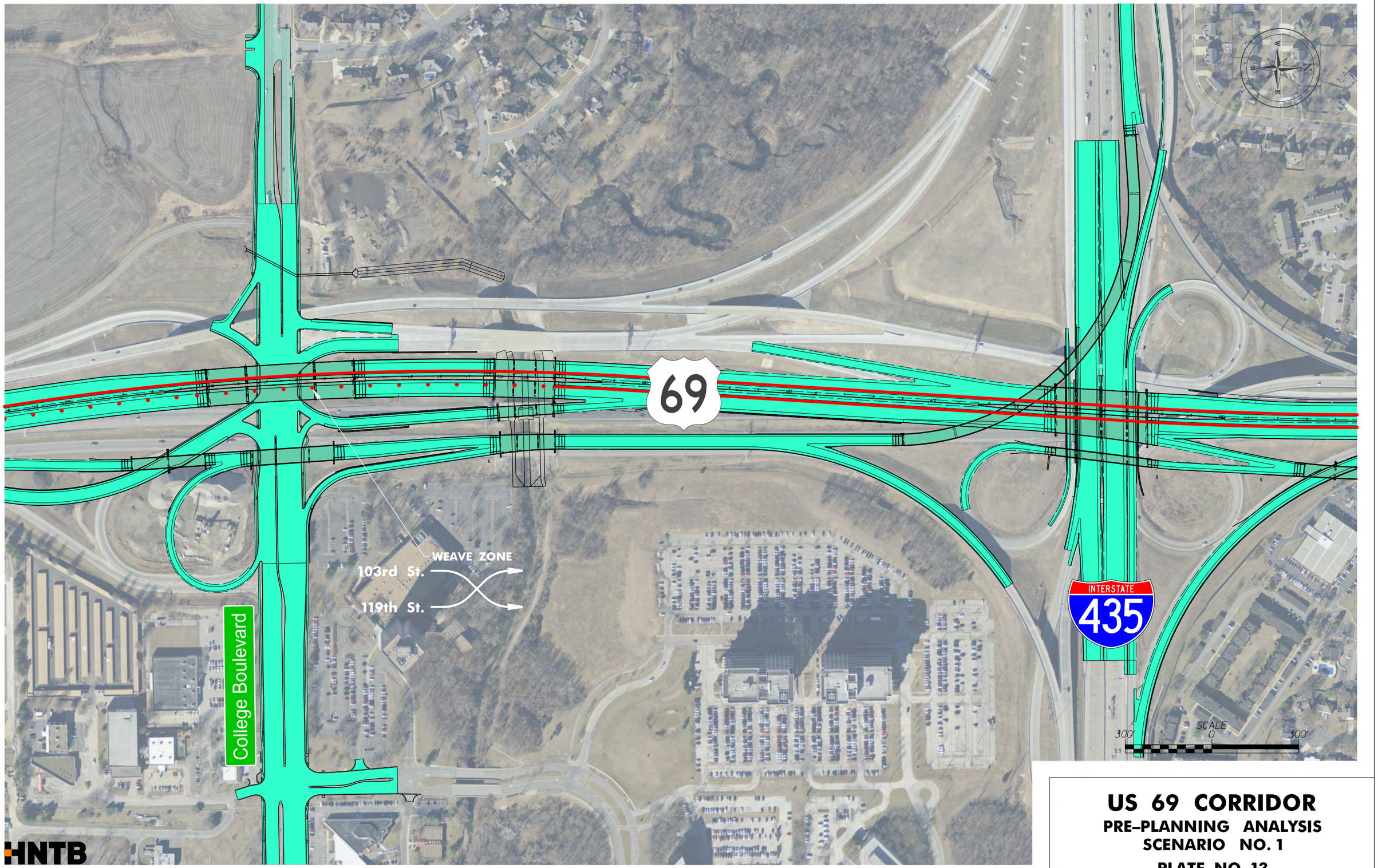
US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 12



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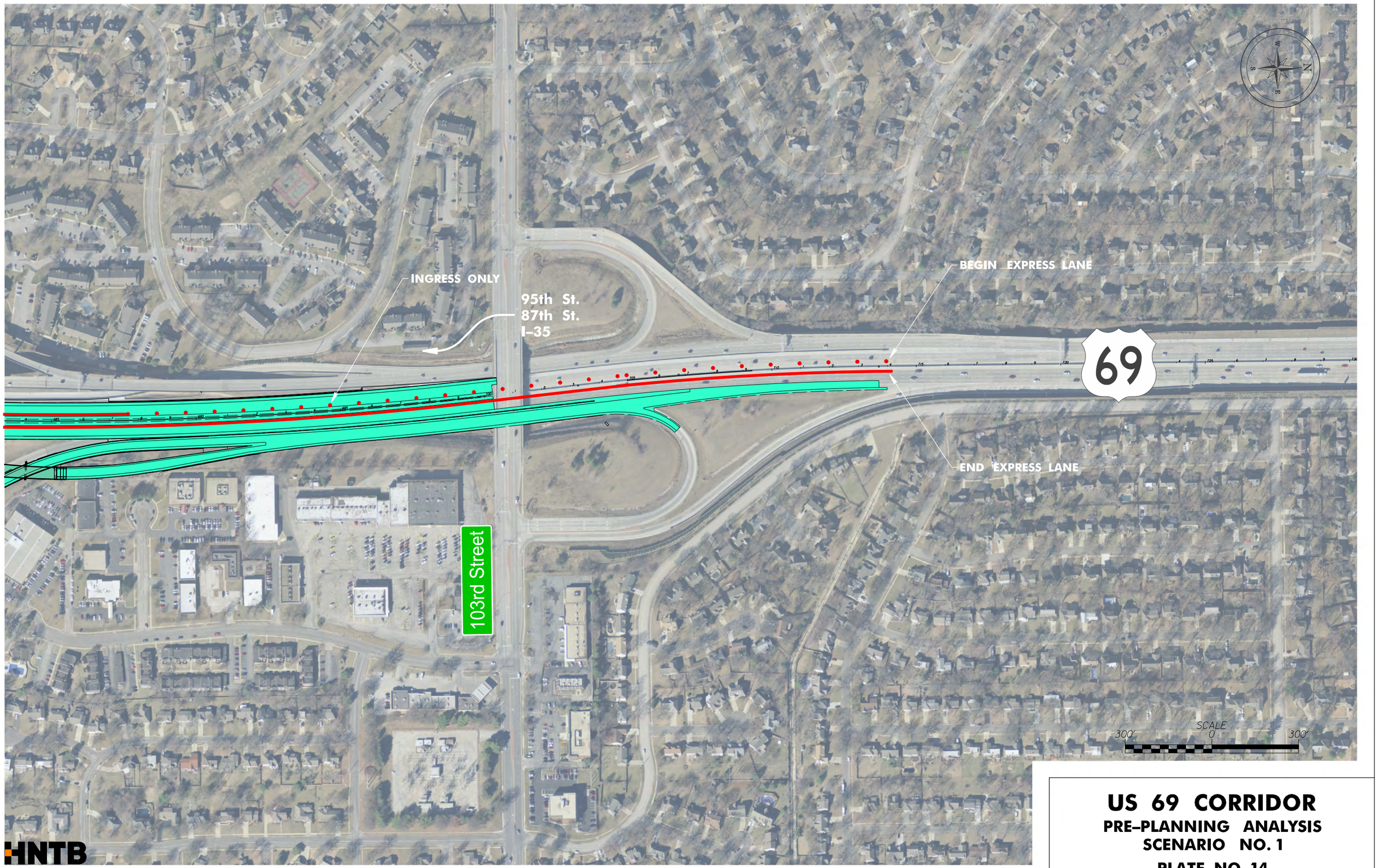
US 69 CORRIDOR

