

MEMO

VIA EMAIL jordan@alrigusa.com

To: Rochester Hills Retail Management LLC

**From: Traffic Services Group
Fleis & VandenBrink Engineering**

Date: October 19, 2022

**Re: Proposed Chick-fil-A and Retail Development
City of Rochester Hills, Michigan
Traffic Impact Study**

1 INTRODUCTION

This memorandum presents the results of the Traffic Impact Study (TIS) for the proposed development in the City of Rochester Hills, Michigan. The project site is located generally in the northwest quadrant of the Rochester Road (M-150) & Hickory Lawn Road intersection, as shown on the attached **Figure 1**. The proposed development includes construction of a Chick-fil-A fast food restaurant with drive-through and an approximately 5,000 SF commercial building. Site access is proposed via an existing signalized intersection on Rochester Road (M-150), aligned opposite of the Meijer / Lowe's driveway. Rochester Road (M-150) is under the jurisdiction of Michigan Department of Transportation (MDOT). As part of the site plan approval and driveway permitting process, a TIS is required for this project.

This TIS has been completed to evaluate the potential impact of the proposed development on the adjacent roadway network. The scope of the study was developed based on Fleis & VandenBrink's (F&V) understanding of the development program, accepted traffic engineering practice, MDOT requirements as outlined in Geometric Design Guidance Section 1.2.4 and professional experience. The study analyses were completed using Synchro and SimTraffic (Version 11) traffic analysis software. Sources of data for this study include F&V subconsultant Gewalt Hamilton Associates, Inc. (GHA), RCOC, MDOT, and ITE.

2 BACKGROUND DATA

2.1 EXISTING ROAD NETWORK

The lane uses and traffic control at the study intersections are shown on the attached **Figure 2** and the study roadways are further described below. For the purposes of this study, residential streets, exit-ramps, and site driveways were assumed to have an operating speed of 25 miles per hour (mph) unless otherwise noted.

Rochester Road (M-150) generally runs in the north and south directions, adjacent to the east side of the project site. The study section of Rochester Road (M-150) is under the jurisdiction of MDOT, is classified as an *Other Principal Arterial*, and has a posted speed limit of 50 mph. The study section of roadway has a typical five-lane cross-section, with two (2) lanes in each direction and a center two-way left-turn lane (TWLTL). Rochester Road (M-150) adjacent to the project site has an Average Annual Daily Traffic (AADT) volume of approximately 44,400 vehicles per day (SEMCOG 2018). At the intersection with Auburn Road, Rochester Road (M-150) widens to provide exclusive right-turn lanes in both directions.

M-59 generally runs in the east and west directions and intersects with Rochester Road (M-150) approximately ¼-mile south of the project site. M-59 is classified as an *Other Freeway* and is under MDOT jurisdiction, with a posted speed limit of 70 mph and an AADT volume of approximately 77,200 vpd (SEMCOG 2016). The study section of roadway includes the M-59 interchange ramps. The WB M-59 Exit Ramp provides dual (2) exclusive left-turn lanes and dual (2) exclusive right-turn lanes. The EB M-59 Exit Ramp provides exclusive left- and right-turn lanes, and a shared left/right-turn lane.

Auburn Road generally runs in the east and west directions approximately 900-feet north of the project site. The study section of Auburn Road is classified as a *Minor Arterial* and has an AADT volume of approximately 15,200 vpd (SEMCOG 2018). The study section of roadway to the east and west of Rochester Road (M-150), is under the City of Rochester Hills and MDOT jurisdictions, respectively. At the signalized intersection with Rochester Road (M-150), Auburn Road provides an exclusive left-turn lane, two (2) through lanes, and an exclusive right-turn lane in both directions.

Hickory Lawn Drive generally runs in the northwest and southeast directions, adjacent to the south side of the project site. Hickory Lawn Drive is under the jurisdiction of the City of Rochester Hills and is classified as a *Local Road*. The study section of Hickory Lawn Drive has an unpaved two-lane cross-section, with one lane in each direction, and provides a minor-street stop-controlled intersection with Rochester Road (M-150).

2.2 EXISTING TRAFFIC VOLUMES

Subconsultant Gewalt Hamilton Associates, INC. (GHA) collected existing Turning Movement Count (TMC) data on Thursday June 10th, 2021, during the weekday AM and PM peak hours, and on Saturday June 12th, 2021, during the mid-day (MD) and PM peak hours, at the following study intersections:

- Rochester Road (M-150) & Auburn Road
- Rochester Road (M-150) & Meijer / Lowe’s Drive
- Rochester Road (M-150) & Hickory Lawn Road
- Rochester Road (M-150) & WB M-59 Exit-Ramp
- Rochester Road (M-150) & EB M-59 Exit Ramp

Due to the impact of COVID-19, the traffic volume data collected may not be representative of “typical” operations. Therefore, historical traffic volume data in the area was reviewed and compared with the collected 2021 TMC volumes. The results of the comparison indicates that the weekday PM, Saturday MD, and Saturday PM peak hour traffic volumes are similar to the expected pre-COVID traffic volumes. However, the weekday AM peak hour traffic volumes on Auburn Road were less than expected when compared to the historical traffic volumes. Therefore, the following AM peak hour adjustment factors were determined and applied to the AM peak hour traffic volumes collected, as summarized in **Table 1**.

Table 1: AM Peak Hour COVID Adjustment Factors

COVID Adjustment Factors	
EB Auburn Road	28%
WB Auburn Road	61%

These data were used as a baseline to establish the current peak hour traffic volumes for the analysis of existing conditions. During collection of the turning movement counts, Peak Hour Factors (PHFs) and commercial truck percentages were recorded for each intersection approach and used in the traffic analysis. Peak hour traffic volumes at each of the study intersections were utilized in the study, and the traffic volumes were balanced upwards between intersections. ‘Dummy nodes’ were also utilized in the Synchro models for sink and source. Therefore, the raw traffic volumes shown in the data collection may not match the traffic volumes used in the analysis and shown on the attached traffic volume figures.

The peak hours of the adjacent streets were generally observed as follows:

- Weekday: 8:00 AM to 9:00 AM and 4:45 PM to 5:45 PM
- Saturday: 1:00 PM to 2:00 PM and 5:15 PM to 6:15 PM

F&V collected an inventory of existing lane use and traffic controls, as shown on the attached **Figure 2**. Additionally, F&V obtained the current signal timing permits for the signalized study intersections from MDOT. The existing 2021 peak hour traffic volumes used in the analysis are shown on the attached **Figure 3A** for the weekday peak hours and the attached **Figure 3B** for the weekend peak hours. All applicable background data referenced in this memorandum is attached.

3 EXISTING CONDITIONS

Existing peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections using Synchro/SimTraffic (Version 11) traffic analysis software. This analysis was based on the existing lane use and traffic control shown on the attached **Figure 2**, the existing peak hour traffic volumes shown on the attached **Figures 3A and 3B**, and the methodologies presented in the Highway Capacity Manual, 6th Edition (HCM6). Typically, LOS D is considered acceptable, with LOS A representing minimal delay and LOS F indicating failing conditions. Additional information regarding HCM LOS is attached. The existing conditions results are attached and summarized in **Table 2**.

Table 2: Existing Intersection Operations

Intersection	Control	Approach	Existing Conditions							
			Weekday				Saturday			
			AM Peak		PM Peak		MD Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1 Rochester Road (M-150) & Auburn Road	Signal	EBL	80.3	F	86.8	F	112.5	F	84.8	F
		EBT	63.6	E	67.5	E	65.2	E	65.7	E
		EBR	85.2	F	60.4	E	65.8	E	69.2	E
		WBL	89.5	F	96.8	F	91.6	F	93.2	F
		WBT	66.7	E	56.7	E	61.0	E	60.5	E
		WBR	57.3	E	56.7	E	64.0	E	64.3	E
		NBL	97.5	F	94.2	F	116.0	F	136.7	F
		NBT	20.6	C	11.1	B	34.9	C	27.8	C
		NBR	16.7	B	5.9	A	23.6	C	20.3	C
		SBL	87.3	F	168.3	F	156.7	F	94.2	F
		SBT	23.4	C	38.2	D	36.6	D	27.4	C
SBR	17.3	B	25.1	C	24.3	C	20.6	C		
Overall	42.0	D	46.1	D	54.5	D	47.3	D		
2 Rochester Road (M-150) & Meijer-Lowe's Drive	Signal	EBL	60.5	E	55.9	E	52.5	D	53.3	D
		EBTR	60.5	E	52.9	D	50.1	D	52.2	D
		WBL	67.3	E	63.3	E	77.1	E	67.4	E
		WBTR	60.3	E	54.4	D	51.0	D	52.5	D
		NBL	0.1	A	0.2	A	0.1	A	0.2	A
		NBT	0.3	A	0.8	A	0.8	A	0.6	A
		NBR	0.0	A	0.1	A	0.1	A	0.1	A
		SBL	0.2	A	2.4	A	4.4	A	1.6	A
		SBTR	1.0	A	1.5	A	1.7	A	1.3	A
Overall	2.7	A	4.7	A	6.6	A	5.0	A		
3 Rochester Road (M-150) & Hickory Lawn Road	Stop (Minor)	EB	11.8	B	13.8	B	20.7	C	12.7	B
		NBL	9.9	A	10.9	B	17.7	C	10.1	B
		SB	Free				Free			
4 Rochester Road (M-150) & WB M-59 Exit-Ramp	Signal	WBL	59.7	E	50.4	D	52.3	D	53.9	D
		WBR	53.6	D	58.1	E	58.4	E	58.9	E
		NBT	0.3	A	10.5	B	8.4	A	7.3	A
		SBT	32.1	C	0.7	A	0.8	A	0.4	A
		Overall	33.3	C	18.3	B	15.4	B	17.4	B
5 Rochester Road (M-150) & EB M-59 Exit-Ramp	Signal	EBL	65.3	E	62.6	E	62.1	E	64.5	E
		EBR	60.6	E	56.5	E	55.9	E	60.7	E
		NBT	3.4	A	6.2	A	5.8	A	4.0	A
		SBT	0.7	B	5.8	A	6.5	A	4.4	A
		Overall	10.2	B	14.6	B	14.6	B	12.8	B

3.1 EXISTING CONDITIONS LOS SUMMARY

The result of the existing conditions analysis indicates that all approaches and movements at the study intersections are currently operating acceptably, at LOS D or better during all of the peak periods, with the exception of the following:

Rochester Road (M-150) & Auburn Road

- During ALL peak periods: All approaches (EB, WB, NB, & SB) left-turn movements are currently operating at LOS F. Additionally, the eastbound and westbound through movements and right-turn movements are currently operating at LOS E.
 - During the AM peak hour, the eastbound right-turn movement is currently operating at LOS F.

Rochester Road (M-150) & Meijer-Lowe's Drive

- During the weekday AM peak hour: The eastbound and westbound approaches are currently operating at LOS E.
- During the weekday PM peak hour: The eastbound and westbound left-turn movements are currently operating at LOS E.
- During the Saturday MD peak hour: The westbound left-turn movement is currently operating at LOS E.
- During the Saturday PM peak hour: The westbound left-turn movement is currently operating at LOS E.

Rochester Road (M-150) & WB M-59 Exit-Ramp

- During the weekday AM peak hour: The westbound left-turn movement is currently operating at LOS E.
- During the weekday PM, Saturday MD, & Saturday PM peak periods: The westbound right-turn movement is currently operating at LOS E.

Rochester Road (M-150) & EB M-59 Exit-Ramp

- During ALL peak periods: The eastbound approach is currently operating at LOS E.

Although the Synchro intersection analysis indicates poor/failing operations for several of the study intersection approaches and movements, review of SimTraffic microsimulations indicates generally acceptable operations. The poor LOS and delays for the majority of these movements is due to the long cycle length (140 seconds) within the signalized roadway network. The consequence of a long cycle length is that vehicles will often arrive at the intersection on a red signal and be required to wait throughout the majority of the cycle length to receive a green signal.

Additionally, the underutilization of the minor street approaches and the random arrival of vehicles contributes to the minor street movements experiencing poor/failing LOS. The Meijer-Lowe's Drive has low volume of vehicles, as a result each cycle length may only serve a few vehicles for that approach, which does not facilitate efficient operations. At the M-59 Exit-Ramps a large percentage of vehicles are making a right-turn movement and were observed to do so with a right-turn on red (RTOR) maneuver; therefore, these movements are expected to experience much less delay than is reported in the LOS.

A reduction of cycle length for the roadway corridor would improve the Synchro intersection operations for these movements; however, this would impact other intersections that are coordinated outside of the study network. Additionally, the long cycle length (140 seconds) was observed to be beneficial in helping clear the long vehicle queues caused by the large volumes of traffic; this is done by minimizing the time-loss that occurs during the clearance intervals (yellow and all-red times) in between the intersection phase splits.

3.2 EXISTING CONDITIONS SIMTRAFFIC NETWORK SIMULATIONS

Weekday AM

- Review of SimTraffic network simulations during the AM peak hour indicates generally acceptable operations throughout the study roadway network.
- Occasional periods of vehicle queues were observed on the westbound Auburn Road approach; however, these queues were observed to dissipate and were not present throughout the AM peak hour.

- All other vehicles queues at the signalized study intersections were observed to typically be serviced within each cycle length.

Weekday PM

- Review of SimTraffic network simulations during the Weekday PM peak hour indicates periods of vehicle queues on the northbound/southbound approaches and for the westbound left-turn movement at the signalized intersection of Rochester Road (M-150) & Auburn Road; however, these queues were typically processed through the intersection within 1 or 2 cycle lengths and were not present throughout the PM peak hour.
- Long vehicle queues were observed on the southbound left-turn movement; these queues were often observed to persist throughout the PM peak hour.
- Review of SimTraffic microsimulations for the remaining study intersections indicates generally acceptable operations, with the majority of vehicle queues observed to be serviced within each cycle length.

Saturday Mid-Day

- Review of SimTraffic network simulations during the Saturday MD peak hour indicates occasional periods of long vehicle queues for the southbound left-turn movement at the signalized intersection of Rochester Road (M-150) & Meijer-Lowe's Drive; these vehicle queues occasionally caused blockages to the north, within the SimTraffic microsimulation model.
- SimTraffic network simulations indicate periods of vehicle queues on the northbound/southbound approaches and for the eastbound/westbound left-turn movements at the signalized intersection of Rochester Road (M-150) & Auburn Road; however, these queues were typically processed through the intersection within 1 or 2 cycle lengths and were not present throughout the Saturday MD peak hour.
- Long vehicle queues were observed on the southbound left-turn movement; these queues were often observed to persist throughout the Saturday MD peak hour.
- Review of SimTraffic microsimulations for the remaining study intersections indicates generally acceptable operations, with the majority of vehicle queues observed to be serviced within each cycle length.

Saturday PM

- Review of SimTraffic network simulations during the Saturday PM peak hour indicates occasional periods of long vehicle queues for all left-turn movements at the signalized intersection of Rochester Road (M-150) & Auburn Road; however, these queues were typically processed through the intersection within 1 or 2 cycle lengths and were observed to dissipate within the PM peak hour.
- Review of SimTraffic microsimulations for the remaining study intersections indicates generally acceptable operations, with the majority of vehicle queues observed to be serviced within each cycle length.

4 BACKGROUND CONDITIONS (2023)

Population and economic growth profile data was obtained for the City of Rochester Hills from the Southeast Michigan Council of Governments (SEMCOG) to calculate a background growth rate for the 2021 traffic volumes. This was used in order to calculate the 2023 site buildout year traffic volumes. Population and employment projections from 2015 to 2045 were reviewed and showed an average annual growth of 0.17% and 0.30%, respectively. Therefore, a conservative background growth rate of **0.5%** per year was applied to the existing 2021 peak hour traffic volumes, in order to forecast the background 2023 traffic volume **without the proposed development**, as shown on the attached **Figure 4A** for the weekday peak hours and **Figure 4B** for the weekend peak hours.

In addition to background growth, it is important to account for traffic that will be generated by approved developments within the vicinity of the study area that have yet to be constructed or are currently under construction. The following background development was identified:

- Bebb Oak Mixed-Use Development

The site-generated trips from the proposed Bebb Oak Mixed-Use Development were obtained from the approved TIS performed by ROWE, PSC. Therefore, the future background peak hour traffic volumes shown on the attached **Figures 4A and 4B** were calculated based on the background growth rate applied to the existing traffic volumes shown on the attached **Figures 3A and 3B** and then combined with the trips generated from the adjacent background development.

Background peak hour vehicle delays and LOS **without the proposed development** were calculated at the study intersections based on the existing lane use and traffic control shown on the attached **Figure 2**, the background peak hour traffic volumes shown on the attached **Figures 4A and 4B**, and the methodologies presented in the HCM6. The results of the background conditions analysis are attached and summarized in **Table 3**.

4.1 BACKGROUND CONDITIONS SUMMARY

- The results of the background conditions analysis indicates that all approaches and movements at the study intersections will continue to operate in a manner similar to the existing conditions analysis. Review of SimTraffic network simulations also indicates similar operations to those observed during the existing conditions analysis.
- Microsimulations indicate occasional periods of vehicle queues at the signalized intersection of Rochester Road (M-150) & Auburn Road during the Weekday PM and Saturday MD peak periods; however, the majority of vehicle queues were observed to be serviced through the intersection within 1 or 2 cycle lengths and would dissipate within the peak hours.
- Review of SimTraffic microsimulations for the remaining study roadway network indicates generally acceptable operations during all peak periods, with the majority of vehicle queues observed to be serviced within each cycle length.

5 SITE TRIP GENERATION

5.1 NEW TRIP GENERATION

The proposed development includes an approximately 4,978 SF Chick-fil-A fast-food restaurant with drive-through and an approximately 5,000 SF commercial building. The number of weekday and weekend peak hour vehicle trips that would be generated by the proposed Chick-fil-A development was forecast based on data from three (3) proportionally sized Chick-fil-A facilities in Michigan located in Caledonia, Kalamazoo, and Okemos. The trip generation data for calculations for these sites is attached.

Additionally, the number of weekday and weekend peak hour vehicle trips that would be generated by the proposed retail development was forecast based on data published by ITE in the *Trip Generation Manual, 11th Edition*. The ITE trip generation data for LUC 822 provides Saturday trip generation only for the peak hour of the generator. Therefore, these rates were conservatively utilized for both the Saturday MD and Saturday PM peak hour trip generation calculations.

5.2 PASS BY TRIP GENERATION

As is typical of commercial developments, a portion of the trips generated by the proposed developments are from vehicles on the adjacent roadway and will pass the site on the way from an origin to an ultimate destination. Therefore, not all traffic at the site driveways is necessarily new traffic added to the street system. This percentage of the trips generated by the development are considered “pass-by” trips and do not add new traffic to the adjacent street system. These trips are therefore reduced from the total external trips generated by a study site. In order to provide a conservative analysis, the trip generation for the proposed retail development (LUC 822) was assumed to include no pass-by trips.

The pass-by rates for the Chick-fil-A restaurant were determined based upon a Chick-fil-A study performed by AECOM that included a pass-by trip calculations for this specific land use. The AECOM pass-by trip information is attached. However, for purposes of this study it was assumed that the opening day operations would differ from steady state. MDOT and the City of Rochester Hills stated that 90% of the site generated traffic would be new trips during the opening day scenario, with a pass-by rate not to exceed 10%. Therefore, this analysis included the evaluation of the following two scenarios:

- **Opening Day Pass-by trip reduction: 10%**
- **Steady State Pass-by trip reduction: 30%**

Table 3: Background Intersection Operations

Intersection	Control	Approach	Existing Conditions								Background Conditions								Difference								
			Weekday				Saturday				Weekday				Saturday				Weekday				Saturday				
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	
1	Rochester Road (M-150) & Auburn Road	Signal	EBL	80.3	F	86.8	F	112.5	F	84.8	F	81.7	F	88.9	F	135.3	F	87.2	F	1.4	-	2.1	-	22.8	-	2.4	-
			EBT	63.6	E	67.5	E	65.2	E	65.7	E	63.7	E	67.7	E	65.3	E	64.3	E	0.1	-	0.2	-	0.1	-	-1.4	-
			EBR	85.2	F	60.4	E	65.8	E	69.2	E	85.5	F	60.5	E	65.7	E	67.2	E	0.3	-	0.1	-	-0.1	-	-2.0	-
			WBL	89.5	F	96.8	F	91.6	F	93.2	F	89.8	F	98.5	F	92.6	F	95.7	F	0.3	-	1.7	-	1.0	-	2.5	-
			WBT	66.7	E	56.7	E	61.0	E	60.5	E	68.7	E	58.0	E	60.8	E	61.1	E	2.0	-	1.3	-	-0.2	-	0.6	-
			WBR	57.3	E	56.7	E	64.0	E	64.3	E	58.3	E	60.0	E	68.2	E	69.7	E	1.0	-	3.3	-	4.2	-	5.4	-
			NBL	97.5	F	94.2	F	116.0	F	136.7	F	97.9	F	95.5	F	119.3	F	139.9	F	0.4	-	1.3	-	3.3	-	3.2	-
			NBT	20.6	C	11.1	B	34.9	C	27.8	C	21.5	C	12.3	B	36.2	D	29.3	C	0.9	-	1.2	-	1.3	C→D	1.5	-
			NBR	16.7	B	5.9	A	23.6	C	20.3	C	17.3	B	6.0	A	23.8	C	20.9	C	0.6	-	0.1	-	0.2	-	0.6	-
			SBL	87.3	F	168.3	F	156.7	F	94.2	F	92.0	F	197.6	F	188.9	F	109.7	F	4.7	-	29.3	-	32.2	-	15.5	-
			SBT	23.4	C	38.2	D	36.6	D	27.4	C	24.0	C	39.5	D	38.3	D	28.6	C	0.6	-	1.3	-	1.7	-	1.2	-
			SBR	17.3	B	25.1	C	24.3	C	20.6	C	17.6	B	25.5	C	24.8	C	21.4	C	0.3	-	0.4	-	0.5	-	0.8	-
Overall	42.0	D	46.1	D	54.5	D	47.3	D	42.8	D	48.5	D	58.4	E	49.2	D	0.8	-	2.4	-	3.9	D→E	1.9	-			
2	Rochester Road (M-150) & Meijer-Lowe's Drive	Signal	EBL	60.5	E	55.9	E	52.5	D	53.3	D	60.4	E	55.7	E	52.6	D	53.4	D	-0.1	-	-0.2	-	0.1	-	0.1	-
			EBTR	60.5	E	52.9	D	50.1	D	52.2	D	60.4	E	52.7	D	50.1	D	52.1	D	-0.1	-	-0.2	-	0.0	-	-0.1	-
			WBL	67.3	E	63.3	E	77.1	E	67.4	E	67.3	E	63.2	E	78.1	E	67.4	E	0.0	-	-0.1	-	1.0	-	0.0	-
			WBTR	60.3	E	54.4	D	51.0	D	52.5	D	60.2	E	54.2	D	51.0	D	52.6	D	-0.1	-	-0.2	-	0.0	-	0.1	-
			NBL	0.1	A	0.2	A	0.1	A	0.2	A	0.1	A	0.2	A	0.2	A	0.2	A	0.0	-	0.0	-	0.1	-	0.0	-
			NBT	0.3	A	0.8	A	0.8	A	0.6	A	0.3	A	0.9	A	0.8	A	0.6	A	0.0	-	0.1	-	0.0	-	0.0	-
			NBR	0.0	A	0.1	A	0.1	A	0.1	A	0.0	A	0.1	A	0.1	A	0.1	A	0.0	-	0.0	-	0.0	-	0.0	-
			SBL	0.2	A	2.4	A	4.4	A	1.6	A	0.2	A	2.7	A	5.0	A	1.9	A	0.0	-	0.3	-	0.6	-	0.3	-
			SBTR	1.0	A	1.5	A	1.7	A	1.3	A	1.0	A	1.6	A	1.8	A	1.4	A	0.0	-	0.1	-	0.1	-	0.1	-
			Overall	2.7	A	4.7	A	6.6	A	5.0	A	2.7	A	4.7	A	6.6	A	5.0	A	0.0	-	0.0	-	0.0	-	0.0	-

Intersection	Control	Approach	Existing Conditions										Background Conditions								Difference							
			Weekday					Saturday					Weekday				Saturday				Weekday				Saturday			
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak			
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS		
3	Rochester Road (M-150) & Hickory Lawn Road	Stop (Minor)	EB	11.8	B	13.8	B	20.7	C	12.7	B	12.1	B	13.8	B	21.4	C	12.7	B	0.3	-	0.0	-	0.7	-	0.0	-	
			NBL	9.9	A	10.9	B	17.7	C	10.1	B	10.0	B	10.9	B	18.3	C	10.4	B	0.1	A→B	0.0	-	0.6	-	0.3	-	
			SB	Free					Free					Free				Free				N/A						
4	Rochester Road (M-150) & WB M-59 Exit-Ramp	Signal	WBL	59.7	E	50.4	D	52.3	D	53.9	D	59.7	E	49.9	D	51.8	D	53.3	D	0.0	-	-0.5	-	-0.5	-	-0.6	-	
			WBR	53.6	D	58.1	E	58.4	E	58.9	E	53.9	D	58.1	E	58.1	E	58.5	E	0.3	-	0.0	-	-0.3	-	-0.4	-	
			NBT	0.3	A	10.5	B	8.4	A	7.3	A	0.3	A	11.0	B	8.8	A	7.7	A	0.0	-	0.5	-	0.4	-	0.4	-	
			SBT	32.1	C	0.7	A	0.8	A	0.4	A	20.6	C	0.8	A	0.9	A	0.5	A	-11.5	-	0.1	-	0.1	-	0.1	-	
			Overall	33.3	C	18.3	B	15.4	B	17.4	B	28.7	C	18.4	B	15.5	B	17.3	B	-4.6	-	0.1	-	0.1	-	-0.1	-	
5	Rochester Road (M-150) & EB M-59 Exit-Ramp	Signal	EBL	65.3	E	62.6	E	62.1	E	64.5	E	65.2	E	62.4	E	61.8	E	64.3	E	-0.1	-	-0.2	-	-0.3	-	-0.2	-	
			EBR	60.6	E	56.5	E	55.9	E	60.7	E	60.4	E	56.2	E	55.6	E	60.3	E	-0.2	-	-0.3	-	-0.3	-	-0.4	-	
			NBT	3.4	A	6.2	A	5.8	A	4.0	A	3.4	A	6.4	A	6.0	A	4.2	A	0.0	-	0.2	-	0.2	-	0.2	-	
			SBT	0.7	B	5.8	A	6.5	A	4.4	A	0.7	B	6.00	A	6.8	A	4.6	A	0.0	-	0.2	-	0.3	-	0.2	-	
			Overall	10.2	B	14.6	B	14.6	B	12.8	B	10.2	B	14.7	B	14.8	B	12.9	B	0.0	-	0.1	-	0.2	-	0.1	-	

* Decreased delays are the result of HCM weighting methodology and/or improved progression resulting from increased volumes

5.3 EXISTING TRIP ADJUSTMENTS

The data collection for the study was performed in June 2021, and at that time the property was occupied and utilized by a restaurant. The restaurant will be razed with the addition of the proposed development. Therefore, the existing trips generated by the restaurant were subtracted from the new trip generation to calculate new trips added to the roadway network with the addition of the proposed developments.

