

TRAFFIC IMPACT ANALYSIS

HERMANTOWN INDUSTRIAL

HERMANTOWN, MINNESOTA

REPORT CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Jacob Rojer, P.E., PTOE
License No. 56767

3-27-2026
Date

Approved _____
St. Louis County Traffic Engineer

Date

Approved _____
MnDOT Traffic Engineer

Date

Approved _____
Hermantown City Engineer

Date

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INTRODUCTION

Kimley-Horn was retained to prepare a Traffic Impact Analysis (TIA) for the proposed Hermantown Industrial development located in Hermantown, Minnesota. The site is located at the southwest corner of Morris Thomas Road & Midway Road. An aerial view of the study location and surrounding roadway network is presented in **Exhibit 1** in **Appendix A**.

As part of this study, the existing roadway network was analyzed to determine the current operations at the study intersections. In order to assess the impact of the development scenarios on the area roadway network, site-generated trips were established and added to the background traffic volumes. Background traffic volumes included the other major development projects in the vicinity. Future traffic conditions were evaluated for the potential Opening Year of the proposed development (2030) and a long-term “Design Year” (2045). Background conditions were analyzed for each study year, along with the “build” conditions of the two development scenarios. Additionally, an Existing (2025) conditions traffic analysis was conducted.

This report presents and documents data collection, summarizes the evaluation of existing and projected future traffic conditions on the surrounding roadways, and identifies recommendations to address the potential impact of site-generated traffic on the adjacent roadway network.

STUDY AREA

The development site is located at the southwest corner of Morris Thomas Road & Midway Road in Hermantown, MN. The site is largely undeveloped with the exception of an electrical substation and sparse residential and commercial buildings along the edges of the site.

EXISTING ROADWAY CHARACTERISTICS

The existing roadway network near the site includes multiple County State Aid Highways (CSAHs), a US Highway, and some minor local roads. The following provides a description of the roadways near the study area:

Midway Road (CSAH 13) is a north-south two-lane St. Louis County roadway located along the eastern boundary of the AUAR study area. The annual average daily traffic (AADT) according to the MnDOT Traffic Mapping Application is 7,111 vehicle per day south of St. Louis River Road, as of 2024. Midway Road is classified as a Minor Arterial and the posted speed limit is 55 miles per hour (mph) near the project site.

United States Highway 2 (US 2) is an east-west two-lane United States highway located northeast of the AUAR area. The MnDOT Traffic Mapping Application reports an AADT of 5,466 vpd west of St. Louis River Road, as of 2025. US Highway 2 is classified as a Principal Arterial, and the posted speed limit is 60 mph near the project site.

Morris Thomas Road (CSAH 56) is an east-west two-lane St. Louis County roadway that forms the northern boundary of the AUAR area. The MnDOT Traffic Mapping Application reports an AADT of 1,195 vehicles per day west of Midway Road, as of 2024. Morris Thomas Road is classified as a Major Collector, and the posted speed limit is 55 mph.

Saint Louis River Road (CSAH 19) east of Midway Road or **County Road 696** west of Midway Road is an east-west two-lane road located south of the AUAR area. The MnDOT Traffic Mapping Application reports an AADT of 508 vpd in 2024. Saint Louis River Road is classified as a minor collector east of Midway Road and a local road west of Midway Road, with a posted speed limit is 55 mph.

Old Highway 2 is an east-west unpaved local road located northeast of the AUAR area. The MnDOT Traffic Mapping Application reported an AADT of 760 vpd in 2019 though is likely much lower than this because the connection to US 2 has since been removed.

The existing geometry and intersection control for the intersections in the study area that will be included in this analysis are shown in **Exhibit 2**.

PLANNED ROADWAY IMPROVEMENTS

St. Louis County is currently in the planning stages of looking at concepts for future roadway improvements along Midway Road to provide grade separation from the rail lines. With the unknown nature of the potential future improvements, no background roadway modifications are assumed for this analysis. Any traffic analysis conducted after roadway improvement plans have been determined should include consideration of the planned improvements.

RAILROAD CROSSING CONDITIONS

There are two railroad crossings within the study area. The north railroad crossing is located on Midway Road, approximately 430' north of Morris Thomas Road. The south railroad crossing is located at the intersection of Midway Road & St. Louis River Road. Both railroad crossings include crossing signals with arms (the south crossing has crossing signals with arms at all four intersection approaches). The north crossing is located approximately 1,000' south of the Midway Road & US Highway 2 intersection.

A count of the trains crossing passing through each of the two railroad crossings was conducted to determine the scale of the impact that the railroad crossings pose to the traffic in the study area. The north railroad crossing saw 12 trains pass-through in the 24-hour period from 12:00 PM on April 9 to 12:00 PM on April 10. The south railroad crossing saw 9 trains pass-through during the same period. The count of the railroad crossings indicated that the flow of trains through both crossings is generally consistent throughout the day without distinct peaks or lulls. However, it should be noted that per the Minnesota Railer Viewer Application, the two crossing locations can have up to 30 trains per day.

Railroad crossings at the crossing point north of Morris Thomas Road were found to typically take 3-5 minutes. Of the 12 observed railroad crossings, the longest crossing took just under 10 minutes, and the shortest crossing took 2 minutes and 15 seconds. Overall, crossings exhibited an average duration of 4 minutes and 10 seconds and a median duration of 3 minutes and 38 seconds.

MnDOT provided railroad crossing data for June-October 2025 for the Morris Thomas Road crossing. The data showed a total of 2,732 crossings during the 5-month/152-day period. This equates to 18 crossings per day. Using the crossings timestamp data, the calculated median crossing duration was 4 minutes and 17 seconds and the 95th percentile crossing duration was 7 minutes 37 seconds.

The number of 5-minute and 10-minute railroad crossing events are shown below in **Table 1**. In the 5-month span, 649 crossings were at least 5 minutes in duration (24% of total), and 50 crossings were at least 10 minutes in duration (2% of total). The number of 10-minute crossing events annually is projected to be 120 (about one per 3 days). Only one 10-minute crossing event occurred during the AM peak hour between June and October 2025.

Table 1: Number of Railroad Crossing Events by Duration

Event Type	Crossing Count Data (June - October 2025)		Projected Annual Events
	Number of Events	Percent of Total Events	
5+ Minute Crossing	649	24%	1,558
10+ Minute Crossing	50	2%	120
<i>Total Crossings</i>	<i>2,732</i>	<i>100%</i>	<i>6,557</i>

As is typical, vehicles may experience delays of a few minutes during crossings and long queues are likely to form at these times. It was observed that queues at the north railroad crossing for vehicles traveling southbound on Midway Road reach the US Highway 2 intersection at times, causing queues to form in the westbound left-turn lane, eastbound right-turn lane, and southbound through lane. Queues from the east and westbound turning movements were not observed to block their respective through lanes at any time with adequate remaining queue storage. A future conditions queue analysis for the railroad crossing was conducted as part of this report (see the *Railroad Crossing Queue Analysis* section below).

VOLUME DEVELOPMENT

Kimley-Horn conducted a review of the study area including existing land uses in the surrounding area, the adjacent street system, current traffic volumes and operating conditions, lane configurations and traffic controls at nearby intersections, and other key roadway characteristics. This section of the report details information on the existing conditions.

EXISTING TRAFFIC VOLUMES

Turning Movement Counts (TMCs) were collected at five (5) study intersections in April 2025, with the PM peak (4:00 PM to 6:00PM) collected on Wednesday, April 9, and the AM peak (7:00 AM to 9:00 AM) collected on Thursday, April 10. The five study intersections are as follows:

- US Highway 2 & Midway Road
- Midway Road & Morris Thomas Road
- Midway Road & St. Louis River Road
- US Highway 2 & Morris Thomas Road
- US Highway 2 & St. Louis River Road

The TMC data indicates that peak hour traffic volumes occur within the study area from 7:15 to 8:15 AM and 4:15 to 5:15 PM on a typical weekday. Full turning movement count data is included in **Appendix A**. The Existing (2025) traffic volumes are shown in **Exhibit 3**.

FUTURE BACKGROUND GROWTH

To account for background growth caused by change in local and regional travel patterns and future developments, a background growth rate was utilized. Historical Annual Average Daily Traffic (AADT) data was compiled with MnDOT's ESAL worksheet and used to calculate historical growth rates along each roadway, which are adjusted for local demographic patterns. The Existing AADT for each roadway and the demographically adjusted growth rates are given in **Table 2**.

Table 2: Demographically Adjusted Growth Rates

Roadway Name	Location on Roadway	Existing AADT	Growth Rate
US Highway 2	East of Midway Road	6,200	0.5%
	West of Midway Road	3,000	0.5%
Midway Road	South of St Louis River Road	7,000	1.1%
Morris Thomas Road	West of Midway Road	1,200	0.6%
	East of US Highway 2	1,800	0.5%
St Louis River Road	East of Midway Road	1,900	0.6%
Average Growth Rate			0.6%

Based on a review of historical AADT trends, the study area roadways are generally projected to see slow growth. The average demographically adjusted growth rate was found to be about 0.6% annual growth. Population projections from the Duluth Superior Metropolitan Interstate Council show that the city of Hermantown is projected to grow from 10,128 in 2021 to 10,672 in 2050, or about 0.2% annual growth. This projection confirms that the area is generally expected to see slow growth and a 0.6% annual growth rate is likely to provide a conservative estimate regarding the level of growth.

FUTURE BACKGROUND DEVELOPMENT

There are no known background developments in the project vicinity. A 0.6% annual background growth provides a conservative estimate for all background traffic growth due to local and regional developments.

FUTURE BACKGROUND TRAFFIC PROJECTIONS

The No-Build traffic volumes for the potential Opening Year (2030) were calculated by growing the Existing (2025) traffic volumes (**Exhibit 3**) by a 0.6% annual growth rate for 5 years. The resultant Potential Opening Year (2030) No-Build traffic volumes are shown in **Exhibit 4**.

The Design Year (2045) No-Build traffic volumes were calculated by growing the Existing (2025) traffic volumes (**Exhibit 3**) by a 0.6% annual growth rate for 20 years. The resultant Design Year (2045) No-Build traffic volumes are shown in **Exhibit 5**.

PROPOSED DEVELOPMENT

The proposed Hermantown Industrial development is within the AUAR development scenario intensity. Site characteristics and estimated trip generation and distribution are described below.

DEVELOPMENT CHARACTERISTICS AND SITE ACCESS

Access to the proposed development would be located along Morris Thomas Road about 0.4 miles west of Midway Road, near the northwest corner of the development site. This access point is anticipated to serve all traffic associated with the proposed development site.

TRIP GENERATION

Site specific trip generation estimates were provided by the developer. The estimates are based on trip generation data collected at similar sites across the country.

The anticipated trip generation for the Hermantown Industrial development at full buildout is shown below in **Table 3**. The development is expected to generate 1,920 daily trips, including 290 trips during the AM peak hour (260 entering and 30 exiting) and 290 during the PM peak hour (30 entering and 260 exiting).

Table 2: Proposed Development Trip Generation

Land Use Description	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Hermantown Industrial	1,920	260	30	290	30	260	290

DIRECTIONAL DISTRIBUTION

The estimated distribution of site-generated traffic on the surrounding roadway network was developed based on a review of area demographics, roadway volumes, and origin-destination data from Replica, a publicly available dataset which utilizes Census data, land use regulations, aggregate mobile data, transaction data, and real estate transaction data to model transportation patterns. Based on the origin-destination data and consideration of the existing traffic patterns and roadway characteristics, the following global distribution was developed:

- 40% to/from southeast on US Highway 2
- 15% to/from north on Midway Road
- 15% to/from south on Midway Road
- 15% to/from east on Morris Thomas Road
- 10% to/from west on Morris Thomas Road
- 5% to/from northwest on US Highway 2

The anticipated site trip distribution for the proposed development is shown in **Exhibit 6**. The site traffic assignment, representing traffic volumes associated with the proposed development at the study intersections, is a function of the estimated trip generation (**Table 2**) as well as the directional distribution listed above. The site trip assignment for Potential Opening Year (2030) Build conditions is shown in **Exhibit 7**. Full Buildout of the development site was included in the 2030 Build conditions.

FUTURE BUILD TRAFFIC PROJECTIONS

The Build traffic volumes for the potential Opening Year (2030) were calculated by adding the total development site trips (**Exhibit 7**) to the Potential Opening Year (2030) No-Build traffic volumes (**Exhibit 4**). The Potential Opening Year (2030) Build traffic volumes are shown in **Exhibit 8**.

The Design Year (2045) Build traffic volumes were calculated by adding the total development site trips (**Exhibit 7**) to the Design Year (2045) No-Build traffic volumes (**Exhibit 5**). The Design Year (2045) Build traffic volumes are shown in **Exhibit 9**.

CAPACITY ANALYSIS

Analysis of the future background conditions was carried out to determine the baseline operating conditions for the potential Opening Year (2030) and the analyzed Design Year (2045) of the proposed development. A review of future traffic growth and planned geometric changes for the study roadways was conducted for the analysis.

ANALYSIS METHODOLOGY

Synchro/SimTraffic 12th edition capacity analysis software was used to evaluate the operating conditions at the study intersections. The capacity of an intersection quantifies its ability to accommodate traffic volumes and is expressed in terms of level of service (LOS), measured in average delay per vehicle. LOS grades range from A to F, with LOS A as the highest (best traffic flow and least delay), LOS E as saturated or at-capacity conditions, and LOS F as the lowest (oversaturated conditions).

The LOS grades shown below, which are provided in the Transportation Research Board's Highway Capacity Manual (HCM), quantify and categorize the driver's discomfort, frustration, fuel consumption, and travel times experienced as a result of intersection control and the resulting traffic queuing. A detailed description of each LOS rating can be found in **Table 4**.

Table 3: Level of Service Grading Descriptions

Level of Service	Description (<i>Highway Capacity Manual</i> , 7 th Edition)
A	Minimal control delay; traffic operates at primarily free-flow conditions; unimpeded movement within traffic stream.
B	Minor control delay at signalized intersections; traffic operates at a fairly unimpeded level with slightly restricted movement within traffic stream.
C	Moderate control delay; movement within traffic stream more restricted than at LOS B; formation of queues contributes to lower average travel speeds.
D	Considerable control delay that may be substantially increased by small increases in flow; average travel speeds continue to decrease.
E	High control delay; average travel speed no more than 33 percent of free flow speed.
F	Extremely high control delay; extensive queuing and high volumes create exceedingly restricted traffic flow.

The range of control delay for each rating (as detailed in the HCM) is shown in **Table 5**.

Table 4: Level of Service Grading Criteria

Level of Service ¹	Average Control Delay (s/veh) at:	
	Unsignalized Intersections	Signalized Intersections
A	0 – 10	0 – 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F ²	> 50	> 80

¹Highway Capacity Manual, 7th Edition

²All movements with a Volume to Capacity (v/c) ratio greater than 1 receive a rating of LOS F.

At side-street stop-controlled intersections, overall delay is not reported, and the worst side street delay is reported in its place. The overall delay at side-street stop-controlled intersections can misrepresent the operating conditions at the intersection since vehicles at free approaches often experience zero delay.

EXISTING (2025) CONDITIONS CAPACITY ANALYSIS

Existing (2025) conditions capacity analysis was conducted to develop an understanding of the baseline operating conditions currently present at the study intersections. Existing geometry and intersection control are shown in **Exhibit 2**, while the Existing (2025) traffic volumes are shown in **Exhibit 3**.

Capacity analysis was conducted in Synchro 12/SimTraffic. The results of Existing (2025) conditions capacity analysis are summarized below in **Table 6**.

Based on the analysis results, all movements at the study intersections currently operate at LOS C or better and all study intersections operate at an overall LOS A or B during the AM and PM peak hours.

The 95th percentile queueing results were reviewed, and all queues are maintained within their provided storage bays with no significant queueing issues anticipated. The SimTraffic analysis reports can be found in **Appendix C**.

Table 5: Existing Year (2025) Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (24.5)	B (18.1)	A (4.3)	B (13.2)	C (22.9)	B (18.2)	A (6.7)	B (12.1)
		WB	C (21.2)	A (9.7)	A (4.9)		C (20.1)	B (13.3)	A (5.4)	
		NB	B (11.6)	B (17.9)	A (4.6)		B (12.2)	B (14.9)	A (4.4)	
		SB	B (11.5)	A (8.3)	A (4.9)		B (11.8)	B (10.7)	A (4.5)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	A (5.1)	-	A (2.2)	A (5.1)	A (6.9)	-	A (3.8)	A (6.9)
		WB	-	-	-		-	-	-	
		NB	A (1.3)	A (2.7)	-		A (3.7)	A (2.4)	-	
		SB	-	A (3.3)	A (2.7)		-	A (4.8)	A (3.6)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.8)	B (10.1)	A (1.8)	B (10.1)	A (6)	A (9.6)	A (1.7)	A (9.6)
		WB	-	A (2.6)	A (2.1)		A (8.7)	A (6)	A (0.9)	
		NB	A (0)	A (0.2)	A (0)		A (1.2)	A (0.2)	A (0)	
		SB	A (0.6)	A (0.6)	A (0)		A (1.7)	A (0.6)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (6.9)	A (6.5)	-	A (6.9)	A (7.5)	A (6.4)	-	A (7.5)
		WB	-	A (1.7)	A (0.1)		-	A (3.1)	A (3)	
		NB	-	-	-		-	-	-	
		SB	A (6.6)	-	A (1.5)		A (6.1)	-	A (2.5)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.7)	A (0.1)	A (4.9)	-	A (0.4)	A (0)	A (3.7)
		WB	A (1.2)	A (0.2)	-		A (1.5)	A (0.4)	-	
		NB	A (4.9)	-	A (2.2)		A (3.7)	-	A (1.9)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS at side street stop-controlled intersections is reported as the worst movement.

POTENTIAL OPENING YEAR (2030) NO-BUILD CAPACITY ANALYSIS

A Potential Opening Year (2030) No-Build Condition analysis was completed to develop an understanding of the baseline operating conditions for the study area in the potential opening year of the proposed development. No geometric changes were assumed in the analysis. The Potential Opening Year (2030) No-Build traffic volumes are shown in **Exhibit 4**. Results of the Potential Opening Year (2030) No-Build conditions capacity analysis are provided in **Table 7**.

Under Potential Opening Year (2030) No-Build conditions, all intersections are expected to continue operating at LOS A or B and all individual movements are anticipated to operate at LOS C or better.

The 95th percentile queueing results were reviewed, and all queues are expected to remain within the provided storage bays with no significant queueing issues anticipated. The SimTraffic analysis reports are provided in **Appendix C**.