PRE–PLANNING ANALYSIS

SCENARIO NO. 1

PLATE NO. 13



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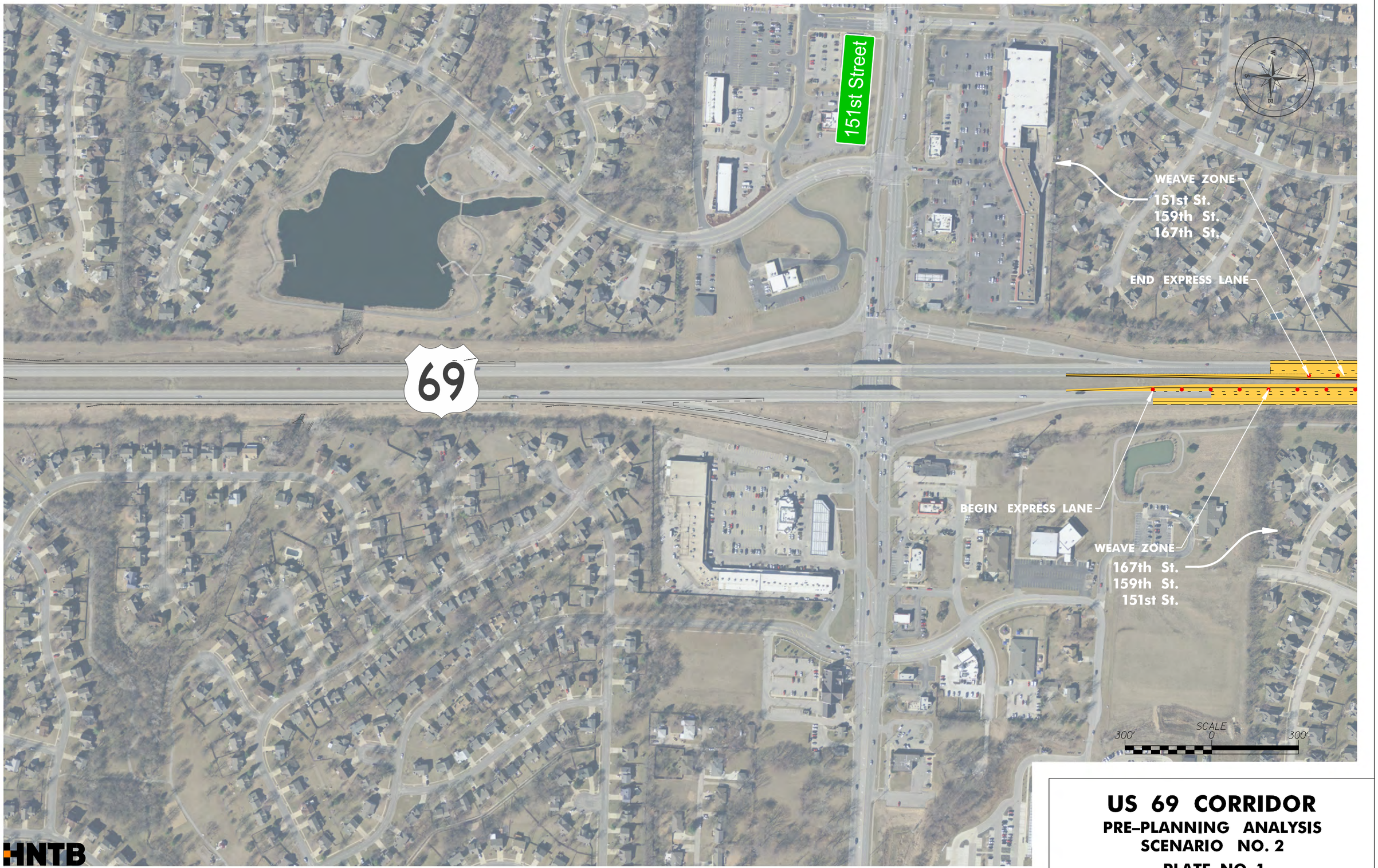
US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 1

PLATE NO. 14



HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS

SCENARIO NO. 2

PLATE NO. 1

143rd Street

WEAVE ZONE

151st St.
159th St.
167th St.

69

WEAVE ZONE

167th St.
159th St.
151st St.

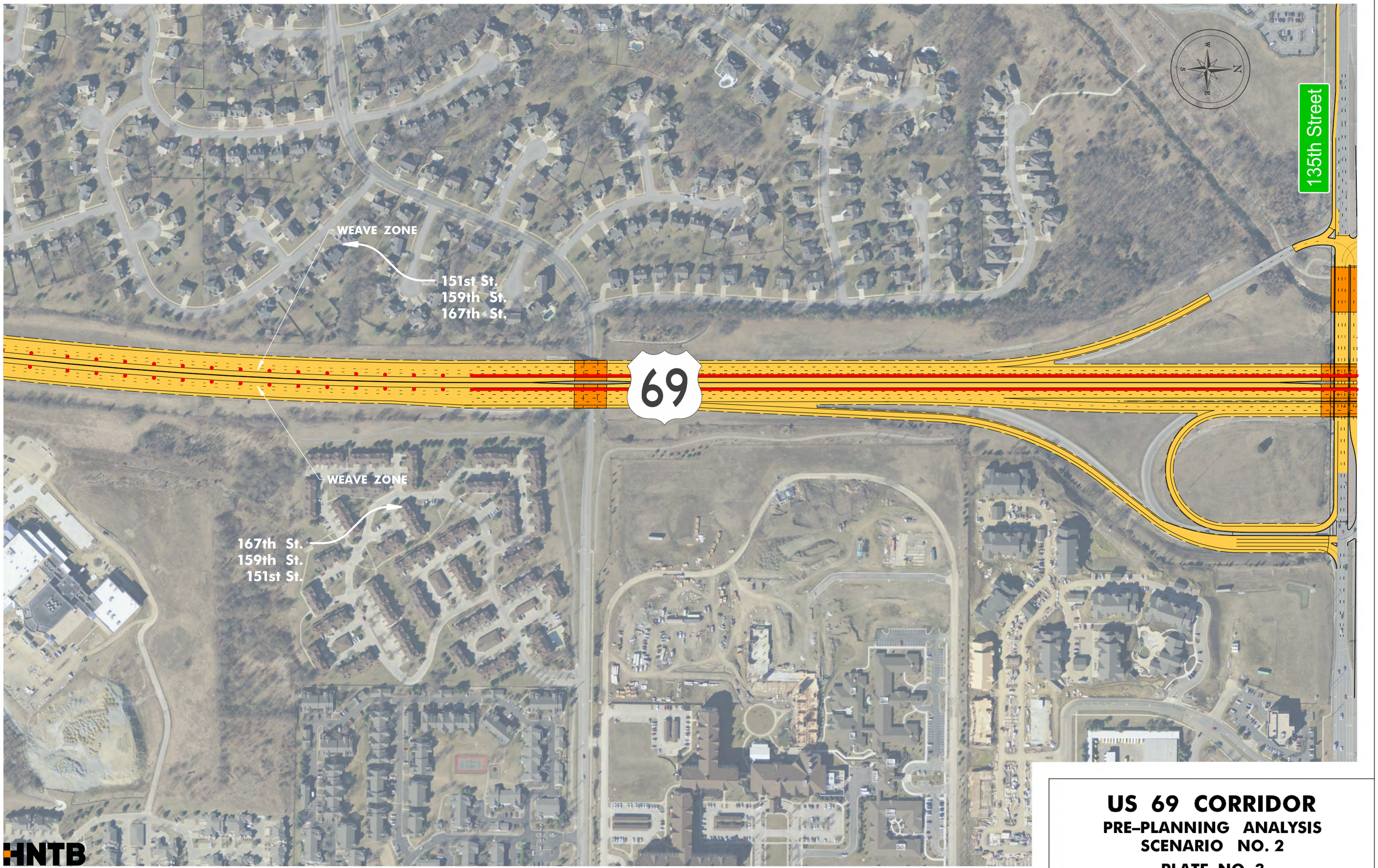
SCALE
300' 0 300'

HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 2

PLATE NO. 2



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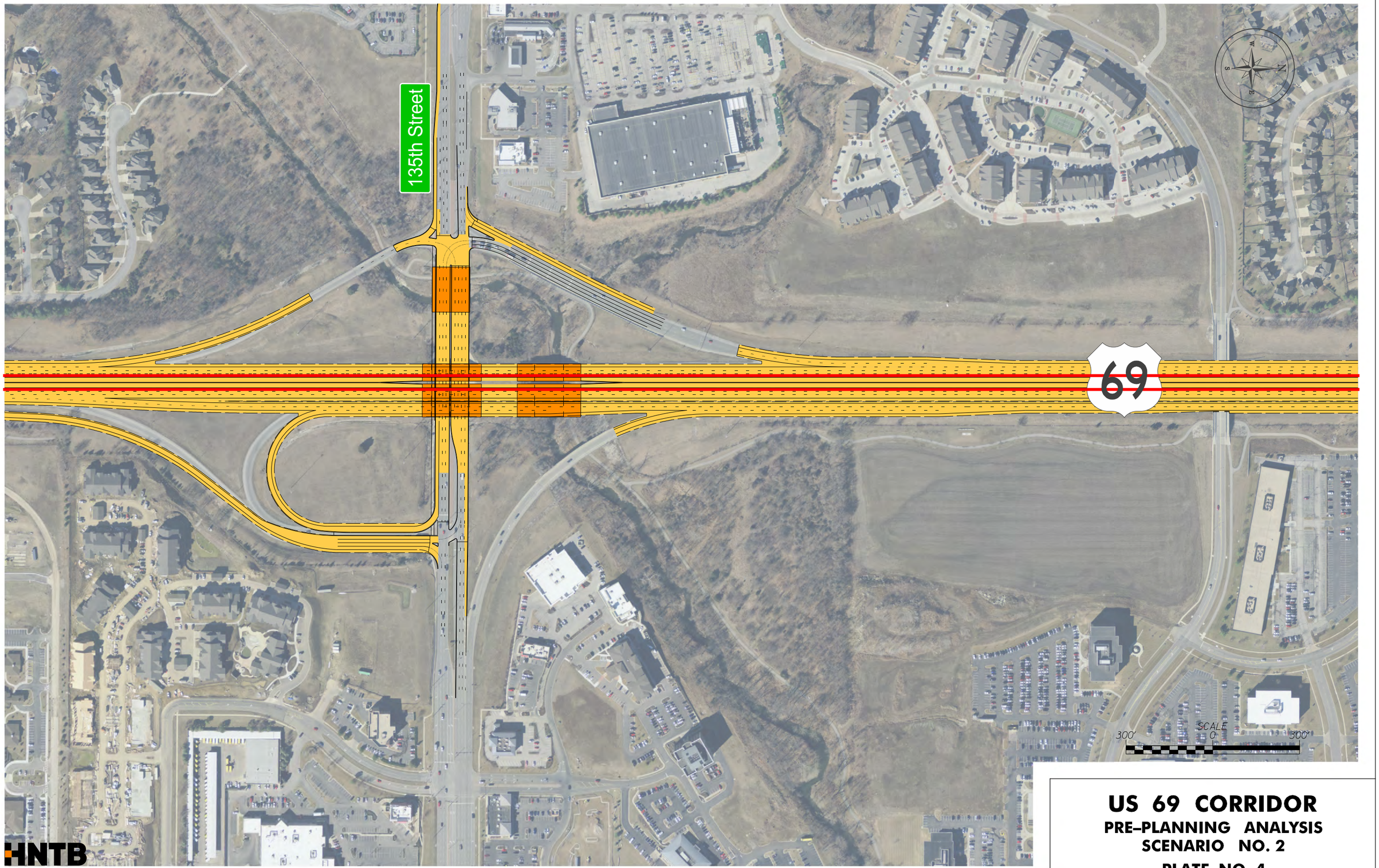
US 69 CORRIDOR