The trip generations utilized for this analysis are summarized in **Table 4** for the “Opening Day” operations and **Table 5** for the “Steady State” Operations.

Table 4: Trip Generation (Opening Day) Summary

Land Use	ITE Code	Amount	Units	AM Peak Hour (vph)			PM Peak Hour (vph)			SAT MD Peak Hour (vph)			SAT PM Peak Hour (vph)		
				In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Chick-fil-A	820	4,978	SF	54	55	109	162	161	323	190	195	385	156	156	312
<i>Pass-By (10%)</i>				5	5	10	16	16	32	19	19	38	15	15	30
New Trips				49	50	99	146	145	291	171	176	347	141	141	282
Strip Retail Plaza (<40k SF)	822	5,036	SF	7	5	12	24	24	48	17	16	33	17	16	33
Total Trips				61	60	121	186	185	371	207	211	418	173	172	345
<i>Total Pass-By</i>				5	5	10	16	16	32	19	19	38	15	15	30
<i>Existing (Development) Volumes</i>				9	5	14	17	13	30	16	24	40	18	15	33
Total Net New Trips				47	50	97	153	156	309	172	168	340	140	142	282

Table 5: Trip Generation (Steady State) Summary

Land Use	ITE Code	Amount	Units	AM Peak Hour (vph)			PM Peak Hour (vph)			SAT MD Peak Hour (vph)			SAT PM Peak Hour (vph)		
				In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Chick-fil-A	820	4,978	SF	54	55	109	162	161	323	190	195	385	156	156	312
<i>Pass-By (30%)</i>				16	16	32	48	48	96	58	58	116	47	47	94
New Trips				38	39	77	114	113	227	132	137	269	109	109	218
Strip Retail Plaza (<40k SF)	822	5,036	SF	7	5	12	24	24	48	17	16	33	17	16	33
Total Trips				61	60	121	186	185	371	207	211	418	173	172	345
<i>Total Pass-By</i>				16	16	32	48	48	96	58	58	116	47	47	94
<i>Existing (Development) Volumes</i>				9	5	14	17	13	30	16	24	40	18	15	33
Total Net New Trips				36	39	75	121	124	245	133	129	262	108	110	218

6 SITE TRIP DISTRIBUTION

The vehicular trips that would be generated by the proposed development were assigned to the study roadway network based on the proposed site access plan and driveway configurations, the existing peak hour traffic patterns in the adjacent roadway network, and the methodologies published by ITE. The ITE trip distribution methodology assumes that new trips will enter the network and access the development, then leave the development and return to their direction of origin, whereas pass-by trips will enter and exit the development in their original direction of travel. The site trip distributions utilized in this analysis are summarized in **Table 6**.

Table 6: Site Trip Distribution

New Trips							Pass-By Trips			
AM	PM	SAT MD	SAT PM	To/From	via	Direction	AM	PM	SAT MD	SAT PM
25%	25%	29%	27%	North	Rochester Road (M-150)	NB	41%	51%	48%	49%
19%	31%	27%	29%	South	Rochester Road (M-150)	SB	59%	49%	52%	51%
14%	10%	12%	11%	East	Auburn Road					
10%	12%	10%	10%	West	Auburn Road					
22%	13%	13%	14%	East	M-59					
10%	9%	9%	9%	West	M-59					
100%	100%	100%	100%	Total			100%	100%	100%	100%

Additionally, it was identified that a portion of the site-generated trips would potentially be traveling across Rochester Road (M-150) to/from the existing developments. It was assumed that approximately 5% of the site generated traffic would be *added* at the intersection as internal trips generated between Meijer / Lowe's and the Chick-fil-A development.

The vehicular traffic volumes shown in **Tables 4 and 5** were distributed to the study network according to the distribution shown in **Table 6**. The site-generated trips shown on the attached **Figures 5A and 5B** for "Opening Day" operations and shown on the attached **Figures 7A and 7B** for "Steady State" operations were added to the background traffic volumes shown on the attached **Figures 4A and 4B** in order to calculate the future peak hour traffic volumes with the addition of the proposed development. Future (Opening Day) peak hour traffic volumes are shown on the attached **Figure 6A and 6B**, for the weekday and weekend peak hours respectively. Future (Steady State) peak hour traffic volumes are shown on the attached **Figure 8A and 8B**, for the weekday and weekend peak hours respectively.

7 FUTURE CONDITIONS (2023)

Future peak hour vehicle delays and LOS *with the proposed development* were calculated based on the future lane use shown on the attached **Figure 2**, future (Opening Day) traffic volumes shown on the attached **Figures 6A and 6B**, future (Steady State) traffic volumes shown on the attached **Figures 8A and 8B**, and the methodologies presented in the HCM6. The results of the future conditions analysis are summarized for "Opening Day" operations in **Table 7** and summarized for "Steady State" operations in **Table 8**.

7.1 FUTURE CONDITIONS LOS SUMMARY

The result of the future (Opening Day & Steady State) conditions analyses indicates that all of the study intersection approaches and movements will continue to operate in a manner similar to background conditions, with the following additional delays:

Rochester Road (M-150) & Auburn Road

- During ALL peak periods: The westbound and northbound left-turn movements will experience some increases in delays, with the addition of the site-generated traffic volumes.

Rochester Road (M-150) & Meijer-Lowe's Drive / Site Drive

- During both the Saturday MD & Saturday PM peak periods: The westbound left-turn movement is expected to operate at LOS F. Additionally, the eastbound approach is expected to operate at LOS E.

Table 7: Future (Opening Day) Intersection Operations

Intersection	Control	Approach	Background Conditions								Future Conditions (Opening Day)								Difference								
			Weekday				Saturday				Weekday				Saturday				Weekday				Saturday				
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	
1	Rochester Road (M-150) & Auburn Road	Signal	EBL	81.7	F	88.9	F	135.3	F	87.2	F	81.7	F	88.9	F	135.3	F	87.2	F	0.0	-	0.0	-	0.0	-	0.0	-
			EBT	63.7	E	67.7	E	65.3	E	64.3	E	62.9	E	67.6	E	63.5	E	63.5	E	-0.8	-	-0.1	-	-1.8	-	-0.8	-
			EBR	85.5	F	60.5	E	65.7	E	67.2	E	87.6	F	64.6	E	72.8	E	69.3	E	2.1	-	4.1	-	7.1	-	2.1	-
			WBL	89.8	F	98.5	F	92.6	F	95.7	F	90.7	F	117.4	F	112.5	F	112.1	F	0.9	-	18.9	-	19.9	-	16.4	-
			WBT	68.7	E	58.0	E	60.8	E	61.1	E	65.4	E	57.9	E	59.8	E	60.5	E	-3.3	-	-0.1	-	-1.0	-	-0.6	-
			WBR	58.3	E	60.0	E	68.2	E	69.7	E	57.3	E	60.0	E	65.9	E	67.9	E	-1.0	-	0.0	-	-2.3	-	-1.8	-
			NBL	97.9	F	95.5	F	119.3	F	139.9	F	108.2	F	126.4	F	148.4	F	167.1	F	10.3	-	30.9	-	29.1	-	27.2	-
			NBT	21.5	C	12.3	B	36.2	D	29.3	C	22.3	C	13.8	B	38.6	D	30.4	C	0.8	-	1.5	-	2.4	-	1.1	-
			NBR	17.3	B	6.0	A	23.8	C	20.9	C	17.9	B	6.1	A	24.7	C	21.5	C	0.6	-	0.1	-	0.9	-	0.6	-
			SBL	92.0	F	197.6	F	188.9	F	109.7	F	92.0	F	197.6	F	188.9	F	109.7	F	0.0	-	0.0	-	0.0	-	0.0	-
			SBT	24.0	C	39.5	D	38.3	D	28.6	C	24.9	C	41.0	D	41.4	D	29.6	C	0.9	-	1.5	-	3.1	-	1.0	-
			SBR	17.6	B	25.5	C	24.8	C	21.4	C	18.0	B	25.5	C	25.3	C	21.7	C	0.4	-	0.0	-	0.5	-	0.3	-
Overall	42.8	D	48.5	D	58.4	E	49.2	D	43.2	D	51.3	D	61.8	E	52.0	D	0.4	-	2.8	-	3.4	-	2.8	-			
2	Rochester Road (M-150) & Meijer-Lowe's Drive / Site Drive	Signal	EBL	60.4	E	55.7	E	52.6	D	53.4	D	58.7	E	50.4	D	62.2	E	59.0	E	-1.7	-	-5.3	E→D	9.6	D→E	5.6	D→E
			EBTR	60.4	E	52.7	D	50.1	D	52.1	D	58.8	E	46.8	D	56.6	E	58.8	E	-1.6	-	-5.9	-	6.5	D→E	6.7	D→E
			WBL	67.3	E	63.2	E	78.1	E	67.4	E	66.7	E	67.0	E	311.4	F	230.5	F	-0.6	-	3.8	-	233.3	E→F	163.1	E→F
			WBTR	60.2	E	54.2	D	51.0	D	52.6	D	56.3	E	43.1	D	51.4	D	50.9	D	-3.9	-	-11.1	-	0.4	-	-1.7	-
			NBL	0.1	A	0.2	A	0.2	A	0.2	A	0.8	A	5.7	A	5.4	A	3.3	A	0.7	-	5.5	-	5.2	-	3.1	-
			NBT	0.3	A	0.9	A	0.8	A	0.6	A	0.4	A	1.4	A	0.8	A	0.7	A	0.1	-	0.5	-	0.0	-	0.1	-
			NBR	0.0	A	0.1	A	0.1	A	0.1	A	0.0	A	0.1	A	0.1	A	0.1	A	0.0	-	0.0	-	0.0	-	0.0	-
			SBL	0.2	A	2.7	A	5.0	A	1.9	A	0.2	A	3.3	A	4.9	A	1.9	A	0.0	-	0.6	-	-0.1	-	0.0	-
			SBTR	1.0	A	1.6	A	1.8	A	1.4	A	1.2	A	2.9	A	2.1	A	1.6	A	0.2	-	1.3	-	0.3	-	0.2	-
			Overall	2.7	A	4.7	A	6.6	A	5.0	A	4.6	A	8.6	A	22.0	C	16.2	B	1.9	-	3.9	-	15.4	A→C	11.2	A→B

Intersection	Control	Approach	Background Conditions								Future Conditions (Opening Day)								Difference								
			Weekday				Saturday				Weekday				Saturday				Weekday				Saturday				
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	
3	Rochester Road (M-150) & Hickory Lawn Road	Stop (Minor)	EB	12.1	B	13.8	B	21.4	C	12.7	B	12.4	B	13.8	B	22.7	C	13.5	B	0.3	-	0.0	-	1.3	-	0.8	-
			NBL	10.0	B	10.9	B	18.3	C	10.4	B	10.0	B	11.6	B	19.5	C	10.6	B	0.0	-	0.7	-	1.2	-	0.2	-
			SB	Free				Free				Free				Free				N/A				N/A			
4	Rochester Road (M-150) & WB M-59 Exit-Ramp	Signal	WBL	59.7	E	49.9	D	51.8	D	53.3	D	59.6	E	48.8	D	50.7	D	52.3	D	-0.1	-	-1.1	-	-1.1	-	-1.0	-
			WBR	53.9	D	58.1	E	58.1	E	58.5	E	54.5	D	58.2	E	57.9	E	58.0	E	0.6	-	0.1	-	-0.2	-	-0.5	-
			NBT	0.3	A	11.0	B	8.8	A	7.7	A	0.3	A	11.9	B	9.7	A	8.3	A	0.0	-	0.9	-	0.9	-	0.6	-
			SBT	20.6	C	0.8	A	0.9	A	0.5	A	20.9	C	0.9	A	1.1	A	0.5	A	0.3	-	0.1	-	0.2	-	0.0	-
			Overall	28.7	C	18.4	B	15.5	B	17.3	B	28.8	C	18.6	B	15.6	B	17.2	B	0.1	-	0.2	-	0.1	-	-0.1	-
5	Rochester Road (M-150) & EB M-59 Exit-Ramp	Signal	EBL	65.2	E	62.4	E	61.8	E	64.3	E	65.1	E	62.5	E	61.4	E	64.0	E	-0.1	-	0.1	-	-0.4	-	-0.3	-
			EBR	60.4	E	56.2	E	55.6	E	60.3	E	60.1	E	55.5	E	54.8	D	59.6	E	-0.3	-	-0.7	-	-0.8	E→D	-0.7	-
			NBT	3.4	A	6.4	A	6.0	A	4.2	A	3.5	A	6.8	A	6.4	A	4.4	A	0.1	-	0.4	-	0.4	-	0.2	-
			SBT	0.7	B	6.0	A	6.8	A	4.6	A	0.7	B	6.4	A	7.2	A	4.8	A	0.0	-	0.4	-	0.4	-	0.2	-
			Overall	10.2	B	14.7	B	14.8	B	12.9	B	10.3	B	15.1	B	15.1	B	13.1	B	0.1	-	0.4	-	0.3	-	0.2	-

* Decreased delays are the result of HCM weighting methodology, and/or improved progression resulting from increased volumes

Table 8: Future (Steady State) Intersection Operations

Intersection	Control	Approach	Background Conditions								Future Conditions (Steady State)								Difference								
			Weekday				Saturday				Weekday				Saturday				Weekday				Saturday				
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	
1	Rochester Road (M-150) & Auburn Road	Signal	EBL	81.7	F	88.9	F	135.3	F	87.2	F	81.7	F	88.9	F	135.3	F	87.2	F	0.0	-	0.0	-	0.0	-	0.0	-
			EBT	63.7	E	67.7	E	65.3	E	64.3	E	63.0	E	67.6	E	64.5	E	64.1	E	-0.7	-	-0.1	-	-0.8	-	-0.2	-
			EBR	85.5	F	60.5	E	65.7	E	67.2	E	87.2	F	63.6	E	71.8	E	69.4	E	1.7	-	3.1	-	6.1	-	2.2	-
			WBL	89.8	F	98.5	F	92.6	F	95.7	F	90.4	F	113.6	F	106.2	F	107.9	F	0.6	-	15.1	-	13.6	-	12.2	-
			WBT	68.7	E	58.0	E	60.8	E	61.1	E	66.1	E	57.9	E	60.4	E	61.0	E	-2.6	-	-0.1	-	-0.4	-	-0.1	-
			WBR	58.3	E	60.0	E	68.2	E	69.7	E	57.5	E	60.0	E	67.1	E	69.3	E	-0.8	-	0.0	-	-1.1	-	-0.4	-
			NBL	97.9	F	95.5	F	119.3	F	139.9	F	106.2	F	120.8	F	143.3	F	159.4	F	8.3	-	25.3	-	24.0	-	19.5	-
			NBT	21.5	C	12.3	B	36.2	D	29.3	C	22.1	C	13.4	B	37.7	D	29.9	C	0.6	-	1.1	-	1.5	-	0.6	-
			NBR	17.3	B	6.0	A	23.8	C	20.9	C	17.8	B	6.1	A	24.3	C	21.2	C	0.5	-	0.1	-	0.5	-	0.3	-
			SBL	92.0	F	197.6	F	188.9	F	109.7	F	92.0	F	197.6	F	188.9	F	109.7	F	0.0	-	0.0	-	0.0	-	0.0	-
			SBT	24.0	C	39.5	D	38.3	D	28.6	C	24.6	C	40.7	D	40.2	D	29.1	C	0.6	-	1.2	-	1.9	-	0.5	-
			SBR	17.6	B	25.5	C	24.8	C	21.4	C	17.9	B	25.5	C	25.0	C	21.4	C	0.3	-	0.0	-	0.2	-	0.0	-
Overall	42.8	D	48.5	D	58.4	E	49.2	D	43.1	D	50.8	D	60.8	E	51.1	D	0.3	-	2.3	-	2.4	-	1.9	-			
2	Rochester Road (M-150) & Meijer-Lowe's Drive / Site Drive	Signal	EBL	60.4	E	55.7	E	52.6	D	53.4	D	58.7	E	50.9	D	61.9	E	58.8	E	-1.7	-	-4.8	E→D	9.3	D→E	5.4	D→E
			EBTR	60.4	E	52.7	D	50.1	D	52.1	D	58.9	E	47.1	D	56.4	E	58.5	E	-1.5	-	-5.6	-	6.3	D→E	6.4	D→E
			WBL	67.3	E	63.2	E	78.1	E	67.4	E	66.7	E	66.7	E	305.2	F	225.1	F	-0.6	-	3.5	-	227.1	E→F	157.7	E→F
			WBTR	60.2	E	54.2	D	51.0	D	52.6	D	56.3	E	43.4	D	51.3	D	50.8	D	-3.9	-	-10.8	-	0.3	-	-1.8	-
			NBL	0.1	A	0.2	A	0.2	A	0.2	A	0.8	A	5.5	A	5.2	A	3.2	A	0.7	-	5.3	-	5.0	-	3.0	-
			NBT	0.3	A	0.9	A	0.8	A	0.6	A	0.4	A	1.3	A	0.8	A	0.6	A	0.1	-	0.4	-	0.0	-	0.0	-
			NBR	0.0	A	0.1	A	0.1	A	0.1	A	0.0	A	0.1	A	0.1	A	0.1	A	0.0	-	0.0	-	0.0	-	0.0	-
			SBL	0.2	A	2.7	A	5.0	A	1.9	A	0.2	A	3.2	A	4.7	A	1.9	A	0.0	-	0.5	-	-0.3	-	0.0	-
			SBTR	1.0	A	1.6	A	1.8	A	1.4	A	1.2	A	2.7	A	2.1	A	1.6	A	0.2	-	1.1	-	0.3	-	0.2	-
			Overall	2.7	A	4.7	A	6.6	A	5.0	A	4.6	A	8.5	A	21.8	C	16.0	B	1.9	-	3.8	-	15.2	A→C	11.0	A→B

Intersection	Control	Approach	Background Conditions								Future Conditions (Steady State)								Difference								
			Weekday				Saturday				Weekday				Saturday				Weekday				Saturday				
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	
3	Rochester Road (M-150) & Hickory Lawn Road	Stop (Minor)	EB	12.1	B	13.8	B	21.4	C	12.7	B	12.4	B	13.8	B	22.5	C	13.5	B	0.3	-	0.0	-	1.1	-	0.8	-
			NBL	10.0	B	10.9	B	18.3	C	10.4	B	10.0	B	11.6	B	19.2	C	10.6	B	0.0	-	0.7	-	0.9	-	0.2	-
			SB	Free				Free				Free				Free				N/A				N/A			
4	Rochester Road (M-150) & WB M-59 Exit-Ramp	Signal	WBL	59.7	E	49.9	D	51.8	D	53.3	D	59.6	E	49.0	D	50.9	D	52.6	D	-0.1	-	-0.9	-	-0.9	-	-0.7	-
			WBR	53.9	D	58.1	E	58.1	E	58.5	E	54.4	D	58.1	E	57.9	E	58.1	E	0.5	-	0.0	-	-0.2	-	-0.4	-
			NBT	0.3	A	11.0	B	8.8	A	7.7	A	0.3	A	11.7	B	9.5	A	8.2	A	0.0	-	0.7	-	0.7	-	0.5	-
			SBT	20.6	C	0.8	A	0.9	A	0.5	A	20.8	C	0.9	A	1.0	A	0.5	A	0.2	-	0.1	-	0.1	-	0.0	-
			Overall	28.7	C	18.4	B	15.5	B	17.3	B	28.8	C	18.5	B	15.6	B	17.2	B	0.1	-	0.1	-	0.1	-	-0.1	-
5	Rochester Road (M-150) & EB M-59 Exit-Ramp	Signal	EBL	65.2	E	62.4	E	61.8	E	64.3	E	65.1	E	62.5	E	61.5	E	64.0	E	-0.1	-	0.1	-	-0.3	-	-0.3	-
			EBR	60.4	E	56.2	E	55.6	E	60.3	E	60.2	E	55.7	E	55.0	D	59.8	E	-0.2	-	-0.5	-	-0.6	E→D	-0.5	-
			NBT	3.4	A	6.4	A	6.0	A	4.2	A	3.5	A	6.7	A	6.3	A	4.3	A	0.1	-	0.3	-	0.3	-	0.1	-
			SBT	0.7	B	6.0	A	6.8	A	4.6	A	0.7	B	6.3	A	7.1	A	4.8	A	0.0	-	0.3	-	0.3	-	0.2	-
			Overall	10.2	B	14.7	B	14.8	B	12.9	B	10.3	B	15.0	B	15.0	B	13.0	B	0.1	-	0.3	-	0.2	-	0.1	-

* Decreased delays are the result of HCM weighting methodology, and/or improved progression resulting from increased volumes

7.2 FUTURE CONDITIONS SIMTRAFFIC NETWORK SIMULATIONS

- Review of the future (Opening Day & Steady State) SimTraffic network simulations, during the Weekday AM and Saturday PM peak hours, indicates acceptable operations, similar to those observed during the background conditions analysis.
- The future (Opening Day & Steady State) SimTraffic microsimulations, during the Weekday PM and Saturday MD peak hours, indicates long vehicle queues for the northbound and southbound left-turn movements at the signalized intersection of Rochester Road (M-150) & Meijer-Lowe’s Drive / Site Drive. These queues were observed to typically persist throughout the peak periods, occasionally causing blockages and spillbacks throughout the roadway network; therefore, the SimTraffic queueing reports during these peak periods may provide misleading results regarding vehicle queue lengths at the off-site intersection operations.

8 ACCESS MANAGEMENT

8.1 AUXILIARY TURN LANES

The MDOT auxiliary right-turn treatment criteria was evaluated at the proposed site driveway on Rochester Road (M-150). There is an existing center left-turn lane on Rochester Road (M-150) adjacent to the project site; therefore, the warrant criteria for an auxiliary left-turn lane was not evaluated. This analysis was based on the future (Opening Day) traffic volumes, as shown on the attached **Figures 6A and 6B**. The results of the analysis are shown on the attached MDOT warranting chart and is summarized in **Table 9**.

Table 9: Auxiliary Turn Lane Analysis Summary

Intersection	Weekday AM Peak	Weekday PM Peak	Saturday MD Peak	Saturday PM Peak	Recommendation
Rochester Road (M-150) & Site Drive	RT Taper	RT Lane	RT Lane	RT Lane	RT Lane

The results of the auxiliary turn lane analysis indicate that a right-turn deceleration lane is recommended on southbound Rochester Road (M-150) at the proposed site driveway.

8.2 INTERSECTION / DRIVEWAY SPACING

The site driveway for the proposed Chick-fil-A and retail development will be located at an existing signalized intersection. No additional access is proposed with this this development. **Exhibit 1** below provides a map and summary of the existing driveways and intersections within 450-ft of the proposed site driveway location. The proposed access point will utilize an existing driveway that is aligned opposite the signalized Meijer / Lowes driveway. No additional site access is proposed with the proposed development.

Exhibit 1: Site Driveway Spacing



9 FUTURE CONDITIONS WITH IMPROVEMENTS

In order to mitigate the impact that the site-generated trips from the proposed development will have on the adjacent study intersections, mitigation measures were reviewed at the following study intersections.

Rochester Road (M-150) & Auburn Road

In order to improve the intersection operations to acceptable delays (LOS D or better), capacity improvements are needed; however, there is limited ROW in this area, limiting the feasibility of such capacity improvements at this intersection.

Therefore, the signal operations were reviewed and it was determined that the left-turn movement delay could be significantly reduced, by providing permissive/protected left-turn phasing. The MDOT left-turn phasing charts were evaluated and are attached, indicating permissive/protected left-turn phasing is warranted; however, through discussions with MDOT and the City of Rochester Hills, it was identified that MDOT would like to maintain the existing protected left-turn signal phasing.

Therefore, signal timing optimizations were evaluated, in an effort to reduce the increase in delay caused by the proposed development to operate similar to background conditions **without the proposed development** or better. The comparison of the background conditions (no build) and future (Opening Day & Steady State) conditions analyses with improvements is attached and shown in **Tables 10 and 11**.

The recommended improvements improvement at this intersection are summarized below and were found to mitigate the traffic impact of the site generated traffic at this intersection.

- Optimize the signal timings (provide additional LT phase green time) during all peak periods. The signals currently run on RCOC's Sydney Coordinated Traffic System (SCATS); therefore, updates would be applied to the back-up timings that were evaluated in this study.

Rochester Road (M-150) & Meijer-Lowe's Drive / Site Drive

The auxiliary turn lane criteria indicates that a southbound right-turn lane is warranted at this intersection. Review of the MDOT left-turn phasing criteria shows that the north/south left-turn phasing criteria is met. The recommended improvements at this intersection are summarized below and were found to mitigate the traffic impact of the site generated traffic at this intersection.

- Provide a southbound right-turn lane on southbound Rochester Road (M-150) at the site driveway.
- Provide permissive-protected left-turn phasing for the northbound/southbound approaches.