Table 6: Potential Opening Year (2030) No-Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (26.9)	C (20.7)	A (4.5)	B (14.1)	C (26.8)	C (20.6)	A (6.1)	B (13.8)
		WB	C (22.5)	B (13.2)	A (5.9)		C (25.7)	B (14.7)	A (5.6)	
		NB	B (11.6)	B (18.1)	A (4.8)		B (12.8)	B (16.8)	A (4.5)	
		SB	B (12.2)	A (8.5)	A (4.6)		B (12.9)	B (12.5)	A (4.8)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	A (5.2)	-	A (2.8)	A (5.2)	A (6.4)	-	A (3.5)	A (6.4)
		WB	-	-	-		-	-	-	
		NB	A (2)	A (2.7)	-		A (4.3)	A (2.6)	-	
		SB	-	A (3.1)	A (2.8)		-	A (5.1)	A (4)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (5.6)	B (10.5)	A (1.7)	B (10.5)	A (6.9)	B (10.9)	A (1.6)	B (10.9)
		WB	-	A (2.6)	A (1.8)		A (5.6)	A (5.7)	A (1.4)	
		NB	A (0.5)	A (0.2)	A (0)		A (2.9)	A (0.2)	A (0)	
		SB	A (1.4)	A (0.6)	A (0)		A (1.1)	A (0.6)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.3)	A (6.7)	-	A (7.3)	A (7.7)	A (6.8)	-	A (7.7)
		WB	-	A (1.8)	A (1.6)		-	A (3.4)	A (1.5)	
		NB	-	-	-		-	-	-	
		SB	A (5.1)	-	A (1.3)		A (5.1)	-	A (2.5)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.6)	A (0)	A (4.2)	-	A (0.5)	A (0)	A (5.4)
		WB	A (1.6)	A (0.1)	-		A (1)	A (0.3)	-	
		NB	A (4.2)	-	A (2.5)		A (5.4)	-	A (1.5)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS at side street stop-controlled intersections is reported as the worst movement.

POTENTIAL OPENING YEAR (2030) BUILD CONDITIONS CAPACITY ANALYSIS

The Potential Opening Year (2030) Build conditions capacity analysis was conducted to determine the traffic impacts of the proposed Build development on the operations of the adjacent roadway network in the potential opening year of the proposed development. Existing (2025) intersection control, geometry, and signal timings were assumed for the analysis. Potential Opening Year (2030) Build traffic volumes are shown in **Exhibit 8**. The results of the Potential Opening Year (2030) Build analysis are shown below in **Table 8**.

Based on the results of the Potential Opening Year (2030) Build conditions analysis, all intersections and movements are anticipated to operate at LOS C or better.

SimTraffic queueing results were reviewed and all 95th percentile queues are anticipated to remain within their respective storage bays. SimTraffic reports are included in **Appendix C**.

Table 7: Potential Opening Year (2030) Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (33.9)	C (29.7)	A (6.6)	B (19.1)	C (33)	C (22.9)	A (6.6)	B (13.7)
		WB	C (29.4)	B (11.3)	A (6)		C (25.2)	B (14.1)	A (6)	
		NB	B (15)	C (23)	A (5.7)		B (14.3)	B (17.7)	A (5.5)	
		SB	B (17.6)	B (12.8)	A (4.6)		B (13.3)	B (13)	A (4.4)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	B (10.1)	A (0.4)	A (4.7)	B (10.1)	C (16.8)	-	B (13.6)	C (16.8)
		WB	-	-	-		-	-	-	
		NB	A (5.5)	A (5.3)	-		A (4.3)	A (3.6)	-	
		SB	-	A (5.7)	A (3.3)		-	A (5.9)	A (4.1)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6)	B (10.4)	A (1.9)	B (10.4)	A (8.5)	B (11.8)	A (1.1)	B (11.8)
		WB	-	A (3)	A (1.9)		A (6.3)	A (6.2)	A (2.8)	
		NB	A (1.8)	A (0.3)	A (0)		A (1.8)	A (0.3)	A (0)	
		SB	A (1.2)	A (0.6)	A (0)		A (1.7)	A (1.2)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.9)	A (7.2)	-	A (7.9)	B (10.8)	A (9.8)	-	B (10.8)
		WB	-	A (2.7)	A (2.2)		-	A (3.5)	A (3.1)	
		NB	-	-	-		-	-	-	
		SB	A (5.6)	-	A (2.1)		A (8.1)	-	A (2.6)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.8)	A (0)	A (8.6)	-	A (0.7)	A (0)	A (7.3)
		WB	A (1.8)	A (0.5)	-		A (1.8)	A (0.5)	-	
		NB	A (8.6)	-	A (2.8)		A (7.3)	-	A (2.8)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	A (1.1)	A (0.1)	A (9.5)	-	A (1.7)	A (0)	A (6.5)
		WB	A (2.5)	A (2.8)	-		A (0.5)	A (0.5)	-	
		NB	A (9.5)	-	A (2.9)		A (6.5)	-	A (4.5)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS in side street stop-controlled intersections is reported as the worst movement.

DESIGN YEAR (2045) NO-BUILD CAPACITY ANALYSIS

The Design Year (2045) No-Build Condition analysis was completed to develop an understanding of the baseline operating conditions for the study area in the long-term without the addition of proposed development traffic. Existing (2025) intersection control, geometry and signal timings were utilized in the analysis. The Design Year (2045) No-Build Traffic Volumes are shown in **Exhibit 6**. Results of the Design Year (2045) No-Build capacity analysis are included below in **Table 9**.

All movements at the study intersections are expected to operate at LOS C or better during the AM and PM peak hours. All study intersections are anticipated to continue operating at an overall LOS A or B. Overall, the increases in delay due to background growth are minimal and operations are expected to remain acceptable through the Design Year (2045) with no modifications to the study area intersections.

The 95th percentile queueing results were reviewed and all 95th percentile queues are expected to be maintained within their provided storage bays. The SimTraffic reports are included in **Appendix C**.

Table 8: Design Year (2045) No-Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	C (25.6)	C (21.2)	A (4.8)	B (15)	C (28.2)	C (22.2)	A (6.7)	B (14.8)
		WB	C (24.7)	B (13.5)	A (6.3)		C (26.7)	B (15.1)	A (6)	
		NB	B (11.1)	B (19.7)	A (4.8)		B (14.6)	B (18.7)	A (4.7)	
		SB	B (14.1)	A (9.4)	A (4.1)		B (14.7)	B (12.7)	A (4.4)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	A (6.2)	-	A (3.3)	A (6.2)	A (8.7)	-	A (4.4)	A (8.7)
		WB	-	-	-		-	-	-	
		NB	A (2.5)	A (2.9)	-		A (5.4)	A (3)	-	
		SB	-	A (3.4)	A (2.8)		-	A (5.6)	A (4.1)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.6)	B (10.8)	A (2.4)	B (10.8)	A (6.5)	B (11.2)	A (2)	B (11.2)
		WB	-	A (2.2)	A (1)		A (5.4)	A (6.3)	A (2.6)	
		NB	A (0.7)	A (0.2)	A (0)		A (1)	A (0.2)	A (0)	
		SB	A (1.9)	A (0.6)	A (0)		A (1.2)	A (0.7)	A (0.1)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.7)	A (6.7)	-	A (7.7)	A (8)	A (6.6)	-	A (8)
		WB	-	A (2)	A (1.7)		-	A (3.3)	A (1.6)	
		NB	-	-	-		-	-	-	
		SB	A (5.7)	-	A (1.8)		A (5.2)	-	A (2.9)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.7)	A (0)	A (5.6)	-	A (0.5)	A (0)	A (4.4)
		WB	A (1.9)	A (0.3)	-		A (1.5)	A (0.4)	-	
		NB	A (5.6)	-	A (3)		A (4.4)	-	A (1.9)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS in side street stop-controlled intersections is reported as the worst movement.

DESIGN YEAR (2045) BUILD CONDITIONS CAPACITY ANALYSIS

Capacity analysis was conducted for the Design Year (2045) Build conditions to determine the long-term effects of the proposed development. Existing (2025) intersection control, geometry, and signal timings were used for the analysis. The Design Year (2045) Build volumes are shown in **Exhibit 9**. Capacity analysis results for the Design Year (2045) Build conditions are provided in **Table 10**.

Results of the Design Year (2045) Build conditions analysis show that with the addition of long term background growth, delays are generally anticipated to see a minor increase compared to the Potential Opening Year (2030) Build conditions. All study intersections are anticipated to operate at LOS C or better and all individual movements are anticipated to operate at LOS D or better during the AM and PM peak hours. SimTraffic queueing results were reviewed, and all 95th percentile queues are anticipated to remain within their provided storage bays and no significant queueing issues are expected. SimTraffic reports are included in **Appendix C**.

Table 9: Design Year (2045) Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	D (40.5)	C (32.1)	A (7.3)	C (22.1)	C (27.5)	C (25)	A (8)	B (15.4)
		WB	C (31.1)	B (12.3)	A (7.4)		C (26.7)	B (15.6)	A (7.1)	
		NB	B (19.8)	C (27.2)	A (5.9)		B (16.5)	B (19.1)	A (5.7)	
		SB	C (23.8)	B (15.2)	A (3.5)		B (15.6)	B (14.5)	A (4.8)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	B (10.2)	-	A (5.6)	B (10.2)	C (21.2)	-	C (15.8)	C (21.2)
		WB	-	-	-		-	-	-	
		NB	A (6.5)	A (5.9)	-		A (5.7)	A (3.9)	-	
		SB	-	A (5.7)	A (3.7)		-	A (6.6)	A (4.6)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.3)	B (11.3)	A (2.2)	B (11.3)	A (7.9)	B (12.1)	A (1.5)	B (12.1)
		WB	-	A (3.1)	A (1.5)		A (6.4)	A (6.9)	A (4.6)	
		NB	A (0.9)	A (0.4)	A (0)		A (1.2)	A (0.3)	A (0)	
		SB	A (2.4)	A (0.6)	A (0)		A (1.6)	A (1)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (8.6)	A (7.6)	-	A (8.6)	B (11)	A (9.6)	-	B (11)
		WB	-	A (3)	A (2.8)		-	A (3.6)	A (2.2)	
		NB	-	-	-		-	-	-	
		SB	A (5.5)	-	A (2.4)		A (6.9)	-	A (2.9)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.9)	A (0)	A (5.2)	-	A (0.7)	A (0)	A (7)
		WB	A (2.8)	A (0.8)	-		A (2)	A (0.5)	-	
		NB	A (5.2)	-	A (3)		A (7)	-	A (3.1)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	A (1.2)	A (0.2)	A (6)	-	A (1.6)	A (0)	A (5.8)
		WB	A (2.6)	A (2.8)	-		A (0.3)	A (0.5)	-	
		NB	A (6)	-	A (2.8)		A (5.8)	-	A (4.4)	
		SB	-	-	-		-	-	-	

Note: The Overall LOS in side street stop-controlled intersections is reported as the worst movement.

DESIGN YEAR (2045) MITIGATED BUILD CONDITIONS CAPACITY ANALYSIS

It is anticipated that site traffic may be given designated routes to the site to avoid undesirable queueing from train crossings near the US Highway 2 & Midway Road intersection. In particular, all traffic traveling to the site from US Highway 2 south of St. Louis River Road would be instructed to turn take a left onto St. Louis River Road and then a right onto Midway Road, approaching Morris Thomas Road from the south. This would reduce the westbound left turn queueing during train events which could otherwise cause operational issues for through traffic along US Highway 2. The traffic volumes associated with this scenario are shown in **Exhibit 10**.

A capacity analysis was conducted on the Design Year (2045) Mitigated Build conditions to determine the impact of the rerouted site traffic on the roadway network with the proposed mitigation plan in place. Results are shown below in **Table 11**. All study intersections are anticipated to operate at LOS A or B and all individual movements at LOS D or better.

Table 10: Design Year (2045) Mitigated Build Level of Service

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Midway Road & US Highway 2	Signal	EB	D (36.8)	C (25.6)	A (5.4)	B (17.2)	C (29.4)	C (24.5)	A (9.1)	B (14.9)
		WB	C (27.5)	B (11.1)	A (6.7)		C (27)	B (16.1)	A (6.3)	
		NB	B (15)	C (22.2)	A (5.8)		B (15.2)	B (19.2)	A (6.7)	
		SB	B (16.9)	B (10.9)	A (3.9)		B (13.9)	B (13.3)	A (4.9)	
Midway Road & Morris Thomas Road	Signal	EB	C (24.2)	-	A (2.8)	A (7.7)	B (13.2)	A (1.1)	A (5.2)	B (10.2)
		WB	-	-	-		-	-	-	
		NB	A (7.5)	A (6.2)	-		B (10.5)	A (7.5)	-	
		SB	-	A (7)	A (3.9)		-	B (12.1)	A (6.3)	
Midway Road & St Louis River Road	Side Street Stop	EB	A (6.6)	B (11.1)	A (2.8)	B (11.1)	A (8)	B (11.8)	A (1.4)	B (11.8)
		WB	-	A (3.5)	A (4.1)		A (6.9)	A (6.3)	A (2.8)	
		NB	A (0.8)	A (0.5)	A (0)		A (1.7)	A (0.3)	A (0)	
		SB	A (1.8)	A (0.8)	A (0)		A (1.8)	A (1.3)	A (0)	
US Highway 2 & Morris Thomas Road	Side Street Stop	EB	A (7.4)	A (7.2)	-	A (7.4)	B (11)	B (10.3)	-	B (11)
		WB	-	A (2.1)	A (0.5)		-	A (3.5)	A (2.5)	
		NB	-	-	-		-	-	-	
		SB	A (5.3)	-	A (2)		A (7.4)	-	A (3.2)	
St Louis River Road & US Highway 2	Side Street Stop	EB	-	A (0.9)	A (0.1)	B (10.4)	-	A (0.7)	A (0)	A (7)
		WB	A (2.8)	A (0.5)	-		A (1.5)	A (0.4)	-	
		NB	B (10.4)	-	A (3)		A (7)	-	A (3.2)	
		SB	-	-	-		-	-	-	
Morris Thomas Road & Industrial Access	Side Street Stop	EB	-	A (1)	A (0.1)	B (14.5)	-	A (1.6)	A (0)	A (6.5)
		WB	A (2.6)	A (1.4)	-		A (0.9)	A (0.7)	-	
		NB	B (14.5)	-	A (2.6)		A (6.5)	-	A (4.5)	
		SB	-	-	-		-	-	-	

TURN LANE WARRANT ANALYSIS

The need for turn lanes in the study area were evaluated using the methodologies laid out in the National Cooperative Highway Research Program's *Report 457* on the need for major-road turn lanes at side-street stop-controlled intersections. Turn lane warrants were conducted at the proposed Industrial Access point along Morris Thomas Road as well as for the intersection of Midway Road & Morris Thomas Road. Turn Lane Warrant sheets are shown in **Appendix D**.

Under the Potential Opening Year (2030) Build conditions, northbound-left and southbound-right turn lanes are both warranted at the intersection of Midway Road & Morris Thomas Road. These lanes are recommended to be constructed along with the proposed development. The results of the turn lane warrant analysis indicated that neither an eastbound right turn lane nor a westbound left turn lane are warranted at the site access point along Morris Thomas Road. However, St. Louis County will require a left turn lane at the proposed site access point along Morris Thomas Road for due to safety concerns associated with the high number of left turns at the intersection during peak periods.

The intersection of US Highway 2 & St. Louis River Road currently has a bypass lane in place of a left turn bay for the westbound approach. The MnDOT Access Management Manual recommends bypass lanes only in instances when left turn lanes are warranted but construction of a left turn lane is impractical. MnDOT guidelines state that a bypass can be considered instead of a left turn lane when a 2-lane highway has an AADT of more than 6,500 vehicles per day and the cross street has an AADT between 100 and 400 vehicles. As of 2025, the AADT on St. Louis River Road is about 500 which exceeds these guidelines and with the development of the AUAR parcels that AADT will increase.

Because the proposed development site adds westbound left turns the US Highway 2 & St. Louis River Road intersection, a left turn lane should be installed at the intersection to conform with the latest guidance from MnDOT. NCHRP guidelines confirm that a left turn lane is warranted under the Potential Opening Year (2030) Build conditions and that a westbound left turn lane should be installed at this intersection.

RAILROAD CROSSING ANALYSIS

Railroad crossing queues were analyzed using SimTraffic to determine if the provided storage bays along US Route 2 are sufficient for the queues which will occur during railroad crossing events. Railroad crossing analysis was focused on the Existing (2025) conditions and the Potential Opening Year (2030) Build conditions because St. Louis County is exploring alternatives to remove the at-grade railroad crossing in the long term.

As discussed in the *Railroad Crossing Conditions* section above, the majority of railroad crossing events take between 3 and 5 minutes, with the longest event observed taking 10 minutes. To be conservative, analysis was conducted on 10-minute train crossing events to estimate worst case scenario queueing which could occur during under typical traffic conditions.

EXISTING (2025) RAILROAD CROSSING QUEUEING

Analysis was conducted on the Existing (2025) railroad crossing conditions to determine the baseline level of queueing that occurs as a result of 10-minute train crossing events. The analysis indicates that southbound railroad crossing queues during the AM peak generally will not have an impact on the intersection of US Highway 2 & Midway Road due to lower southbound traffic volumes. With higher northbound traffic volumes, the maximum queues for northbound are anticipated to extend 1,346' south of Morris Thomas Road.

The PM Peak hour has higher southbound traffic volumes than the AM peak hour which results in more queueing at the US Highway 2 & Midway Road intersection. The approximate maximum queues for affected movements at the intersection are 75' for eastbound right turns, 167' for westbound left turns, and 1,808' for southbound through. Northbound queues at the railroad crossing extend 1,078' south of Morris Thomas Road. These results are in line with what was observed as part of the existing conditions data collection.

BUILD (2030) RAILROAD CROSSING QUEUEING

During the AM peak hour, a 10-minute crossing event sees queues at the railroad crossing point form less quickly than the PM peak hour due to less traffic volume along Midway Road, but when queues reach the intersection of US Highway 2, queues in the turn lanes (particularly the westbound left turn lane) form quickly due to higher turning volumes. The westbound left turn movement at US Highway 2 & Midway Road is anticipated to see maximum queues of 453' during a 10-minute crossing event in the AM peak. The southbound through movement sees queues of 682' and the eastbound right turn movement sees 93' queues. The 453' westbound queue would extend back to the easternmost access to the retail parcels on the north without blocking it. However, it is recommended that traffic traveling to the site from US Highway 2 south of St. Louis River Road should be routed to turn at St. Louis River Road to avoid the US Highway 2 & Midway Road railroad crossing and reduce potential undesirable queueing in the westbound left turn lane.

During the PM peak hour, a 10-minute crossing event causes queues to form more quickly than the AM peak hour due to greater traffic flow along Midway Road, but queue storage is less of a concern for turning movements since the majority of entering site trips turning eastbound right and westbound left at the intersection occur during the AM peak hour. The westbound left turn movement is anticipated to see maximum queue lengths from a 10-minute crossing event of about 187'. The southbound through movement sees maximum queues of 2,031' and the eastbound right turn movement sees 58' queues. Queueing results for both scenarios are summarized below in **Table 12**.