PRE–PLANNING ANALYSIS

SCENARIO NO. 2

PLATE NO. 3



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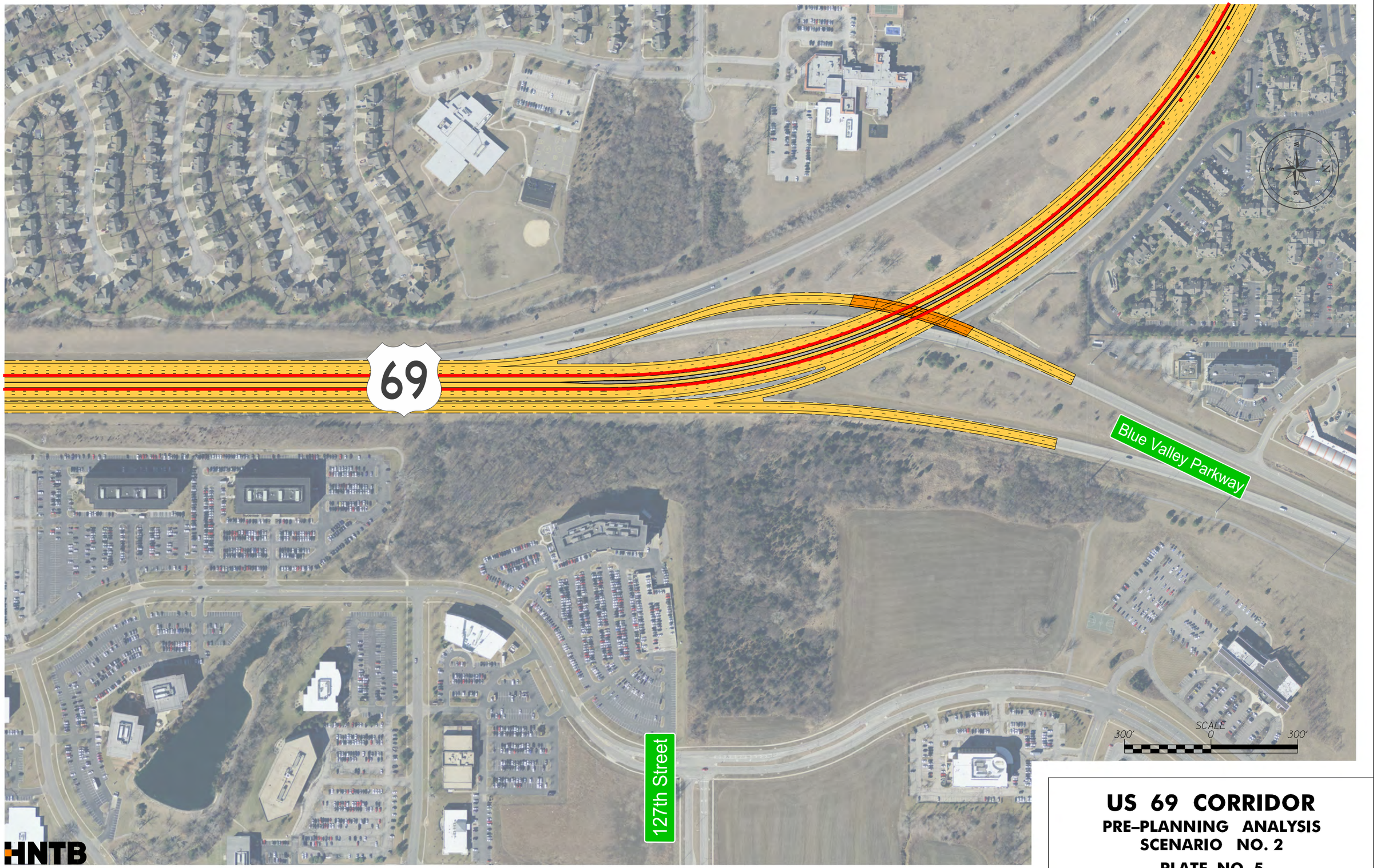
US 69 CORRIDOR

PRE-PLANNING ANALYSIS

SCENARIO NO. 2

PLATE NO. 4



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US 69 CORRIDOR

PRE-PLANNING ANALYSIS

SCENARIO NO. 2

PLATE NO. 5

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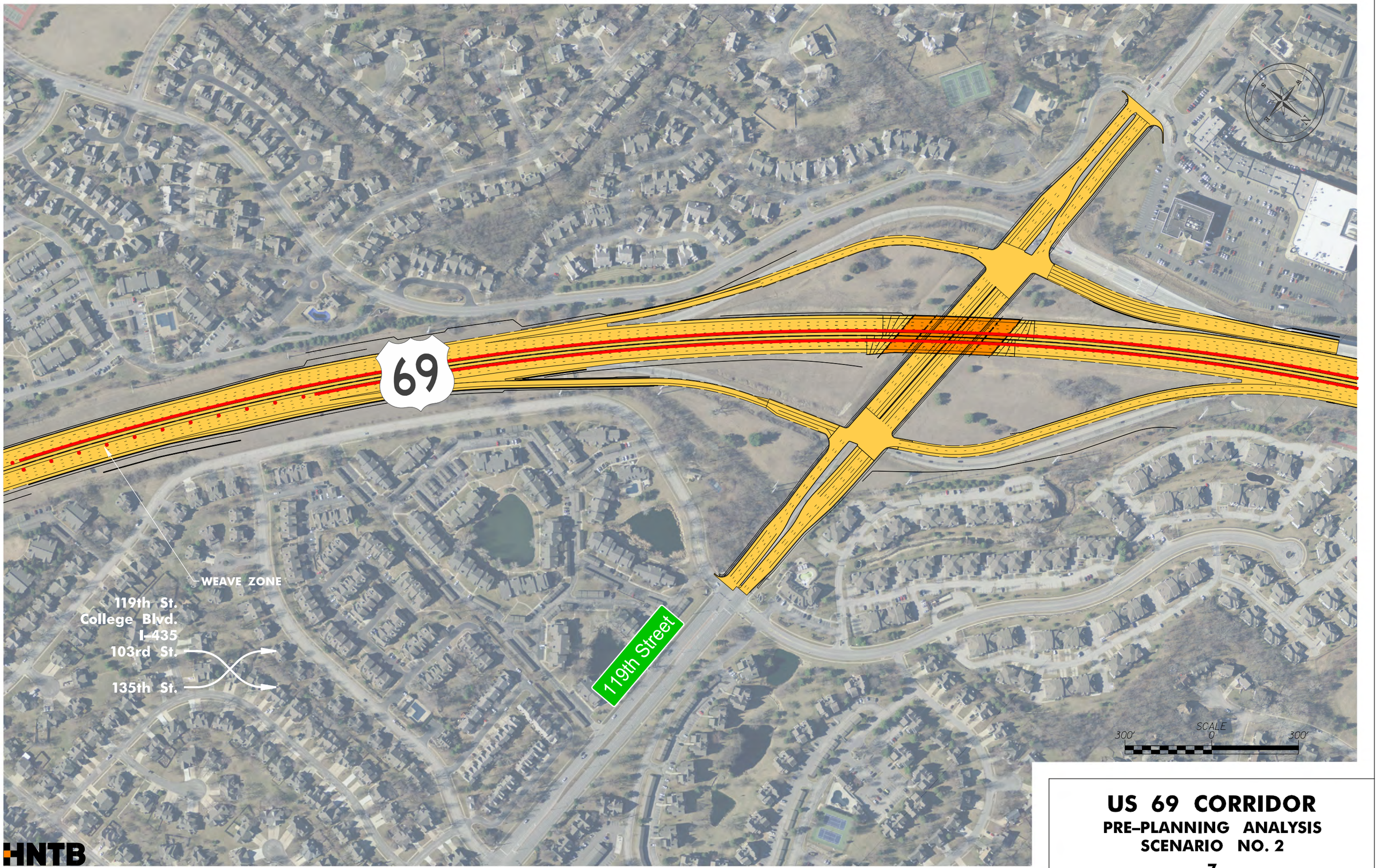
US 69 CORRIDOR