The comparison of the background conditions (no build) and future (Opening Day & Steady State) conditions analyses with improvements is attached and shown in **Tables 10 and 11**.

9.1 FUTURE CONDITIONS WITH IMPROVEMENTS SUMMARY

The results of the future (Opening Day & Steady State) improvements analyses indicates that, with the addition of the recommended improvements, the traffic impacts generated by the proposed development traffic are mitigated.

- Additionally, the signalized intersection of Rochester Road (M-150) & Auburn Road is expected to improve to background conditions or better. Review of SimTraffic network simulations also indicates improved vehicle queueing for the left-turn movements.
- The signalized intersection of Rochester Road & Meijer-Lowe's Drive / Site Drive is expected to experience some increased delays on the northbound and southbound approaches. However, review of the SimTraffic microsimulations indicates significantly improved vehicle queueing for the northbound/southbound left-turn movements and acceptable operations for the through movements. Additionally, although the Synchro intersection LOS/delay indicates poor operations for the westbound left-turn movement, review of SimTraffic network simulations indicates that the vehicle queues are typically observed to be serviced within each cycle length, leaving minimal residual queueing.

Table 10: Future (Opening Day) Intersection Operations with Improvements

Intersection	Control	Approach	Background Conditions								Future Conditions (Opening Day) w/ IMP								Difference								
			Weekday				Saturday				Weekday				Saturday				Weekday				Saturday				
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	
1	Rochester Road (M-150) & Auburn Road	Signal	EBL	81.7	F	88.9	F	135.3	F	87.2	F	72.1	E	84.7	F	104.4	F	83.2	F	-9.6	F→E	-4.2	-	-30.9	-	-4.0	-
			EBT	63.7	E	67.7	E	65.3	E	64.3	E	62.9	E	67.6	E	63.5	E	63.5	E	-0.8	-	-0.1	-	-1.8	-	-0.8	-
			EBR	85.5	F	60.5	E	65.7	E	67.2	E	87.6	F	64.6	E	72.8	E	69.3	E	2.1	-	4.1	-	7.1	-	2.1	-
			WBL	89.8	F	98.5	F	92.6	F	95.7	F	79.0	E	90.5	F	89.9	F	89.7	F	-10.8	F→E	-8.0	-	-2.7	-	-6.0	-
			WBT	68.7	E	58.0	E	60.8	E	61.1	E	65.0	E	55.7	E	60.3	E	58.7	E	-3.7	-	-2.3	-	-0.5	-	-2.4	-
			WBR	58.3	E	60.0	E	68.2	E	69.7	E	57.1	E	57.2	E	66.9	E	63.8	E	-1.2	-	-2.8	-	-1.3	-	-5.9	-
			NBL	97.9	F	95.5	F	119.3	F	139.9	F	75.6	E	89.2	F	116.0	F	107.9	F	-22.3	F→E	-6.3	-	-3.3	-	-32.0	-
			NBT	21.5	C	12.3	B	36.2	D	29.3	C	0.9	A	20.7	C	13.8	B	5.7	A	-20.6	C→A	8.4	B→C	-22.4	D→B	-23.6	C→A
			NBR	17.3	B	6.0	A	23.8	C	20.9	C	0.4	A	8.3	A	6.5	A	3.4	A	-16.9	B→A	2.3	-	-17.3	C→A	-17.5	C→A
			SBL	92.0	F	197.6	F	188.9	F	109.7	F	78.2	E	163.2	F	156.0	F	91.0	F	-13.8	F→E	-34.4	-	-32.9	-	-18.7	-
			SBT	24.0	C	39.5	D	38.3	D	28.6	C	25.3	C	47.5	D	46.5	D	32.9	C	1.3	-	8.0	-	8.2	-	4.3	-
			SBR	17.6	B	25.5	C	24.8	C	21.4	C	18.4	B	27.9	C	27.1	C	23.9	C	0.8	-	2.4	-	2.3	-	2.5	-
			Overall	42.8	D	48.5	D	58.4	E	49.2	D	35.0	D	50.8	D	50.8	D	40.2	D	-7.8	-	2.3	-	-7.6	E→D	-9.0	-
2	Rochester Road & Meijer-Lowe's Drive / Site Drive	Signal	EBL	60.4	E	55.7	E	52.6	D	53.4	D	58.7	E	50.5	D	46.9	D	47.9	D	-1.7	-	-5.2	E→D	-5.7	-	-5.5	-
			EBTR	60.4	E	52.7	D	50.1	D	52.1	D	58.9	E	47.0	D	43.5	D	46.2	D	-1.5	-	-5.7	-	-6.6	-	-5.9	-
			WBL	67.3	E	63.2	E	78.1	E	67.4	E	66.7	E	68.6	E	71.8	E	66.7	E	-0.6	-	5.4	-	-6.3	-	-0.7	-
			WBTR	60.2	E	54.2	D	51.0	D	52.6	D	56.3	E	43.2	D	40.5	D	42.1	D	-3.9	-	-11.0	-	-10.5	-	-10.5	-
			NBL	0.1	A	0.2	A	0.2	A	0.2	A	4.0	A	10.1	B	20.2	C	10.1	B	3.9	-	9.9	A→B	20.0	A→C	9.9	A→B
			NBT	0.3	A	0.9	A	0.8	A	0.6	A	0.5	A	2.4	A	2.2	A	1.4	A	0.2	-	1.5	-	1.4	-	0.8	-
			NBR	0.0	A	0.1	A	0.1	A	0.1	A	0.0	A	0.1	A	0.2	A	0.1	A	0.0	-	0.0	-	0.1	-	0.0	-
			SBL	0.2	A	2.7	A	5.0	A	1.9	A	4.1	A	9.8	A	11.7	B	9.8	A	3.9	-	7.1	-	6.7	A→B	7.9	-
			SBTR [SBR]	1.0	A	1.6	A	1.8	A	1.4	A	0.8	A	2.2	A	13.9	B	1.8	A	-0.2	-	0.6	-	12.1	A→B	0.4	-
			SBTR [SBR]	2.7	A	4.7	A	6.6	A	5.0	A	0.0	A	0.2	A	7.2	A	0.2	A	-2.7	-	-4.5	-	0.6	-	-4.8	-
			Overall	12.1	B	13.8	B	21.4	C	12.7	B	4.5	A	8.9	A	14.5	B	8.6	A	-7.6	B→A	-4.9	B→A	-6.9	C→B	-4.1	B→A

Table 11: Future (Steady State) Intersection Operations with Improvements

Intersection	Control	Approach	Background Conditions								Future Conditions (Steady State) w/ IMP								Difference								
			Weekday				Saturday				Weekday				Saturday				Weekday				Saturday				
			AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		AM Peak		PM Peak		MD Peak		PM Peak		
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	
1	Rochester Road (M-150) & Auburn Road	Signal	EBL	81.7	F	88.9	F	135.3	F	87.2	F	72.1	E	86.7	F	104.4	F	83.2	F	-9.6	F→E	-2.2	-	-30.9	-	-4.0	-
			EBT	63.7	E	67.7	E	65.3	E	64.3	E	63.0	E	67.6	E	64.5	E	64.1	E	-0.7	-	-0.1	-	-0.8	-	-0.2	-
			EBR	85.5	F	60.5	E	65.7	E	67.2	E	87.2	F	63.6	E	71.8	E	69.4	E	1.7	-	3.1	-	6.1	-	2.2	-
			WBL	89.8	F	98.5	F	92.6	F	95.7	F	78.8	E	98.8	F	89.2	F	89.2	F	-11.0	F→E	0.3	-	-3.4	-	-6.5	-
			WBT	68.7	E	58.0	E	60.8	E	61.1	E	65.7	E	56.8	E	61.5	E	59.4	E	-3.0	-	-1.2	-	0.7	-	-1.7	-
			WBR	58.3	E	60.0	E	68.2	E	69.7	E	57.4	E	58.5	E	69.8	E	65.4	E	-0.9	-	-1.5	-	1.6	-	-4.3	-
			NBL	97.9	F	95.5	F	119.3	F	139.9	F	75.2	E	88.6	F	111.2	F	102.3	F	-22.7	F→E	-6.9	-	-8.1	-	-37.6	-
			NBT	21.5	C	12.3	B	36.2	D	29.3	C	0.9	A	17.6	B	12.0	B	5.0	A	-20.6	C→A	5.3	-	-24.2	D→B	-24.3	C→A
			NBR	17.3	B	6.0	A	23.8	C	20.9	C	0.4	A	7.5	A	5.9	A	3.0	A	-16.9	B→A	1.5	-	-17.9	C→A	-17.9	C→A
			SBL	92.0	F	197.6	F	188.9	F	109.7	F	78.2	E	163.2	F	156.0	F	91.0	F	-13.8	F→E	-34.4	-	-32.9	-	-18.7	-
			SBT	24.0	C	39.5	D	38.3	D	28.6	C	25.1	C	44.6	D	44.1	D	32.1	C	1.1	-	5.1	-	5.8	-	3.5	-
			SBR	17.6	B	25.5	C	24.8	C	21.4	C	18.2	B	27.1	C	26.5	C	23.5	C	0.6	-	1.6	-	1.7	-	2.1	-
			Overall	42.8	D	48.5	D	58.4	E	49.2	D	35.0	D	49.7	D	49.6	D	39.7	D	-7.8	-	1.2	-	-8.8	E→D	-9.5	-
2	Rochester Road & Meijer-Lowe's Drive / Site Drive	Signal	EBL	60.4	E	55.7	E	52.6	D	53.4	D	58.7	E	51.0	D	46.7	D	47.9	D	-1.7	-	-4.7	E→D	-5.9	-	-5.5	-
			EBTR	60.4	E	52.7	D	50.1	D	52.1	D	58.9	E	47.2	D	43.5	D	46.3	D	-1.5	-	-5.5	-	-6.6	-	-5.8	-
			WBL	67.3	E	63.2	E	78.1	E	67.4	E	66.7	E	68.2	E	71.1	E	66.6	E	-0.6	-	5.0	-	-7.0	-	-0.8	-
			WBTR	60.2	E	54.2	D	51.0	D	52.6	D	56.4	E	43.5	D	40.5	D	42.2	D	-3.8	-	-10.7	-	-10.5	-	-10.4	-
			NBL	0.1	A	0.2	A	0.2	A	0.2	A	4.0	A	9.9	A	19.5	B	10.0	B	3.9	-	9.7	-	19.3	A→B	9.8	A→B
			NBT	0.3	A	0.9	A	0.8	A	0.6	A	0.5	A	2.2	A	2.1	A	1.4	A	0.2	-	1.3	-	1.3	-	0.8	-
			NBR	0.0	A	0.1	A	0.1	A	0.1	A	0.0	A	0.1	A	0.2	A	0.1	A	0.0	-	0.0	-	0.1	-	0.0	-
			SBL	0.2	A	2.7	A	5.0	A	1.9	A	4.1	A	9.6	A	11.6	B	9.8	A	3.9	-	6.9	-	6.6	A→B	7.9	-
			SBTR [SBT]	1.0	A	1.6	A	1.8	A	1.4	A	0.8	A	2.1	A	13.6	B	1.7	A	-0.2	-	0.5	-	11.8	A→B	0.3	-
			SBTR [SBR]	2.7	A	4.7	A	6.6	A	5.0	A	0.0	A	0.2	A	7.2	A	0.2	A	-2.7	-	-4.5	-	0.6	-	-4.8	-
			Overall	12.1	B	13.8	B	21.4	C	12.7	B	4.5	A	8.9	A	14.3	B	8.6	A	-7.6	B→A	-4.9	B→A	-7.1	C→B	-4.1	B→A

10 SITE CIRCULATION AND DRIVE-THROUGH QUEUEING

10.1 SITE OPERATIONS

The site circulation and queuing for Chick-fil-A is very unique. To ensure that adequate on-site queuing is provided, Chick-fil-A has designed their stores to accommodate their operations.

Opening Day: The opening of a new store creates a significant demand. Data provided by Chick-fil-A for their Novi store showed at 40% increase in customers over their current steady state operations. In order to accommodate this additional demand, Chick-fil-A has an on-site queueing plan with extra staffing to accommodate the peak operations. The infrastructure (parking) for the adjacent retail will be constructed; however, the retail building will not be constructed until the Chick-fil-A has reached steady state of stabilized vehicle queueing.

Steady State: After the opening day reaches an equilibrium for the site and data supports that the additional queueing is not necessary, the retail building will be constructed on the property. However, the service rate and peak hour staffing will remain as this is part of the normal operations plan for Chick-fil-A stores.

10.2 QUEUEING ANALYSIS

A queueing analysis was performed to evaluate the opening day and steady state operations of this site to determine the peak drive-through queueing for the development. F&V collected data at the existing Chick-fil-A restaurant located in Novi, near the Twelve-Oaks Mall, on Wednesday August 24th, 2022, and Saturday August 27th, 2022. The data collection result summary is attached and summarized below.

The data collection included:

- Order time, Chick-fil-A employees take patrons orders while vehicles are in line, rather than the traditional order board. During peak times, the vehicles roll through the ordering process and do not stop at an order board.
- Service rate calculations for the pick-up window: Time to pull up to the drive-through window, receive order, and pull away.
- Vehicle Length: Average vehicle measured 23-25-ft in length, bumper to bumper.
- Customer data collected and verified through orders showed 70% percentage of site generated trips use drive-through.

The calculated vehicle queue lengths for the for the proposed operations are summarized in **Table 12**.

Table 12: Queue Length Calculations

Opening Day Operations		Normal Operations	
STACKING SPACE CALCULATOR		STACKING SPACE CALCULATOR	
Number of Arrivals	186	Number of Arrivals	133
Peak Period Time (minutes)	60	Peak Period Time (minutes)	60
% Arrivals during peak period	100%	% Arrivals during peak period	100%
Time per Vehicle (s)	36	Time per Vehicle (s)	36
Vehicle Stacking Length (FT)	25	Vehicle Stacking Length (FT)	25
Service Rate	100	Service Rate	100
Arrival Rate	186	Arrival Rate	133
TOTAL QUEUE (Veh)	86	TOTAL QUEUE (Veh)	33
TOTAL QUEUE (ft)	2,150	TOTAL QUEUE (ft)	825

Drive-through queue lengths were observed and recorded in order to provide a comparison between the calculated vehicle queueing and the actual restaurant operations. A summary of the site-generated drive-through queueing information observed during the weekday mid-day (11:00 AM to 1:00 PM), weekday afternoon (5:00 PM to 6:00 PM), and Saturday mid-day (11:00 AM to 3:00 PM) peak periods is summarized in **Table 13**.

Table 13: Field Review Drive-Through Queueing Summary

Queue Length (cars)	Mid-Day	PM	SAT
50% Percentile	14	13	27
85% Percentile	21	18	35
95% Percentile	24	27	37
Average	15	13	25
Maximum (Veh)	29	28	40
Maximum (ft)	725	700	1,000

The results of the drive-through queueing observations made during the field review indicates an 85th percentile vehicle queue length of approximately 35 vehicles during the Saturday operations, which represent the highest day for the Novi site. Therefore, the steady state operations calculated for the proposed Rochester Hills site are expected to be representative of the steady state operations observed for similar Chick-fil-A sites located in Southeast Michigan.

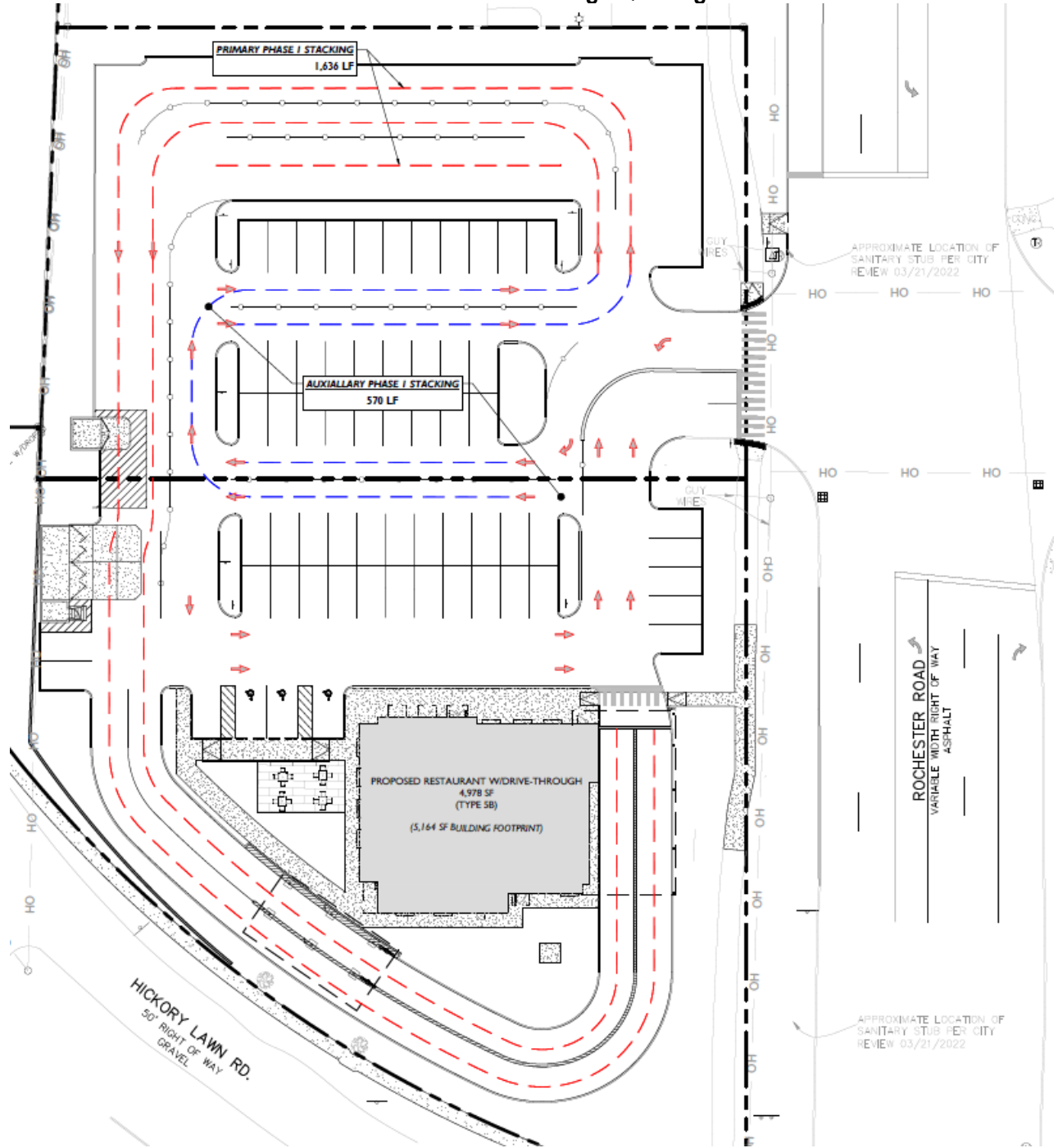
10.3 SUMMARY

The proposed site plan includes enough vehicle queueing storage for 1,636-LF during normal operations, with an additional 570-LF of stacking available during periods of peak operations. Therefore, the proposed development can adequately accommodate the expected vehicle queueing operations and provides enough additional space to accommodate the increased opening day operations. The drive-through queueing plan is shown on **Exhibit 2**.

- During peak time periods, Chick-fil-A utilizes employees stationed outside along the drive-through queue, with menu tablets to take patrons orders, eliminating the need for the menu kiosk and providing additional queueing storage space. This also helps to expedite the ordering and payment process, thus increasing the service rate.
- The opening day queueing can accommodate a minimum of 1,636-LF of stacking, with the option to expand further into the parking lot as necessary for additional storage as necessary to accommodate additional vehicle demand.
- Comparison indicates that the calculated steady state operations are expected to be representative of the steady state operations observed, in the field review, for a similar Chick-fil-A site.

Therefore, the expected and maximum potential drive-through queue lengths can be adequately accommodated on site without impacting operations on the adjacent roadway network.

Exhibit 2: Drive-Through Queuing



11 CONCLUSIONS

The conclusions of this TIS are as follows:

11.1 BACKGROUND DATA

- Due to the impact of COVID-19, the traffic volume data collected may not be representative of “typical” operations. The weekday PM and Saturday MD and PM peak hour traffic volumes are similar to the expected pre-COVID traffic volumes. The weekday AM peak hour traffic volumes on Auburn Road were less than expected when compared to the historical traffic volumes. The following AM peak hour adjustment factors were applied to the AM peak hour traffic volumes collected.

COVID Adjustment Factors	
EB Auburn Road	28%
WB Auburn Road	61%

- A conservative 0.5% annual background growth rate was utilized in order to project the existing 2021 traffic volumes to the buildout year of 2023.
- In addition to the implicit growth rate, the following background developments will be under construction within the buildout year and was included as background traffic.
 - Bebb Oak Mixed-Use Development

11.2 EXISTING (2021) CONDITIONS

The result of the existing conditions analysis indicates that all of the study intersections approaches and movements are currently operating acceptably at LOS D or better during the peak periods with the following exceptions:

Rochester Road (M-150) & Auburn Road

- During ALL peak periods: All approaches (EB, WB, NB, & SB) left-turn movements are currently operating at LOS F. Additionally, the EB and WB through movements and right-turn movements are currently operating at LOS E.
 - Additionally, during the AM peak hour, the EB right-turn movement is currently operating at LOS F.

Rochester Road (M-150) & Meijer-Lowe’s Drive

- During the weekday AM peak hour: The EB and WB approaches are currently operating at LOS E.
- During the weekday PM peak hour: The EB and WB left-turn movements are currently operating at LOS E.
- During the Saturday MD peak hour: The WB left-turn movement is currently operating at LOS E.
- During the Saturday PM peak hour: The WB left-turn movement is currently operating at LOS E.

Rochester Road (M-150) & WB M-59 Exit Ramp

- During the weekday AM peak hour: The WB left-turn movement is currently operating at LOS E.
- During the weekday PM, Saturday MD, & Saturday PM peak periods: The WB right-turn movement is currently operating at LOS E.

Rochester Road (M-150) & EB M-59 Exit Ramp

- During ALL peak periods: The EB approach is currently operating at LOS E.

Review of SimTraffic network simulations also indicates occasional periods of vehicle queues at the signalized intersection of Rochester Road (M-150) & Auburn Road during the Weekday PM and Saturday MD peak periods; however, the majority of vehicle queues were observed to be serviced through the intersection within 1 or 2 cycle lengths and would dissipate within the peak hours. Review of SimTraffic microsimulations for the remaining study roadway network indicates generally acceptable operations during all peak periods, with the majority of vehicle queues observed to be serviced within each cycle length.

11.3 BACKGROUND (2023) CONDITIONS

- The results of the background conditions analysis indicates that all approaches and movements at the study intersections will continue to operate in a manner similar to the existing conditions analysis.

11.4 FUTURE (2023) CONDITIONS

The results of the future conditions analysis indicates that all of the study intersection approaches and movements will continue to operate in a manner similar to background conditions with the following additional delays:

Rochester Road (M-150) & Auburn Road

- During All peak periods: The WB and NB left-turn movements will experience increased delays

Rochester Road (M-150) & Meijer / Lowe's Drive / Site Drive

- During both the Saturday MD & Saturday PM peak periods: the WB left-turn movement is expected to operate at LOS F. Additionally, the EB approach is expected to operate at LOS E.

Review of the future (Opening Day & Steady State) SimTraffic network simulations, during the Weekday AM and Saturday PM peak hours, indicates acceptable operations, similar to those observed during the background conditions analysis. However, the future (Opening Day & Steady State) SimTraffic microsimulations, during the Weekday PM and Saturday MD peak hours, indicates long vehicle queues for the northbound and southbound left-turn movements at the signalized intersection of Rochester Road (M-150) & Meijer-Lowe's Drive / Site Drive.

11.5 AUXILIARY TURN LANE EVALUATION

- There is currently a center left-turn lane on Rochester Road (M-150) adjacent to the project site; therefore, only the right-turn treatment warrant was evaluated at the proposed site driveway.
- The MDOT right-turn lane warrant criteria indicates that a full-width right-turn lane is recommended on southbound Rochester Road (M-150) at the site driveway.

11.6 FUTURE (2023) CONDITIONS WITH IMPROVEMENTS

In order to mitigate the impact that the site-generated trips from the proposed development will have on the adjacent study intersections, mitigation measures were reviewed at the following study intersections.

Rochester Road (M-150) & Auburn Road

Permissive/protected left-turn phasing was evaluated and found to significantly reduce the left-turn delay; however, MDOT and the City have indicated that this is not desirable. In order to improve the intersection operations to acceptable delays (LOS D or better), capacity improvements are needed; however, there is limited ROW in this area, limiting the feasibility of such capacity improvements at this intersection.

Therefore, signal timing optimizations were evaluated, in an effort to reduce the increase in delay caused by the proposed development to operate similar to background conditions **without the proposed development** or better.

- Optimize the signal timings (provide additional LT phase green time) during all peak periods

Rochester Road (M-150) & Meijer-Lowe's Drive / Site Drive

The MDOT left-turn phasing criteria were reviewed at this intersection and shows that this north/south left-turn phasing criteria is met. Therefore, the recommended improvements are summarized below and were found to mitigate the traffic impact of the site generated traffic at this intersection.

- Provide a southbound right-turn lane on southbound Rochester Road (M-150) at the site driveway.
- Provide permissive-protected left-turn phasing for the northbound/southbound approaches.

The results of the future (Opening Day & Steady State) improvements analyses indicates that, with the addition of the recommended improvements, the traffic impacts generated by the proposed development traffic are mitigated.

11.7 SITE CIRCULATION AND DRIVE-THROUGH QUEUEING

The site circulation and queuing for Chick-fil-A is very unique. To ensure that adequate on-site queuing is provided, Chick-fil-A has designed their stores to accommodate their operations.