Table 11: 10-Minute Train Crossing Event Queueing Results

Scenario	Maximum Queue by Movement				
	US Highway 2 & Midway Road			Midway Road & Morris Thomas Road	
	EBR	WBL	SBT	NBT	EBL/R ¹
<i>(Available Queue Storage)</i>	300'	450'	-	-	- / 250'
Existing (2025) Conditions – AM Peak	26'	59'	164'	1,346'	298'
Existing (2025) Conditions – PM Peak	75'	167'	1,808'	1,078'	277'
Build (2030) Conditions – AM Peak	93'	453'	682'	1,504'	432'
Build (2030) Conditions – PM Peak	58'	187'	2,031'	1,349'	1,563'
Build (2030) Conditions Mitigated – AM Peak	72'	204'	626'	1,812'	257'
Build (2030) Conditions Mitigated – PM Peak	44'	142'	1,863'	1,421'	1,169'

¹Dedicated left turn storage (250') was assumed at Midway Road & Morris Thomas Road under Build conditions.

Based on the results of the railroad queueing analysis, the existing storage is anticipated to be sufficient for all maximum queues resulting at the intersection of US Highway 2 & Morris Thomas Road during 10-minute train crossing events except for the westbound left which is at capacity. Rerouting traffic from US Highway 2 southeast of the site onto St. Louis River Road to avoid the US Highway 2 & Midway Road railroad crossing and reduce potential undesirable queueing in the westbound left turn lane.

In review of the MnDOT provided data for the railroad crossing from June through October 2025, a total of 97 railroad crossings occurred during the weekday AM peak hour (7:45 AM to 8:45 AM) when the projected queues for the turn lanes on US 2 are the longest. 97 crossings in the 5 months represents 0.9 events per weekday AM peak. While there are anticipated to be crossings almost every day during the AM peak hour, only 23 crossings exceeded 5 minutes and only 1 crossing in the 5-month time frame was 10 minutes. Therefore, the analysis condition outlined above for a 10-minute train crossing is not anticipated to be a regular occurrence.

Travel demand strategies should be implemented prior to the beginning of construction and will be included in project bid documents, agreements, and notices to sub-contractors, suppliers, and employees.

RAILROAD CROSSING OPERATIONAL ANALYSIS

An operational comparison of the existing side street stop and potential signalization at the intersection of Midway Road & Morris Thomas Road was conducted to determine which traffic control is more appropriate for the intersection. The analysis focused on the worst-case scenario crossing event (10-minutes) for the AM and PM peak hours. For the comparison, two crossing events were analyzed during the peak hours, with 20 minutes between the ending of the first event and the beginning of the second. Analysis results are given below in **Table 13**.

Table 12: Railroad Crossing Operational Analysis (10-minute Queueing Events)

Intersection	Control	Approach	Operations by Movement							
			AM Peak Hour				PM Peak Hour			
			Left	Through	Right	Overall	Left	Through	Right	Overall
Build (2030) with Side Street Stop at Midway & Morris Thomas										
Midway Road & US Highway 2	Signal	EB	C (35)	C (32)	C (30)	D (46)	D (50)	C (30)	D (43)	D (54)
		WB	E (78)	C (25)	A (8)		E (68)	B (20)	A (7)	
		NB	E (57)	E (58)	C (32)		C (30)	C (29)	B (13)	
		SB	D (45)	D (45)	A (7)		F (89)	F (110)	F (81)	
Midway Road & Morris Thomas Road	Side Street Stop	EB	F (199)	-	C (25.1)	F (62)	F (334)	-	F (197)	F (111)
		WB	-	-	-		-	-	-	
		NB	F (73)	F (100)	-		F (96)	F (105)	-	
		SB	-	A (3)	A (3)		-	A (3)	A (1)	
Build (2030) with Signal at Midway & Morris Thomas										
Midway Road & US Highway 2	Signal	EB	D (39)	C (32)	C (27)	D (46)	D (44)	C (30)	D (38)	E (56)
		WB	E (78)	C (27)	A (8)		E (70)	C (21)	A (8)	
		NB	E (56)	E (59)	C (35)		D (38)	D (36)	B (19)	
		SB	D (45)	D (45)	A (5)		F (93)	F (109)	E (78)	
Midway Road & Morris Thomas Road	Signal	EB	F (104)	-	A (7)	E (64)	F (192)	-	F (86)	F (85)
		WB	-	-	-		-	-	-	
		NB	F (83)	-	F (120)		F (111)	F (121)	-	
		SB	-	B (11)	A (6)		-	B (17)	A (6)	

The results of the analysis indicate 10-minute crossing events could cause very high levels of delay at the intersection of Midway Road & Morris Thomas Road, particularly in the PM peak hour. The eastbound left turn movement at this intersection sees severe delays of more than 5 minutes per vehicle due to queueing along Midway Road. With the addition of a signal at Midway Road & Morris Thomas Road, delays at the intersection are anticipated to be reduced by about 24% during the PM peak hour, with eastbound left turn delays reduced to about 3 minutes per vehicle. The overall delay at the intersection sees little change during the AM Peak hour. However, the eastbound left turn movement sees a significant reduction in delay and queueing at this time. The operations at Midway Road & US Highway 2 are relatively unaffected by the installation of a signal at Midway Road & Morris Thomas Road, changing by a few seconds or less during both peak hours.

Due to northbound queues along Midway Road south of the railroad crossing, eastbound queues at Morris Thomas Road dissipate very slowly at the side street stop controlled intersection of these two roads. Queues during the PM peak hour are anticipated to take in excess of 20 minutes to dissipate following a 10-minute train crossing event. The installation of a traffic signal at Midway Road & Morris Thomas Road would allow these queues to dissipate in about half this time (10 minutes).

Based on the anticipated operational benefit of a traffic signal at Midway Road & Morris Thomas Road, along with the potential safety benefits of having a traffic signal near the railroad crossing, it is recommended that a permanent traffic signal be installed at the intersection of Midway Road & Morris Thomas Road under Opening Year (2030) Build conditions. The traffic signal will require railroad crossing preemption to ensure safe crossing conditions as well as coordination with the traffic signal at Midway Road & US Highway 2.

CONCLUSION AND RECOMMENDATIONS

A traffic analysis was performed to quantify the impacts of the proposed development on the adjacent roadway network and study intersections. No-Build, and Build conditions were analyzed in the Potential Opening Year (2030) and the Design Year (2045). An Existing Year (2025) analysis was also conducted.

PROJECT CHARACTERISTICS

The proposed Hermantown Industrial development site is located at the southwest corner of Midway Road & Morris Thomas Road in Hermantown, MN. The proposed development is within the AUAR development scenario intensity. To determine the traffic impacts of the proposed development, the following study intersections were analyzed in the traffic analysis:

- US Highway 2 & Midway Road
- Midway Road & Morris Thomas Road
- Midway Road & St. Louis River Road
- US Highway 2 & Morris Thomas Road
- US Highway 2 & St. Louis River Road

Access to the proposed development is provided via a full-movement intersection along Morris Thomas Road, approximately 0.4 miles west of Midway Road, near the northwest corner of the development site.

BACKGROUND CONDITIONS CAPACITY ANALYSIS SUMMARY

A capacity analysis was conducted for Existing Year (2025) traffic conditions at the study intersections to determine current operating conditions of the roadway network. Based on the analysis, all intersections and individual movements are estimated to operate at LOS C or better.

A capacity analysis was conducted for the Potential Opening Year (2030) No-Build traffic conditions at the study intersections to determine baseline conditions for the 2030 analysis year. Based on the analysis, all intersections and individual movements are anticipated to continue operating at LOS C or better.

A capacity analysis was conducted for the Design Year (2045) No-Build traffic conditions at the study intersections to determine baseline conditions for the 2045 analysis year. Based on the analysis, all intersections and individual movements are anticipated to continue operating at LOS C or better.

BUILD CONDITIONS CAPACITY ANALYSIS SUMMARY

A capacity analysis was conducted for the Potential Opening Year (2030) Build traffic conditions at the study intersection. It was found that the addition of site traffic causes generally minor increases in network delays compared to the Potential Opening Year (2030) No-Build conditions. Turn lane improvements are recommended at the intersection of Morris Thomas Road & Midway Road. Additionally, a signal may be required at the intersection to alleviate queueing during railroad crossing events.

Under Design Year (2045) Build traffic conditions, it was found that with turn lane improvements and a traffic signal installed at the intersection of Midway Road & Morris Thomas Road, all study intersections would operate at LOS C or better and all individual movements would operate at LOS D or better.

MITIGATION PLAN

The following provides a summary of mitigation improvements that were identified as part of the traffic analysis for the proposed development. Based on St. Louis County's review of the proposed development's traffic impacts, the following mitigations will be required as a result of the proposed development:

1. Intersection of Morris Thomas Rd (CSAH 56) and development driveway
 - a. Construct a westbound dedicated left-turn lane on Morris Thomas Road at the driveway.
 - b. Driveway will be stop controlled.
2. Intersection of Midway Rd (CSAH 13) and Morris Thomas Rd (CSAH 56)
 - a. Construct a northbound dedicated left-turn lane on Midway Road at Morris Thomas Road.
 - b. Construct eastbound dedicated left-turn and right-turn lanes on Morris Thomas Road at Midway Road. Storage for the right-turn lane will ensure vehicles are not occluded from accessing the right-turn lane during 95% of the time.
 - c. Construct a southbound dedicated right-turn lane on Midway Road at Morris Thomas Road.
 - d. Install a permanent traffic signal.
 - e. Install conduit/cable to coordinate the signal controller with the railroad crossing controller (USDOT #251905S) and the signal controller at the US 2 signal system.
3. Railroad crossing (DOT #251905S)
 - a. Install a traffic queue cutter signal system that will face southbound Midway Road traffic and be located immediately north of Old Hwy 2
 - b. The need for railroad crossing upgrades will be coordinated with the MnDOT Rail Office (Paul DeLaRosa, paul.delarosa@state.mn.us).
4. Intersection of US 2 and Midway Road (CSAH 13)
 - a. Install conduit/cable to coordinate the signal controller with the railroad crossing controller (USDOT #251905S) and the signal controller at the Midway Road/Morris Thomas Road signal system.
5. Intersection of US 2 and St. Louis River Road
 - a. Construct a northwest bound dedicated left turn lane to accommodate additional site traffic.
6. Signal timing
 - a. Develop optimized signal timing models for both the Midway Road/Morris Thomas Road and US 2/Midway Road signal systems to accommodate non-train and train events.
7. Travel Demand Management (TDM)
 - a. A plan completed prior to the beginning of construction will be included in project bid documents, agreements, and notices to sub-contractors, suppliers, and employees. The TDM plan will direct all traffic traveling to the site from US Highway 2 southeast of St. Louis River Road to turn onto St. Louis River Road and enter from the south along Midway Road instead of turning left onto Midway Road from US Highway 2.
 - b. If the TDM plan does not prove to be effective at limiting queues at Midway Road & US Highway 2, additional mitigation such as variable message signs or other advanced warning during train event could be implemented at US Highway 2 & St. Louis River Road.