PRE-PLANNING ANALYSIS
SCENARIO NO. 2
PLATE NO. 6



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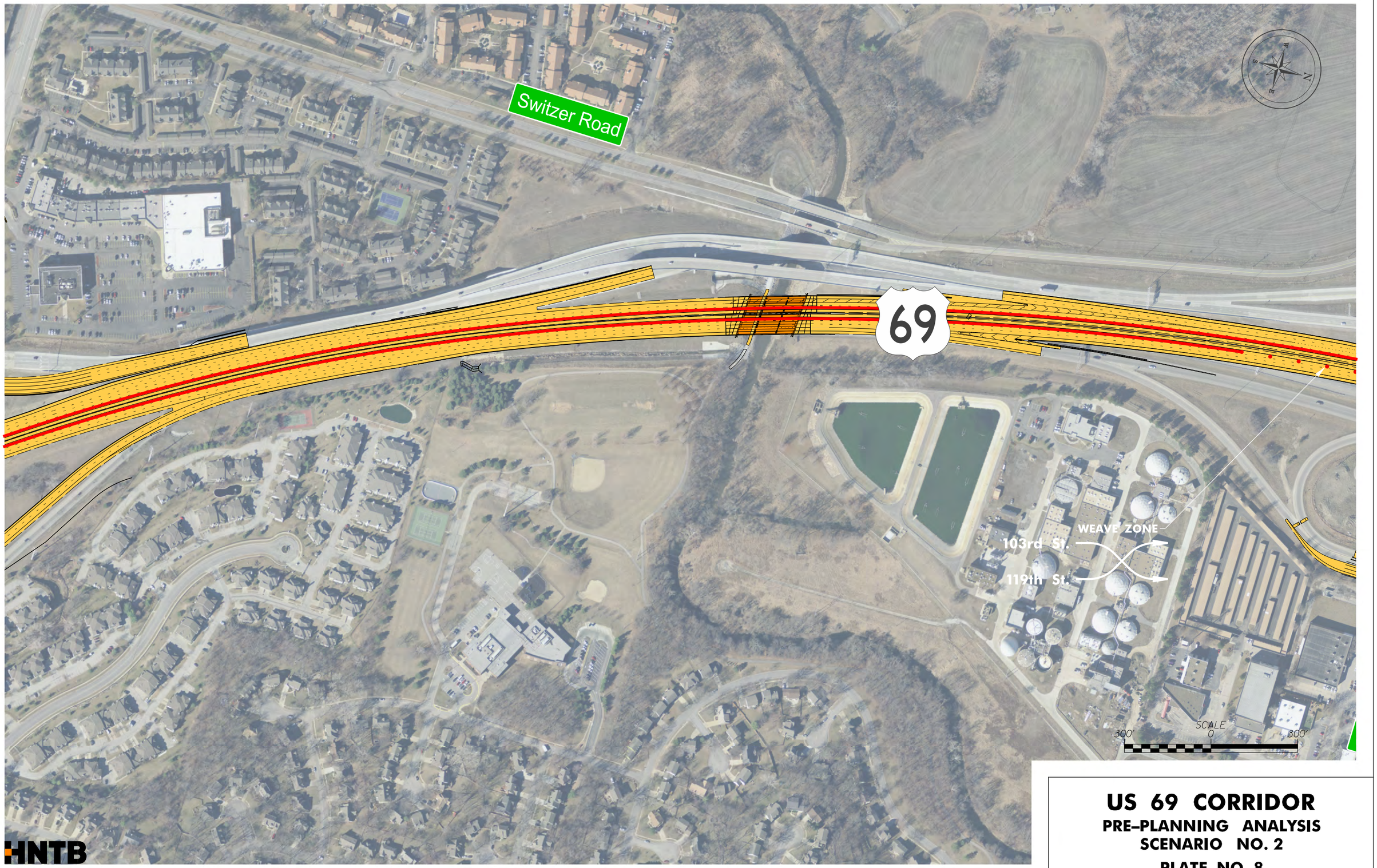
US 69 CORRIDOR

PRE-PLANNING ANALYSIS

SCENARIO NO. 2

7

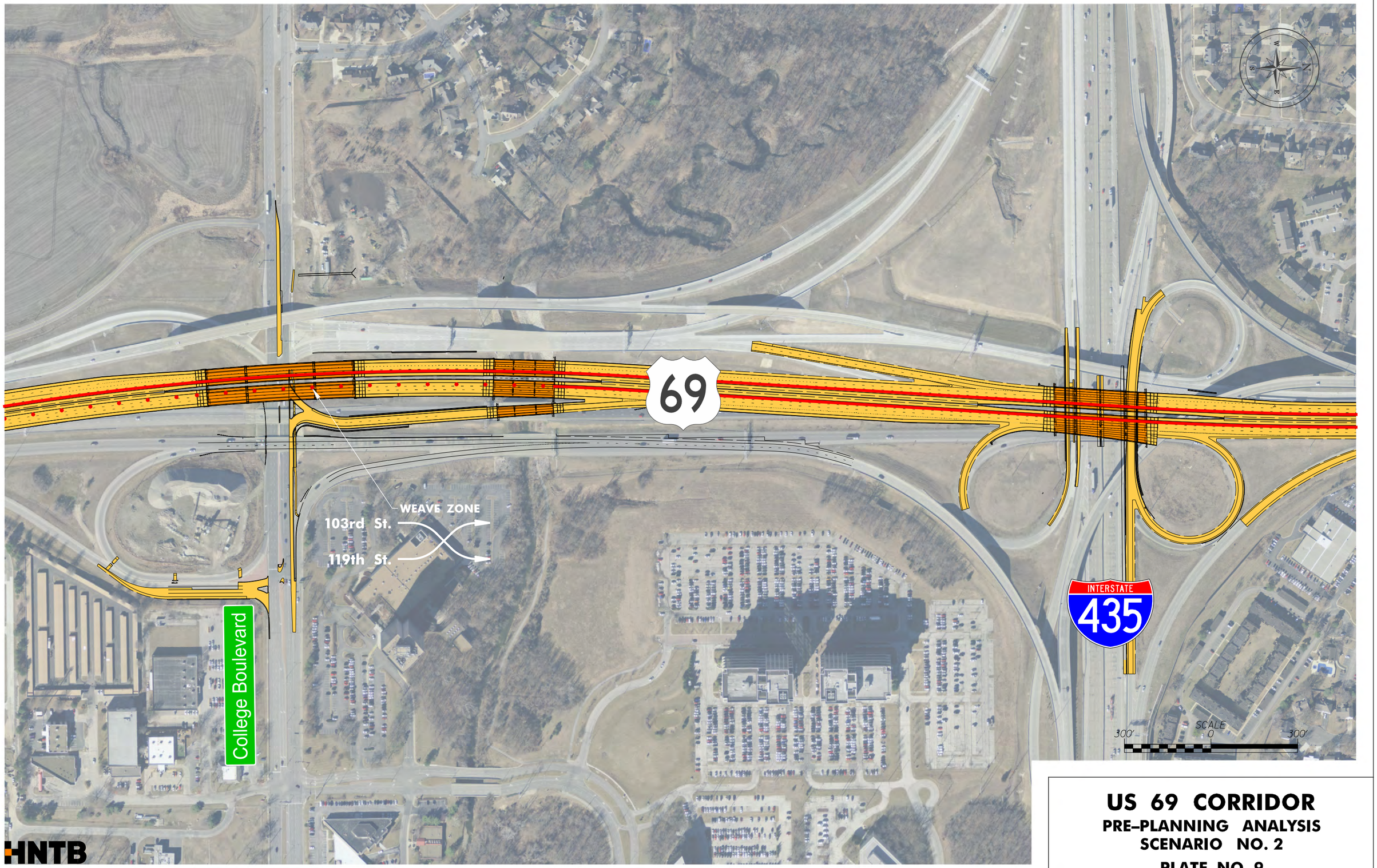


HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 2

PLATE NO. 8



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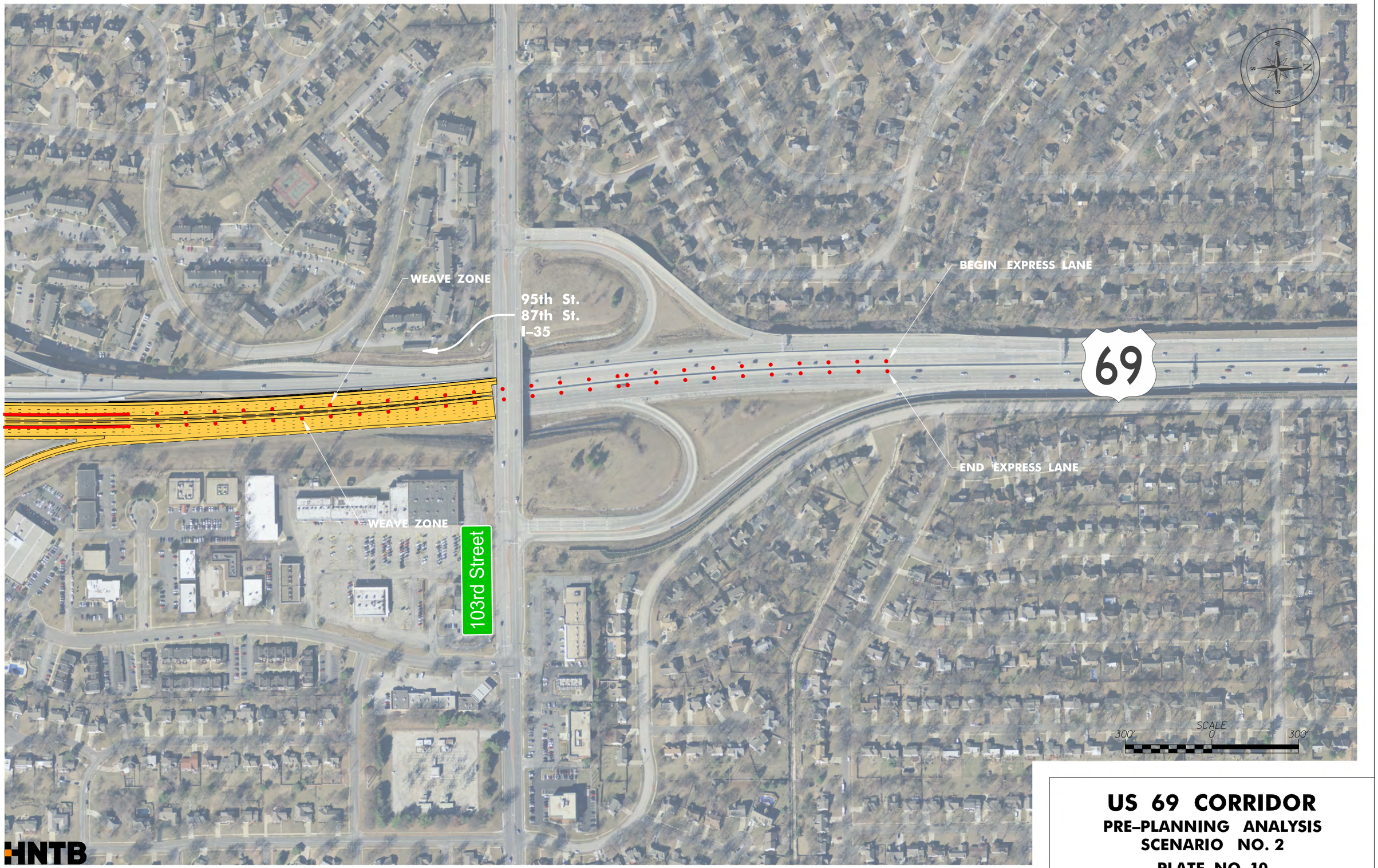
US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 2