- **Opening Day:** The opening of a new store creates a significant demand. In order to accommodate this, Chick-fil-A has an on-site queueing plan with extra staffing to accommodate the peak operations. The infrastructure (parking) for the adjacent retail will be constructed, but the retail will not be occupied until the Chick-fil-A has reached steady state queueing.
- **Field Review:** F&V staff performed a field review of the existing Chick-fil-A restaurant located in Novi, near the 12-Oaks Mall, on Wednesday August 24th, 2022, and Saturday August 27th, 2022. During the field review, an average service rate was calculated to determine the required on-site vehicle queueing.
- F&V performed a queueing analysis for this site to determine the peak queueing for the development based upon the projected operations for both opening day and normal operations. The results of this analysis are summarized below.

Opening Day Operations		Normal Operations	
STACKING SPACE CALCULATOR		STACKING SPACE CALCULATOR	
Number of Arrivals	186	Number of Arrivals	133
Peak Period Time (minutes)	60	Peak Period Time (minutes)	60
% Arrivals during peak period	100%	% Arrivals during peak period	100%
Time per Vehicle (s)	36	Time per Vehicle (s)	36
Vehicle Stacking Length (FT)	25	Vehicle Stacking Length (FT)	25
Service Rate	100	Service Rate	100
Arrival Rate	186	Arrival Rate	133
TOTAL QUEUE (Veh)	86	TOTAL QUEUE (Veh)	33
TOTAL QUEUE (ft)	2,150	TOTAL QUEUE (ft)	825

- During peak time periods, Chick-fil-A utilizes employees stationed outside along the drive-through queue, with menu tablets to take patrons orders, eliminating the need for the menu kiosk and providing additional queueing storage space. This also helps to expedite the ordering and payment process, thus increasing the service rate.
- The opening day queueing can accommodate a minimum of 1,636-LF of stacking, with the option to expand further into the parking lot as necessary for additional storage as necessary to accommodate additional vehicle demand.
- Comparison indicates that the calculated steady state operations are expected to be representative of the steady state operations observed, in the field review, for a similar Chick-fil-A site.

Therefore, the expected and maximum potential drive-through queue lengths can be adequately accommodated on site without impacting operations on the adjacent roadway network.

12 RECOMMENDATIONS

The recommendations of this TIS are as follows:

Rochester Road (M-150) & Auburn Road

- Optimize the signal timings (provide additional LT phase green time) during all peak periods

Rochester Road (M-150) & Meijer-Lowe's Drive / Site Drive

- Provide a southbound right-turn lane on southbound Rochester Road (M-150) at the site driveway.
- Provide permissive-protected left-turn phasing for the northbound/southbound approaches.
- Provide internal wayfinding to facilitate site circulation and vehicle queuing within the site.

Any questions related to this memorandum, study, analysis, and results should be addressed to Fleis & VandenBrink.



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Michigan.

Attached: Figures 1-8
Proposed Site/Concept Plan
Traffic Volume Data
Signal Timing Permits
SEMCOG Information
Bebb Oak TIS Data
Synchro / SimTraffic Results
Left-turn Phasing Warrants
MDOT Auxiliary Lane Charts
Chick-fil-A Trip Generation Memo (ROWE)

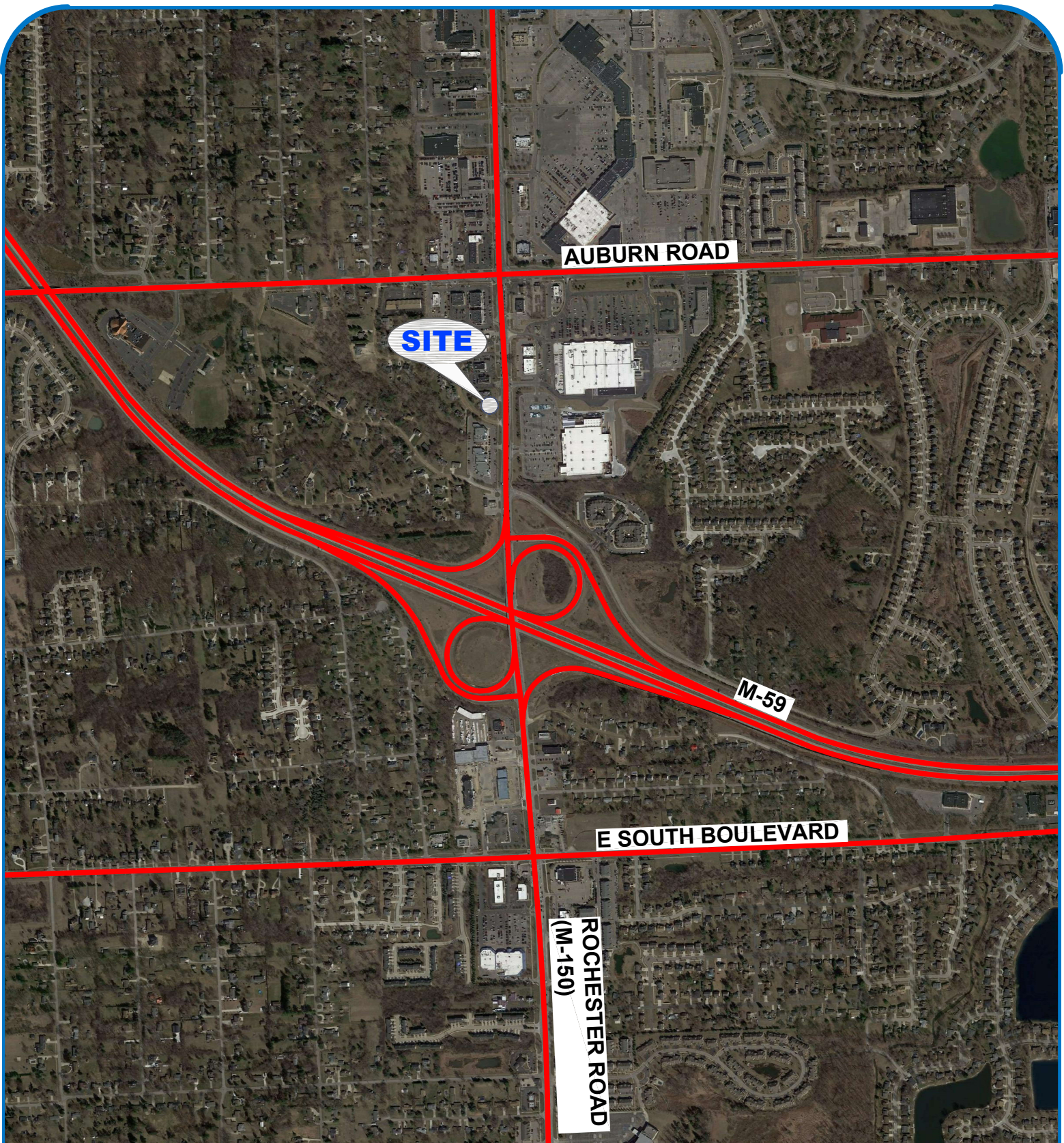


FIGURE 1 SITE LOCATION MAP

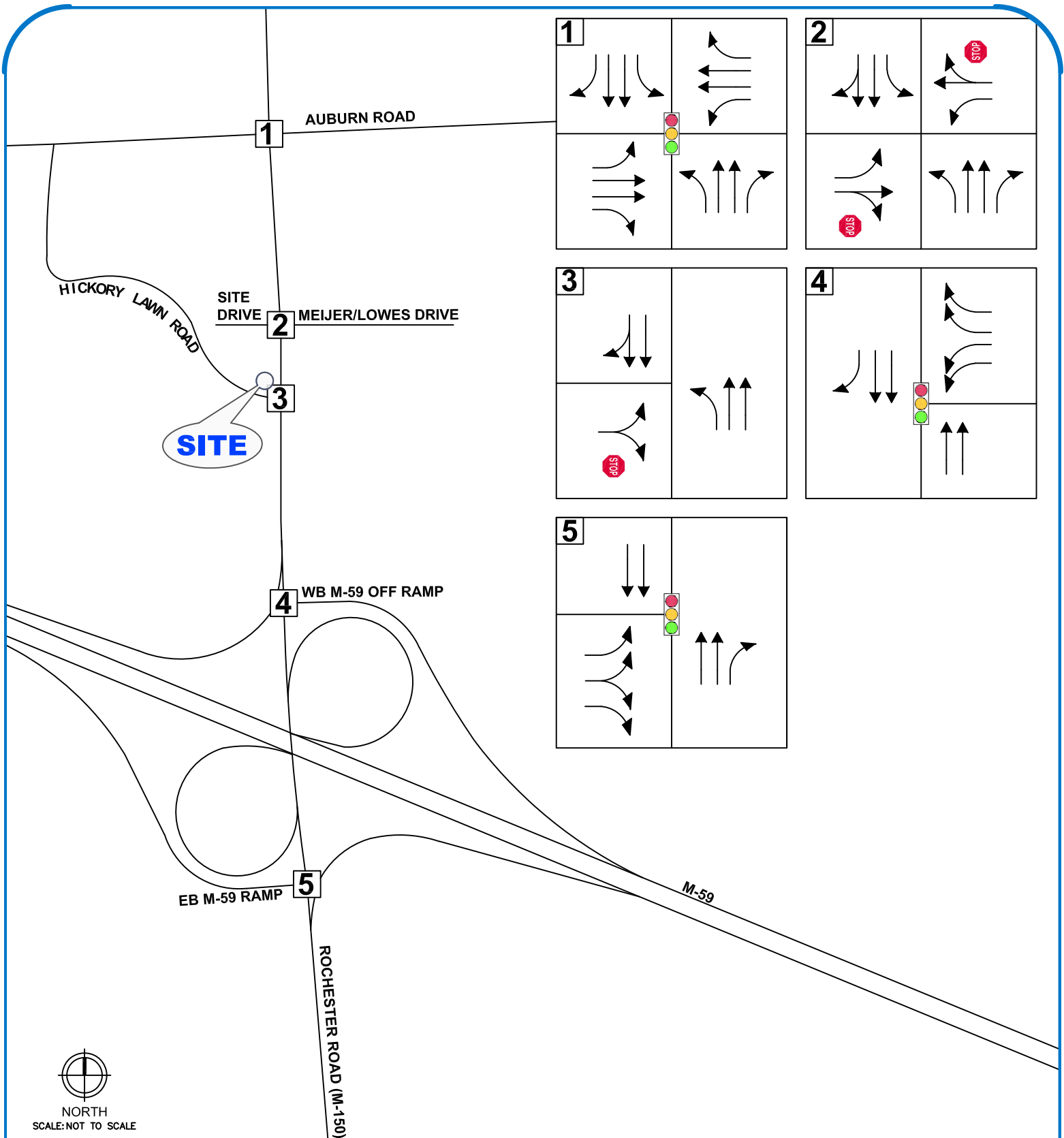
CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

 SITE LOCATION



NORTH
SCALE: NOT TO SCALE



NORTH
SCALE: NOT TO SCALE



FIGURE 2 LANE USE AND TRAFFIC CONTROL

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- PROPOSED ROADS
- LANE USE
- PROPOSED LANE USE
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION

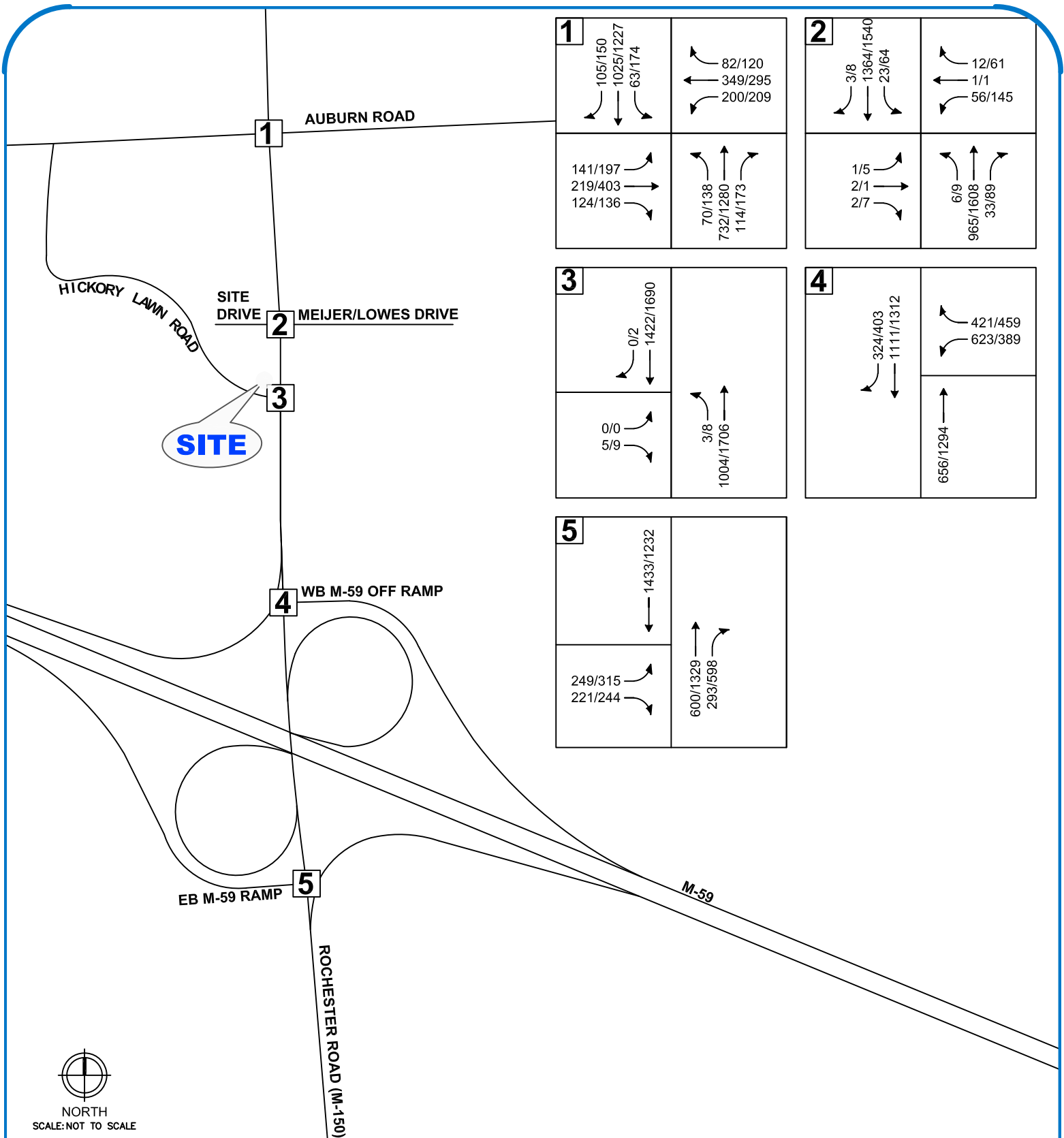


FIGURE 3A
EXISTING TRAFFIC
VOLUMES (WEEKDAY)

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (AM/PM)



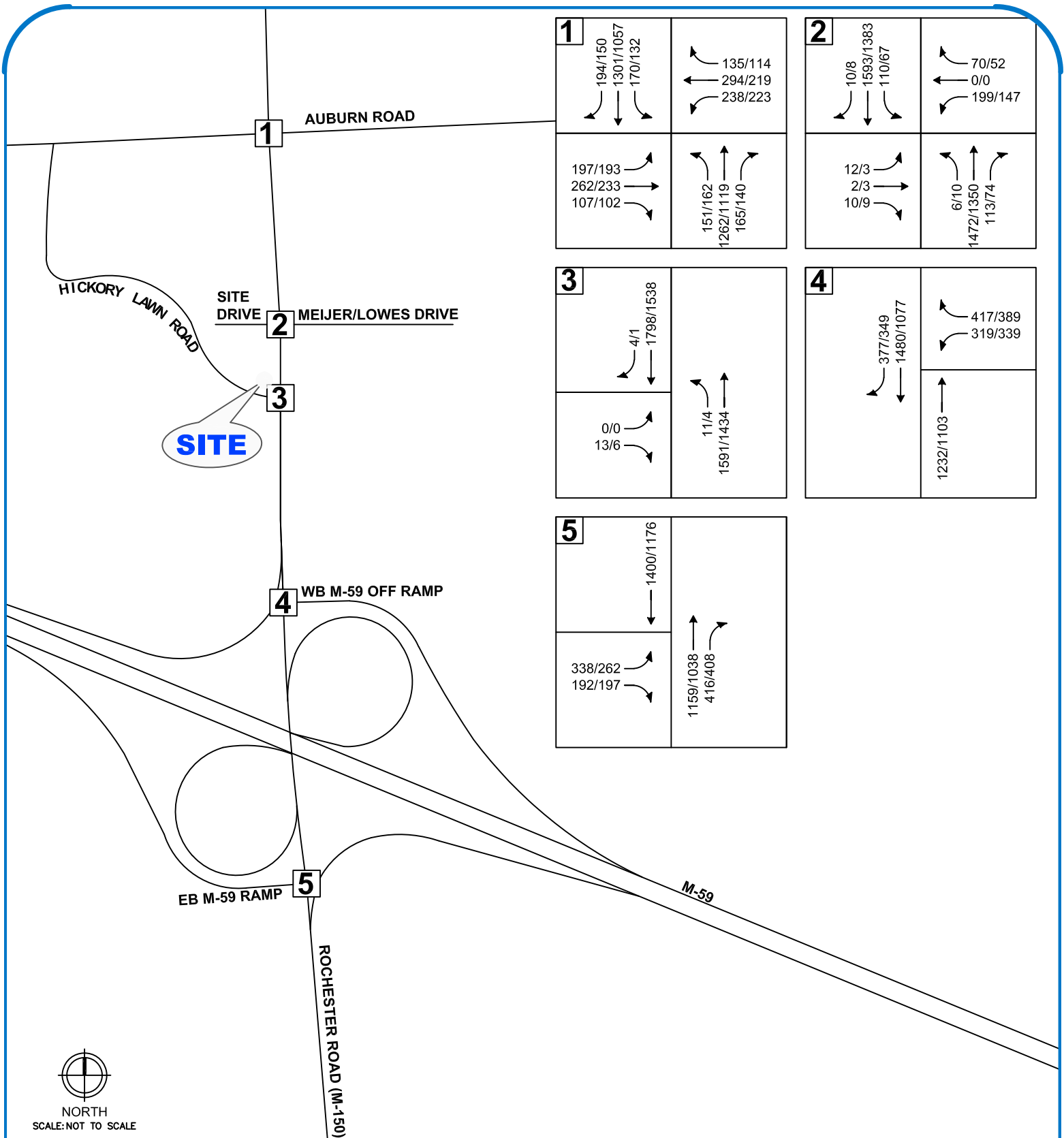


FIGURE 3B
EXISTING TRAFFIC
VOLUMES (SATURDAY)

CHICK-FIL-A TIS - ROCHESTER HILLS, MI



LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (MD/PM)

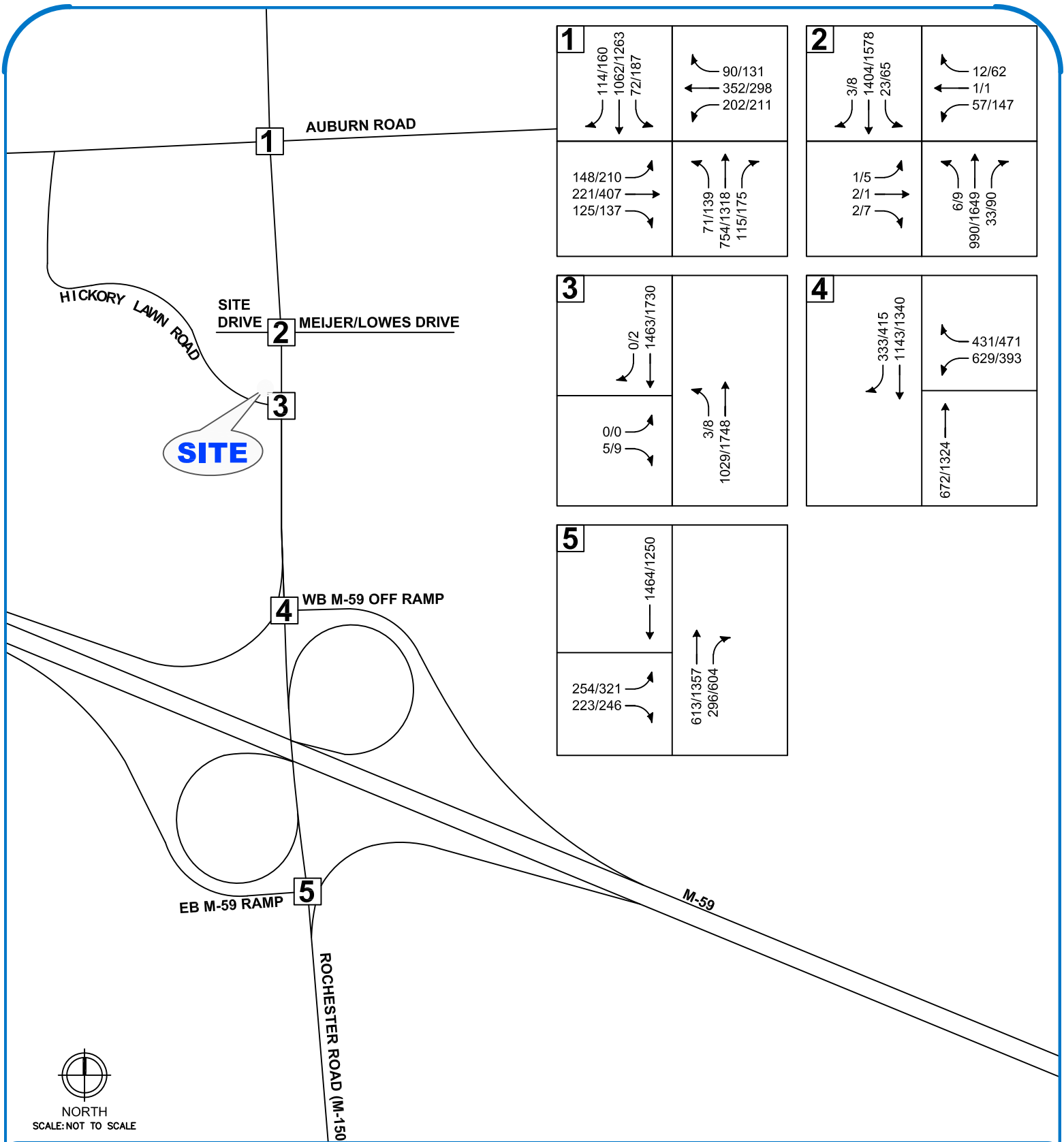


FIGURE 4A
BACKGROUND TRAFFIC
VOLUMES (WEEKDAY)

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (AM/PM)