APPENDIX

Appendix A: Exhibits

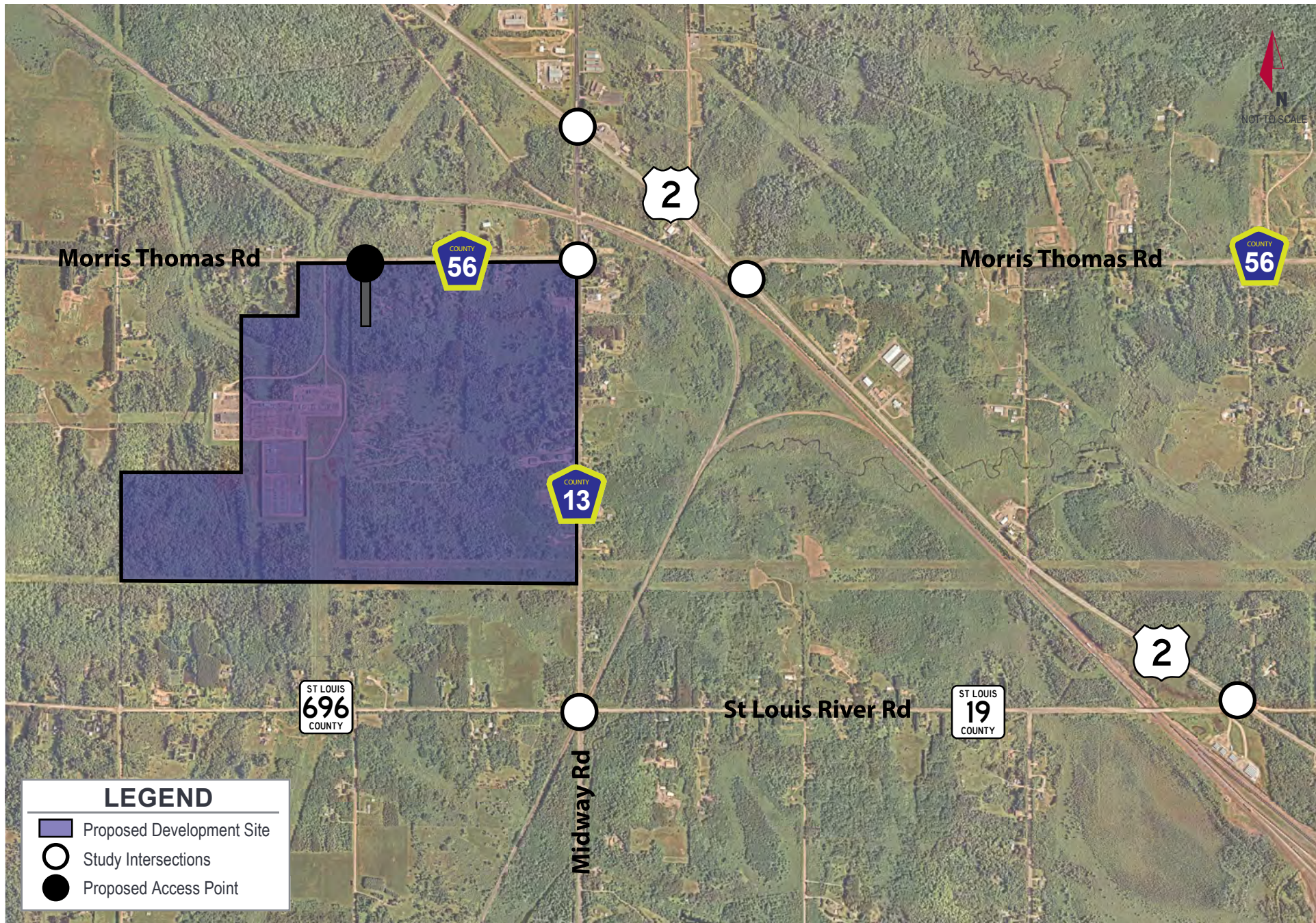
Appendix B: Turning Movement Counts

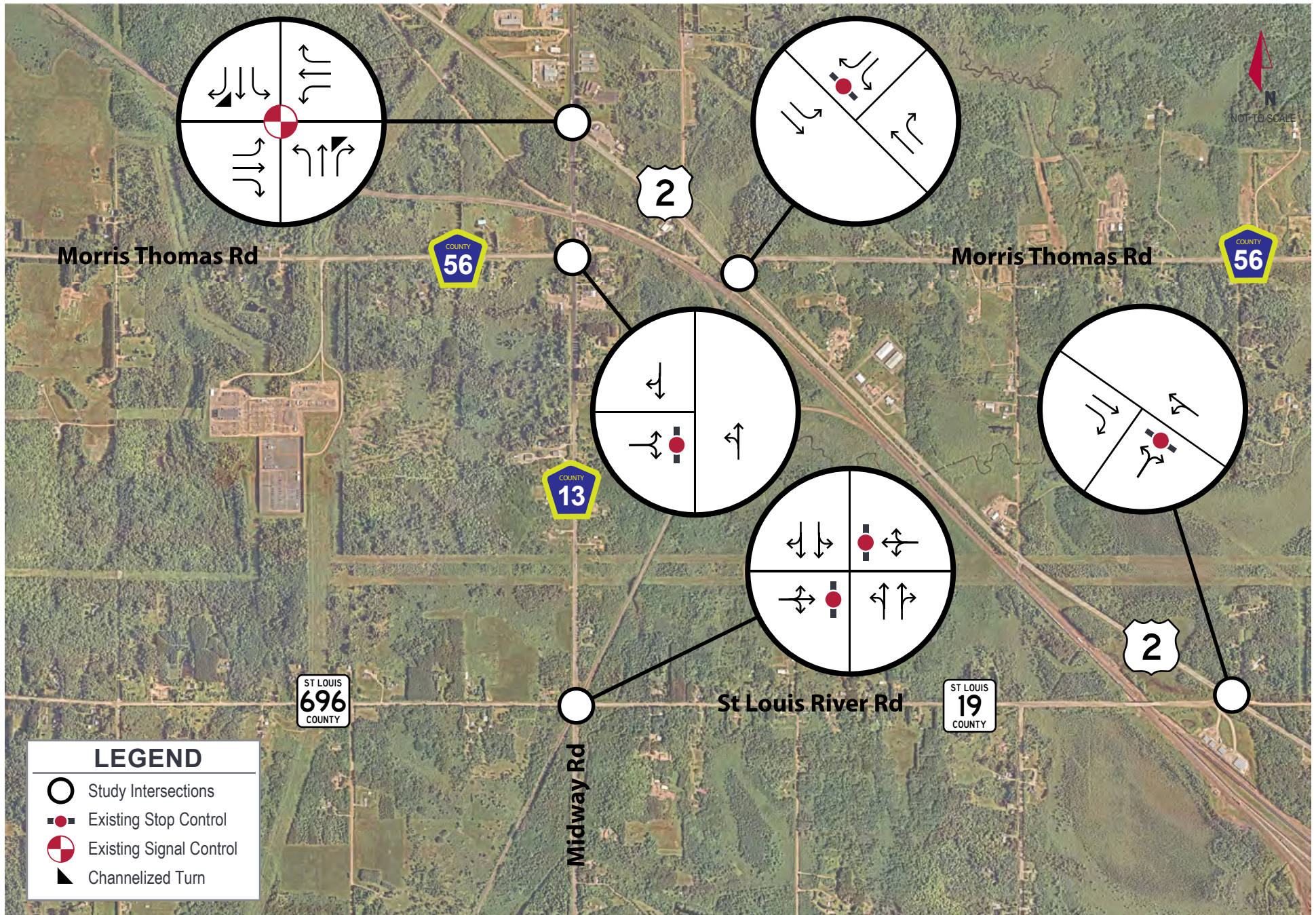
Appendix C: SimTraffic Reports

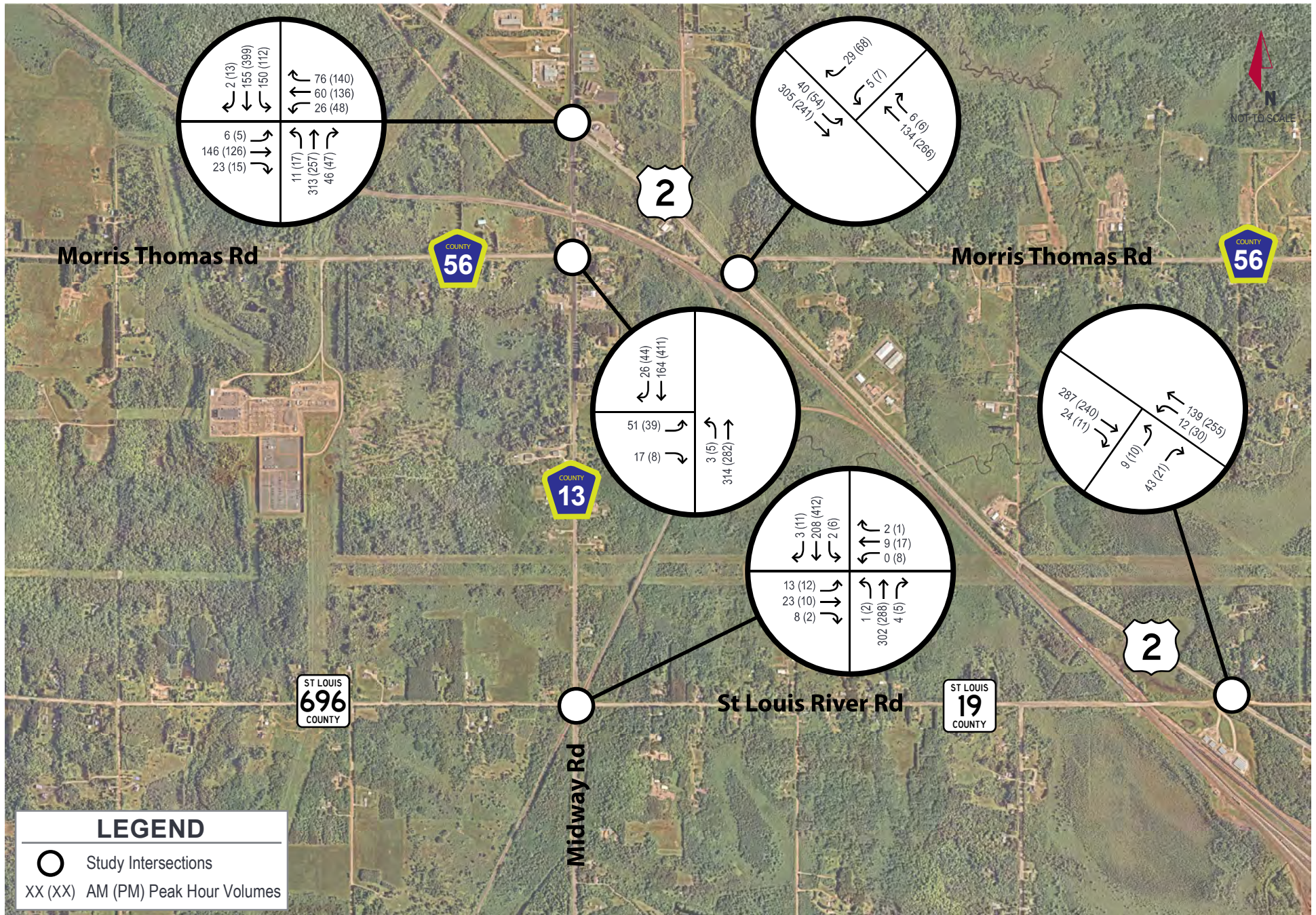
Appendix D: Turn Lane Warrant Sheets

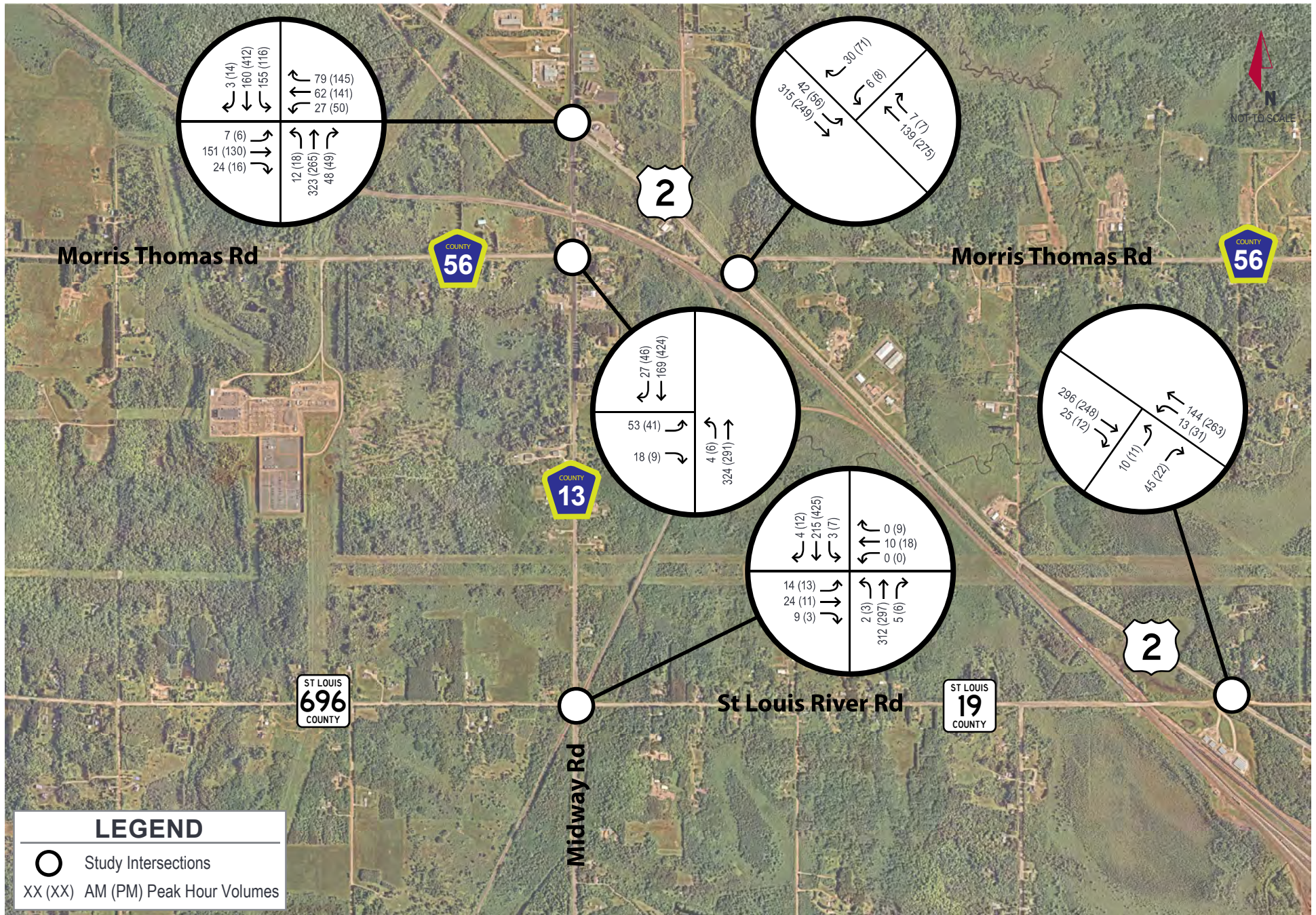
Appendix A:

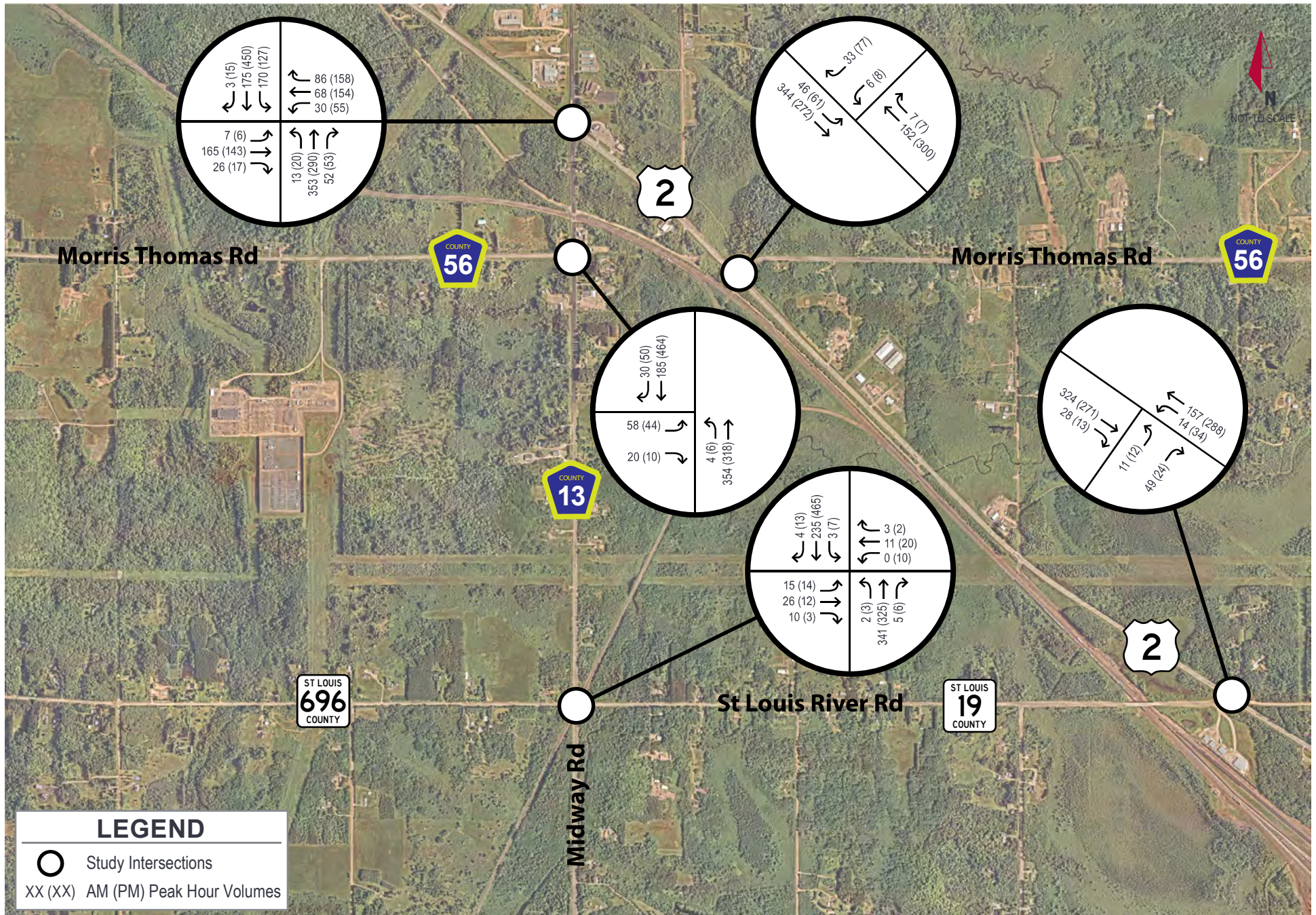
Exhibits

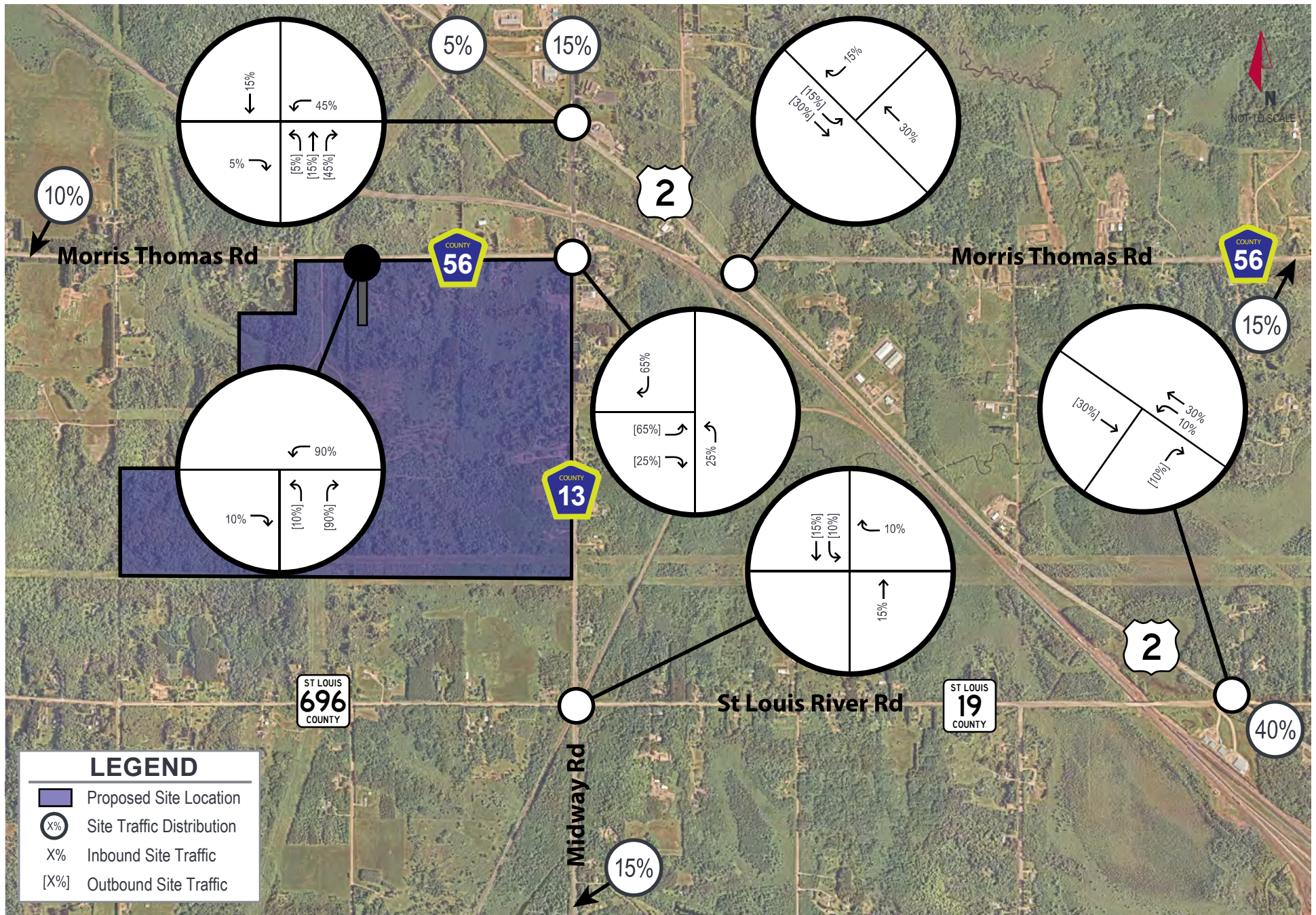


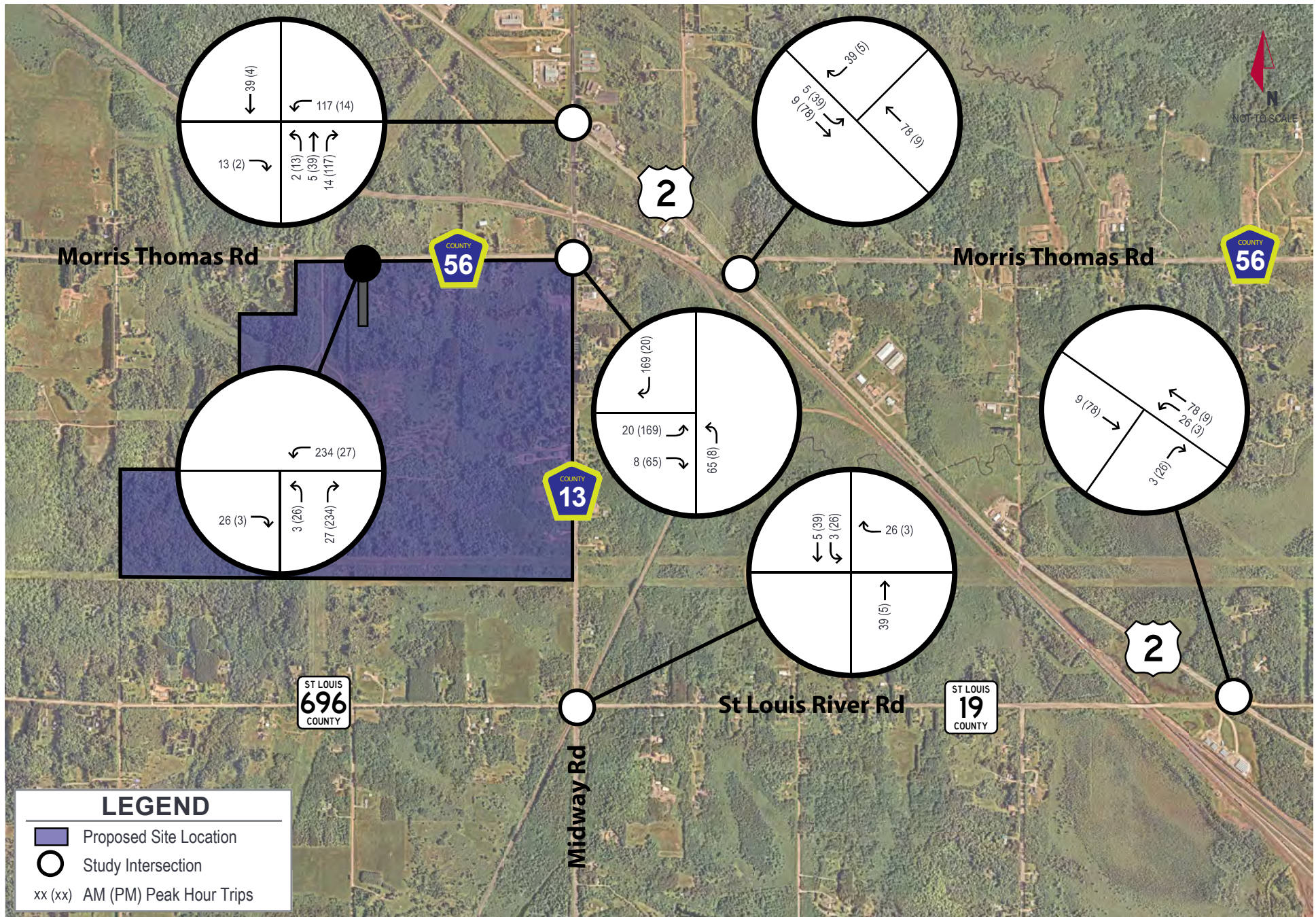


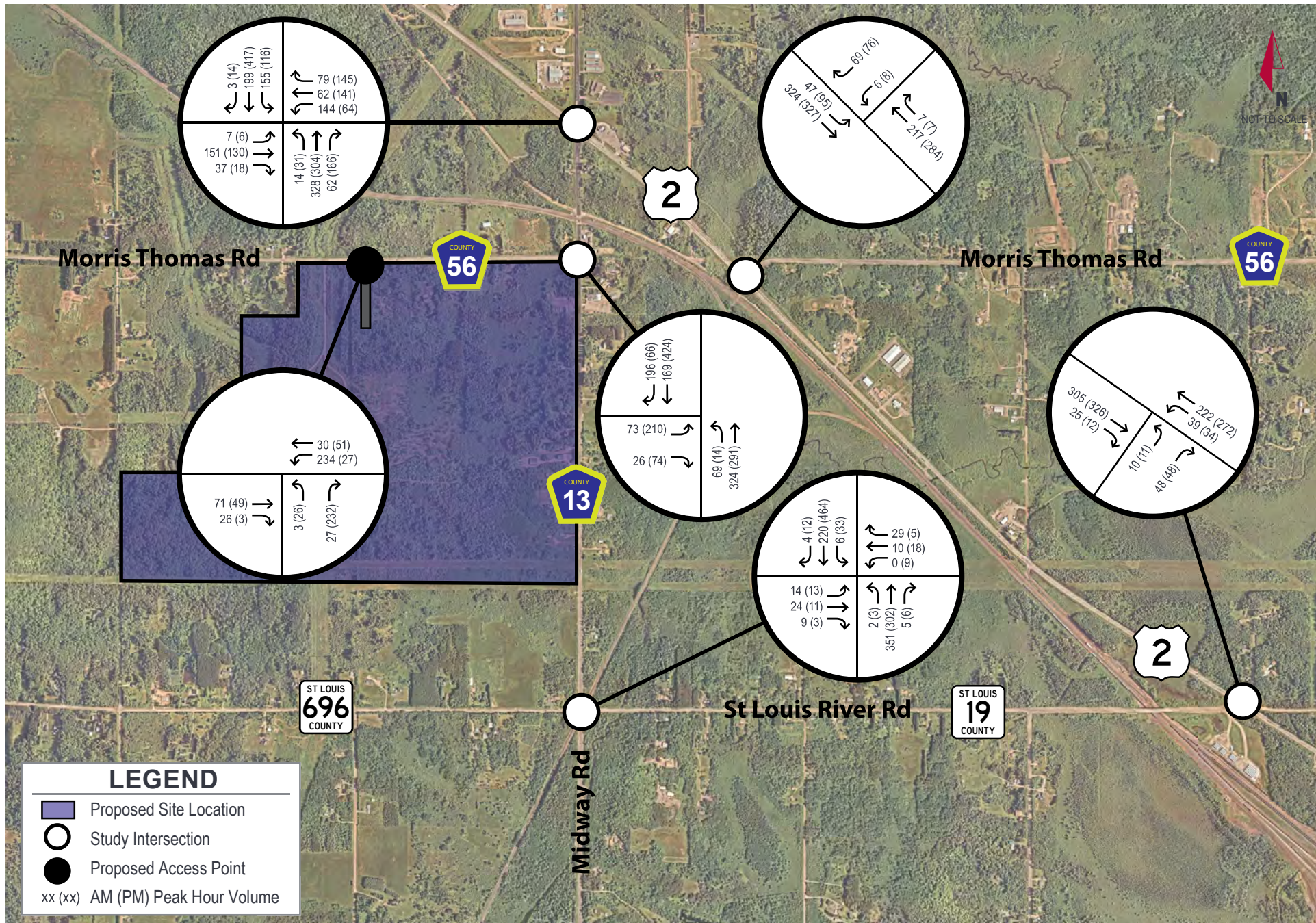


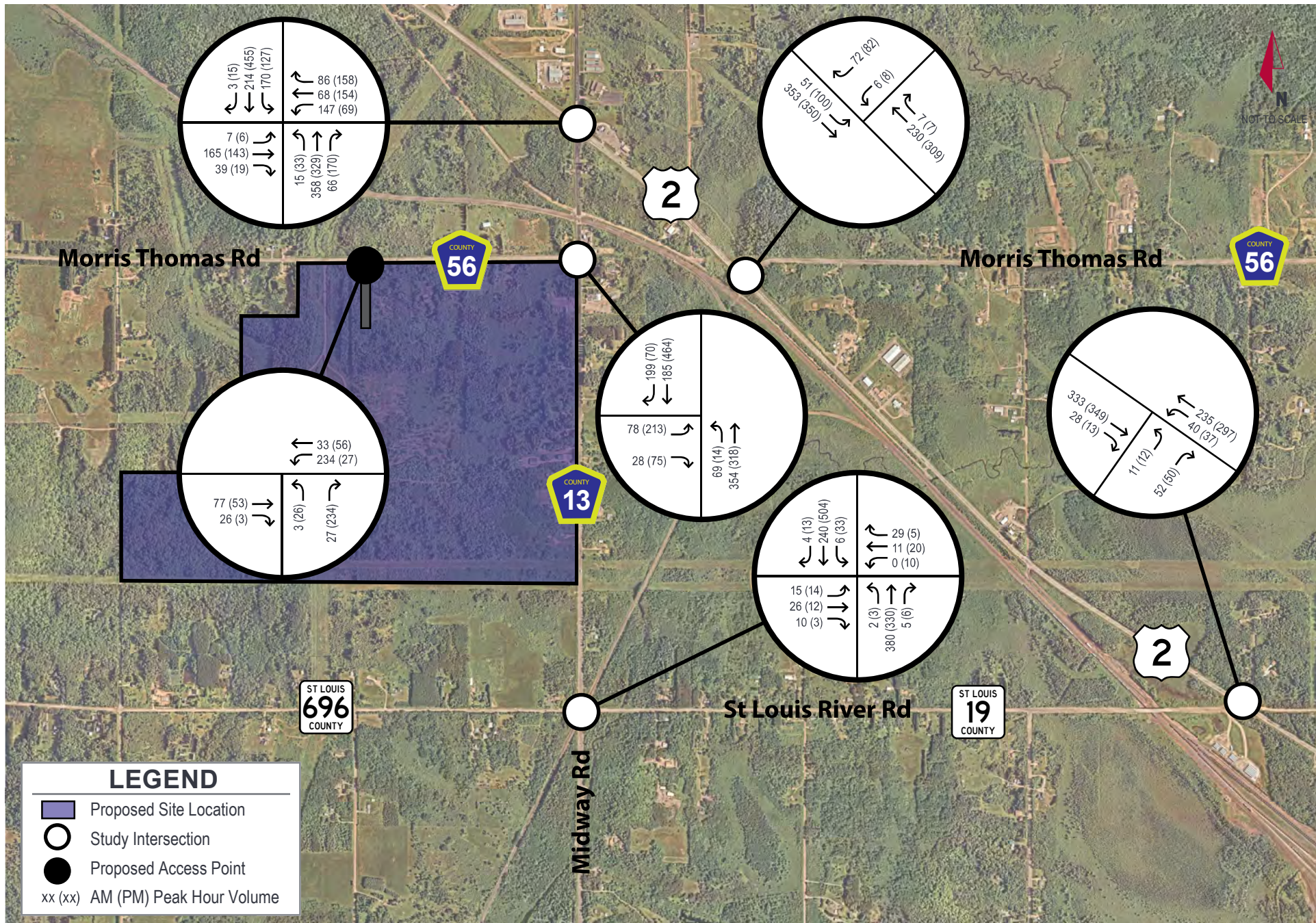












Appendix B:

Turning Movement Counts



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 1

Turning Movement Data

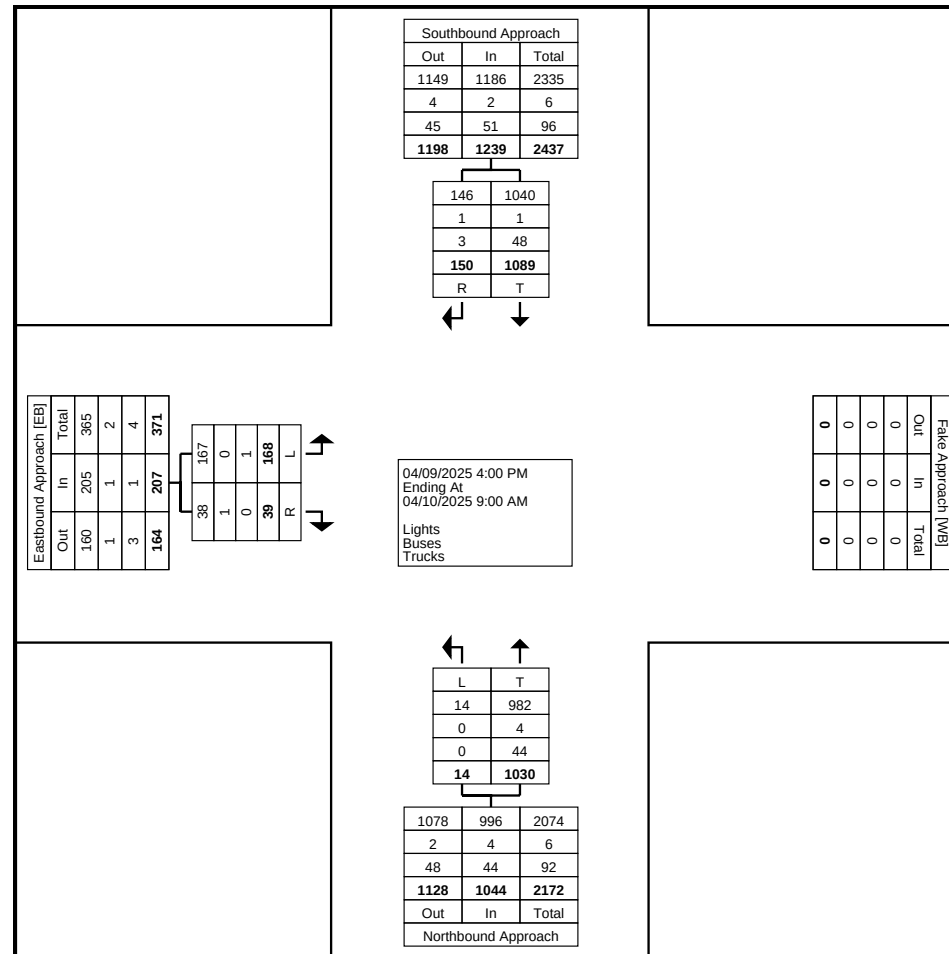
Start Time	Eastbound Approach			Northbound Approach			Southbound Approach			Int. Total
	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	
4:00 PM	13	1	14	4	56	60	109	14	123	197
4:15 PM	13	2	15	0	83	83	83	10	93	191
4:30 PM	11	2	13	1	82	83	116	12	128	224
4:45 PM	6	4	10	3	60	63	91	5	96	169
Hourly Total	43	9	52	8	281	289	399	41	440	781
5:00 PM	9	0	9	1	57	58	121	17	138	205
5:15 PM	7	1	8	0	44	44	107	21	128	180
5:30 PM	4	0	4	2	39	41	77	20	97	142
5:45 PM	2	1	3	0	56	56	65	11	76	135
Hourly Total	22	2	24	3	196	199	370	69	439	662
*** BREAK ***	-	-	-	-	-	-	-	-	-	-
7:00 AM	12	4	16	0	64	64	41	2	43	123
7:15 AM	8	2	10	0	66	66	27	6	33	109
7:30 AM	21	7	28	0	97	97	52	7	59	184
7:45 AM	16	3	19	2	94	96	55	4	59	174
Hourly Total	57	16	73	2	321	323	175	19	194	590
8:00 AM	6	5	11	1	57	58	30	9	39	108
8:15 AM	16	4	20	0	63	63	33	5	38	121
8:30 AM	15	0	15	0	57	57	38	2	40	112
8:45 AM	9	3	12	0	55	55	44	5	49	116
Hourly Total	46	12	58	1	232	233	145	21	166	457
Grand Total	168	39	207	14	1030	1044	1089	150	1239	2490
Approach %	81.2	18.8	-	1.3	98.7	-	87.9	12.1	-	-
Total %	6.7	1.6	8.3	0.6	41.4	41.9	43.7	6.0	49.8	-
Lights	167	38	205	14	982	996	1040	146	1186	2387
% Lights	99.4	97.4	99.0	100.0	95.3	95.4	95.5	97.3	95.7	95.9
Buses	0	1	1	0	4	4	1	1	2	7
% Buses	0.0	2.6	0.5	0.0	0.4	0.4	0.1	0.7	0.2	0.3
Trucks	1	0	1	0	44	44	48	3	51	96
% Trucks	0.6	0.0	0.5	0.0	4.3	4.2	4.4	2.0	4.1	3.9



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 2



Turning Movement Data Plot



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 3

Turning Movement Peak Hour Data (4:15 PM)

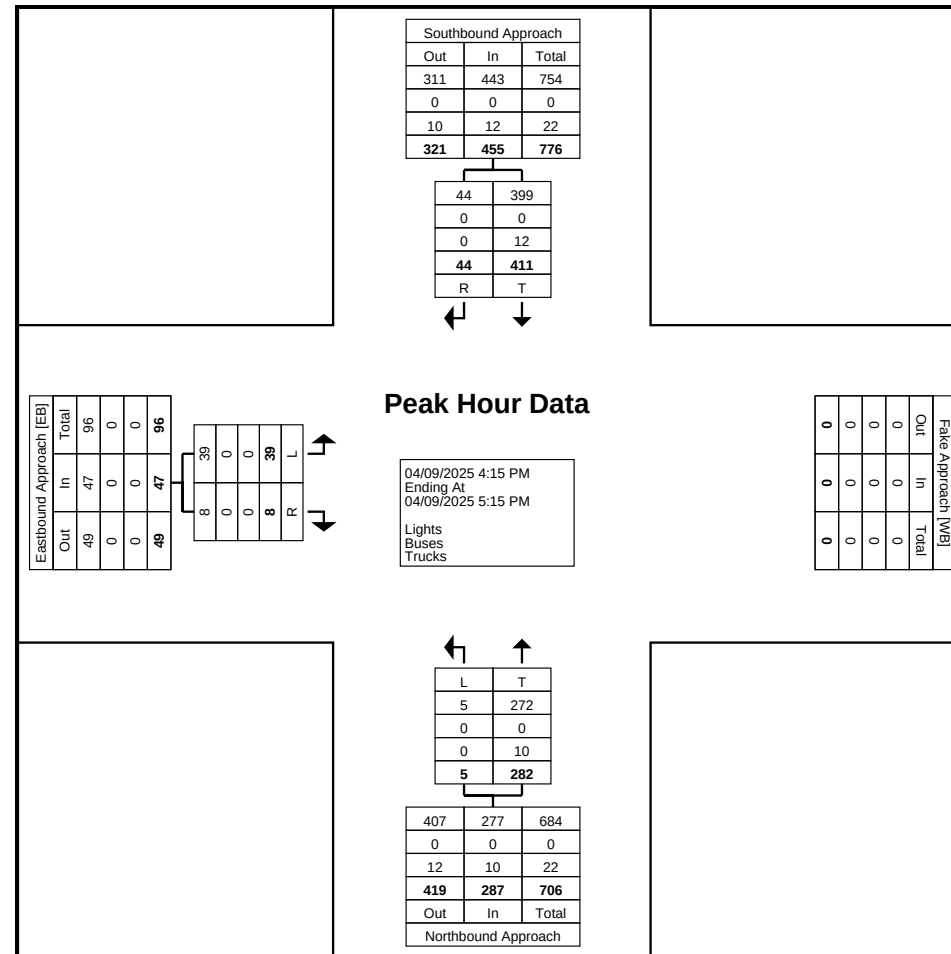
Start Time	Eastbound Approach			Northbound Approach			Southbound Approach			Int. Total
	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	
4:15 PM	13	2	15	0	83	83	83	10	93	191
4:30 PM	11	2	13	1	82	83	116	12	128	224
4:45 PM	6	4	10	3	60	63	91	5	96	169
5:00 PM	9	0	9	1	57	58	121	17	138	205
Total	39	8	47	5	282	287	411	44	455	789
Approach %	83.0	17.0	-	1.7	98.3	-	90.3	9.7	-	-
Total %	4.9	1.0	6.0	0.6	35.7	36.4	52.1	5.6	57.7	-
PHF	0.750	0.500	0.783	0.417	0.849	0.864	0.849	0.647	0.824	0.881
Lights	39	8	47	5	272	277	399	44	443	767
% Lights	100.0	100.0	100.0	100.0	96.5	96.5	97.1	100.0	97.4	97.2
Buses	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trucks	0	0	0	0	10	10	12	0	12	22
% Trucks	0.0	0.0	0.0	0.0	3.5	3.5	2.9	0.0	2.6	2.8



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
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4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 5

Turning Movement Peak Hour Data (7:00 AM)

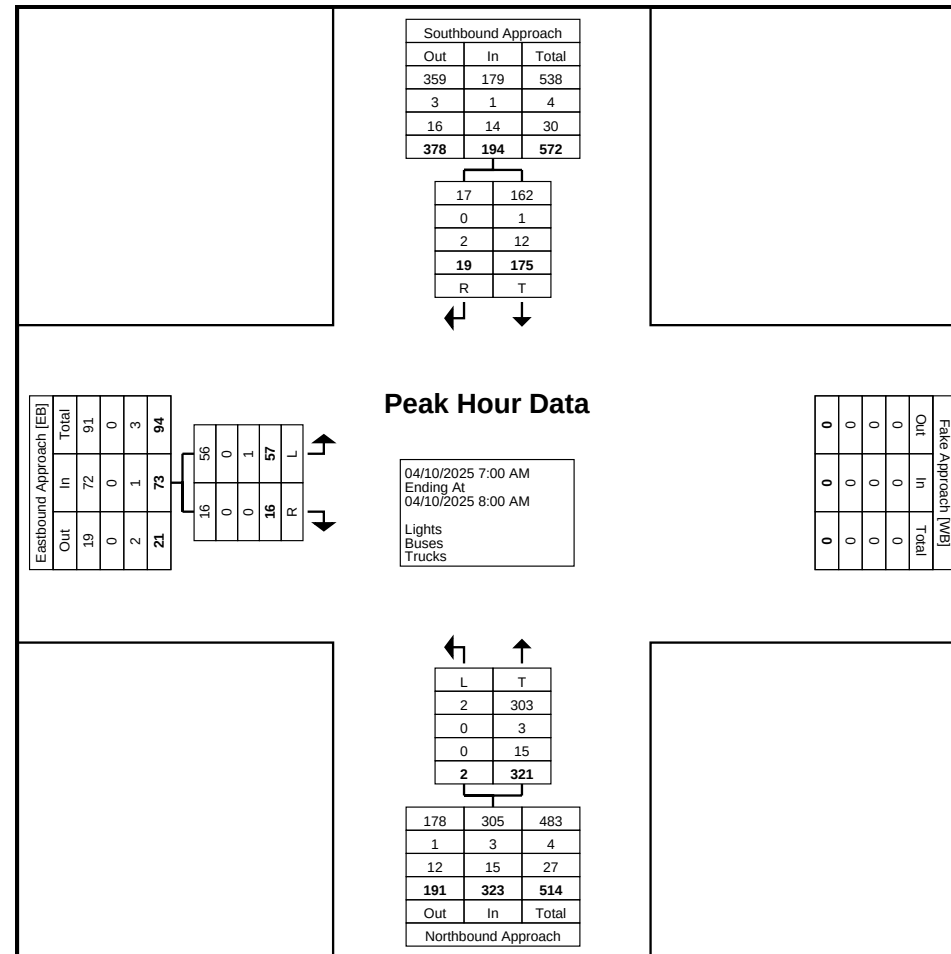
Start Time	Eastbound Approach			Northbound Approach			Southbound Approach			Int. Total
	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	
7:00 AM	12	4	16	0	64	64	41	2	43	123
7:15 AM	8	2	10	0	66	66	27	6	33	109
7:30 AM	21	7	28	0	97	97	52	7	59	184
7:45 AM	16	3	19	2	94	96	55	4	59	174
Total	57	16	73	2	321	323	175	19	194	590
Approach %	78.1	21.9	-	0.6	99.4	-	90.2	9.8	-	-
Total %	9.7	2.7	12.4	0.3	54.4	54.7	29.7	3.2	32.9	-
PHF	0.679	0.571	0.652	0.250	0.827	0.832	0.795	0.679	0.822	0.802
Lights	56	16	72	2	303	305	162	17	179	556
% Lights	98.2	100.0	98.6	100.0	94.4	94.4	92.6	89.5	92.3	94.2
Buses	0	0	0	0	3	3	1	0	1	4
% Buses	0.0	0.0	0.0	0.0	0.9	0.9	0.6	0.0	0.5	0.7
Trucks	1	0	1	0	15	15	12	2	14	30
% Trucks	1.8	0.0	1.4	0.0	4.7	4.6	6.9	10.5	7.2	5.1