PLATE NO. 9



HNTB

US 69 CORRIDOR

PRE–PLANNING ANALYSIS
SCENARIO NO. 2

PLATE NO. 10

DRAFT
February 3, 2021

U.S. 69 MODERNIZATION AND EXPANSION USER CHARACTERISTICS SUMMARY

Introduction

The Kansas Department of Transportation (KDOT) in cooperation with the Kansas Turnpike Authority (KTA), the City of Overland Park and the Federal Highway Administration (FHWA) have partnered on the U.S. 69 Modernization and Expansion (Project). U.S. 69 is a major north-south United States highway, extending from Texas to Minnesota. In Overland Park, KS, the highway is the busiest U.S. highways in the State of Kansas.

The Project limits of the Project extend from 103rd Street on the north to 179th Street on the south. Published AADT data from KDOT indicates that nearly 90,000 vehicles use the corridor daily near the northern limits of the project to around 26,000 vehicles near the southern limits.

This report summarizes the characteristics of U.S. 69 motorists in the project area, including trip distance, trip purpose, and user demographic information. Statistics were obtained from Replica, a synthetic activity-based travel model. The Replica model was built for the Kansas City metropolitan area and is a snapshot of travel characteristics on a typical weekday (Thursday) during four seasons consisting of:

- Fall 2018 (September through November)
- Winter 2018/2019 (December through February)
- Spring 2019 (March through May)
- Summer 2019 (June through August)

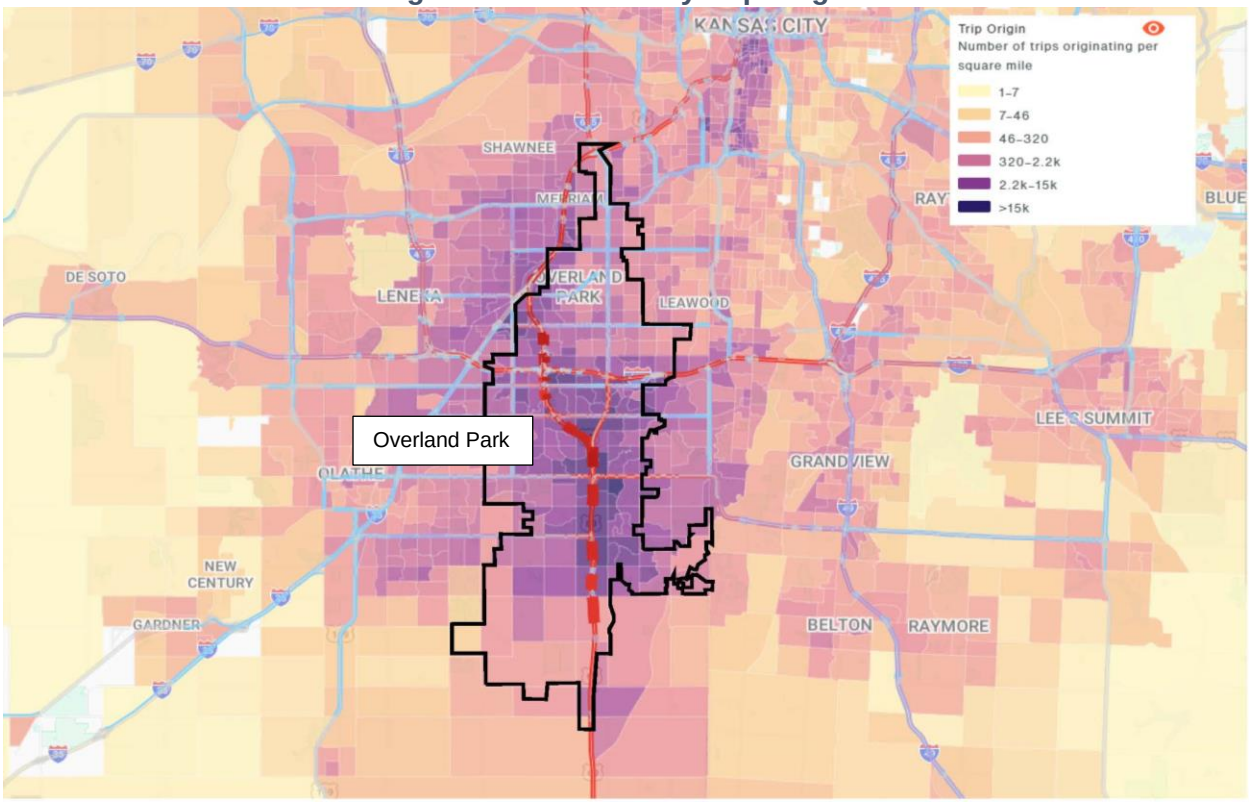
In addition to providing general U.S. user characteristics, the Replica model will be used to provide supporting information for the Break-in-Access (BIA) and traffic and revenue (T&R) study.

U.S. 69 User Characteristics

Users of the U.S. 69 corridor's project area have the following transportation characteristics:

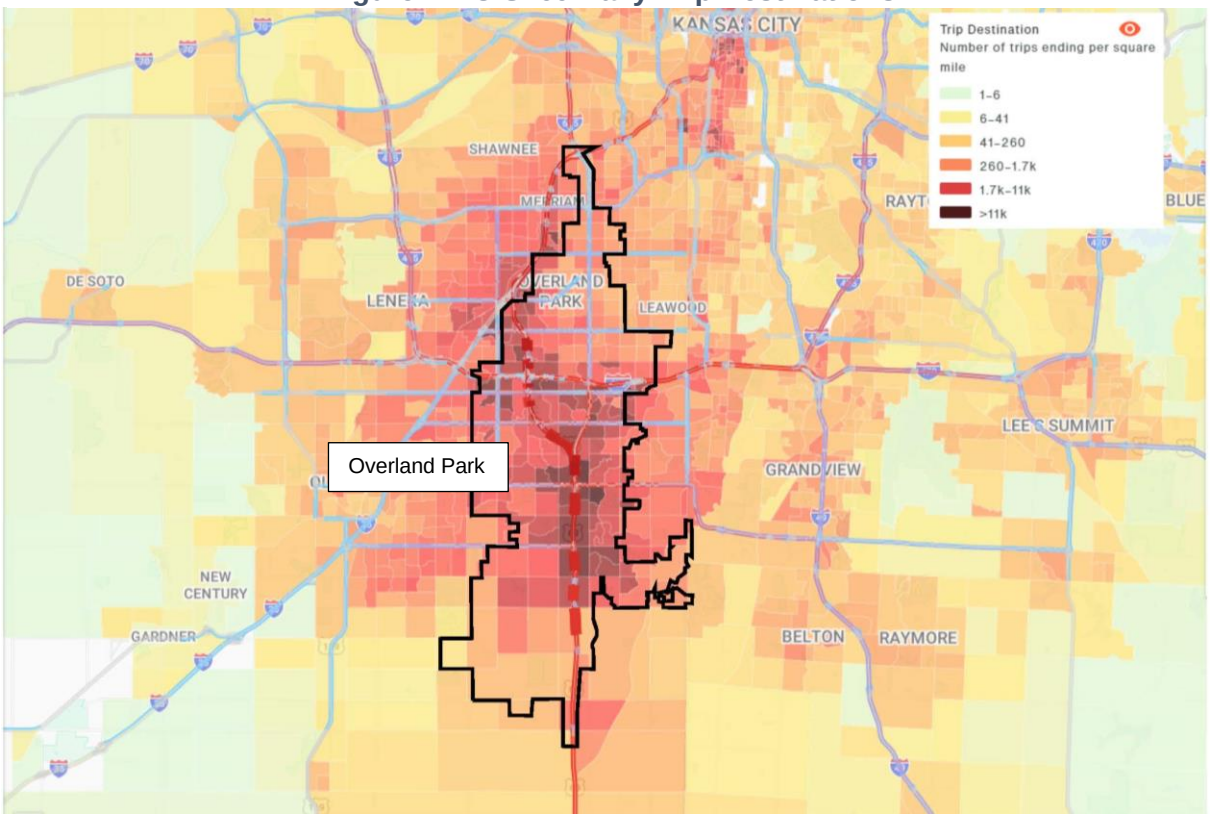
- Trip Origins – While many motorists that start their daily trips and use the U.S. 69 are located in Overland Park and in proximity of the U.S. 69 corridor, there are a significant number of motorists that start their trips throughout the Kansas City megtropolitan region and use U.S. 69. as shown in *Figure 1*. Approximately 47% of trips in the project corridor limits originate within Overland Park, with the other 53% originating outside of Overland Park througout the Kansas City metropolitan area.