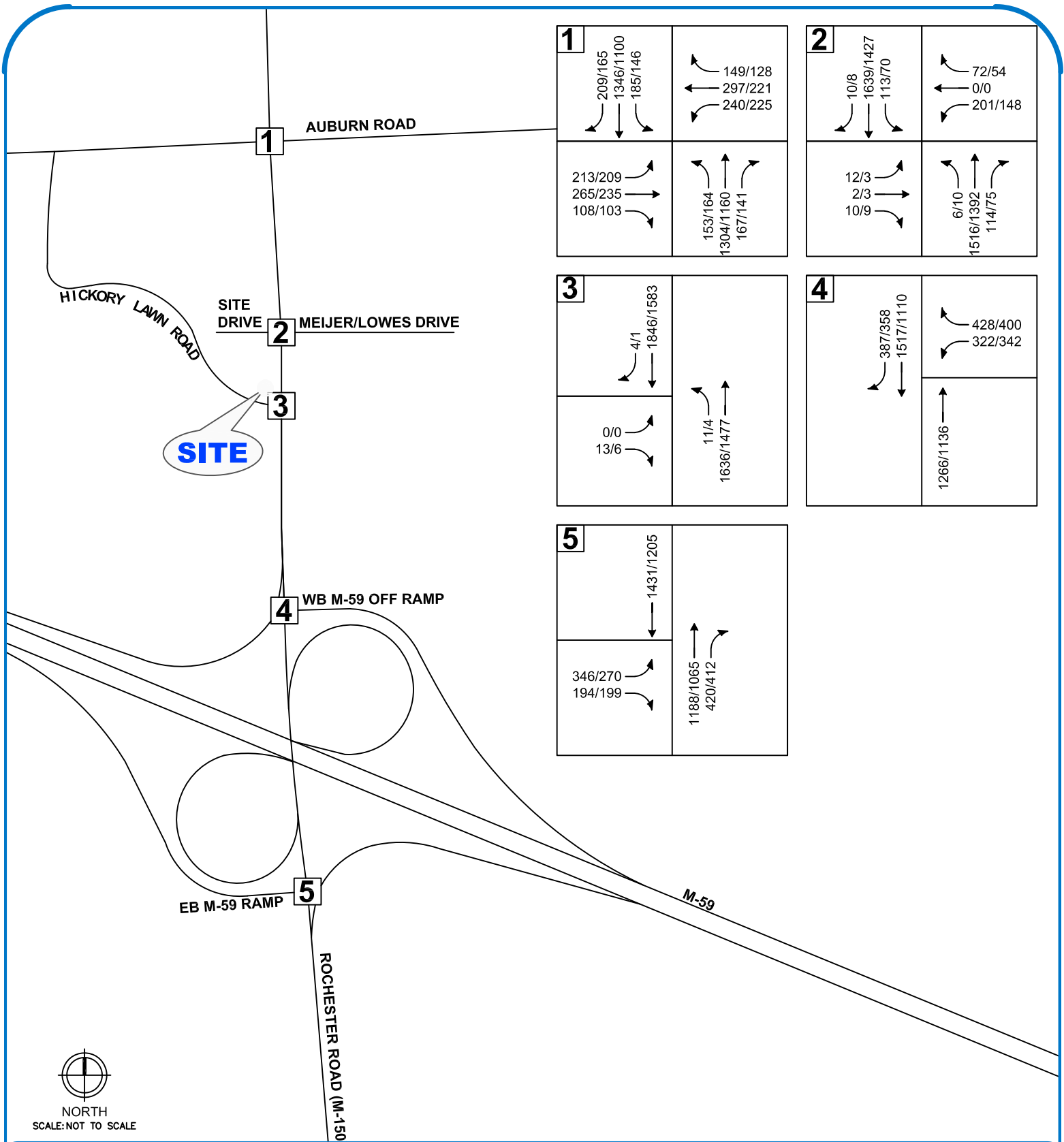
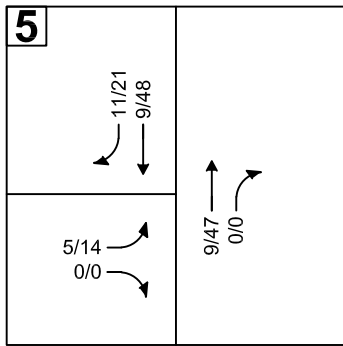
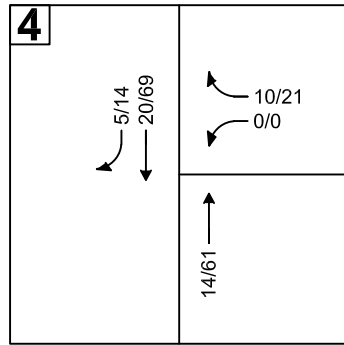
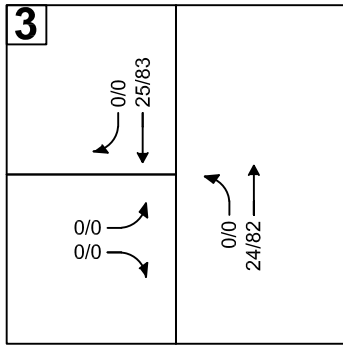
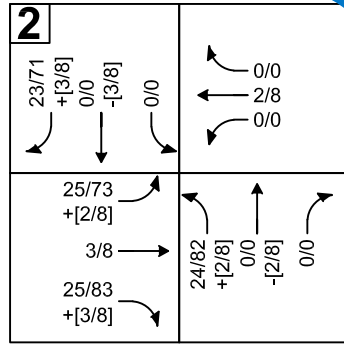
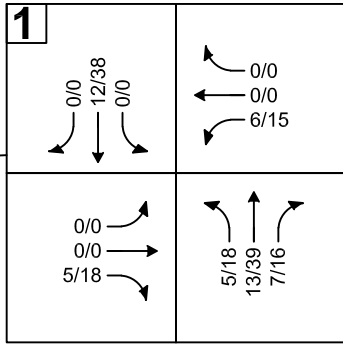
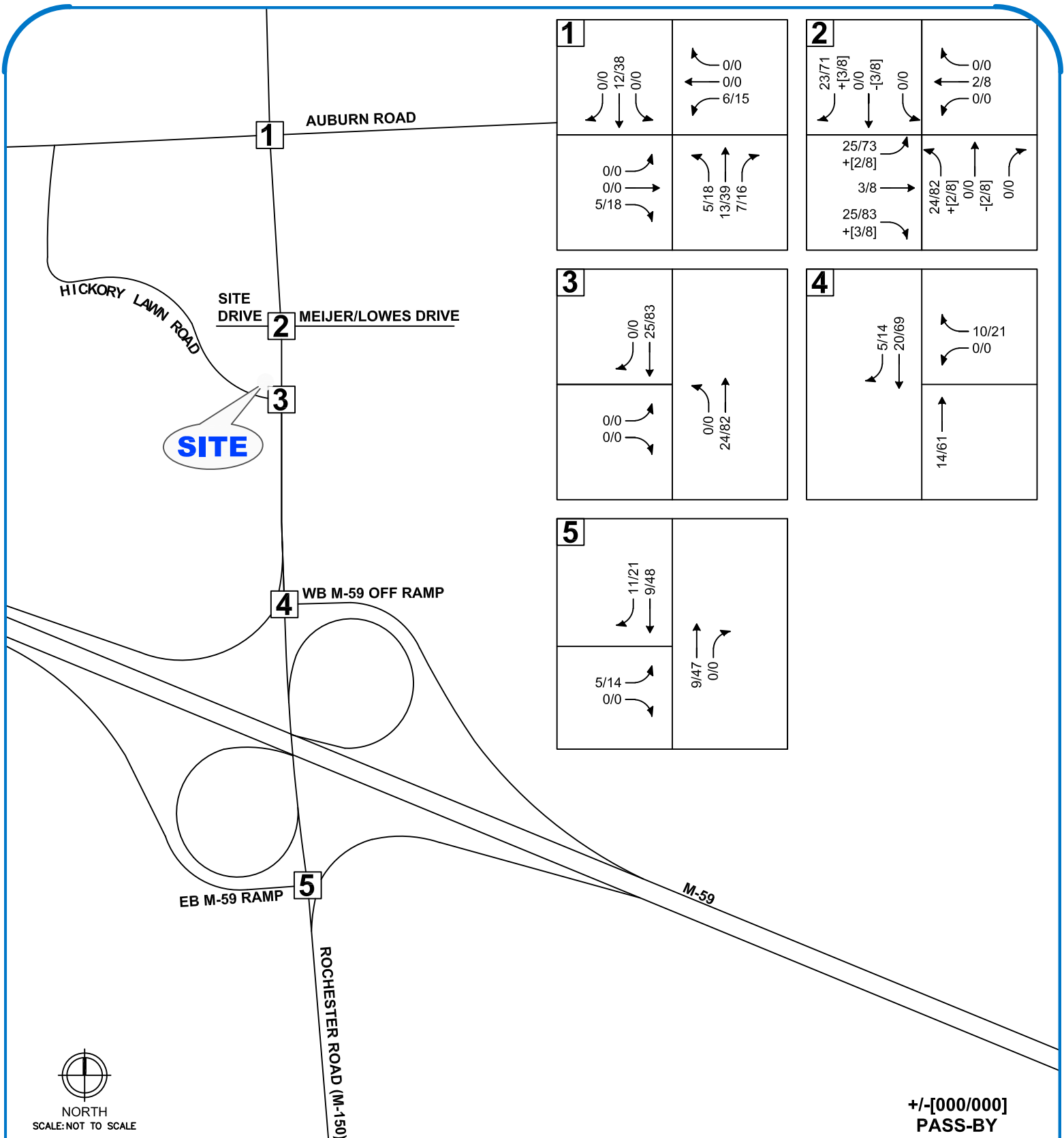


FIGURE 4B BACKGROUND TRAFFIC VOLUMES (SATURDAY)

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (MD/PM)



**FIGURE 5A - SITE-GENERATED
(OPENING DAY) TRAFFIC
VOLUMES (WEEKDAY)**

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- $\begin{matrix} \curvearrowright \\ \leftarrow \\ \curvearrowleft \end{matrix}$ TRAFFIC VOLUMES (AM/PM)

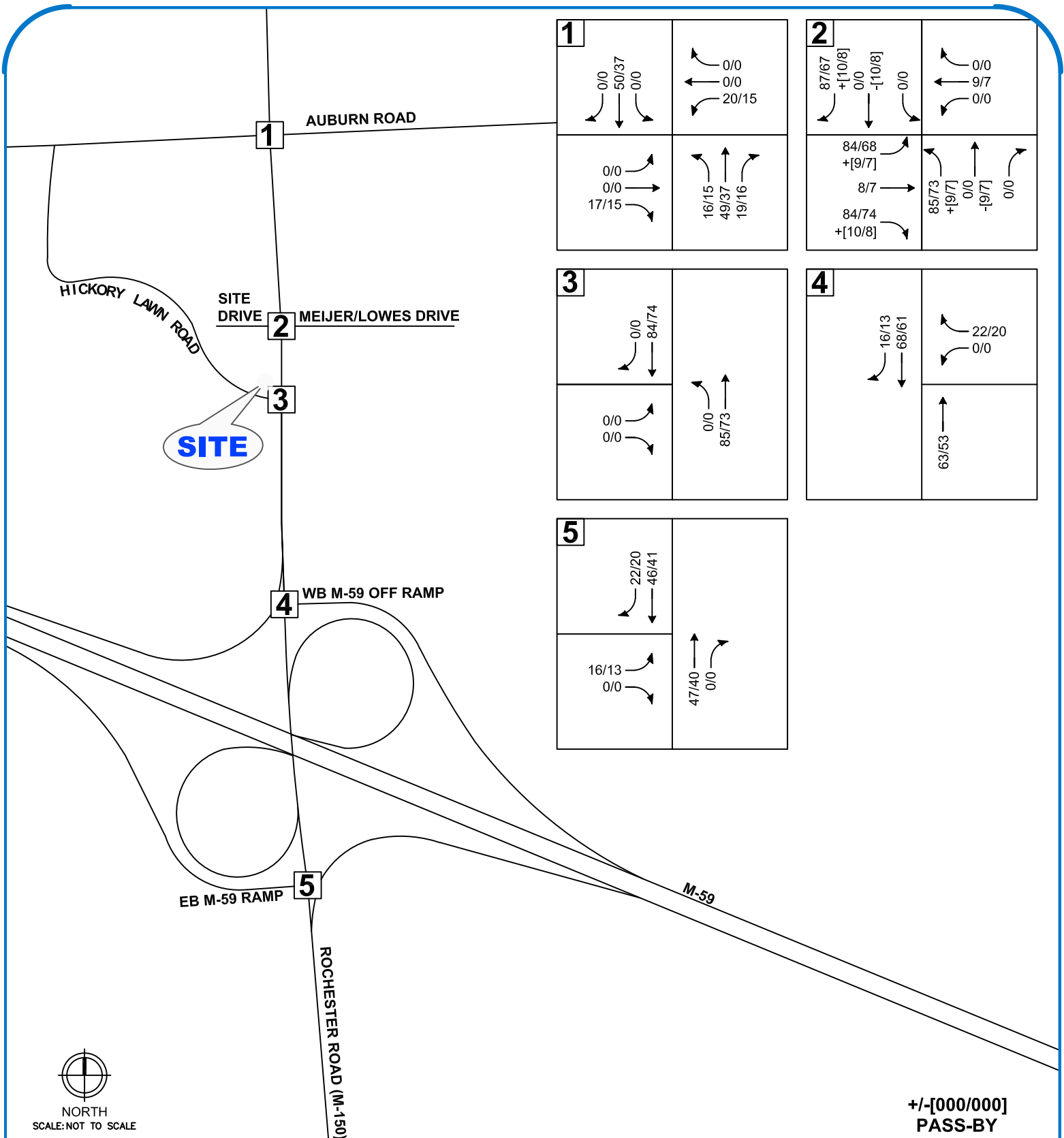
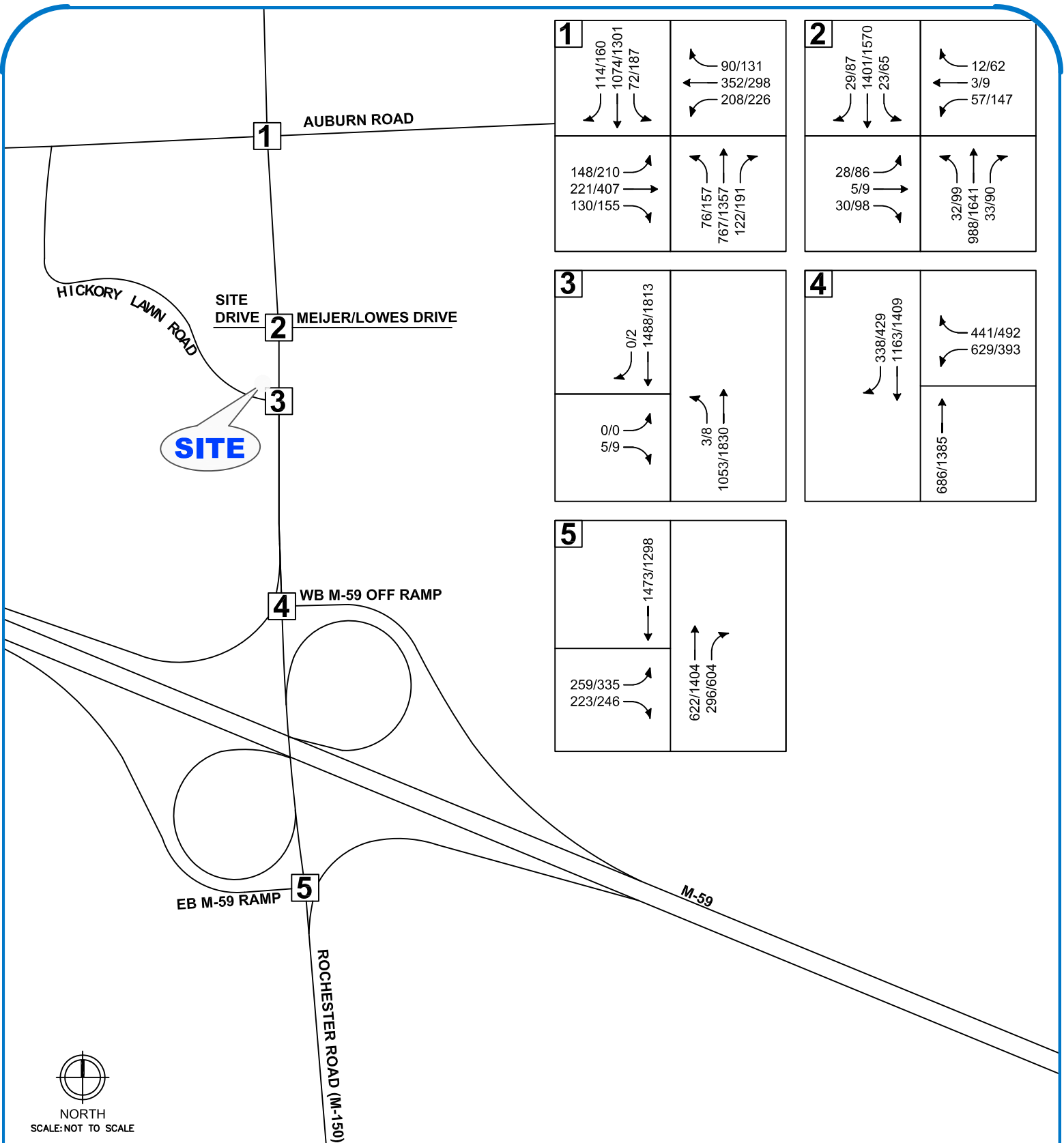


FIGURE 5B - SITE-GENERATED (OPENING DAY) TRAFFIC VOLUMES (SATURDAY)

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- PROPOSED ROADS
- TRAFFIC VOLUMES (MD/PM)



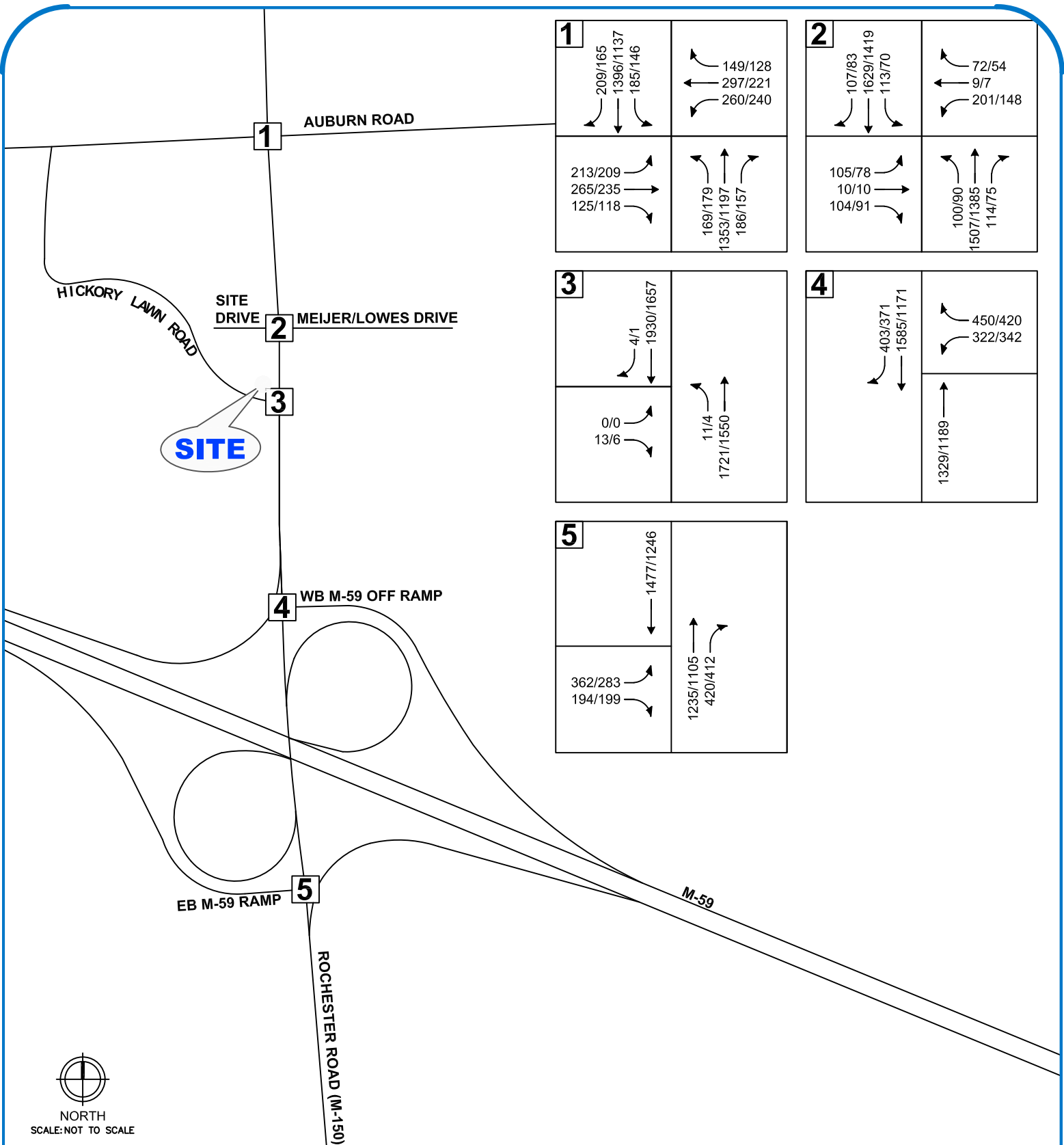
**FIGURE 6A - FUTURE
(OPENING DAY) TRAFFIC
VOLUMES (WEEKDAY)**

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (AM/PM)





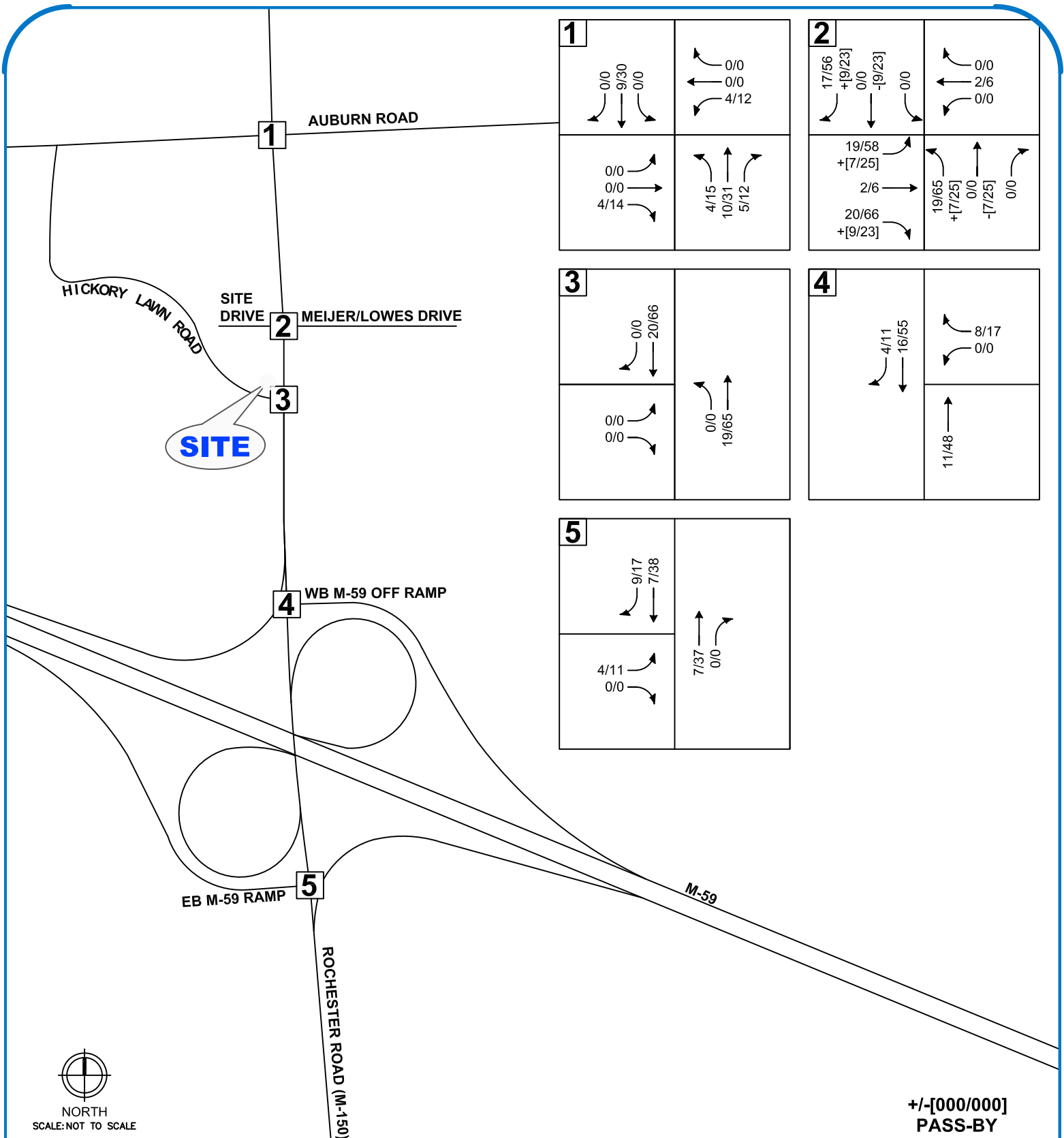
**FIGURE 6B - FUTURE
(OPENING DAY) TRAFFIC
VOLUMES (SATURDAY)**

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (MD/PM)





**FIGURE 7A - SITE-GENERATED
(STEADY STATE) TRAFFIC
VOLUMES (WEEKDAY)**

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (AM/PM)