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4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & Morris Thomas Rd
Site Code:
Start Date: 04/09/2025
Page No: 6



Turning Movement Peak Hour Data Plot (7:00 AM)



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4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
Page No: 1

Turning Movement Data

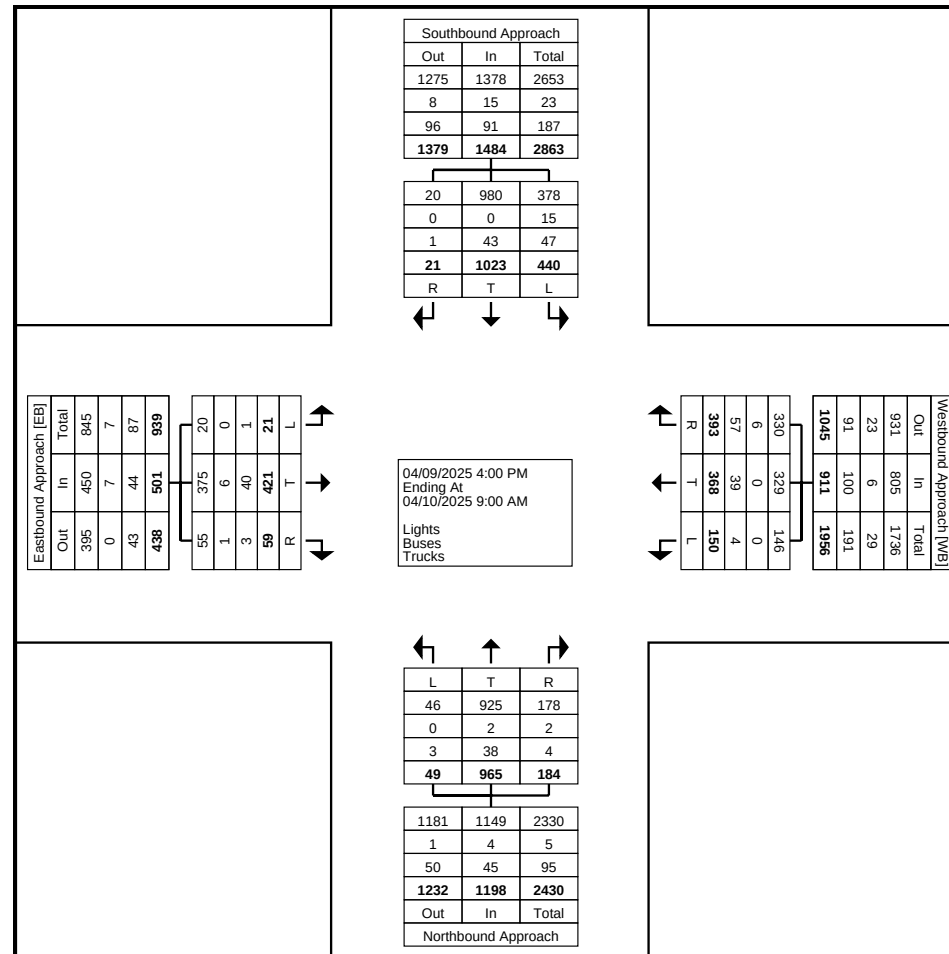
Start Time	Eastbound Approach Eastbound				Westbound Approach Westbound				Northbound Approach Northbound				Southbound Approach Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:00 PM	3	22	3	28	13	32	32	77	3	53	13	69	29	87	1	117	291
4:15 PM	0	35	5	40	9	33	25	67	3	72	19	94	28	99	2	129	330
4:30 PM	2	42	6	50	13	35	43	91	7	80	10	97	26	101	1	128	366
4:45 PM	0	27	3	30	9	43	41	93	3	52	13	68	24	93	9	126	317
Hourly Total	5	126	17	148	44	143	141	328	16	257	55	328	107	380	13	500	1304
5:00 PM	3	22	1	26	17	25	31	73	4	53	5	62	34	106	1	141	302
5:15 PM	0	18	4	22	18	24	29	71	3	38	13	54	25	115	0	140	287
5:30 PM	1	18	8	27	16	30	18	64	4	36	5	45	19	70	3	92	228
5:45 PM	1	9	0	10	10	21	13	44	3	54	5	62	17	62	0	79	195
Hourly Total	5	67	13	85	61	100	91	252	14	181	28	223	95	353	4	452	1012
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	0	20	1	21	4	11	20	35	1	49	20	70	23	34	0	57	183
7:15 AM	2	34	7	43	5	13	12	30	2	66	7	75	25	26	0	51	199
7:30 AM	2	44	7	53	7	17	22	46	2	95	18	115	54	45	0	99	313
7:45 AM	2	44	6	52	8	19	21	48	4	99	11	114	44	45	1	90	304
Hourly Total	6	142	21	169	24	60	75	159	9	309	56	374	146	150	1	297	999
8:00 AM	0	24	3	27	6	11	21	38	3	53	10	66	27	39	1	67	198
8:15 AM	3	22	2	27	1	18	25	44	2	57	19	78	17	34	0	51	200
8:30 AM	2	24	2	28	6	18	27	51	3	64	9	76	21	36	1	58	213
8:45 AM	0	16	1	17	8	18	13	39	2	44	7	53	27	31	1	59	168
Hourly Total	5	86	8	99	21	65	86	172	10	218	45	273	92	140	3	235	779
Grand Total	21	421	59	501	150	368	393	911	49	965	184	1198	440	1023	21	1484	4094
Approach %	4.2	84.0	11.8	-	16.5	40.4	43.1	-	4.1	80.6	15.4	-	29.6	68.9	1.4	-	-
Total %	0.5	10.3	1.4	12.2	3.7	9.0	9.6	22.3	1.2	23.6	4.5	29.3	10.7	25.0	0.5	36.2	-
Lights	20	375	55	450	146	329	330	805	46	925	178	1149	378	980	20	1378	3782
% Lights	95.2	89.1	93.2	89.8	97.3	89.4	84.0	88.4	93.9	95.9	96.7	95.9	85.9	95.8	95.2	92.9	92.4
Buses	0	6	1	7	0	0	6	6	0	2	2	4	15	0	0	15	32
% Buses	0.0	1.4	1.7	1.4	0.0	0.0	1.5	0.7	0.0	0.2	1.1	0.3	3.4	0.0	0.0	1.0	0.8
Trucks	1	40	3	44	4	39	57	100	3	38	4	45	47	43	1	91	280
% Trucks	4.8	9.5	5.1	8.8	2.7	10.6	14.5	11.0	6.1	3.9	2.2	3.8	10.7	4.2	4.8	6.1	6.8



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
Page No: 2



Turning Movement Data Plot



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
Page No: 3

Turning Movement Peak Hour Data (4:15 PM)

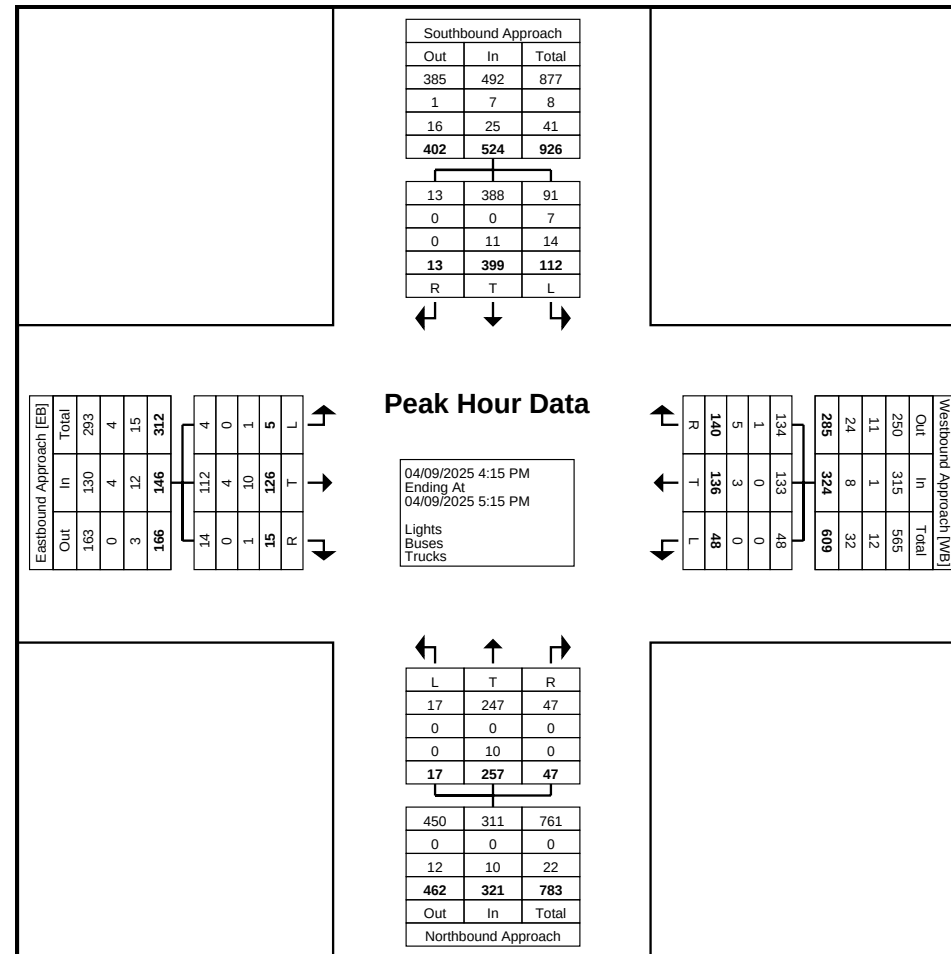
Start Time	Eastbound Approach Eastbound				Westbound Approach Westbound				Northbound Approach Northbound				Southbound Approach Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:15 PM	0	35	5	40	9	33	25	67	3	72	19	94	28	99	2	129	330
4:30 PM	2	42	6	50	13	35	43	91	7	80	10	97	26	101	1	128	366
4:45 PM	0	27	3	30	9	43	41	93	3	52	13	68	24	93	9	126	317
5:00 PM	3	22	1	26	17	25	31	73	4	53	5	62	34	106	1	141	302
Total	5	126	15	146	48	136	140	324	17	257	47	321	112	399	13	524	1315
Approach %	3.4	86.3	10.3	-	14.8	42.0	43.2	-	5.3	80.1	14.6	-	21.4	76.1	2.5	-	-
Total %	0.4	9.6	1.1	11.1	3.7	10.3	10.6	24.6	1.3	19.5	3.6	24.4	8.5	30.3	1.0	39.8	-
PHF	0.417	0.750	0.625	0.730	0.706	0.791	0.814	0.871	0.607	0.803	0.618	0.827	0.824	0.941	0.361	0.929	0.898
Lights	4	112	14	130	48	133	134	315	17	247	47	311	91	388	13	492	1248
% Lights	80.0	88.9	93.3	89.0	100.0	97.8	95.7	97.2	100.0	96.1	100.0	96.9	81.3	97.2	100.0	93.9	94.9
Buses	0	4	0	4	0	0	1	1	0	0	0	0	7	0	0	7	12
% Buses	0.0	3.2	0.0	2.7	0.0	0.0	0.7	0.3	0.0	0.0	0.0	0.0	6.3	0.0	0.0	1.3	0.9
Trucks	1	10	1	12	0	3	5	8	0	10	0	10	14	11	0	25	55
% Trucks	20.0	7.9	6.7	8.2	0.0	2.2	3.6	2.5	0.0	3.9	0.0	3.1	12.5	2.8	0.0	4.8	4.2



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
Page No: 4



Turning Movement Peak Hour Data Plot (4:15 PM)



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
Page No: 5

Turning Movement Peak Hour Data (7:30 AM)

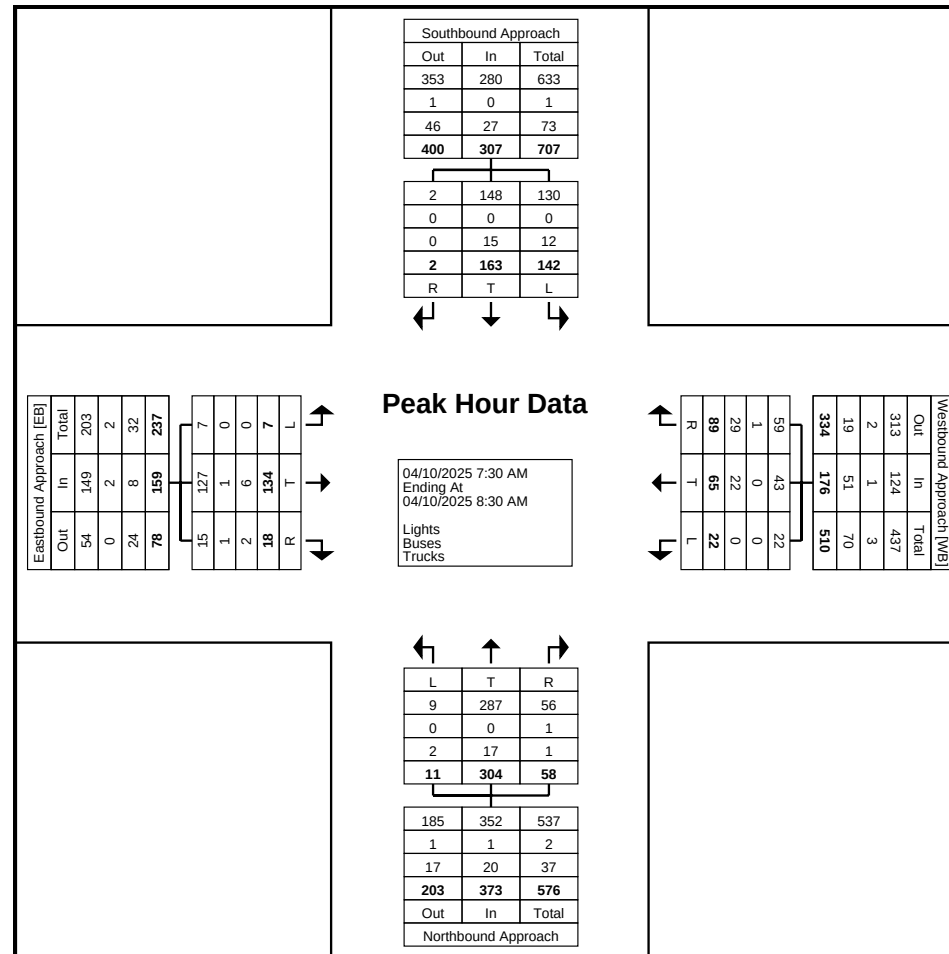
Start Time	Eastbound Approach Eastbound				Westbound Approach Westbound				Northbound Approach Northbound				Southbound Approach Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:30 AM	2	44	7	53	7	17	22	46	2	95	18	115	54	45	0	99	313
7:45 AM	2	44	6	52	8	19	21	48	4	99	11	114	44	45	1	90	304
8:00 AM	0	24	3	27	6	11	21	38	3	53	10	66	27	39	1	67	198
8:15 AM	3	22	2	27	1	18	25	44	2	57	19	78	17	34	0	51	200
Total	7	134	18	159	22	65	89	176	11	304	58	373	142	163	2	307	1015
Approach %	4.4	84.3	11.3	-	12.5	36.9	50.6	-	2.9	81.5	15.5	-	46.3	53.1	0.7	-	-
Total %	0.7	13.2	1.8	15.7	2.2	6.4	8.8	17.3	1.1	30.0	5.7	36.7	14.0	16.1	0.2	30.2	-
PHF	0.583	0.761	0.643	0.750	0.688	0.855	0.890	0.917	0.688	0.768	0.763	0.811	0.657	0.906	0.500	0.775	0.811
Lights	7	127	15	149	22	43	59	124	9	287	56	352	130	148	2	280	905
% Lights	100.0	94.8	83.3	93.7	100.0	66.2	66.3	70.5	81.8	94.4	96.6	94.4	91.5	90.8	100.0	91.2	89.2
Buses	0	1	1	2	0	0	1	1	0	0	1	1	0	0	0	0	4
% Buses	0.0	0.7	5.6	1.3	0.0	0.0	1.1	0.6	0.0	0.0	1.7	0.3	0.0	0.0	0.0	0.0	0.4
Trucks	0	6	2	8	0	22	29	51	2	17	1	20	12	15	0	27	106
% Trucks	0.0	4.5	11.1	5.0	0.0	33.8	32.6	29.0	18.2	5.6	1.7	5.4	8.5	9.2	0.0	8.8	10.4



Kimley-Horn
4201 Winfield Road Suite 600

Warrenville, Illinois, United States 60555
(630) 487-5550 ethan.scowcroft@kimley-horn.com

Count Name: Midway Rd & US Hwy 2
Site Code:
Start Date: 04/09/2025
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Turning Movement Peak Hour Data Plot (7:30 AM)

Study Name Midway Rd & St. Louis River Rd

Start Date 04/09/2025

Start Time 4:00 PM

Site Code

Type Road
Classification Totals

	St. Louis River Road Eastbound			St. Louis River Road Westbound			Midway Road Northbound			Midway Road Southbound		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4:00 PM	2	1	1	1	6	0	0	62	1	0	105	3
4:15 PM	0	4	0	1	4	0	0	83	1	1	93	3
4:30 PM	5	4	0	3	5	0	1	86	3	1	90	6
4:45 PM	5	0	1	3	4	0	0	68	1	2	66	1
5:00 PM	2	2	1	1	4	1	1	51	0	2	163	1
5:15 PM	3	1	0	0	4	3	0	38	2	1	115	4
5:30 PM	3	1	1	1	2	1	1	39	0	1	76	2
5:45 PM	3	2	0	0	3	1	1	49	0	1	84	1
7:00 AM	4	5	1	0	0	0	1	56	0	1	39	2
7:15 AM	3	4	4	0	2	1	0	65	0	0	40	0
7:30 AM	3	8	3	0	3	0	0	89	2	0	61	1
7:45 AM	5	4	1	0	2	0	1	93	1	1	68	0
8:00 AM	2	7	0	0	2	1	0	55	1	1	39	2
8:15 AM	2	3	0	2	0	3	0	55	0	1	34	2
8:30 AM	2	2	0	0	0	0	0	54	1	0	32	0
8:45 AM	0	3	0	0	0	1	0	52	1	0	37	0