Figure 1 - U.S. 69 Daily Trip Origins



- Trip Destinations – Similarly, while many motorists that end their daily trips and use the U.S. 69 are located in Overland Park and in proximity of the U.S. 69 corridor, there are a significant number of motorists that end their trips throughout the Kansas City megtropolitan region and use U.S. 69. as shown in *Figure 2*. Approximately 44% of trips on the project corridor limits have a destination within Overland Park, with the other 56% end their trip outside of Overland Park.

Figure 2 – U.S. 69 Daily Trip Destinations



- **Primary Travel Mode** – The primary travel mode of U.S. 69 users are single drivers of private automobiles, which represent 67.9% of all users while, 24.7% are passengers in private automobiles. 7.3% of motorists use commercial vehicle.

- **Start Time** – Corridor users' busiest start time is 4 PM, which represents 8.6% of users. *Figure 4* below shows the corridor has steady traffic between the hours of 7 AM and 6 PM.

- **Trip Distance** – The median total trip distance of U.S. 69 travelers in the project area, including the portion of their trip outside the project limits, is 15.8 miles. 79.6% of trips are 8 miles or longer. *Figure 5* below shows the full categorical proportions of trip distances for U.S. 69 users.

- **Trip Duration** – The median trip duration, including trip time spent outside of the project limits, is 20.0 minutes. 67.7% of trips are between 10 and 40 minutes long.

- **Trip Purpose** – The most common trip purpose is "home trip" at 33.8%, with "work trip" at 20.6%, "shop trip" at 8.2% and "commercial/freight trip" at 7.3%

Figure 4 - Trip Start Time

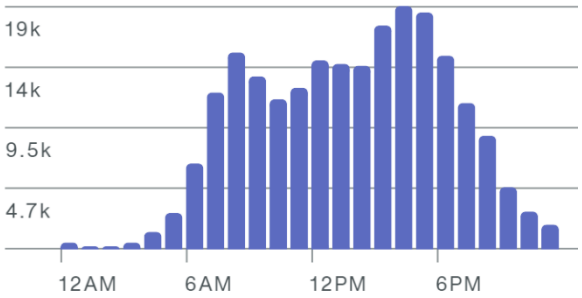
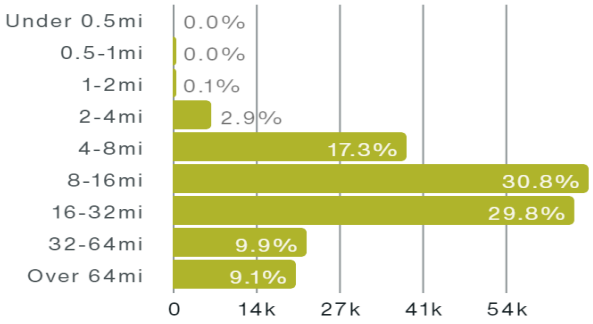


Figure 5 - Trip Distance



Other characteristics of U.S. 69 users in the project area are summarized below in *Table 1*. Similar characteristics for the populations of Johnson County, the State of Kansas, and the United States are shown for comparison.

Table 1 - Project Area User Characteristic Comparisons

	U.S. 69 Project Motorists	Johnson County, KS	Kansas	United States
Median Household Income	$96k	$85k	$58k	$60k
Median Age	46	37	37[1]	39[1]
Unemployment Rate (Spring 2019)	2.2%	2.0%	3.1%[2]	3.7%[2]
Average cars per household	2.1	1.9	1.9	1.8
Race and Ethnicity	• 80.8% White Non-Hispanic/Latino • 6.5% Black Non-Hispanic/Latino • 5.3% Asian Non-Hispanic/Latino • 5.5% Hispanic or Latino • 2.0% Other	• 80.5% White Non-Hispanic/Latino • 4.5% Black Non-Hispanic/Latino • 4.7% Asian Non-Hispanic/Latino • 7.4% Hispanic or Latino • 2.9% Other	• 75% White Non-Hispanic/Latino • 6% Black Non-Hispanic/Latino • 3% Asian Non-Hispanic/Latino • 12% Hispanic or Latino • 4% Other1	• 60% White Non-Hispanic/Latino • 12% Black Non-Hispanic/Latino • 6% Asian Non-Hispanic/Latino • 18% Hispanic or Latino • 4% Other1

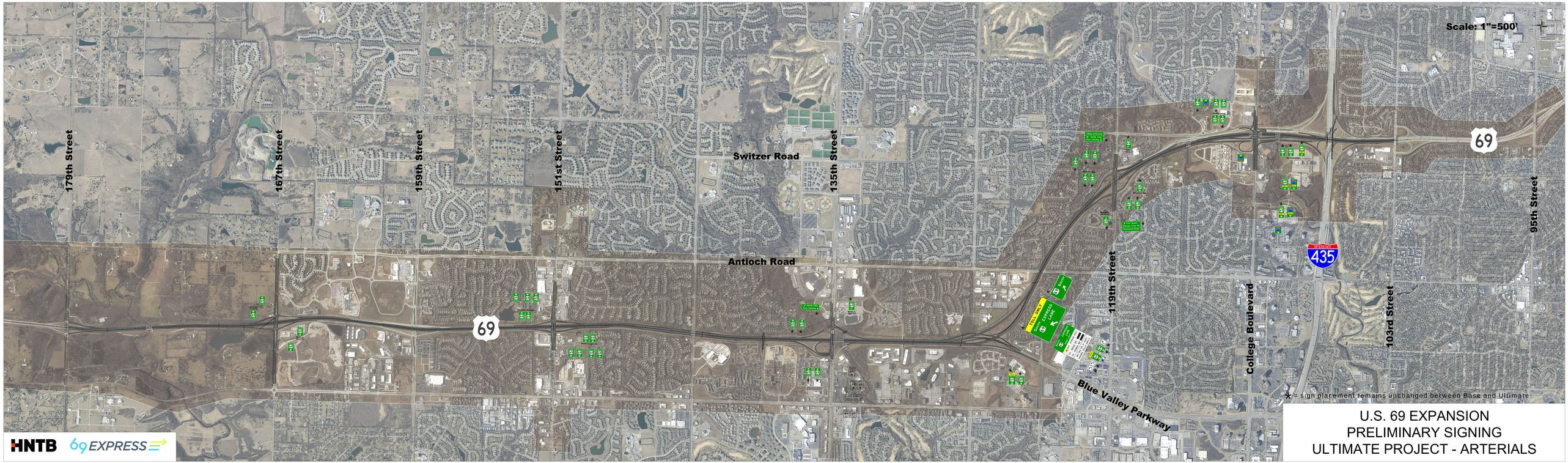
[1] U.S. Census Bureau (2019). American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for Johnson County, KS and United States <http://censusreporter.org>
[2] "Civilian Unemployment Rate, May 2019." U.S. Bureau of Labor Statistics, January 29, 2021. https://www.bls.gov/.

Conclusion

U.S. 69 is an integral corridor for the Kansas City metropolitan area and State of Kansas. Although many users begin and end their trips near the U.S. 69 corridor, the Replica data illustrates how many others are originating from or heading to locations throughout the entire metropolitan area. Over 80% of vehicle trips have either an origin or destination outside of Overland Park. Most user trips are 8 miles or longer and last approximately 20 minutes, and the corridor carries steady traffic between the hours of 7 AM and 6 PM. Although a wide variety of users travel the corridor daily, a typical user is someone heading to work in the morning and to home in the evening, coming from a two-car household and with a median household income above county, state, and nationwide averages.

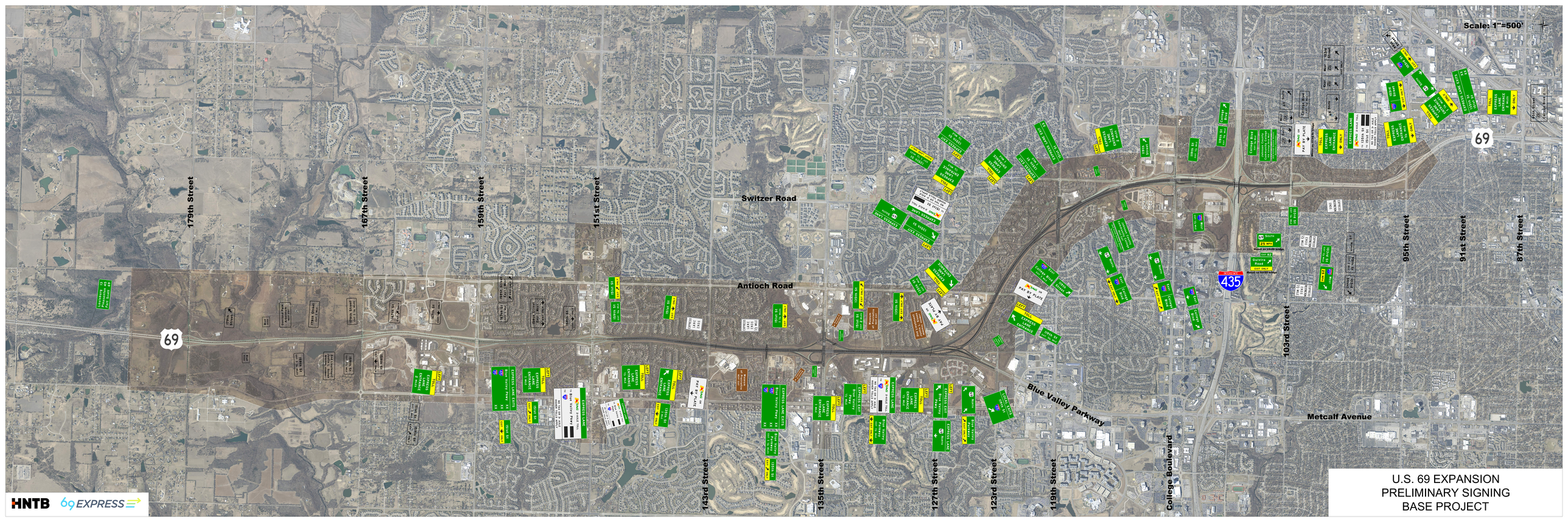
Appendix C – Design

- 2040 Base and 2050 Ultimate Build Design and Conceptual Signing Plans
- Design Standard