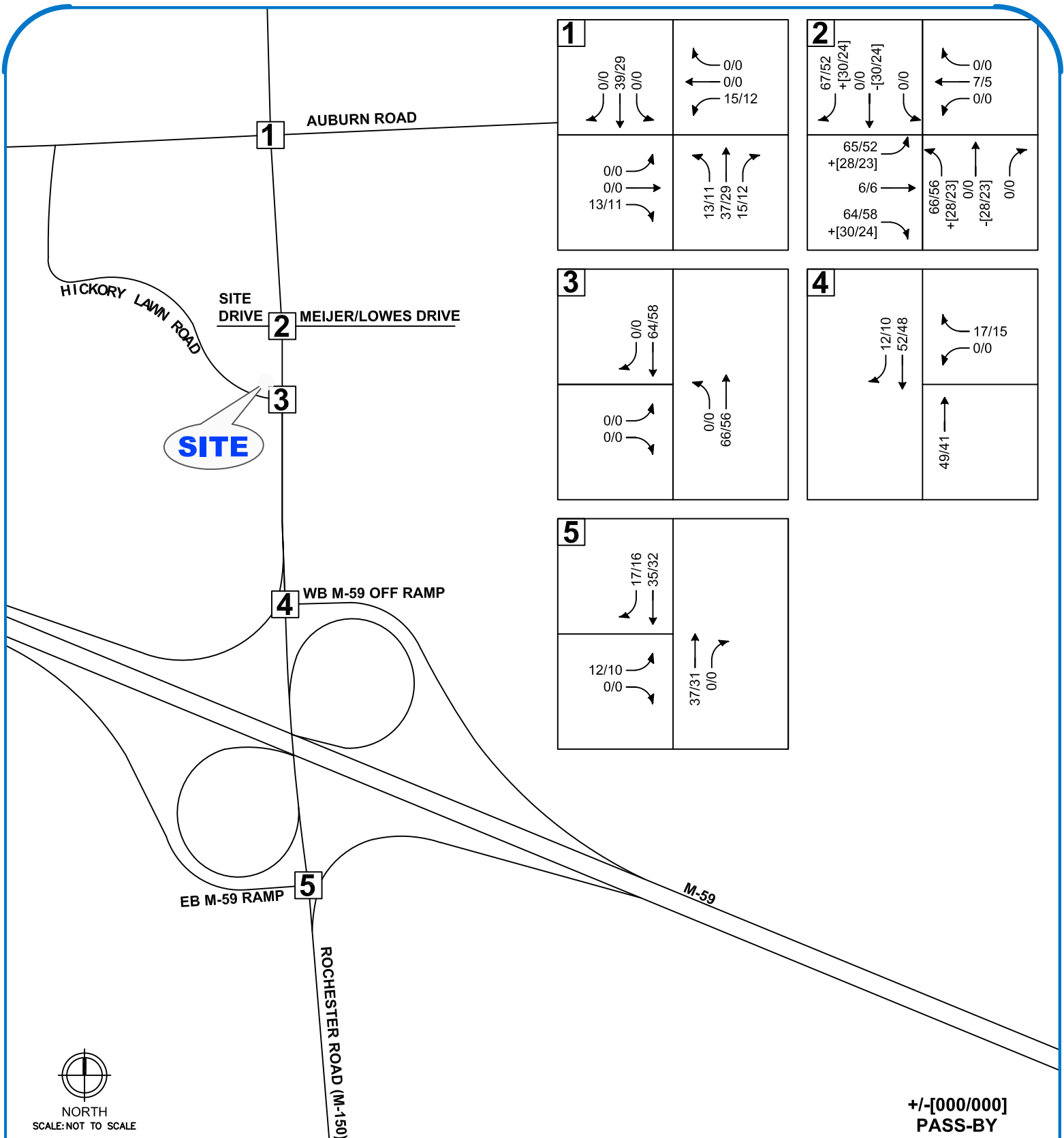
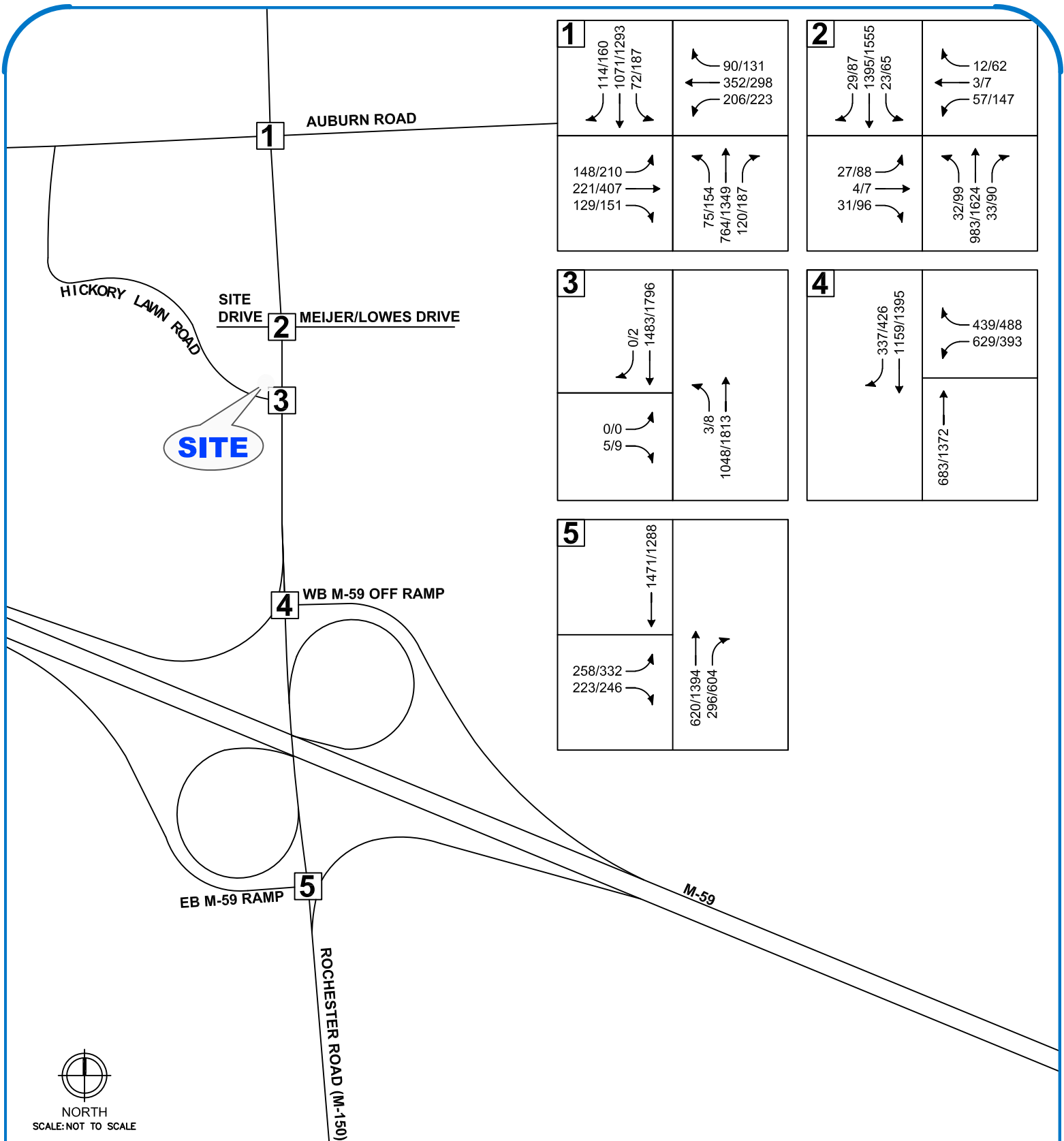


FIGURE 7B - SITE-GENERATED (STEADY STATE) TRAFFIC VOLUMES (SATURDAY)

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- PROPOSED ROADS
- TRAFFIC VOLUMES (MD/PM)



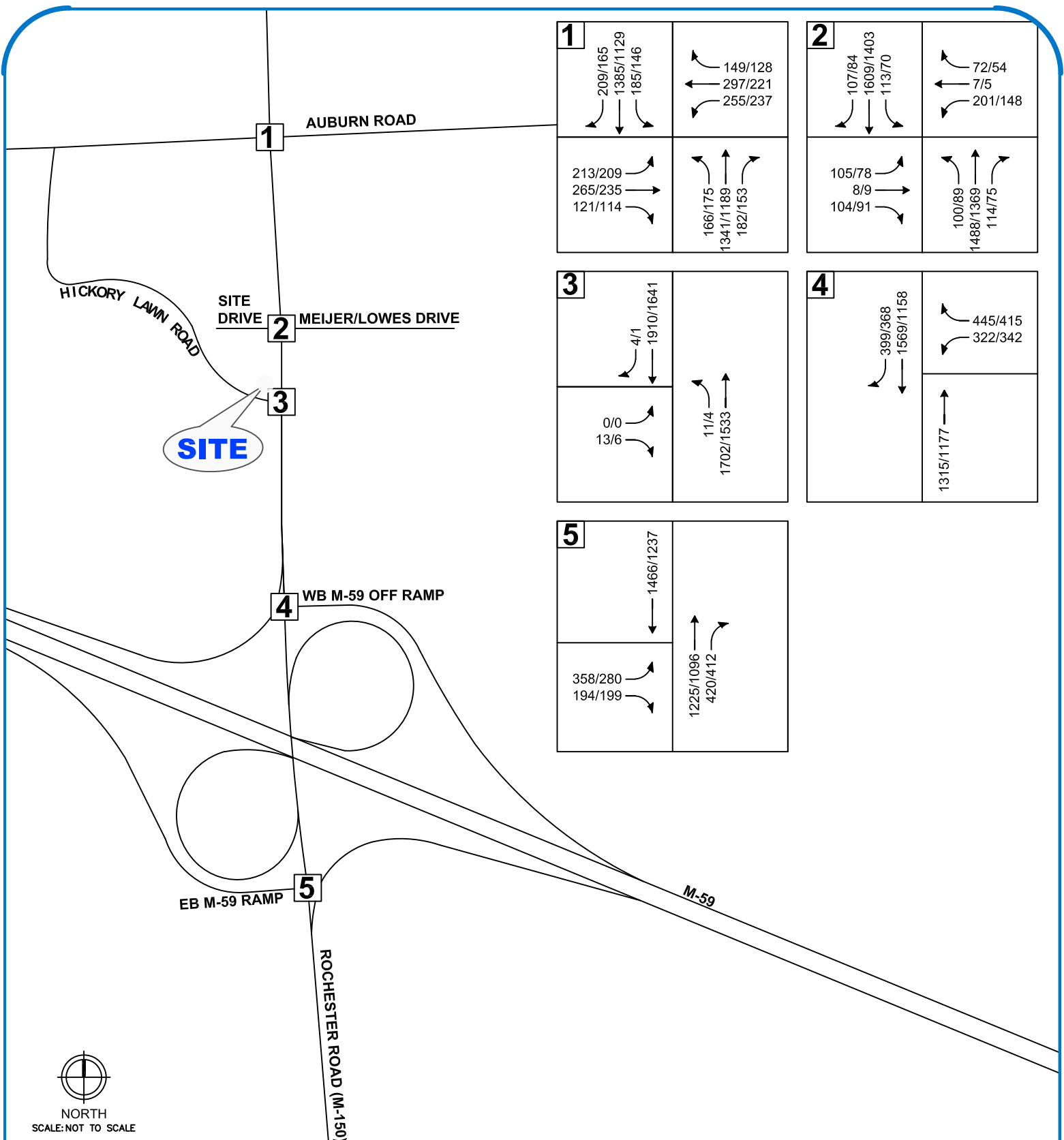
**FIGURE 8A - FUTURE
(STEADY STATE) TRAFFIC
VOLUMES (WEEKDAY)**

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (AM/PM)





**FIGURE 8B - FUTURE
(STEADY STATE) TRAFFIC
VOLUMES (SATURDAY)**

CHICK-FIL-A TIS - ROCHESTER HILLS, MI

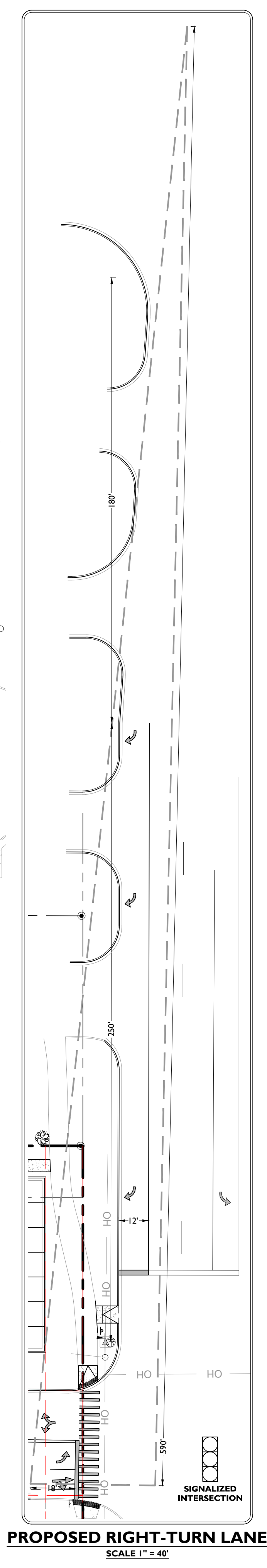
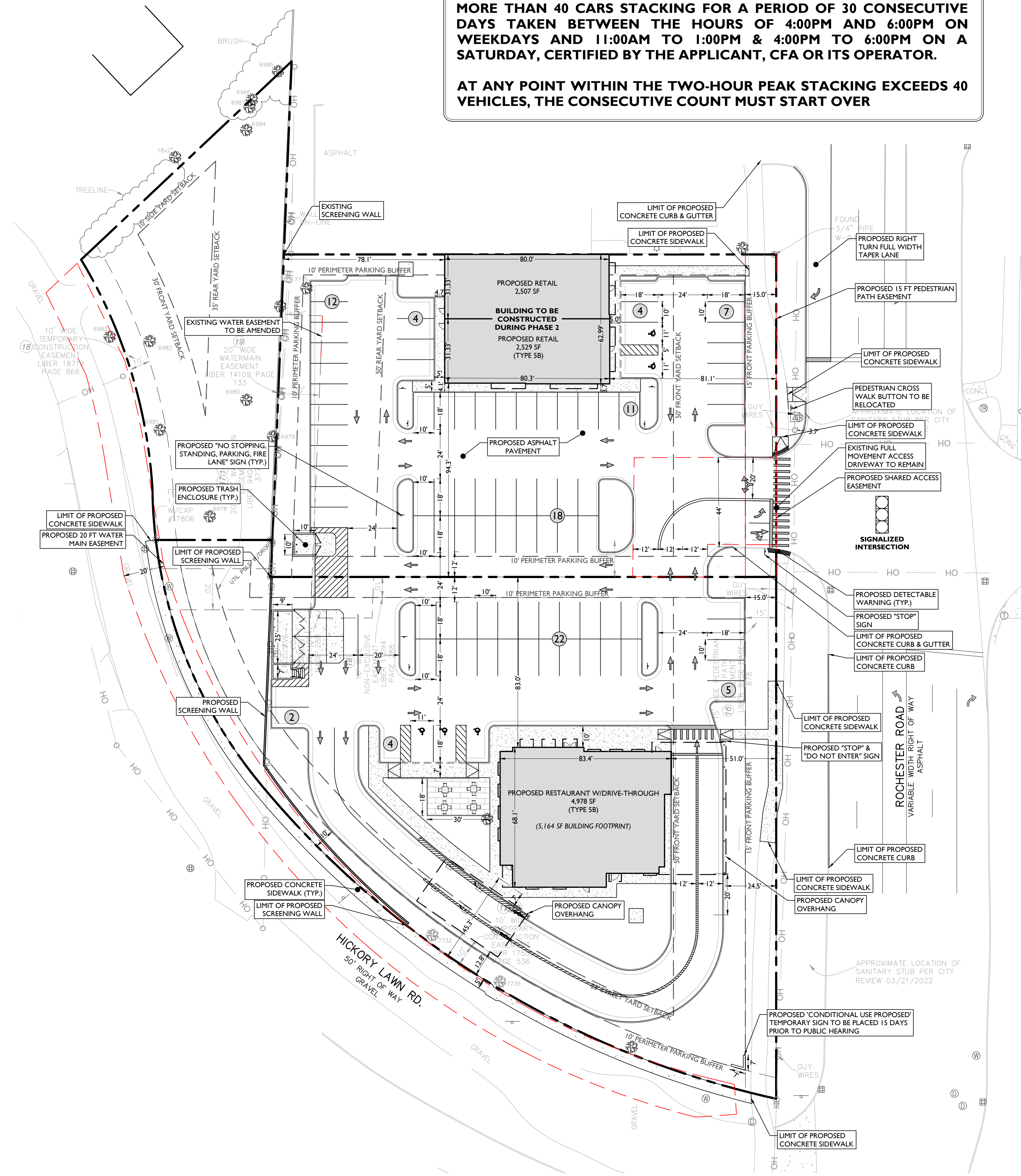
LEGEND

- ROADS
- - - PROPOSED ROADS
- TRAFFIC VOLUMES (MD/PM)



CONSTRUCTION OF THE RETAIL BUILDING NOT COMMENCE UNTIL THE APPLICANT PROVIDES REASONABLE EVIDENCE TO THE CITY PLANNING DEPARTMENT THAT THE CFA DRIVE-THRU AREA IS ABLE TO ACCOMMODATE ALL OF THE DRIVE-THRU STACKING REQUIRED FOR THE SITE, WHICH EVIDENCE SHALL INCLUDE PERIODIC COUNTS OF NO MORE THAN 40 CARS STACKING FOR A PERIOD OF 30 CONSECUTIVE DAYS TAKEN BETWEEN THE HOURS OF 4:00PM AND 6:00PM ON WEEKDAYS AND 11:00AM TO 1:00PM & 4:00PM TO 6:00PM ON A SATURDAY, CERTIFIED BY THE APPLICANT, CFA OR ITS OPERATOR.

AT ANY POINT WITHIN THE TWO-HOUR PEAK STACKING EXCEEDS 40 VEHICLES, THE CONSECUTIVE COUNT MUST START OVER



LAND USE AND ZONING
PARCEL ID: 15-34-227-039
GENERAL BUSINESS (B-2) & FLEXIBLE BUSINESS OVERLAY (FB-2)

PROPOSED USE		PERMITTED USE	PROPOSED
ZONING REQUIREMENT	RETAIL STORE		
MINIMUM LOT AREA	N/A	38,109 SF (0.87 AC)	
MAXIMUM BUILDING HEIGHT	30 FT (2 STORIES)	24.25 FT (1 STORY)	
MINIMUM FRONT YARD SETBACK	50 FT	81.0 FT	
MINIMUM SIDE YARD SETBACK (ONE)	0 FT	0.0 FT	
MINIMUM SIDE YARD SETBACK (TOTAL)	50 FT	94.0 FT	
MINIMUM REAR YARD SETBACK	50 FT	78.0 FT	
MINIMUM FRONT PARKING BUFFER	15 FT	15.0 FT	
MINIMUM PERIMETER PARKING BUFFER	10 FT	0.0 FT (W)	

LAND USE AND ZONING
PARCEL ID: 15-34-227-017
ONE FAMILY RESIDENTIAL (R-3)

ZONING REQUIREMENT	REQUIRED	PROPOSED
MINIMUM LOT AREA	12,000 SF (0.28 AC)	14,468 SF (0.33 AC)
MAXIMUM BUILDING HEIGHT	30 FT (2 STORIES)	N/A
MINIMUM FRONT YARD SETBACK	30 FT	N/A
MINIMUM SIDE YARD SETBACK (ONE)	10 FT	N/A
MINIMUM SIDE YARD SETBACK (TOTAL)	20 FT	N/A
MINIMUM REAR YARD SETBACK	35 FT	N/A
MINIMUM FLOOR AREA	1,200 SF	N/A
MAX LOT COVERAGE	30%	N/A

LAND USE AND ZONING
PARCEL ID: 15-34-227-040
GENERAL BUSINESS (B-2) & FLEXIBLE BUSINESS OVERLAY (FB-2) & ONE-FAMILY RESIDENTIAL (R-3)

PROPOSED USE		CONDITIONAL USE	PERMITTED USE
ZONING REQUIREMENT	RESTAURANT W/ DRIVE-THROUGH		
MINIMUM LOT AREA	N/A	67,757 SF (1.56 AC)	
MAXIMUM BUILDING HEIGHT	30 FT (2 STORIES)	≤ 30 FT (2 STORIES)	
MINIMUM FRONT YARD SETBACK	50 FT	51.0 FT	
MINIMUM SIDE YARD SETBACK (ONE)	0 FT	83.0 FT	
MINIMUM SIDE YARD SETBACK (TOTAL)	50 FT	128.3 FT	
MINIMUM STREET SIDE YARD SETBACK	25 FT	45.3 FT	
MINIMUM FRONT PARKING BUFFER	15 FT	15.0 FT	
MINIMUM PERIMETER PARKING BUFFER	10 FT	0.0 FT (W)	

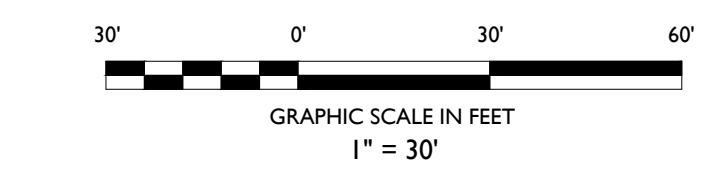
OFF-STREET PARKING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 138-11.204	RESTAURANT: 1 PER 2 PEOPLE AT MAX. CAPACITY (136 PEOPLE)/(12 PEOPLE) = 68 SPACES	89 SPACES
§ 138-11.204	RETAIL: 1 SPACE PER 300 SF (5,036 SF)/(1,300 SF) = 17 SPACES TOTAL: 68 + 17 = 85 SPACES	
§ 138-11.200	MAXIMUM PARKING: 125% OF REQUIRED SPACES (85 SPACES)(1.25) = 107 SPACES	89 SPACES
§ 138-11.204	DRIVE THRU STACKING SPACES: 10 SPACES PER SERVICE WINDOW 1 WINDOW = 10 SPACES	34 SPACES
§ 138-11.300	BARRIER FREE PARKING: FOR 76-100 PARKING SPACES 1 + 4% OF PROPOSED SPACES 1 + (89 SPACES)(0.04) = 5 SPACES	5 SPACES
§ 138-11.305	STACKING SPACE DIMENSIONS: 8 FT X 16 FT	12 FT X 20 FT
§ 138-11.302	90° PARKING: 10 FT X 18 FT WITH 24 FT AISLE	10 FT X 18 FT W/ 24 FT AISLE

SYMBOL DESCRIPTION

---	PROPERTY LINE
---	SETBACK LINE
---	PROPOSED CURB & GUTTER
---	PROPOSED FLUSH CURB
---	PROPOSED SIGNS
---	PROPOSED BUILDING
---	PROPOSED CONCRETE
---	PROPOSED AREA LIGHT
---	PROPOSED SCREENING WALL
---	PROPOSED BUILDING DOORS

- GENERAL NOTES**
- THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC PRIOR TO THE START OF CONSTRUCTION.
 - THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
 - ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC, AND ITS SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
 - THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
 - THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
 - THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
 - THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTOR'S EXPENSE.
 - CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC, WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
 - THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
 - THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
 - THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
 - SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC, BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.



STONEFIELD engineering & design
Detroit, MI • Rutherford, NJ • New York, NY
Princeton, NJ • Tampa, FL • Boston, MA
www.stonefielddesign.com
607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

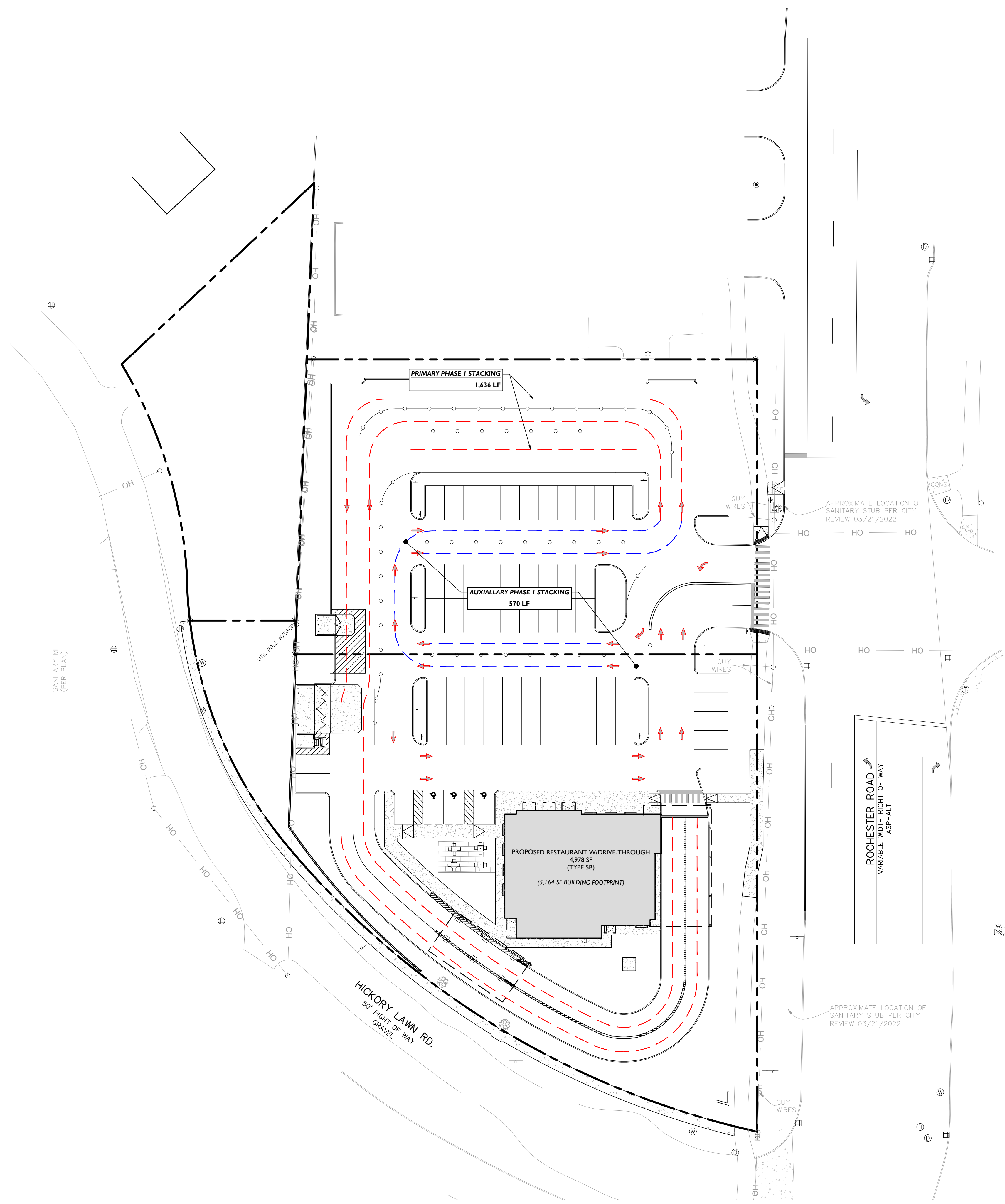
NOT APPROVED FOR CONSTRUCTION

3178 & 3200 SOUTH ROCHESTER ROAD
PROPOSED COMMERCIAL DEVELOPMENT
PARCEL ID: 15-34-227-039, 15-34-227-017, 15-34-227-040
3247 HICKORY LAWN ROAD, 3178 & 3200 SOUTH ROCHESTER ROAD
OAKLAND COUNTY, MICHIGAN

STONEFIELD engineering & design
MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

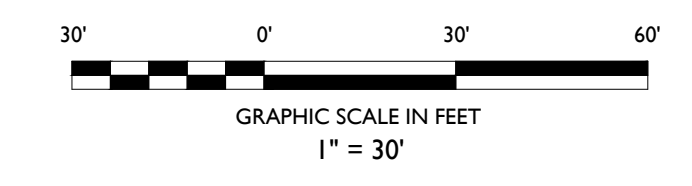
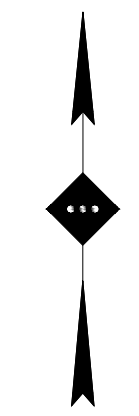
SCALE: 1" = 30' PROJECT ID: DET-200166
TITLE: SITE PLAN
DRAWING: CITY FILE #21-036 SECTION #34
C-3

V:\03\2022\2022-01-15\3178 & 3200 SOUTH ROCHESTER ROAD, ROCHESTER HILLS, MICHIGAN\DWG\INITIAL CAR STACKING EXHIBIT - 01-15-22.DWG



PHASE I OFF-STREET PARKING REQUIREMENTS		
CODE SECTION	REQUIRED	PROPOSED
§ 138-11.305	STACKING SPACE DIMENSIONS: 8 FT X 16 FT	1,636 LF + 570 LF = 2,206 LF (2,206 LF) (1 SPACE / 16 LF) =
§ 138-11.204	DRIVE THRU STACKING SPACES: 10 SPACES PER SERVICE WINDOW 1 WINDOW = 10 SPACES	137 STACKING SPACES