Study Name US Hwy 2 & Morris Thomas Rd

Start Date 04/09/2025

Start Time 4:00 PM

Site Code

Type Road
Classification Totals

Start Time	WB Morris Thomas Rd. Westbound			SB US Hwy 2 Southbound			NB US Hwy 2 Northwestbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4:00 PM	4		21	10	55			57	2
4:15 PM	1		13	22	62			58	1
4:30 PM	3		18	8	72			72	2
4:45 PM	3		20	16	52			82	1
5:00 PM	0		17	8	55			54	2
5:15 PM	1		16	13	45			57	1
5:30 PM	1		9	7	33			55	3
5:45 PM	2		9	4	29			37	1
7:00 AM	2		5	18	42			34	1
7:15 AM	1		9	9	61			21	2
7:30 AM	2		10	16	100			38	2
7:45 AM	1		5	6	94			43	1
8:00 AM	1		5	9	50			32	1
8:15 AM	0		1	12	44			45	0
8:30 AM	2		8	11	46			50	2
8:45 AM	0		6	5	41			29	0

Study Name US Hwy 2 & St. Louis River Rd

Start Date 04/09/2025

Start Time 4:00 PM

Site Code

Type Road
Classification Totals

Start Time	EB St. Louis River Rd. Eastbound			SB US Hwy 2 Southbound			NB US Hwy 2 Northbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4:00 PM	0		2		53	6	8	57	
4:15 PM	4		2		61	2	13	64	
4:30 PM	5		6		76	2	3	60	
4:45 PM	1		6		47	7	7	75	
5:00 PM	0		7		56	0	7	56	
5:15 PM	1		4		41	3	9	63	
5:30 PM	3		3		34	1	9	46	
5:45 PM	0		3		29	2	7	39	
7:00 AM	3		11		44	2	2	28	
7:15 AM	1		7		53	7	4	24	
7:30 AM	5		13		95	10	2	40	
7:45 AM	1		10		89	5	5	37	
8:00 AM	2		13		50	2	1	38	
8:15 AM	4		4		43	0	1	43	
8:30 AM	1		8		47	0	1	42	
8:45 AM	2		4		41	0	1	26	

Appendix C:

SimTraffic Reports

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.7	0.3	3.8	0.2	0.0	0.3	0.1	0.0	0.0	3.6	0.6	3.8
Total Del/Veh (s)	24.5	18.1	4.3	21.2	9.7	4.9	11.6	17.9	4.6	11.5	8.3	4.9

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	13.2

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.1	2.2	1.3	2.7	3.3	2.7	3.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.8	10.1	1.8	2.6	2.1		0.2	0.0	0.6	0.6	0.0	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.5	3.8	0.2
Total Del/Veh (s)	6.9	6.5	1.7	0.1	6.6	1.5	4.9

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.7	0.1	1.2	0.2	4.9	2.2	0.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	20.5

Queuing and Blocking Report
Existing (2025) - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	
Directions Served	L	T	R	L	T	R	L	T	L	T	
Maximum Queue (ft)	32	132	26	66	84	65	35	220	124	101	
Average Queue (ft)	3	44	3	17	17	15	6	99	48	36	
95th Queue (ft)	18	95	16	47	52	45	22	173	89	84	
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300		
Storage Blk Time (%)									1		
Queuing Penalty (veh)									0		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB
Directions Served	LR
Maximum Queue (ft)	52
Average Queue (ft)	24
95th Queue (ft)	44
Link Distance (ft)	1646
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	65	37	5
Average Queue (ft)	25	8	0
95th Queue (ft)	51	29	3
Link Distance (ft)	1279	6729	299
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Existing (2025) - AM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	35	24	54
Average Queue (ft)	4	2	14
95th Queue (ft)	20	13	36
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	31	50
Average Queue (ft)	2	16
95th Queue (ft)	15	37
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.4	0.3	4.1	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.7	3.4
Total Del/Veh (s)	22.9	18.2	6.7	20.1	13.3	5.4	12.2	14.9	4.4	11.8	10.7	4.5

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	12.1

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.9	3.8	3.7	2.4	4.8	3.6	3.9

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.0	9.6	1.7	8.7	6.0	0.9	1.2	0.2	0.0	1.7	0.6	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.3	3.4	0.4
Total Del/Veh (s)	7.5	6.4	3.1	3.0	6.1	2.5	4.7

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.4	0.0	1.5	0.4	3.7	1.9	0.6

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	20.3

Queuing and Blocking Report
Existing (2025) - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	33	121	41	69	91	81	30	177	79	170
Average Queue (ft)	3	36	3	18	28	13	7	72	37	72
95th Queue (ft)	17	87	19	48	68	44	25	138	70	131
Link Distance (ft)	1621			2530			1423			1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)									0	
Queuing Penalty (veh)									0	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	59	15
Average Queue (ft)	20	1
95th Queue (ft)	44	6
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	34	47	15	46
Average Queue (ft)	14	11	1	3
95th Queue (ft)	35	31	8	21
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Existing (2025) - PM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	49	22	74
Average Queue (ft)	12	3	22
95th Queue (ft)	38	15	47
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	42	23
Average Queue (ft)	6	9
95th Queue (ft)	26	21
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.8	0.3	3.9	0.1	0.0	0.3	0.1	0.0	0.1	3.6	0.7	4.3
Total Del/Veh (s)	26.9	20.7	4.5	22.5	13.2	5.9	11.6	18.1	4.8	12.2	8.5	4.6

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	14.1

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.2	2.8	2.0	2.7	3.1	2.8	3.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.6	10.5	1.7	2.6	1.8	0.5	0.2	0.0	1.4	0.6	0.0	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	3.5	0.2
Total Del/Veh (s)	7.3	6.7	1.8	1.6	5.1	1.3	5.0

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.6	0.0	1.6	0.1	4.2	2.5	0.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	21.4

Queuing and Blocking Report
Opening Year (2030) No-Build - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	20	151	24	102	99	90	31	208	132	99
Average Queue (ft)	4	48	3	19	23	17	6	102	54	37
95th Queue (ft)	16	111	12	65	67	55	23	174	102	83
Link Distance (ft)	1621			2530			1423			1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)	0									
Queuing Penalty (veh)	0									

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	55	10
Average Queue (ft)	25	0
95th Queue (ft)	42	5
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	75	33	21
Average Queue (ft)	24	9	1
95th Queue (ft)	54	31	10
Link Distance (ft)	1279	6729	289
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Opening Year (2030) No-Build - AM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	33	33	47
Average Queue (ft)	6	5	14
95th Queue (ft)	24	23	34
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	43	64
Average Queue (ft)	3	17
95th Queue (ft)	23	40
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.8	0.2	3.8	0.0	0.0	0.0	0.1	0.0	0.1	3.3	0.7	3.3
Total Del/Veh (s)	26.8	20.6	6.1	25.7	14.7	5.6	12.8	16.8	4.5	12.9	12.5	4.8

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	13.8

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.4	3.5	4.3	2.6	5.1	4.0	4.2

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.9	10.9	1.6	5.6	5.7	1.4	2.9	0.2	0.0	1.1	0.6	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	0.9

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.2	0.3	3.7	0.4
Total Del/Veh (s)	7.7	6.8	3.4	1.5	5.1	2.5	4.9

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.0	1.0	0.3	5.4	1.5	0.5

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	22.0

Queuing and Blocking Report
Opening Year (2030) No-Build - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	30	124	33	83	113	66	36	190	91	211
Average Queue (ft)	4	43	3	25	35	15	8	82	39	90
95th Queue (ft)	18	97	15	61	82	45	27	153	76	166
Link Distance (ft)	1621			2530			1423			1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350	450		200	300		
Storage Blk Time (%)									0	
Queuing Penalty (veh)									0	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	54	43	4
Average Queue (ft)	21	2	0
95th Queue (ft)	43	19	3
Link Distance (ft)	1646	4896	1423
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	39	30	22	26
Average Queue (ft)	18	11	1	1
95th Queue (ft)	38	27	11	14
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) No-Build - PM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	57	28	61
Average Queue (ft)	11	3	24
95th Queue (ft)	37	15	47
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	39	23
Average Queue (ft)	5	9
95th Queue (ft)	23	20
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.7	0.3	3.9	0.4	0.0	0.4	0.3	0.0	0.1	3.6	0.7	2.6
Total Del/Veh (s)	25.6	21.2	4.8	24.7	13.5	6.3	11.1	19.7	4.8	14.1	9.4	4.1

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	15.0

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.2	3.3	2.5	2.9	3.4	2.8	3.3

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.6	10.8	2.4	2.2	1.0	0.7	0.2	0.0	1.9	0.6	0.0	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	3.7	0.2
Total Del/Veh (s)	7.7	6.7	2.0	1.7	5.7	1.8	5.2

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.7	0.0	1.9	0.3	5.6	3.0	0.9

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	22.5

Queuing and Blocking Report
Design Year (2045) No-Build - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	20	134	37	84	97	86	31	249	143	120
Average Queue (ft)	3	50	3	20	23	19	6	104	59	40
95th Queue (ft)	13	106	16	56	64	55	23	191	110	91
Link Distance (ft)	1621			2530			1423			1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)								1		
Queuing Penalty (veh)								1		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	61	5
Average Queue (ft)	28	1
95th Queue (ft)	51	6
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	67	37	5	15
Average Queue (ft)	27	9	0	1
95th Queue (ft)	52	31	4	10
Link Distance (ft)	1279	6729	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	38	27	51
Average Queue (ft)	7	4	15
95th Queue (ft)	26	18	37
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	52	61
Average Queue (ft)	4	20
95th Queue (ft)	26	44
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.2	0.3	3.7	0.0	0.0	0.0	0.1	0.0	0.2	3.2	0.8	3.2
Total Del/Veh (s)	28.2	22.2	6.7	26.7	15.1	6.0	14.6	18.7	4.7	14.7	12.7	4.4

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	14.8

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.7	4.4	5.4	3.0	5.6	4.1	4.6

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.5	11.2	2.0	5.4	6.3	2.6	1.0	0.2	0.0	1.2	0.7	0.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.0

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1	0.3	3.7	0.4
Total Del/Veh (s)	8.0	6.6	3.3	1.6	5.2	2.9	4.9

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.0	1.5	0.4	4.4	1.9	0.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.9
Total Del/Veh (s)	23.6

Queuing and Blocking Report
Design Year (2045) No-Build - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	29	169	21	72	104	70	30	215	118	233
Average Queue (ft)	4	49	2	27	34	15	8	95	49	93
95th Queue (ft)	18	113	12	60	91	45	25	185	97	181
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)								1		0
Queuing Penalty (veh)								0		0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	52	36
Average Queue (ft)	22	2
95th Queue (ft)	44	16
Link Distance (ft)	1646	4896
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	35	35	11	33
Average Queue (ft)	17	12	1	2
95th Queue (ft)	38	28	7	13
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	59	24	60
Average Queue (ft)	13	5	22
95th Queue (ft)	40	19	40
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	42	32
Average Queue (ft)	6	11
95th Queue (ft)	27	24
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.6	0.4	3.8	0.5	0.0	0.5	0.1	0.0	0.0	3.5	0.7	3.2
Total Del/Veh (s)	38.4	34.0	8.2	73.3	22.5	20.6	18.6	28.8	6.6	22.1	16.2	4.3

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	30.9

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	53.0	43.6	14.2	11.4	7.7	5.0	14.7

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.7	10.6	2.3	3.6	1.9	1.1	0.4	0.0	1.9	0.8	0.0	1.2

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.1	3.6	0.4
Total Del/Veh (s)	8.8	8.5	3.9	3.8	7.5	3.4	6.3

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.4	1.0	7.8	3.0	1.3

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.0	0.2	0.1	0.1
Total Del/Veh (s)	2.1	0.4	5.2	4.5	13.6	3.7	4.4

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	41.8

Queuing and Blocking Report
Opening Year (2030) Build - AM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	L	T
Maximum Queue (ft)	34	179	46	370	569	266	40	290	164	215
Average Queue (ft)	5	75	9	198	121	50	10	136	72	73
95th Queue (ft)	21	143	30	380	641	259	31	242	135	148
Link Distance (ft)		1621			2530			1423		1155
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	325		325	350		450	200		300	
Storage Blk Time (%)				9	0	0		3		
Queuing Penalty (veh)				13	0	0		3		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	420	312	52
Average Queue (ft)	102	75	7
95th Queue (ft)	302	204	30
Link Distance (ft)	2226	4896	1423
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	70	57	20	42
Average Queue (ft)	24	26	1	5
95th Queue (ft)	50	51	9	24
Link Distance (ft)	1279	6729	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) Build - AM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	62	22	60
Average Queue (ft)	15	4	28
95th Queue (ft)	44	16	53
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	129	57
Average Queue (ft)	24	20
95th Queue (ft)	79	43
Link Distance (ft)	134	811
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	17	81	73
Average Queue (ft)	1	34	36
95th Queue (ft)	6	68	59
Link Distance (ft)	675	2226	861
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 16

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.2	0.3	3.9	0.0	0.0	0.0	0.0	0.0	0.1	3.3	0.8	3.3
Total Del/Veh (s)	31.8	28.3	10.5	27.4	14.7	6.6	17.4	20.4	6.2	14.5	16.2	5.0

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	16.3

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	1.1	0.0	0.0	0.0	0.0	0.0	0.3
Total Del/Veh (s)	283.6	281.9	6.4	4.9	8.0	5.2	102.1

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.7	11.6	1.2	7.5	8.3	3.2	1.8	0.3	0.0	2.0	1.5	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.6

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.4	0.5	3.7	0.4
Total Del/Veh (s)	13.0	11.1	3.9	2.9	8.9	3.2	8.0

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.1	0.7	5.2	0.0	3.2	1.1

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.4	0.4	0.3
Total Del/Veh (s)	3.0	0.2	1.2	1.9	13.2	10.7	7.8

Total Network Performance

Denied Del/Veh (s)	1.0
Total Del/Veh (s)	89.6

Queuing and Blocking Report
Opening Year (2030) Build - PM Peak Hour

05/20/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	33	132	45	135	105	77	52	204	75	94	210
Average Queue (ft)	4	55	5	55	35	16	19	98	2	41	113
95th Queue (ft)	20	112	22	105	83	48	42	164	32	78	194
Link Distance (ft)		1621			2530			1424			1155
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)								0			
Queuing Penalty (veh)								1			

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	1990	87	9
Average Queue (ft)	1001	19	0
95th Queue (ft)	2117	57	6
Link Distance (ft)	2228	4896	1424
Upstream Blk Time (%)	3		
Queuing Penalty (veh)	12		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	35	49	20	73
Average Queue (ft)	17	18	1	16
95th Queue (ft)	37	37	10	54
Link Distance (ft)	1279	6727	299	289
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) Build - PM Peak Hour

05/20/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	79	24	60
Average Queue (ft)	25	4	25
95th Queue (ft)	60	17	46
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	67	48
Average Queue (ft)	13	17
95th Queue (ft)	44	35
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	33	227
Average Queue (ft)	5	94
95th Queue (ft)	23	196
Link Distance (ft)	2228	936
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 13

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.8	0.3	3.8	0.3	0.0	0.3	0.1	0.0	0.1	3.5	0.7	3.3
Total Del/Veh (s)	33.3	34.2	9.1	34.2	12.5	8.8	21.8	31.4	6.5	23.7	17.2	4.5

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.7
Total Del/Veh (s)	24.0

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0		0.0	0.0	0.0	0.1	0.4	0.1
Total Del/Veh (s)	26.4		3.5	10.6	6.6	8.3	6.9	9.4

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.2	11.0	1.9	2.5	1.8	0.3	0.4	0.0	2.3	0.8	0.0	1.2

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.2	3.6	0.5
Total Del/Veh (s)	9.2	8.3	3.9	3.7	7.2	3.3	6.1

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.0	2.7	1.0	8.1	3.0	1.2

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.2	0.2	0.1
Total Del/Veh (s)	2.2	0.3	5.8	5.3	18.0	4.4	5.1

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	33.7

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - AM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	41	149	48	343	156	81	204	332	208	178	185
Average Queue (ft)	6	69	9	162	27	18	15	149	5	71	77
95th Queue (ft)	26	134	32	291	100	60	76	266	73	135	152
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)				0				4			
Queuing Penalty (veh)				0				6			

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	129	39	109	100	102	128
Average Queue (ft)	63	16	44	32	32	52
95th Queue (ft)	110	35	86	79	80	98
Link Distance (ft)	2220		4884		1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	59	50	70
Average Queue (ft)	23	24	6
95th Queue (ft)	49	46	33
Link Distance (ft)	1278	6729	288
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - AM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	43	24	65
Average Queue (ft)	11	4	29
95th Queue (ft)	36	18	52
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	EB	WB	B16	NB
Directions Served	T	LT	T	LR
Maximum Queue (ft)	4	129	6	60
Average Queue (ft)	0	24	0	20
95th Queue (ft)	3	81	4	43
Link Distance (ft)	336	134	1476	811
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	25	100	93
Average Queue (ft)	1	41	41
95th Queue (ft)	9	81	70
Link Distance (ft)	675	2220	855
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 6

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	4.1	0.3	3.8	0.0	0.0	0.0	0.0	0.0	0.1	3.3	0.7	3.2
Total Del/Veh (s)	32.3	28.2	7.6	28.0	14.7	6.6	18.7	22.9	7.9	15.1	15.4	4.8

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	16.7

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	15.8	6.3	14.8	9.4	16.4	7.7	12.9

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.0	12.2	1.8	7.4	6.8	3.1	1.0	0.3	0.0	2.0	1.8	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.8

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.8	0.5	3.7	0.4
Total Del/Veh (s)	13.9	12.2	3.7	2.3	12.5	2.8	8.7

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.1	0.7	8.2	0.6	3.6	1.2

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.4	0.4	0.3
Total Del/Veh (s)	2.9	0.1	1.9	2.6	10.1	7.0	5.6

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	34.6

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - PM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	36	140	34	126	83	67	56	235	132	91	257
Average Queue (ft)	4	57	4	54	31	15	20	111	5	40	106
95th Queue (ft)	19	118	17	103	71	48	46	198	58	78	193
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)								1	0		
Queuing Penalty (veh)								3	0		

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	196	69	54	127	210	64
Average Queue (ft)	99	29	23	53	98	31
95th Queue (ft)	160	58	49	103	177	58
Link Distance (ft)	2222		4884		1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)					0	
Queuing Penalty (veh)					0	

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	43	48	11	118
Average Queue (ft)	18	16	1	18
95th Queue (ft)	40	35	9	75
Link Distance (ft)	1278	6727	299	288
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Opening Year (2030) Build Mitigated - PM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	73	38	49
Average Queue (ft)	22	6	23
95th Queue (ft)	53	25	40
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	70	55
Average Queue (ft)	12	20
95th Queue (ft)	44	41
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	48	178
Average Queue (ft)	7	79
95th Queue (ft)	30	130
Link Distance (ft)	2222	930
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 3