HNTB 69 EXPRESS

U.S. 69 EXPANSION
PRELIMINARY SIGNING
ULTIMATE PROJECT - ARTERIALS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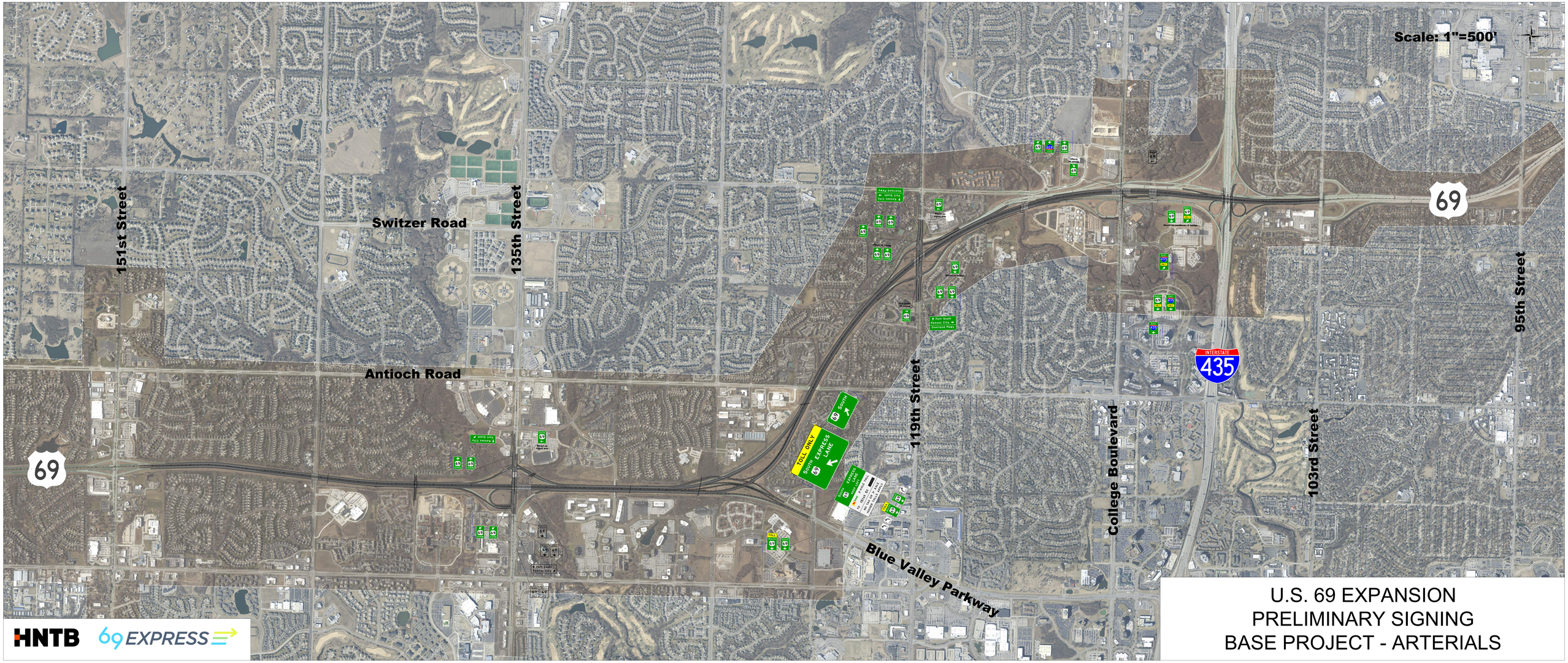
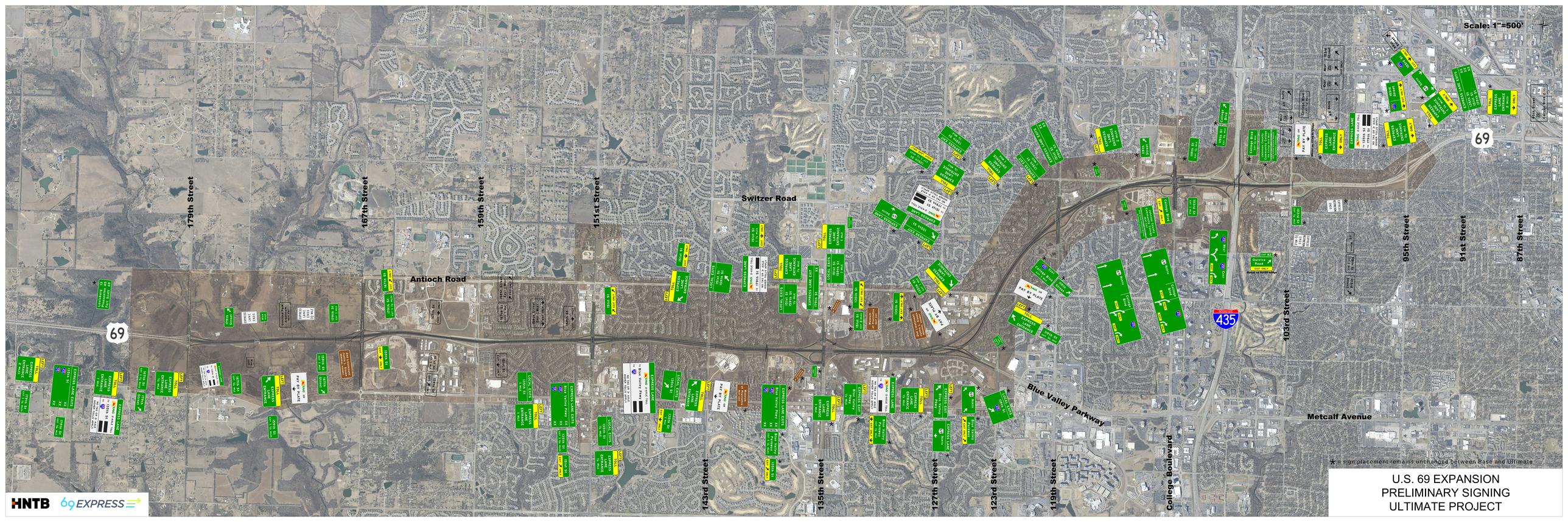
179th Street
167th Street
159th Street
151st Street
Switzer Road
Antioch Road
143rd Street
135th Street
127th Street
123rd Street
119th Street
Blue Valley Parkway
College Boulevard
103rd Street
Metcalf Avenue
95th Street
91st Street
87th Street
69
435
HNTB
69 EXPRESS
U.S. 69 EXPANSION
PRELIMINARY SIGNING
BASE PROJECT


Scale: 1"=500'
151st Street
Switzer Road
135th Street
Antioch Road
69
119th Street
College Boulevard
103rd Street
95th Street
435
INTERSTATE
TOLL ONLY
South EXPRESS LANE
Blue Valley Parkway
HNTB
69 EXPRESS
U.S. 69 EXPANSION
PRELIMINARY SIGNING
BASE PROJECT - ARTERIALS


Scale: 1"=500'
179th Street
167th Street
159th Street
151st Street
Switzer Road
Antioch Road
69
435
103rd Street
95th Street
91st Street
87th Street
Blue Valley Parkway
Metcalf Avenue
143rd Street
135th Street
127th Street
123rd Street
119th Street
College Boulevard
* = sign placement remains unchanged between Base and Ultimate
HNTB
69 EXPRESS
U.S. 69 EXPANSION
PRELIMINARY SIGNING
ULTIMATE PROJECT

Design Criteria - US-69 Corridor

KDOT Project No. 69-46 KA-5700-02
Overland Park Project No. 73898
October 19th, 2020