SYMBOL	DESCRIPTION
	INITIAL STACKING LINE
	AUXILIARY STACKING LINE
	TEMPORARY STACKING CONES



NOT APPROVED FOR CONSTRUCTION

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EXHIBIT

3178 & 3200 SOUTH ROCHESTER ROAD
PROPOSED COMMERCIAL DEVELOPMENT

PARCEL IDS: 15-34-227-017, 15-34-227-039, & 15-34-227-040
3178 & 3200 SOUTH ROCHESTER ROAD
CITY OF ROCHESTER HILLS
OAKLAND COUNTY, MICHIGAN

MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD
engineering & design

SCALE: 1" = 30' PROJECT ID: DET-200166

TITLE:
INITIAL CAR STACKING EXHIBIT

DRAWING:
EX-I

ISSUE	DATE	BY	DESCRIPTION
1	10/12/2022	MG	SUBMISSION FOR SITE PLAN APPROVAL

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
 Thu Jun 10, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Auburn Rd Eastbound							Auburn Rd Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
2021-06-10 7:00AM	13	27	15	0	1	56	30	38	2	0	3	73		
7:15AM	5	23	29	0	0	57	27	36	6	0	2	71		
7:30AM	18	25	27	0	0	70	35	41	13	0	1	90		
7:45AM	26	38	20	0	6	90	24	49	11	0	0	84		
Hourly Total	62	113	91	0	7	273	116	164	32	0	6	318		
8:00AM	22	43	22	0	1	88	31	48	10	0	2	91		
8:15AM	21	41	25	0	1	88	38	54	8	0	1	101		
8:30AM	40	36	20	0	0	96	34	59	8	0	3	104		
8:45AM	27	51	28	0	0	106	21	56	17	0	2	96		
Hourly Total	110	171	95	0	2	378	124	217	43	0	8	392		
4:00PM	60	87	30	0	1	178	60	85	20	0	1	166		
4:15PM	51	65	29	0	0	145	59	56	15	0	2	132		
4:30PM	48	95	33	0	2	178	56	62	16	0	2	136		
4:45PM	56	106	28	0	0	190	50	71	31	0	1	153		
Hourly Total	215	353	120	0	3	691	225	274	82	0	6	587		
5:00PM	49	86	35	0	0	170	51	69	20	0	0	140		
5:15PM	64	106	31	0	1	202	60	97	32	0	4	193		
5:30PM	28	105	40	0	1	174	48	58	31	0	1	138		
5:45PM	69	103	36	0	0	208	53	69	25	0	0	147		
Hourly Total	210	400	142	0	2	754	212	293	108	0	5	618		
Total	597	1037	448	0	14	2096	677	948	265	0	25	1915		
% Approach	28.5%	49.5%	21.4%	0%	0.7%	-	35.4%	49.5%	13.8%	0%	1.3%	-		
% Total	4.2%	7.3%	3.1%	0%	0.1%	14.7%	4.7%	6.6%	1.9%	0%	0.2%	13.4%		
Lights	592	1024	440	0	14	2070	669	931	254	0	25	1879		
% Lights	99.2%	98.7%	98.2%	0%	100%	98.8%	98.8%	98.2%	95.8%	0%	100%	98.1%		
Articulated Trucks	2	0	2	0	0	4	1	5	1	0	0	7		
% Articulated Trucks	0.3%	0%	0.4%	0%	0%	0.2%	0.1%	0.5%	0.4%	0%	0%	0.4%		
Buses and Single-Unit Trucks	3	13	6	0	0	22	7	12	10	0	0	29		
% Buses and Single-Unit Trucks	0.5%	1.3%	1.3%	0%	0%	1.0%	1.0%	1.3%	3.8%	0%	0%	1.5%		

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
 Thu Jun 10, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-10 7:00AM	18	140	17	0	1	176	2	217	19	0	0	238	543		
7:15AM	23	159	14	0	2	198	11	253	19	0	0	283	609		
7:30AM	27	164	24	0	0	215	5	287	18	0	2	312	687		
7:45AM	27	226	23	0	0	276	10	276	29	0	3	318	768		
Hourly Total	95	689	78	0	3	865	28	1033	85	0	5	1151	2607		
8:00AM	18	143	30	0	4	195	12	272	20	0	0	304	678		
8:15AM	15	184	26	0	1	226	10	258	23	0	1	292	707		
8:30AM	14	176	20	0	0	210	15	250	30	0	2	297	707		
8:45AM	23	229	33	0	0	285	26	245	28	0	1	300	787		
Hourly Total	70	732	109	0	5	916	63	1025	101	0	4	1193	2879		
4:00PM	40	294	40	0	1	375	42	291	30	0	0	363	1082		
4:15PM	41	311	39	0	2	393	48	328	31	0	1	408	1078		
4:30PM	30	304	51	0	2	387	47	298	34	0	0	379	1080		
4:45PM	36	331	43	0	3	413	49	294	37	0	0	380	1136		
Hourly Total	147	1240	173	0	8	1568	186	1211	132	0	1	1530	4376		
5:00PM	36	307	47	0	0	390	44	325	46	0	0	415	1115		
5:15PM	32	289	41	0	2	364	39	283	35	0	1	358	1117		
5:30PM	34	353	36	0	1	424	42	325	29	0	2	398	1134		
5:45PM	31	287	56	0	1	375	41	243	38	0	0	322	1052		
Hourly Total	133	1236	180	0	4	1553	166	1176	148	0	3	1493	4418		
Total	445	3897	540	0	20	4902	443	4445	466	0	13	5367	14280		
% Approach	9.1%	79.5%	11.0%	0%	0.4%	-	8.3%	82.8%	8.7%	0%	0.2%	-	-		
% Total	3.1%	27.3%	3.8%	0%	0.1%	34.3%	3.1%	31.1%	3.3%	0%	0.1%	37.6%	-		
Lights	431	3822	530	0	20	4803	435	4371	457	0	13	5276	14028		
% Lights	96.9%	98.1%	98.1%	0%	100%	98.0%	98.2%	98.3%	98.1%	0%	100%	98.3%	98.2%		
Articulated Trucks	8	31	2	0	0	41	3	23	2	0	0	28	80		
% Articulated Trucks	1.8%	0.8%	0.4%	0%	0%	0.8%	0.7%	0.5%	0.4%	0%	0%	0.5%	0.6%		
Buses and Single-Unit Trucks	6	44	8	0	0	58	5	51	7	0	0	63	172		
% Buses and Single-Unit Trucks	1.3%	1.1%	1.5%	0%	0%	1.2%	1.1%	1.1%	1.5%	0%	0%	1.2%	1.2%		

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC)
 Thu Jun 10, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734

[N] Rochester Rd (M-150)

Total: 10151

In: 5367

Out: 4784

479

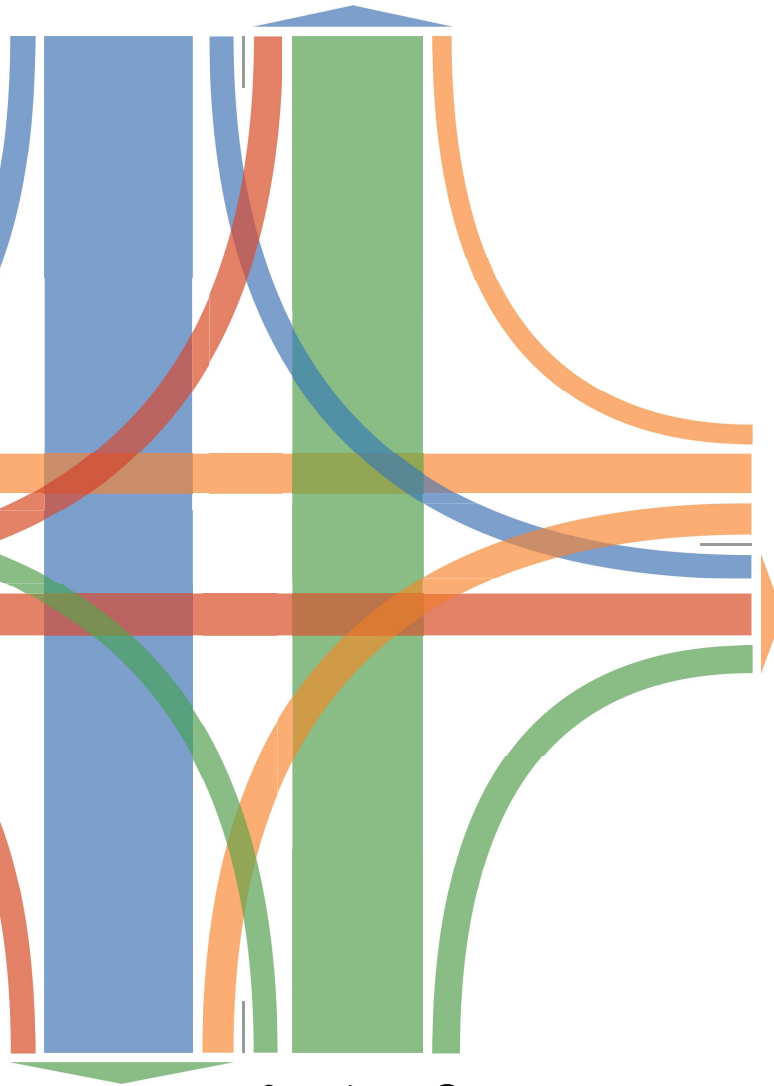
4445

443

[W] Auburn Rd
 Total: 3968
 In: 2096 Out: 1872

597
 1037
 462

290
 948
 677
 Out: 2040 In: 1915
 Total: 3955
 [E] Auburn Rd



445

3897

560

Out: 5584

In: 4902

Total: 10486

[S] Rochester Rd (M-150)

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
 Thu Jun 10, 2021
 AM Peak (8 AM - 9 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Auburn Rd Eastbound						Auburn Rd Westbound					
Time	L	T	R	U	RR	App	L	T	R	U	RR	App
2021-06-10 8:00AM	22	43	22	0	1	88	31	48	10	0	2	91
8:15AM	21	41	25	0	1	88	38	54	8	0	1	101
8:30AM	40	36	20	0	0	96	34	59	8	0	3	104
8:45AM	27	51	28	0	0	106	21	56	17	0	2	96
Total	110	171	95	0	2	378	124	217	43	0	8	392
% Approach	29.1%	45.2%	25.1%	0%	0.5%	-	31.6%	55.4%	11.0%	0%	2.0%	-
% Total	3.8%	5.9%	3.3%	0%	0.1%	13.1%	4.3%	7.5%	1.5%	0%	0.3%	13.6%
PHF	0.688	0.838	0.848	-	0.500	0.892	0.816	0.919	0.632	-	0.667	0.942
Lights	106	165	92	0	2	365	121	210	42	0	8	381
% Lights	96.4%	96.5%	96.8%	0%	100%	96.6%	97.6%	96.8%	97.7%	0%	100%	97.2%
Articulated Trucks	1	0	0	0	0	1	1	1	0	0	0	2
% Articulated Trucks	0.9%	0%	0%	0%	0%	0.3%	0.8%	0.5%	0%	0%	0%	0.5%
Buses and Single-Unit Trucks	3	6	3	0	0	12	2	6	1	0	0	9
% Buses and Single-Unit Trucks	2.7%	3.5%	3.2%	0%	0%	3.2%	1.6%	2.8%	2.3%	0%	0%	2.3%

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC

Thu Jun 10, 2021

AM Peak (8 AM - 9 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845016, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-10 8:00AM	18	143	30	0	4	195	12	272	20	0	0	304	678		
8:15AM	15	184	26	0	1	226	10	258	23	0	1	292	707		
8:30AM	14	176	20	0	0	210	15	250	30	0	2	297	707		
8:45AM	23	229	33	0	0	285	26	245	28	0	1	300	787		
Total	70	732	109	0	5	916	63	1025	101	0	4	1193	2879		
% Approach	7.6%	79.9%	11.9%	0%	0.5%	-	5.3%	85.9%	8.5%	0%	0.3%	-	-		
% Total	2.4%	25.4%	3.8%	0%	0.2%	31.8%	2.2%	35.6%	3.5%	0%	0.1%	41.4%	-		
PHF	0.761	0.799	0.826	-	0.313	0.804	0.606	0.942	0.842	-	0.500	0.981	0.915		
Lights	66	713	105	0	5	889	59	1005	97	0	4	1165	2800		
% Lights	94.3%	97.4%	96.3%	0%	100%	97.1%	93.7%	98.0%	96.0%	0%	100%	97.7%	97.3%		
Articulated Trucks	4	7	1	0	0	12	2	8	1	0	0	11	26		
% Articulated Trucks	5.7%	1.0%	0.9%	0%	0%	1.3%	3.2%	0.8%	1.0%	0%	0%	0.9%	0.9%		
Buses and Single-Unit Trucks	0	12	3	0	0	15	2	12	3	0	0	17	53		
% Buses and Single-Unit Trucks	0%	1.6%	2.8%	0%	0%	1.6%	3.2%	1.2%	3.0%	0%	0%	1.4%	1.8%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC)
 Thu Jun 10, 2021
 AM Peak (8 AM - 9 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734

[N] Rochester Rd (M-150)

Total: 2086

In: 1193

Out: 893

105

1025

63

[W] Auburn Rd
 Total: 770
 In: 378 Out: 392

110
 171
 97

51
 217
 124
 Out: 348 In: 392
 Total: 740
 [E] Auburn Rd

Out: 1246

In: 916

Total: 2162

[S] Rochester Rd (M-150)

70

732

114

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
 Thu Jun 10, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Auburn Rd Eastbound						Auburn Rd Westbound					
	L	T	R	U	RR	App	L	T	R	U	RR	App
2021-06-10 4:45PM	56	106	28	0	0	190	50	71	31	0	1	153
5:00PM	49	86	35	0	0	170	51	69	20	0	0	140
5:15PM	64	106	31	0	1	202	60	97	32	0	4	193
5:30PM	28	105	40	0	1	174	48	58	31	0	1	138
Total	197	403	134	0	2	736	209	295	114	0	6	624
% Approach	26.8%	54.8%	18.2%	0%	0.3%	-	33.5%	47.3%	18.3%	0%	1.0%	-
% Total	4.4%	9.0%	3.0%	0%	0%	16.3%	4.6%	6.6%	2.5%	0%	0.1%	13.9%
PHF	0.770	0.950	0.838	-	0.500	0.911	0.871	0.760	0.891	-	0.375	0.808
Lights	197	401	131	0	2	731	208	294	113	0	6	621
% Lights	100%	99.5%	97.8%	0%	100%	99.3%	99.5%	99.7%	99.1%	0%	100%	99.5%
Articulated Trucks	0	0	2	0	0	2	0	0	0	0	0	0
% Articulated Trucks	0%	0%	1.5%	0%	0%	0.3%	0%	0%	0%	0%	0%	0%
Buses and Single-Unit Trucks	0	2	1	0	0	3	1	1	1	0	0	3
% Buses and Single-Unit Trucks	0%	0.5%	0.7%	0%	0%	0.4%	0.5%	0.3%	0.9%	0%	0%	0.5%

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
 Thu Jun 10, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-10 4:45PM	36	331	43	0	3	413	49	294	37	0	0	380	1136		
5:00PM	36	307	47	0	0	390	44	325	46	0	0	415	1115		
5:15PM	32	289	41	0	2	364	39	283	35	0	1	358	1117		
5:30PM	34	353	36	0	1	424	42	325	29	0	2	398	1134		
Total	138	1280	167	0	6	1591	174	1227	147	0	3	1551	4502		
% Approach	8.7%	80.5%	10.5%	0%	0.4%	-	11.2%	79.1%	9.5%	0%	0.2%	-	-		
% Total	3.1%	28.4%	3.7%	0%	0.1%	35.3%	3.9%	27.3%	3.3%	0%	0.1%	34.5%	-		
PHF	0.958	0.907	0.888	-	0.500	0.938	0.888	0.944	0.799	-	0.375	0.934	0.991		
Lights	137	1271	167	0	6	1581	172	1213	144	0	3	1532	4465		
% Lights	99.3%	99.3%	100%	0%	100%	99.4%	98.9%	98.9%	98.0%	0%	100%	98.8%	99.2%		
Articulated Trucks	0	4	0	0	0	4	0	5	1	0	0	6	12		
% Articulated Trucks	0%	0.3%	0%	0%	0%	0.3%	0%	0.4%	0.7%	0%	0%	0.4%	0.3%		
Buses and Single-Unit Trucks	1	5	0	0	0	6	2	9	2	0	0	13	25		
% Buses and Single-Unit Trucks	0.7%	0.4%	0%	0%	0%	0.4%	1.1%	0.7%	1.4%	0%	0%	0.8%	0.6%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC)
 Thu Jun 10, 2021
 PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845016, Location: 42.636136, -83.131734

[N] Rochester Rd (M-150)

Total: 3148

In: 1551

Out: 1597

150

1227

174

[W] Auburn Rd
 Total: 1319
 In: 736 Out: 583

197
 403
 136

120
 295
 209
 Out: 750 In: 624
 Total: 1374
 [E] Auburn Rd

138

1280

173

Out: 1572

In: 1591

Total: 3163

[S] Rochester Rd (M-150)

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

Full Length (12 PM-2 PM, 5 PM-7 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Auburn Rd Eastbound							Auburn Rd Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
2021-06-12 12:00PM	52	67	33	0	5	157	45	58	31	0	2	136		
12:15PM	46	97	29	0	6	178	55	78	35	0	1	169		
12:30PM	52	67	33	0	1	153	58	56	27	0	2	143		
12:45PM	65	80	52	0	1	198	64	66	37	0	0	167		
Hourly Total	215	311	147	0	13	686	222	258	130	0	5	615		
1:00PM	50	84	27	0	1	162	57	72	25	0	1	155		
1:15PM	63	97	38	0	0	198	64	73	33	0	4	174		
1:30PM	52	60	23	0	1	136	54	77	31	0	2	164		
1:45PM	32	21	15	0	2	70	63	72	34	0	5	174		
Hourly Total	197	262	103	0	4	566	238	294	123	0	12	667		
5:00PM	41	48	31	0	0	120	60	60	32	0	1	153		
5:15PM	51	61	27	0	1	140	58	59	25	0	2	144		
5:30PM	48	62	18	0	1	129	61	66	32	0	1	160		
5:45PM	46	59	25	0	0	130	50	43	23	0	0	116		
Hourly Total	186	230	101	0	2	519	229	228	112	0	4	573		
6:00PM	48	51	29	0	1	129	54	51	31	0	0	136		
6:15PM	45	63	32	0	0	140	32	62	30	0	1	125		
6:30PM	38	64	21	0	0	123	50	61	24	0	1	136		
6:45PM	47	67	22	0	2	138	52	51	19	0	2	124		
Hourly Total	178	245	104	0	3	530	188	225	104	0	4	521		
Total	776	1048	455	0	22	2301	877	1005	469	0	25	2376		
% Approach	33.7%	45.5%	19.8%	0%	1.0%	-	36.9%	42.3%	19.7%	0%	1.1%	-		
% Total	4.8%	6.5%	2.8%	0%	0.1%	14.2%	5.4%	6.2%	2.9%	0%	0.2%	14.6%		
Lights	775	1044	449	0	22	2290	876	997	466	0	25	2364		
% Lights	99.9%	99.6%	98.7%	0%	100%	99.5%	99.9%	99.2%	99.4%	0%	100%	99.5%		
Articulated Trucks	0	1	0	0	0	1	0	0	0	0	0	0		
% Articulated Trucks	0%	0.1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Buses and Single-Unit Trucks	1	3	6	0	0	10	1	8	3	0	0	12		
% Buses and Single-Unit Trucks	0.1%	0.3%	1.3%	0%	0%	0.4%	0.1%	0.8%	0.6%	0%	0%	0.5%		

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

Full Length (12 PM-2 PM, 5 PM-7 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound						Rochester Rd (M-150) Southbound						
Time	L	T	R	U	RR	App	L	T	R	U	RR	App	Int
2021-06-12 12:00PM	31	327	37	0	1	396	44	299	49	0	1	393	1082
12:15PM	45	272	28	0	1	346	57	276	50	0	3	386	1079
12:30PM	34	312	42	0	0	388	40	320	50	0	1	411	1095
12:45PM	44	261	41	0	0	346	50	277	32	0	2	361	1072
Hourly Total	154	1172	148	0	2	1476	191	1172	181	0	7	1551	4328
1:00PM	29	320	38	0	0	387	43	331	40	0	0	414	1118
1:15PM	42	304	31	0	6	383	41	303	32	0	2	378	1133
1:30PM	43	324	39	0	0	406	56	329	55	0	3	443	1149
1:45PM	37	314	51	0	0	402	30	338	56	0	6	430	1076
Hourly Total	151	1262	159	0	6	1578	170	1301	183	0	11	1665	4476
5:00PM	39	238	40	0	0	317	40	234	27	1	2	304	894
5:15PM	26	277	32	0	2	337	26	260	33	0	1	320	941
5:30PM	50	272	44	0	1	367	34	252	36	0	1	323	979
5:45PM	41	303	26	0	3	373	39	259	40	0	0	338	957
Hourly Total	156	1090	142	0	6	1394	139	1005	136	1	4	1285	3771
6:00PM	45	267	31	0	1	344	33	286	39	0	0	358	967
6:15PM	39	284	24	0	0	347	40	237	31	0	1	309	921
6:30PM	41	240	30	0	1	312	29	202	24	0	2	257	828
6:45PM	45	281	40	0	0	366	32	233	43	0	3	311	939
Hourly Total	170	1072	125	0	2	1369	134	958	137	0	6	1235	3655
Total	631	4596	574	0	16	5817	634	4436	637	1	28	5736	16230
% Approach	10.8%	79.0%	9.9%	0%	0.3%	-	11.1%	77.3%	11.1%	0%	0.5%	-	-
% Total	3.9%	28.3%	3.5%	0%	0.1%	35.8%	3.9%	27.3%	3.9%	0%	0.2%	35.3%	-
Lights	626	4578	571	0	16	5791	633	4410	634	1	28	5706	16151
% Lights	99.2%	99.6%	99.5%	0%	100%	99.6%	99.8%	99.4%	99.5%	100%	100%	99.5%	99.5%
Articulated Trucks	1	4	0	0	0	5	0	6	1	0	0	7	13
% Articulated Trucks	0.2%	0.1%	0%	0%	0%	0.1%	0%	0.1%	0.2%	0%	0%	0.1%	0.1%
Buses and Single-Unit Trucks	4	14	3	0	0	21	1	20	2	0	0	23	66
% Buses and Single-Unit Trucks	0.6%	0.3%	0.5%	0%	0%	0.4%	0.2%	0.5%	0.3%	0%	0%	0.4%	0.4%

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

Full Length (12 PM-2 PM, 5 PM-7 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Rochester Rd (M-150)

Total: 11603

In: 5736

Out: 5867

665

4436

634

1

[W] Auburn Rd
Total: 4602
In: 2301 Out: 2301

776
1048
477

494
1005
877
Out: 2272 In: 2376
Total: 4648
[E] Auburn Rd

631

4596

590

Out: 5790

In: 5817

Total: 11607

[S] Rochester Rd (M-150)

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

PM Peak (WKND), Forced Peak (1 PM - 2 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Auburn Rd Eastbound						Auburn Rd Westbound					
Time	L	T	R	U	RR	App	L	T	R	U	RR	App
2021-06-12 1:00PM	50	84	27	0	1	162	57	72	25	0	1	155
1:15PM	63	97	38	0	0	198	64	73	33	0	4	174
1:30PM	52	60	23	0	1	136	54	77	31	0	2	164
1:45PM	32	21	15	0	2	70	63	72	34	0	5	174
Total	197	262	103	0	4	566	238	294	123	0	12	667
% Approach	34.8%	46.3%	18.2%	0%	0.7%	-	35.7%	44.1%	18.4%	0%	1.8%	-
% Total	4.4%	5.9%	2.3%	0%	0.1%	12.6%	5.3%	6.6%	2.7%	0%	0.3%	14.9%
PHF	0.782	0.675	0.678	-	0.500	0.715	0.930	0.955	0.904	-	0.600	0.958
Lights	196	262	100	0	4	562	238	291	121	0	12	662
% Lights	99.5%	100%	97.1%	0%	100%	99.3%	100%	99.0%	98.4%	0%	100%	99.3%
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Buses and Single-Unit Trucks	1	0	3	0	0	4	0	3	2	0	0	5
% Buses and Single-Unit Trucks	0.5%	0%	2.9%	0%	0%	0.7%	0%	1.0%	1.6%	0%	0%	0.7%

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

PM Peak (WKND), Forced Peak (1 PM - 2 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-12 1:00PM	29	320	38	0	0	387	43	331	40	0	0	414	1118		
1:15PM	42	304	31	0	6	383	41	303	32	0	2	378	1133		
1:30PM	43	324	39	0	0	406	56	329	55	0	3	443	1149		
1:45PM	37	314	51	0	0	402	30	338	56	0	6	430	1076		
Total	151	1262	159	0	6	1578	170	1301	183	0	11	1665	4476		
% Approach	9.6%	80.0%	10.1%	0%	0.4%	-	10.2%	78.1%	11.0%	0%	0.7%	-	-		
% Total	3.4%	28.2%	3.6%	0%	0.1%	35.3%	3.8%	29.1%	4.1%	0%	0.2%	37.2%	-		
PHF	0.878	0.974	0.779	-	0.250	0.972	0.759	0.962	0.817	-	0.458	0.940	0.974		
Lights	149	1257	159	0	6	1571	170	1293	182	0	11	1656	4451		
% Lights	98.7%	99.6%	100%	0%	100%	99.6%	100%	99.4%	99.5%	0%	100%	99.5%	99.4%		
Articulated Trucks	0	0	0	0	0	0	0	0	1	0	0	1	1		
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0.5%	0%	0%	0.1%	0%		
Buses and Single-Unit Trucks	2	5	0	0	0	7	0	8	0	0	0	8	24		
% Buses and Single-Unit Trucks	1.3%	0.4%	0%	0%	0%	0.4%	0%	0.6%	0%	0%	0%	0.5%	0.5%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

PM Peak (WKND), Forced Peak (1 PM - 2 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Rochester Rd (M-150)