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.6	0.4	3.7	0.4	0.0	0.3	0.0	0.0	0.1	3.5	0.7	3.2
Total Del/Veh (s)	41.7	38.6	9.6	41.2	14.5	10.9	23.5	33.3	7.6	28.6	20.2	4.3

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.7
Total Del/Veh (s)	27.5

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0		0.0	0.0	0.0	0.0	0.4	0.1
Total Del/Veh (s)	13.6		3.2	10.3	7.9	9.7	8.2	9.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.5	11.6	2.4	3.3	2.1	1.5	0.5	0.0	2.2	0.8	0.0	1.3

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.3	3.6	0.4
Total Del/Veh (s)	10.1	8.3	4.2	2.6	9.1	3.8	6.3

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.9	0.0	2.9	1.1	10.7	2.9	1.4

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.2	0.2	0.1
Total Del/Veh (s)	2.4	0.3	6.0	5.4	14.8	4.4	5.1

Total Network Performance

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	36.8

Queuing and Blocking Report
Design Year (2045) Build - AM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	38	226	53	358	252	196	164	426	350	200	204
Average Queue (ft)	6	82	10	173	48	33	16	175	15	82	94
95th Queue (ft)	24	166	31	319	222	158	84	328	132	164	177
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)				3				7			0
Queuing Penalty (veh)				5				9			0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	118	43	92	120	112	134
Average Queue (ft)	48	15	41	41	40	58
95th Queue (ft)	89	34	76	96	87	100
Link Distance (ft)	2220		4884		1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	58	64	15	53
Average Queue (ft)	26	28	1	5
95th Queue (ft)	51	53	8	28
Link Distance (ft)	1278	6729	299	288
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Design Year (2045) Build - AM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	55	31	80
Average Queue (ft)	13	5	31
95th Queue (ft)	40	21	60
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	101	55
Average Queue (ft)	28	20
95th Queue (ft)	79	43
Link Distance (ft)	134	811
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	17	141	98
Average Queue (ft)	1	42	40
95th Queue (ft)	7	93	70
Link Distance (ft)	675	2220	855
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 14

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.9	0.3	3.7	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.8	3.3
Total Del/Veh (s)	33.5	30.3	11.1	27.7	18.0	7.5	20.0	22.6	8.6	17.0	17.2	5.3

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	17.8

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	15.7	7.3	16.5	10.1	17.1	8.2	13.4

3: Midway Rd & St Louis River Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	9.3	14.6	1.2	8.0	7.5	3.5	2.3	0.4	0.0	2.4	1.9	0.0

3: Midway Rd & St Louis River Rd Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	1.9

4: US Highway 2 & Morris Thomas Rd Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1	0.3	3.6	0.4
Total Del/Veh (s)	14.6	12.3	3.9	3.0	12.3	3.5	9.0

5: St Louis River Rd & US Highway 2 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	2.5	0.6	7.5	0.0	3.3	1.1

6: Industrial Access & Morris Thomas Rd Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.4	0.4	0.3
Total Del/Veh (s)	3.0	0.2	1.9	2.6	9.3	7.0	5.6

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	36.0

Queuing and Blocking Report
Design Year (2045) Build - PM Peak Hour

05/22/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	39	163	38	133	116	69	52	238	152	105	275
Average Queue (ft)	4	65	5	52	43	20	21	117	13	46	125
95th Queue (ft)	19	130	23	101	93	53	45	202	100	86	225
Link Distance (ft)	1621			2530			1423			1155	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	325		325	350		450	200		300	300	
Storage Blk Time (%)								1	0		0
Queuing Penalty (veh)								4	0		0

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	227	87	78	143	215	70
Average Queue (ft)	99	32	22	60	99	29
95th Queue (ft)	172	66	54	118	183	56
Link Distance (ft)	2222		4884		1423	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)	0					0
Queuing Penalty (veh)	0					0

Intersection: 3: Midway Rd & St Louis River Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (ft)	46	39	26	82
Average Queue (ft)	17	16	1	19
95th Queue (ft)	40	33	11	58
Link Distance (ft)	1278	6727	299	288
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Design Year (2045) Build - PM Peak Hour

05/22/2025

Intersection: 4: US Highway 2 & Morris Thomas Rd

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	92	32	66
Average Queue (ft)	24	5	26
95th Queue (ft)	64	20	51
Link Distance (ft)	1667		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350	150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: St Louis River Rd & US Highway 2

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	68	50
Average Queue (ft)	16	20
95th Queue (ft)	49	40
Link Distance (ft)	134	811
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Industrial Access & Morris Thomas Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	55	157
Average Queue (ft)	9	77
95th Queue (ft)	36	127
Link Distance (ft)	2222	930
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 5

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	1.6	0.3	2.1	2.6	0.6	2.9	0.1	0.0	0.0	2.0	0.5	1.4
Total Del/Veh (s)	35.0	32.1	30.2	77.9	25.1	7.5	56.7	58.3	31.9	45.1	44.7	6.7

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	1.0
Total Del/Veh (s)	45.7

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	1.8	0.2	2.0	0.4	0.0	0.0	0.5
Total Del/Veh (s)	198.9	25.1	73.6	100.1	3.0	2.6	62.1

4: Midway Rd & Railroad Crossing Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	2.8	0.0	1.4
Total Del/Veh (s)	57.4	108.8	82.8

Total Network Performance

Movement	All
Denied Del/Veh (s)	2.0
Total Del/Veh (s)	130.8

Queuing and Blocking Report

10 Minute Crossing - 2030 Build AM Peak

06/27/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	32	172	93	453	202	176	170	980	350	314	682
Average Queue (ft)	4	61	14	117	33	19	10	220	30	94	134
95th Queue (ft)	20	131	62	345	163	97	71	762	191	247	458
Link Distance (ft)	3164			2724			966			2950	
Upstream Blk Time (%)								3			
Queuing Penalty (veh)								10			
Storage Bay Dist (ft)	325	325		700	450		200	300		300	
Storage Blk Time (%)				0	1				10	4	5
Queuing Penalty (veh)				0	2				8	8	10

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	292	432	300	1504	56
Average Queue (ft)	99	64	46	341	3
95th Queue (ft)	267	308	193	1181	22
Link Distance (ft)	2892		2789		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	250	250		250	
Storage Blk Time (%)	16	0		21	
Queuing Penalty (veh)	4	2		16	

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	398	990
Average Queue (ft)	178	302
95th Queue (ft)	479	980
Link Distance (ft)	392	966
Upstream Blk Time (%)	27	14
Queuing Penalty (veh)	115	60
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 236

1: Midway Rd & US Highway 2 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.6	0.2	2.5	2.5	0.5	2.7	0.5	0.0	0.0	3.3	2.1	3.6
Total Del/Veh (s)	50.3	29.7	43.4	68.0	19.6	7.3	29.6	28.8	13.2	89.1	109.8	81.2

1: Midway Rd & US Highway 2 Performance by movement

Movement	All
Denied Del/Veh (s)	1.3
Total Del/Veh (s)	53.7

2: Midway Rd & Morris Thomas Rd Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	1.7	0.4	1.5	0.3	0.0	0.0	0.5
Total Del/Veh (s)	333.6	197.1	96.4	104.5	3.1	1.1	111.5

4: Midway Rd & Railroad Crossing Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	1.8	1.0	1.4
Total Del/Veh (s)	44.5	90.2	67.6

Total Network Performance

Movement	All
Denied Del/Veh (s)	2.3
Total Del/Veh (s)	162.9

Queuing and Blocking Report

10 Minute Crossing - 2030 Build PM Peak

06/27/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	23	144	52	187	145	116	150	805	350	350	2031	140
Average Queue (ft)	6	55	7	54	51	32	16	122	18	79	525	7
95th Queue (ft)	20	117	30	140	115	85	71	448	139	259	1667	91
Link Distance (ft)	3164			2724			966			2950		
Upstream Blk Time (%)								0		1		
Queuing Penalty (veh)								2		0		
Storage Bay Dist (ft)	325	325		700	450		200	300		300	300	
Storage Blk Time (%)								4	0	0	23	
Queuing Penalty (veh)								8	1	0	33	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	300	1563	200	1349	21
Average Queue (ft)	208	560	13	303	1
95th Queue (ft)	393	1484	97	1043	9
Link Distance (ft)	2892		2789		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	250	250		250	
Storage Blk Time (%)	56			23	
Queuing Penalty (veh)	43			3	

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	399	991
Average Queue (ft)	165	335
95th Queue (ft)	473	1054
Link Distance (ft)	392	966
Upstream Blk Time (%)	29	20
Queuing Penalty (veh)	156	109
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 355

Queuing and Blocking Report

10 Minute Crossing - 2030 Build Rerouted AM Peak

11/05/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	47	168	72	204	98	72	163	978	350	314	626
Average Queue (ft)	6	53	13	48	21	14	10	195	30	78	113
95th Queue (ft)	25	122	48	141	62	47	71	685	191	214	408
Link Distance (ft)	3164			2724			966			2950	
Upstream Blk Time (%)								2			
Queuing Penalty (veh)								7			
Storage Bay Dist (ft)	325	325		700	450		200	300		300	
Storage Blk Time (%)								9	0	0	5
Queuing Penalty (veh)								7	0	1	9

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	257	220	300	1812	399	280
Average Queue (ft)	79	20	74	436	48	32
95th Queue (ft)	219	116	243	1443	200	126
Link Distance (ft)	2892		2789		392	
Upstream Blk Time (%)					1	
Queuing Penalty (veh)					2	
Storage Bay Dist (ft)	250	250		250		
Storage Blk Time (%)	5	2		24	2	0
Queuing Penalty (veh)	2	7		38	2	0

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	400	992
Average Queue (ft)	168	310
95th Queue (ft)	471	966
Link Distance (ft)	392	966
Upstream Blk Time (%)	26	11
Queuing Penalty (veh)	112	38
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 225

Queuing and Blocking Report

10 Minute Crossing - 2030 Build Rerouted PM Peak

11/05/2025

Intersection: 1: Midway Rd & US Highway 2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	35	160	44	142	137	139	227	968	350	350	1863	136
Average Queue (ft)	7	56	6	41	48	35	22	151	41	83	468	7
95th Queue (ft)	25	128	27	112	108	90	107	579	221	263	1469	88
Link Distance (ft)		3164			2724			966			2950	
Upstream Blk Time (%)								1				
Queuing Penalty (veh)								4				
Storage Bay Dist (ft)	325		325	700		450	200		300	300		300
Storage Blk Time (%)								6	0	1	22	
Queuing Penalty (veh)								12	0	5	31	

Intersection: 2: Midway Rd & Morris Thomas Rd

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	300	1169	299	1421	411	251
Average Queue (ft)	160	298	30	366	98	34
95th Queue (ft)	350	955	149	1125	330	170
Link Distance (ft)		2892		2789	392	
Upstream Blk Time (%)					4	
Queuing Penalty (veh)					19	
Storage Bay Dist (ft)	250		250			250
Storage Blk Time (%)	31			28	6	0
Queuing Penalty (veh)	25			7	3	0

Intersection: 4: Midway Rd & Railroad Crossing

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	397	993
Average Queue (ft)	172	413
95th Queue (ft)	478	1119
Link Distance (ft)	392	966
Upstream Blk Time (%)	28	19
Queuing Penalty (veh)	155	103
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 364

Appendix D:

Turn Lane Warrant Sheets

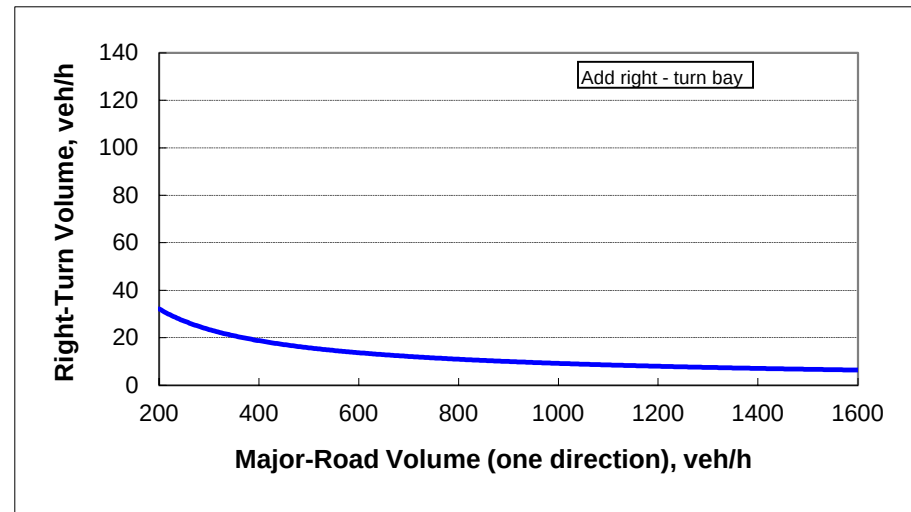
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	111
Right-turn volume, veh/h:	34

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	51
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Morris Thomas Road & Industrial Access Eastbound Right (2045 Build Conditions)

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

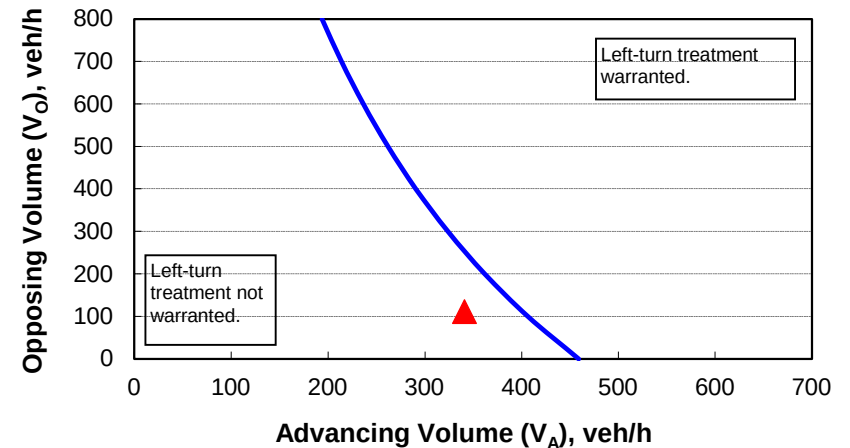
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	90%
Advancing volume (V_A), veh/h:	341
Opposing volume (V_O), veh/h:	111

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	401
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Morris Thomas Road & Industrial Access Westbound Left (2045 Build Conditions)

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

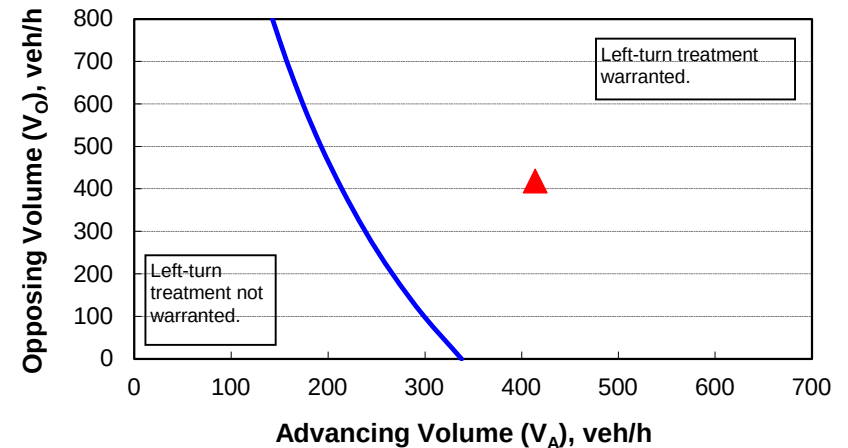
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	21%
Advancing volume (V_A), veh/h:	414
Opposing volume (V_O), veh/h:	418

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	210
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Midway Road & Morris Thomas Road Northbound Right (2030 Build Conditions)

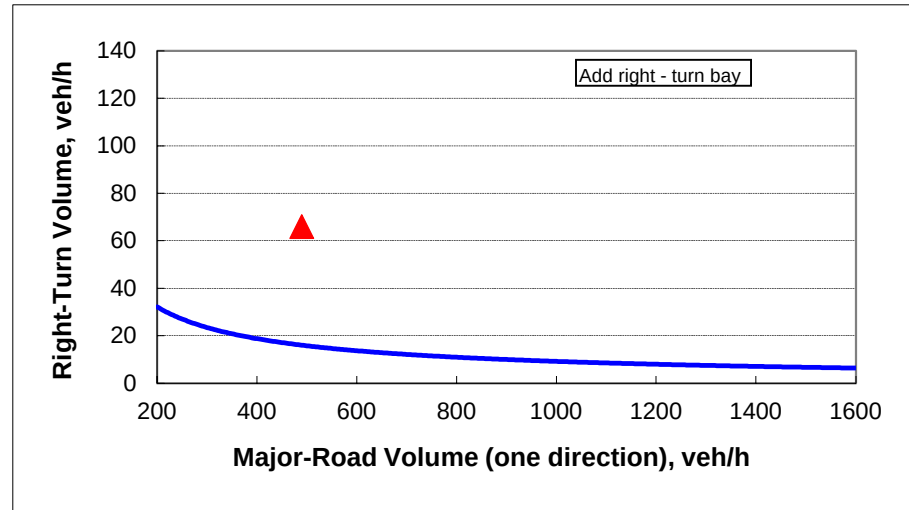
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	490
Right-turn volume, veh/h:	66

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	16
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Midway Road & Morris Thomas Road Southbound Right (2030 Build Conditions)

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

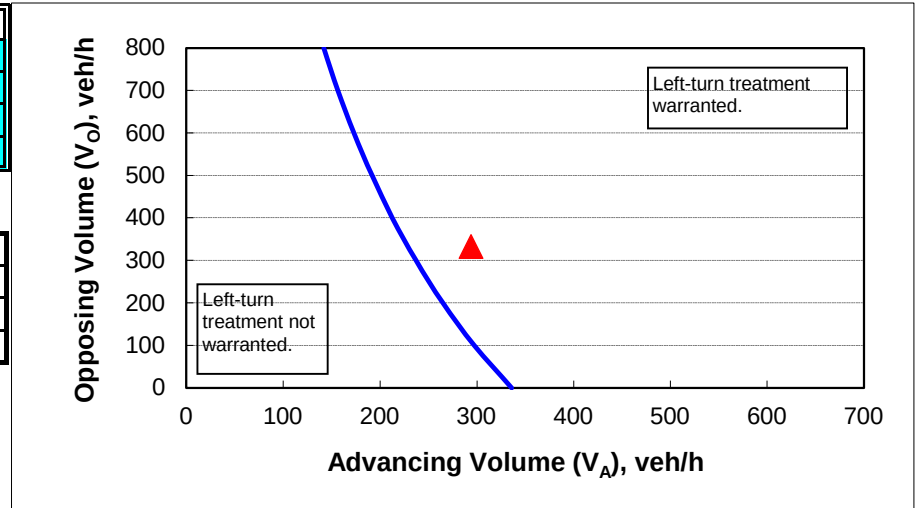
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	60
Percent of left-turns in advancing volume (V_A), %:	16%
Advancing volume (V_A), veh/h:	294
Opposing volume (V_O), veh/h:	332

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	229
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

US-2 & St Louis River Road Westbound Left (2030 Build Conditions)