Design Feature	Mainline				Ramps											
	US-69		I-435		At Gores				Intermediate				Departing/ Approaching Side Rd.		Loop Ramps	
					Entrance		Exit		Service Ramps		C-D Roads & System Ramps					
	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum
Access Control	Full		Full		Full		Full		Full		Full		Full		Full	Full
Posted Speed (mph)	65 / 70 ¥		65													
Design Speed (mph)	75	70	70	65	50††		55 †		45	40	55	50	35	30	30	25
Design Vehicle	WB-67		WB-67		WB-67				WB-67		WB-67		WB-67+P (Truck off-tracking allowed)		WB-67	
Typical Section																
-Lane Width (ft)	12'		12'		Single Lane: 16', Multiple Lane: 12' each				Single Lane: 16', Multiple Lane: 12' each		Single Lane: 16', Multi Lane: 12' each		Single Lane: 16', Multiple Lane: 12' each		16'	
-Shoulders (ft)																
-Outside (Rt.)*	10' without CSB, 12' with CSB		10' without CSB, 12' with CSB		8' (10' with CSB)		8' (10' with CSB)		8' (10' with CSB)		8'		8' (10' with CSB)		8' (10' with CSB)	
-Inside/Median (Lt.)*	10' without CSB, 12' with CSB		10' without CSB, 12' with CSB		Single lane: 2' without CSB, 4' with CSB Multiple Lanes: 4' without CSB, 6' with CSB				Single lane: 2' without CSB, 4' with CSB Multiple Lanes: 4' without CSB, 6' with CSB		Single Lanes: 4' Multiple Lanes: 6'		Single lane: 2' without CSB, 4' with CSB Multiple Lanes: 4' without CSB, 6' with CSB		4'	
Vertical Alignment																
-Minimum Long. Slope	0.50%	0.30%	0.50%	0.30%	0.50%	0.30%	0.50%	0.30%	0.50%	0.30%	0.50%	0.30%	0.50%	0.30%	0.50%	0.30%
-Maximum Long. Slope	3%		3%		5%		5%		5%		5.0% (3.0% desirable)		N/A		5%	
-SSD at Crest Curves (ft)	820'	730'	820'	645'	425'		495'		360'	305'	495'	425'	250'	200'	200'	155'
-K Values																
-Sag Vertical	206	181	206	157	96		115		79	64	115	96	49	37	37	26
-Crest Vertical	312	247	312	193	84		114		61	44	114	84	29	19	19	12
Horizontal Curvature																
-Minimum Radius (ft)	3620' (desired) 2210' (min)	3150' (desired) 1810' (min)	3620' (desired) 2210' (min)	2710' (desired) 1480' (min)	1120'	758'	1400'	960'	878' (desired) 587' (min)	672' (desired) 444' (min)	1400' (desired) 960' (min)	1120' (desired) 758' (min)	485' (desired) 314' (min)	336' (desired) 214' (min)	336' (desired) 214' (min)	214' (desired) 134' (min)
-Maximum Superelevation**	6% (desired) 8% (maximum)		6% (desired) 8% (maximum)		7.2%	8.0%	7.2%	8.0%	8.0%		7.2% (desired) 8% (maximum)		8.0%		8.0%	
Vertical Clearance																
-Over highways & local roads with interchanges	16'-4"		16'-4"		16'-4"		16'-4"		16'-4"		16'-4"		16'-4"		16'-4"	
-Over local roads (no interchange)	15'-4"		15'-4"		15'-4"		15'-4"		15'-4"		15'-4"		15'-4"		15'-4"	
Minimum Curb Return Radii (ft)	N/A		N/A		N/A		N/A		N/A		N/A		60 (w/sho.), 75 (w/curb)		N/A	
Clear Zone (ft)* **	34'		34'		24'	20'	24'		24' (20' min.)	24' (16' min.)	24'	24' (20' min.)	24' (16' min.)	24' (16' min.)	24' (16' min.)	16'

Sources:

2018 AASHTO Green Book

2014 KDOT Road Manual

2006 AASHTO Roadside Design Guide

* Rt. & Lt. Is referenced looking in the direction of traffic

** Use e_{max} = 8% table in 2018 Green Book

*** Values for 6:1 or flatter fill slopes. Use higher range values from RDG table 3.1 for grading variants.

¥ Minimum Design Speed South of 167th St & US-69

† Use Mainline Design Speed for exits with decision lane

†† Use 55mph (Desirable) for C-D Road Entrances

Design Criteria - US-69 Corridor

KDOT Project No. - 69-46 KA-5700-02
Overland Park Project No. 73898
February 22, 2021

Alignment Name **Alignment Number** **Design Feature**	**College Blvd** College Blvd	**119th St** 119th St	**135th St** 135th St	**139th St** 139th St	**151st St** 151st St	**159th St** 159th St	**167th St** 167th St
Design Speed (mph)	45	45	45	30	35	45	45
Current Posted Speed (mph)	45	45	45	30	35	45	45
Typical Section							
-Lane Width							
-Inside Ramp Terminals (ft)	12'	12	12	N/A	12	12	12'
-Outside Ramp Terminals (ft)**	11.5'/11'/11'/13'	11.5'/11'/13'	11.5'/11'/13'	16'	11.5'/11'/13'	11.5'/11'/13'	11.5'/13'
-Shoulders (ft)							
-Inside (Lt.)**	O.P. Type E Curb	O.P. Type E Curb	O.P. Type E Curb	N/A	O.P. Type E Curb	O.P. Type E Curb	O.P. Type E Curb
-Outside (Rt.)**	O.P. Type B Curb	O.P. Type B Curb	O.P. Type B Curb	O.P. Type B Curb	O.P. Type B Curb	O.P. Type B Curb	O.P. Type B Curb
-Sidewalks							
-Location	2 sides	2 sides	1 sides	2 sides	2 sides	2 sides	2 sides
-Width (ft)	5'	5'	10'	5'	5'	5' (s/w) & 10' (hike/bike)	5' (s/w) & 10' (hike/bike)
-Cross Slope	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Alignment							
-Percent Grade							
-Minimum	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
-Maximum	6.00%	6.00%	6.00%	8.00%	6.00%	6.00%	6.00%
-Min. Stopping Sight Dist. (ft)	360	360	360	200	360	360	360
-Min. K Value							
-Sag Vertical	79	79	79	37	79	79	79
-Crest Vertical	61	61	61	19	61	61	61
-Horizontal Curvature							
-Minimum Radius (ft)	1050'	1050'	1050'	350'	1050'	1050'	1050'
-Normal Crown	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Entrances							
-Profiles							
-Min. Grade from back of curb	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
-Max. Grade from back of curb	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
-Grade across sidewalks	2% (max) 1% (pref)	2% (max) 1% (pref)	2% (max) 1% (pref)	2% (max) 1% (pref)	2% (max) 1% (pref)	2% (max) 1% (pref)	2% (max) 1% (pref)
-Widths							
-Commercial**							
-Max. for Single Entrance (ft) (b-b)	35	35	35	35	35	35	35
-Max. per Entrance- Divided (ft) (b-b)	28	28	28	28	28	28	28
-Min. per Entrance- Divided (ft) (b-b)	18	18	18	18	18	18	18
-Min. Median- Divided (ft) (b-b)	8	8	8	8	8	8	8
-Min. Return Radii (ft)	15	15	15	15	15	15	15
-Residential**							
-Min. width (ft)	16	16	16	12	16	16	16
-Max. width on Thoroughfare (ft)	35	35	35	35	35	35	35
-Wing on Thoroughfare (ft)	6	6	6	N/A	6	6	6
-Return Radii (ft)	-	-	-	-	-	-	-
Vertical Clearance							
-Over highways & local roads w/ I/C (ft)	16'-4"	16'-4"	16'-4"	N/A	16'-4"	16'-4"	16'-4"
-Over local roads (ft)	15'-4"	15'-4"	15'-4"	15'-4"	15'-4"	15'-4"	15'-4"
Curb Return Radii							
-Minimum Radius (Standard) (ft)	25.0	25.0	25.0	25.0	25.0	25.0	25.0
-Minimum Radius at Thoroughfare (ft)	50.0	50.0	50.0	N/A	50.0	50.0	50.0
Clear Zone between ramp terminals (ft)	20.0	20.0	20.0	16.0	16.0	20.0	20.0

Notes:
Design Criteria based on 2018 AASHTO Green Book
*KDOT Road Manual - 2014
**Side streeets will be designed to Overland Park City standards
https://www.opkansas.org/city-services/building-construction/civil-engineering/construction-standards/

Exception #	Location	Description	Criteria	Exception	Reason	
1	I-435	Shoulder Width	10' (3.0m to match existing)	5.0' (median shoulder, min at pier location)	Localized to flyover bridge pier (~270'), to meet would require shifting and reconstruction/widening of all I-435 lanes including parallel ramp lanes through the US-69 bridge group (~1800', 4 lanes EB, 4-5 lanes WB + ramp lane).	
2	Ramp 69N-435W	Horizontal Stopping Sight Distance	Min 425' (50mph)	283' (38.0mph)	Cost prohibitive to widen bridge to obtain HSSD for 50mph. Greenbook value for lower range of allowable ramp speeds with mainline at 70mph is 35mph	FHWA
3	Ramp 69N-435E	Horizontal Stopping Sight Distance	Min 425' (50mph)	350 (44.2mph)	Improvements are matching existing conditions and it's cost prohibitive to widen a retaining wall. Greenbook value for lower range of allowable ramp speeds with mainline at 70mph is 35mph	
4	US-69	Shoulder Width	12'	8' (median shoulder)	Existing and future I-435 flyover bridge piers restrict ability to obtain full shoulder width while also accomodating express lane buffer (~900')	
5	US-69	Shoulder Width	12'	8' (median shoulder)	Existing infrastructure restricts ability to obtain full shoulder width while also accomodating express lane buffer (~1200' at north end of ETL)	
6	US-69	Shoulder width	12'	7' (southbound outside), 11' (southbound inside)	Existing bridge piers over 132nd St., bridge is not being replaced.	
7	US-69	Shoulder width	12'	10' (southbound outside), 10' (southbound inside), 8' (northbound outside)	Existing bridge piers over Antioch, bridge is not being replaced.	KDOT
8	US-69	Maximum Grade	Max 3%	4.56% (match existing)	Avoid excessive fill at Indian Creek or excessive cut at 119th.	
9	Interim Ramp 69N-435W	Maximum Grade	Max 5%	6.00%	Utilized to match with existing grade (loop ramp)	
10	Ramp 435E-69N	Maximum Grade	Max 5%	6.00%	Utilized to tie in with US 69N (loop ramp)	
11	Ramp 69N-119th	Maximum Grade	Max 5%	6.50%	Avoid excessive grading impacts and tie into 119th St	
12	Ramp 119th-69S	Maximum Grade	Max 5%	6.00%	Avoid excessive grading impacts and tie into 119th St	
13	135th St.	Minimum Grade	Min 1%	0.50%	Matching existing grade	
14	US-69 (Northbound)	Horizontal Stopping Sight Distance	Min 730' (70mph)	567' (59.8mph)	To meet min, would need 26' inside shoulder or flatten curve & lengthen bridges substantially (ROW impacts). Meets criteria for 59mph, will be posted 65mph	