Total: 3259

In: 1665

Out: 1594

194

1301

170

[W] Auburn Rd

Total: 1205

In: 566

Out: 639

197
262
107

135
294
238

Out: 597

In: 667

[E] Auburn Rd

Total: 1264

151

1262

165

Out: 1646

In: 1578

Total: 3224

[S] Rochester Rd (M-150)

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

Forced Peak (5:15 PM - 6:15 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Auburn Rd Eastbound							Auburn Rd Westbound						
Time	L	T	R	U	RR	App	L	T	R	U	RR	App		
2021-06-12 5:15PM	51	61	27	0	1	140	58	59	25	0	2	144		
5:30PM	48	62	18	0	1	129	61	66	32	0	1	160		
5:45PM	46	59	25	0	0	130	50	43	23	0	0	116		
6:00PM	48	51	29	0	1	129	54	51	31	0	0	136		
Total	193	233	99	0	3	528	223	219	111	0	3	556		
% Approach	36.6%	44.1%	18.8%	0%	0.6%	-	40.1%	39.4%	20.0%	0%	0.5%	-		
% Total	5.0%	6.1%	2.6%	0%	0.1%	13.7%	5.8%	5.7%	2.9%	0%	0.1%	14.5%		
PHF	0.946	0.940	0.853	-	0.750	0.943	0.914	0.830	0.867	-	0.375	0.869		
Lights	193	232	99	0	3	527	223	219	110	0	3	555		
% Lights	100%	99.6%	100%	0%	100%	99.8%	100%	100%	99.1%	0%	100%	99.8%		
Articulated Trucks	0	1	0	0	0	1	0	0	0	0	0	0		
% Articulated Trucks	0%	0.4%	0%	0%	0%	0.2%	0%	0%	0%	0%	0%	0%		
Buses and Single-Unit Trucks	0	0	0	0	0	0	0	0	1	0	0	1		
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0.9%	0%	0%	0.2%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

Forced Peak (5:15 PM - 6:15 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-12 5:15PM	26	277	32	0	2	337	26	260	33	0	1	320	941		
5:30PM	50	272	44	0	1	367	34	252	36	0	1	323	979		
5:45PM	41	303	26	0	3	373	39	259	40	0	0	338	957		
6:00PM	45	267	31	0	1	344	33	286	39	0	0	358	967		
Total	162	1119	133	0	7	1421	132	1057	148	0	2	1339	3844		
% Approach	11.4%	78.7%	9.4%	0%	0.5%	-	9.9%	78.9%	11.1%	0%	0.1%	-	-		
% Total	4.2%	29.1%	3.5%	0%	0.2%	37.0%	3.4%	27.5%	3.9%	0%	0.1%	34.8%	-		
PHF	0.810	0.923	0.756	-	0.583	0.952	0.846	0.924	0.925	-	0.500	0.935	0.982		
Lights	162	1114	132	0	7	1415	132	1053	147	0	2	1334	3831		
% Lights	100%	99.6%	99.2%	0%	100%	99.6%	100%	99.6%	99.3%	0%	100%	99.6%	99.7%		
Articulated Trucks	0	1	0	0	0	1	0	0	0	0	0	0	2		
% Articulated Trucks	0%	0.1%	0%	0%	0%	0.1%	0%	0%	0%	0%	0%	0%	0.1%		
Buses and Single-Unit Trucks	0	4	1	0	0	5	0	4	1	0	0	5	11		
% Buses and Single-Unit Trucks	0%	0.4%	0.8%	0%	0%	0.4%	0%	0.4%	0.7%	0%	0%	0.4%	0.3%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Auburn Rd - TMC

Sat Jun 12, 2021

Forced Peak (5:15 PM - 6:15 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 846462, Location: 42.636136, -83.131734



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

[N] Rochester Rd (M-150)

Total: 2765

In: 1339

Out: 1426

150

1057

132

[W] Auburn Rd
Total: 1059
In: 528 Out: 531

193
233
102

114
219
223

Out: 505 In: 556
Total: 1061
[E] Auburn Rd

162

1119

140

Out: 1382

In: 1421

Total: 2803

[S] Rochester Rd (M-150)

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Thu Jun 10, 2021

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845027, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Meijer-Lowe's/Site Driveway Eastbound							Meijer-Lowe's/Site Driveway Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
Time														
2021-06-10 7:00AM	1	0	0	0	0	1	8	0	1	0	1	10		
7:15AM	0	0	0	0	0	0	8	0	1	0	1	10		
7:30AM	0	1	0	0	0	1	16	0	0	0	0	16		
7:45AM	0	1	0	0	0	1	10	0	0	0	2	12		
Hourly Total	1	2	0	0	0	3	42	0	2	0	4	48		
8:00AM	0	0	0	0	1	1	15	1	0	0	8	24		
8:15AM	1	0	1	0	0	2	14	0	0	0	2	16		
8:30AM	0	0	0	0	1	1	18	0	1	0	4	23		
8:45AM	2	0	0	0	1	3	27	0	1	0	7	35		
Hourly Total	3	0	1	0	3	7	74	1	2	0	21	98		
4:00PM	0	1	1	0	0	2	44	0	12	0	6	62		
4:15PM	0	1	2	0	3	6	33	0	16	0	8	57		
4:30PM	2	0	0	0	0	2	29	0	10	0	3	42		
4:45PM	3	0	1	0	0	4	45	0	5	0	6	56		
Hourly Total	5	2	4	0	3	14	151	0	43	0	23	217		
5:00PM	0	0	1	0	0	1	38	1	8	0	5	52		
5:15PM	0	0	0	0	1	1	40	0	9	0	6	55		
5:30PM	2	0	0	0	3	5	34	0	4	0	9	47		
5:45PM	1	0	0	0	1	2	30	0	10	0	1	41		
Hourly Total	3	0	1	0	5	9	142	1	31	0	21	195		
Total	12	4	6	0	11	33	409	2	78	0	69	558		
% Approach	36.4%	12.1%	18.2%	0%	33.3%	-	73.3%	0.4%	14.0%	0%	12.4%	-		
% Total	0.1%	0%	0.1%	0%	0.1%	0.3%	3.5%	0%	0.7%	0%	0.6%	4.8%		
Lights	12	4	6	0	11	33	398	2	75	0	67	542		
% Lights	100%	100%	100%	0%	100%	100%	97.3%	100%	96.2%	0%	97.1%	97.1%		
Articulated Trucks	0	0	0	0	0	0	4	0	0	0	0	4		
% Articulated Trucks	0%	0%	0%	0%	0%	0%	1.0%	0%	0%	0%	0%	0.7%		
Buses and Single-Unit Trucks	0	0	0	0	0	0	7	0	3	0	2	12		
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	1.7%	0%	3.8%	0%	2.9%	2.2%		

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Thu Jun 10, 2021

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845027, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							
Time	L	T	R	U	RR	App	L	T	R	U	RR	App	Int		
2021-06-10 7:00AM	1	175	4	0	0	180	2	267	0	0	0	269	460		
7:15AM	0	209	2	0	0	211	1	294	0	0	0	295	516		
7:30AM	0	245	3	0	0	248	6	372	1	0	0	379	644		
7:45AM	2	273	11	0	2	288	4	329	1	0	0	334	635		
Hourly Total	3	902	20	0	2	927	13	1262	2	0	0	1277	2255		
8:00AM	2	210	7	0	1	220	10	314	0	0	0	324	569		
8:15AM	2	237	8	0	1	248	3	341	1	0	0	345	611		
8:30AM	0	239	12	0	2	253	7	311	0	0	0	318	595		
8:45AM	0	280	11	0	0	291	7	292	0	0	0	299	628		
Hourly Total	4	966	38	0	4	1012	27	1258	1	0	0	1286	2403		
4:00PM	2	383	15	0	5	405	20	383	1	0	0	404	873		
4:15PM	1	384	18	0	4	407	12	388	4	0	0	404	874		
4:30PM	2	419	20	0	2	443	15	391	2	0	0	408	895		
4:45PM	3	410	17	0	8	438	20	349	2	0	0	371	869		
Hourly Total	8	1596	70	0	19	1693	67	1511	9	0	0	1587	3511		
5:00PM	3	395	16	0	4	418	17	412	0	0	0	429	900		
5:15PM	1	383	15	0	4	403	12	372	0	0	0	384	843		
5:30PM	1	392	20	0	4	417	14	402	4	0	1	421	890		
5:45PM	4	405	21	0	1	431	11	319	4	0	0	334	808		
Hourly Total	9	1575	72	0	13	1669	54	1505	8	0	1	1568	3441		
Total	24	5039	200	0	38	5301	161	5536	20	0	1	5718	11610		
% Approach	0.5%	95.1%	3.8%	0%	0.7%	-	2.8%	96.8%	0.3%	0%	0%	-	-		
% Total	0.2%	43.4%	1.7%	0%	0.3%	45.7%	1.4%	47.7%	0.2%	0%	0%	49.3%	-		
Lights	24	4952	193	0	35	5204	159	5442	20	0	1	5622	11401		
% Lights	100%	98.3%	96.5%	0%	92.1%	98.2%	98.8%	98.3%	100%	0%	100%	98.3%	98.2%		
Articulated Trucks	0	38	3	0	0	41	0	27	0	0	0	27	72		
% Articulated Trucks	0%	0.8%	1.5%	0%	0%	0.8%	0%	0.5%	0%	0%	0%	0.5%	0.6%		
Buses and Single-Unit Trucks	0	49	4	0	3	56	2	67	0	0	0	69	137		
% Buses and Single-Unit Trucks	0%	1.0%	2.0%	0%	7.9%	1.1%	1.2%	1.2%	0%	0%	0%	1.2%	1.2%		

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC
 Thu Jun 10, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845027, Location: 42.63371, -83.131637

[N] Rochester Rd (M-150)

Total: 10916

In: 5718

Out: 5198

21

5536

161

[W] Meijer-Lowe's/Site Driveway

Total: 80
 In: 33 Out: 47

12
14
17

147
2
409

147
2
409

Out: 403 In: 558
 Total: 961

[E] Meijer-Lowe's/Site Driveway

24

5039

238

Out: 5962

In: 5301

Total: 11263

[S] Rochester Rd (M-150)

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Thu Jun 10, 2021

AM Peak (7:30 AM - 8:30 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845027, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Meijer-Lowe's/Site Driveway Eastbound							Meijer-Lowe's/Site Driveway Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
Time														
2021-06-10 7:30AM	0	1	0	0	0	1	16	0	0	0	0	16		
7:45AM	0	1	0	0	0	1	10	0	0	0	2	12		
8:00AM	0	0	0	0	1	1	15	1	0	0	8	24		
8:15AM	1	0	1	0	0	2	14	0	0	0	2	16		
Total	1	2	1	0	1	5	55	1	0	0	12	68		
% Approach	20.0%	40.0%	20.0%	0%	20.0%	-	80.9%	1.5%	0%	0%	17.6%	-		
% Total	0%	0.1%	0%	0%	0%	0.2%	2.2%	0%	0%	0%	0.5%	2.8%		
PHF	0.250	0.500	0.250	-	0.250	0.625	0.859	0.250	-	-	0.375	0.708		
Lights	1	2	1	0	1	5	51	1	0	0	11	63		
% Lights	100%	100%	100%	0%	100%	100%	92.7%	100%	0%	0%	91.7%	92.6%		
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0		
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Buses and Single-Unit Trucks	0	0	0	0	0	0	4	0	0	0	1	5		
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	7.3%	0%	0%	0%	8.3%	7.4%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Thu Jun 10, 2021

AM Peak (7:30 AM - 8:30 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845027, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							
Time	L	T	R	U	RR	App		L	T	R	U	RR	App	Int	
2021-06-10 7:30AM	0	245	3	0	0	248		6	372	1	0	0	379	644	
7:45AM	2	273	11	0	2	288		4	329	1	0	0	334	635	
8:00AM	2	210	7	0	1	220		10	314	0	0	0	324	569	
8:15AM	2	237	8	0	1	248		3	341	1	0	0	345	611	
Total	6	965	29	0	4	1004		23	1356	3	0	0	1382	2459	
% Approach	0.6%	96.1%	2.9%	0%	0.4%	-		1.7%	98.1%	0.2%	0%	0%	-	-	
% Total	0.2%	39.2%	1.2%	0%	0.2%	40.8%		0.9%	55.1%	0.1%	0%	0%	56.2%	-	
PHF	0.750	0.884	0.659	-	0.500	0.872		0.575	0.911	0.750	-	-	0.912	0.955	
Lights	6	929	27	0	3	965		23	1331	3	0	0	1357	2390	
% Lights	100%	96.3%	93.1%	0%	75.0%	96.1%		100%	98.2%	100%	0%	0%	98.2%	97.2%	
Articulated Trucks	0	13	0	0	0	13		0	8	0	0	0	8	21	
% Articulated Trucks	0%	1.3%	0%	0%	0%	1.3%		0%	0.6%	0%	0%	0%	0.6%	0.9%	
Buses and Single-Unit Trucks	0	23	2	0	1	26		0	17	0	0	0	17	48	
% Buses and Single-Unit Trucks	0%	2.4%	6.9%	0%	25.0%	2.6%		0%	1.3%	0%	0%	0%	1.2%	2.0%	

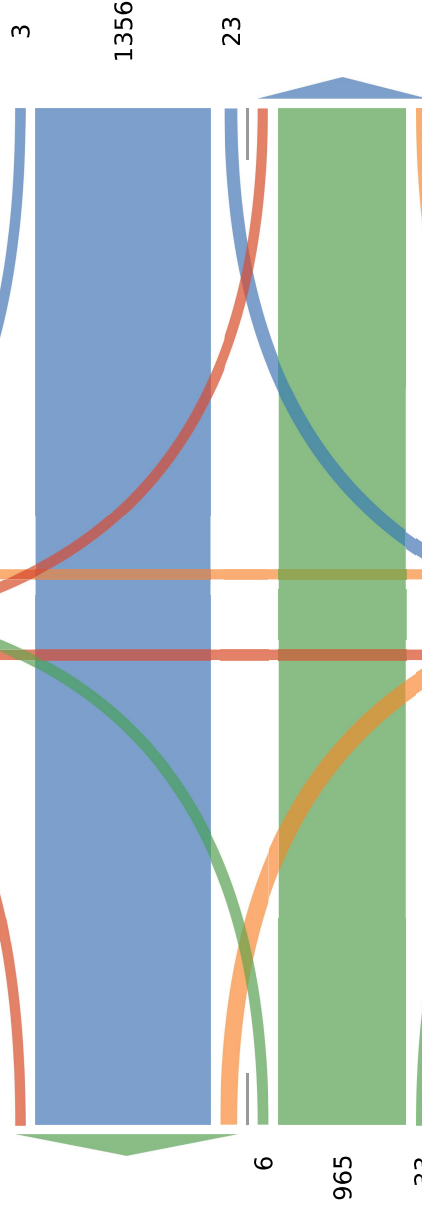
* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC
 Thu Jun 10, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845027, Location: 42.63371, -83.131637

[N] Rochester Rd (M-150)

Total: 2360

In: 1382 Out: 978



[W] Meijer-Lowe's/Site Driveway
 Total: 15
 In: 5 Out: 10

Out: 58 In: 68
 Total: 126

[E] Meijer-Lowe's/Site Driveway

Out: 1413 In: 1004
 Total: 2417
 [S] Rochester Rd (M-150)

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Thu Jun 10, 2021

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845027, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Meijer-Lowe's/Site Driveway Eastbound							Meijer-Lowe's/Site Driveway Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
2021-06-10 4:15PM	0	1	2	0	3	6	33	0	16	0	8	57		
4:30PM	2	0	0	0	0	2	29	0	10	0	3	42		
4:45PM	3	0	1	0	0	4	45	0	5	0	6	56		
5:00PM	0	0	1	0	0	1	38	1	8	0	5	52		
Total	5	1	4	0	3	13	145	1	39	0	22	207		
% Approach	38.5%	7.7%	30.8%	0%	23.1%	-	70.0%	0.5%	18.8%	0%	10.6%	-		
% Total	0.1%	0%	0.1%	0%	0.1%	0.4%	4.1%	0%	1.1%	0%	0.6%	5.9%		
PHF	0.417	0.250	0.500	-	0.250	0.542	0.806	0.250	0.609	-	0.688	0.908		
Lights	5	1	4	0	3	13	143	1	38	0	22	204		
% Lights	100%	100%	100%	0%	100%	100%	98.6%	100%	97.4%	0%	100%	98.6%		
Articulated Trucks	0	0	0	0	0	0	2	0	0	0	0	2		
% Articulated Trucks	0%	0%	0%	0%	0%	0%	1.4%	0%	0%	0%	0%	1.0%		
Buses and Single-Unit Trucks	0	0	0	0	0	0	0	0	1	0	0	1		
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	0%	2.6%	0%	0%	0.5%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Thu Jun 10, 2021

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845027, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-10 4:15PM	1	384	18	0	4	407	12	388	4	0	0	404	874		
4:30PM	2	419	20	0	2	443	15	391	2	0	0	408	895		
4:45PM	3	410	17	0	8	438	20	349	2	0	0	371	869		
5:00PM	3	395	16	0	4	418	17	412	0	0	0	429	900		
Total	9	1608	71	0	18	1706	64	1540	8	0	0	1612	3538		
% Approach	0.5%	94.3%	4.2%	0%	1.1%	-	4.0%	95.5%	0.5%	0%	0%	-	-		
% Total	0.3%	45.4%	2.0%	0%	0.5%	48.2%	1.8%	43.5%	0.2%	0%	0%	45.6%	-		
PHF	0.750	0.959	0.888	-	0.563	0.963	0.800	0.934	0.500	-	-	0.939	0.983		
Lights	9	1589	70	0	18	1686	64	1508	8	0	0	1580	3483		
% Lights	100%	98.8%	98.6%	0%	100%	98.8%	100%	97.9%	100%	0%	0%	98.0%	98.4%		
Articulated Trucks	0	10	1	0	0	11	0	6	0	0	0	6	19		
% Articulated Trucks	0%	0.6%	1.4%	0%	0%	0.6%	0%	0.4%	0%	0%	0%	0.4%	0.5%		
Buses and Single-Unit Trucks	0	9	0	0	0	9	0	26	0	0	0	26	36		
% Buses and Single-Unit Trucks	0%	0.6%	0%	0%	0%	0.5%	0%	1.7%	0%	0%	0%	1.6%	1.0%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

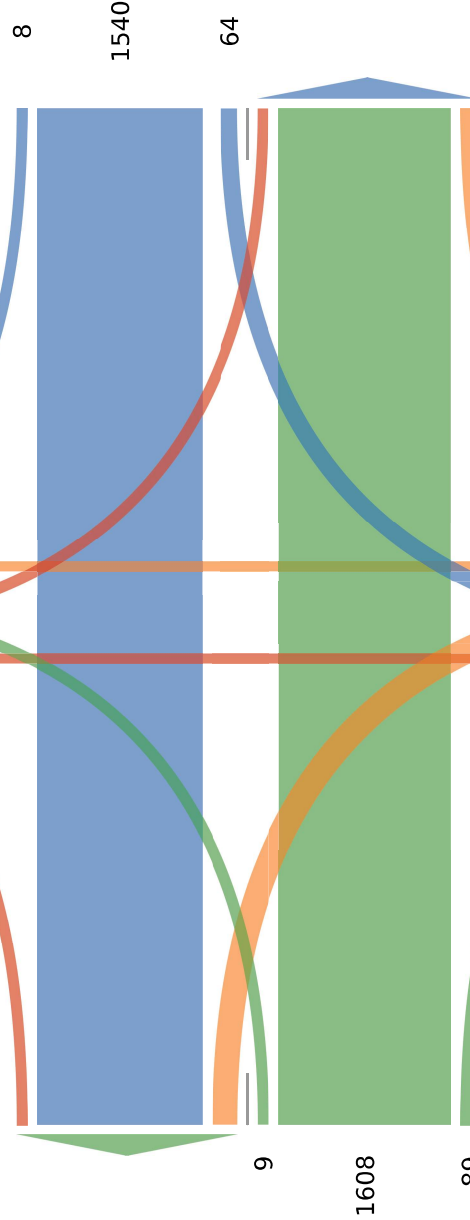
Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC
 Thu Jun 10, 2021
 PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845027, Location: 42.63371, -83.131637

[N] Rochester Rd (M-150)

Total: 3286

In: 1612

Out: 1674



Out: 1692

In: 1706

Total: 3398

[S] Rochester Rd (M-150)

[W] Meijer-Lowe's/Site Driveway

Total: 31

In: 13 Out: 18

5
4

61
1
145

Out: 154 In: 207

Total: 361

[E] Meijer-Lowe's/Site Driveway

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Sat Jun 12, 2021

Full Length (12 PM-2 PM, 5 PM-7 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845031, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Meijer-Lowe's/Site Driveway Eastbound							Meijer-Lowe's/Site Driveway Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
2021-06-12 12:00PM	4	0	0	0	4	8	46	0	8	0	11	65		
12:15PM	3	0	0	0	0	3	55	0	7	0	9	71		
12:30PM	1	1	0	0	1	3	55	0	6	0	8	69		
12:45PM	2	1	4	0	0	7	54	0	8	0	12	74		
Hourly Total	10	2	4	0	5	21	210	0	29	0	40	279		
1:00PM	4	0	1	0	3	8	53	0	6	0	10	69		
1:15PM	5	0	1	0	0	6	37	0	11	0	9	57		
1:30PM	0	0	1	0	1	2	59	0	9	0	9	77		
1:45PM	2	0	3	0	2	7	45	0	3	0	13	61		
Hourly Total	11	0	6	0	6	23	194	0	29	0	41	264		
5:00PM	1	0	2	0	3	6	43	1	3	0	7	54		
5:15PM	0	1	2	0	0	3	38	0	6	0	8	52		
5:30PM	1	1	0	0	3	5	30	0	5	0	8	43		
5:45PM	2	1	4	0	0	7	44	0	6	0	8	58		
Hourly Total	4	3	8	0	6	21	155	1	20	0	31	207		
6:00PM	0	0	0	0	0	0	35	0	3	0	8	46		
6:15PM	2	0	1	0	2	5	47	1	3	0	9	60		
6:30PM	1	0	2	0	0	3	35	0	4	0	10	49		
6:45PM	1	0	0	0	1	2	32	0	4	0	6	42		
Hourly Total	4	0	3	0	3	10	149	1	14	0	33	197		
Total	29	5	21	0	20	75	708	2	92	0	145	947		
% Approach	38.7%	6.7%	28.0%	0%	26.7%	-	74.8%	0.2%	9.7%	0%	15.3%	-		
% Total	0.2%	0%	0.2%	0%	0.2%	0.6%	5.4%	0%	0.7%	0%	1.1%	7.2%		
Lights	29	5	21	0	20	75	706	2	92	0	145	945		
% Lights	100%	100%	100%	0%	100%	100%	99.7%	100%	100%	0%	100%	99.8%		
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0		
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Buses and Single-Unit Trucks	0	0	0	0	0	0	2	0	0	0	0	2		
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0.3%	0%	0%	0%	0%	0.2%		

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Sat Jun 12, 2021

Full Length (12 PM-2 PM, 5 PM-7 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845031, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound						Rochester Rd (M-150) Southbound						Int
	L	T	R	U	RR	App	L	T	R	U	RR	App	
2021-06-12 12:00PM	1	386	18	1	4	410	22	372	4	0	0	398	881
12:15PM	1	340	22	0	4	367	19	366	5	0	0	390	831
12:30PM	3	369	23	0	6	401	18	412	6	0	0	436	909
12:45PM	1	353	25	0	7	386	29	403	3	0	0	435	902
Hourly Total	6	1448	88	1	21	1564	88	1553	18	0	0	1659	3523
1:00PM	0	362	26	0	1	389	28	389	1	0	0	418	884
1:15PM	2	388	19	0	6	415	35	392	0	0	0	427	905
1:30PM	2	364	17	0	5	388	15	380	0	0	0	395	862
1:45PM	6	401	17	0	8	432	22	416	2	0	0	440	940
Hourly Total	10	1515	79	0	20	1624	100	1577	3	0	0	1680	3591
5:00PM	3	307	21	0	5	336	19	333	0	0	0	352	748
5:15PM	5	326	12	0	3	346	19	349	2	0	0	370	771
5:30PM	2	357	17	0	7	383	15	329	1	0	0	345	776
5:45PM	2	350	13	0	7	372	13	324	0	0	0	337	774
Hourly Total	12	1340	63	0	22	1437	66	1335	3	0	0	1404	3069
6:00PM	1	317	15	0	0	333	20	381	5	1	0	407	786
6:15PM	3	327	8	0	2	340	6	300	1	0	0	307	712
6:30PM	3	315	18	0	3	339	19	282	2	0	0	303	694
6:45PM	1	330	14	0	2	347	11	311	0	0	1	323	714
Hourly Total	8	1289	55	0	7	1359	56	1274	8	1	1	1340	2906
Total	36	5592	285	1	70	5984	310	5739	32	1	1	6083	13089
% Approach	0.6%	93.4%	4.8%	0%	1.2%	-	5.1%	94.3%	0.5%	0%	0%	-	-
% Total	0.3%	42.7%	2.2%	0%	0.5%	45.7%	2.4%	43.8%	0.2%	0%	0%	46.5%	-
Lights	36	5569	283	1	70	5959	310	5705	32	1	1	6049	13028
% Lights	100%	99.6%	99.3%	100%	100%	99.6%	100%	99.4%	100%	100%	100%	99.4%	99.5%
Articulated Trucks	0	4	0	0	0	4	0	7	0	0	0	7	11
% Articulated Trucks	0%	0.1%	0%	0%	0%	0.1%	0%	0.1%	0%	0%	0%	0.1%	0.1%
Buses and Single-Unit Trucks	0	19	2	0	0	21	0	27	0	0	0	27	50
% Buses and Single-Unit Trucks	0%	0.3%	0.7%	0%	0%	0.4%	0%	0.5%	0%	0%	0%	0.4%	0.4%

*L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC
 Sat Jun 12, 2021
 Full Length (12 PM-2 PM, 5 PM-7 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845031, Location: 42.63371, -83.131637

[N] Rochester Rd (M-150)

Total: 11942

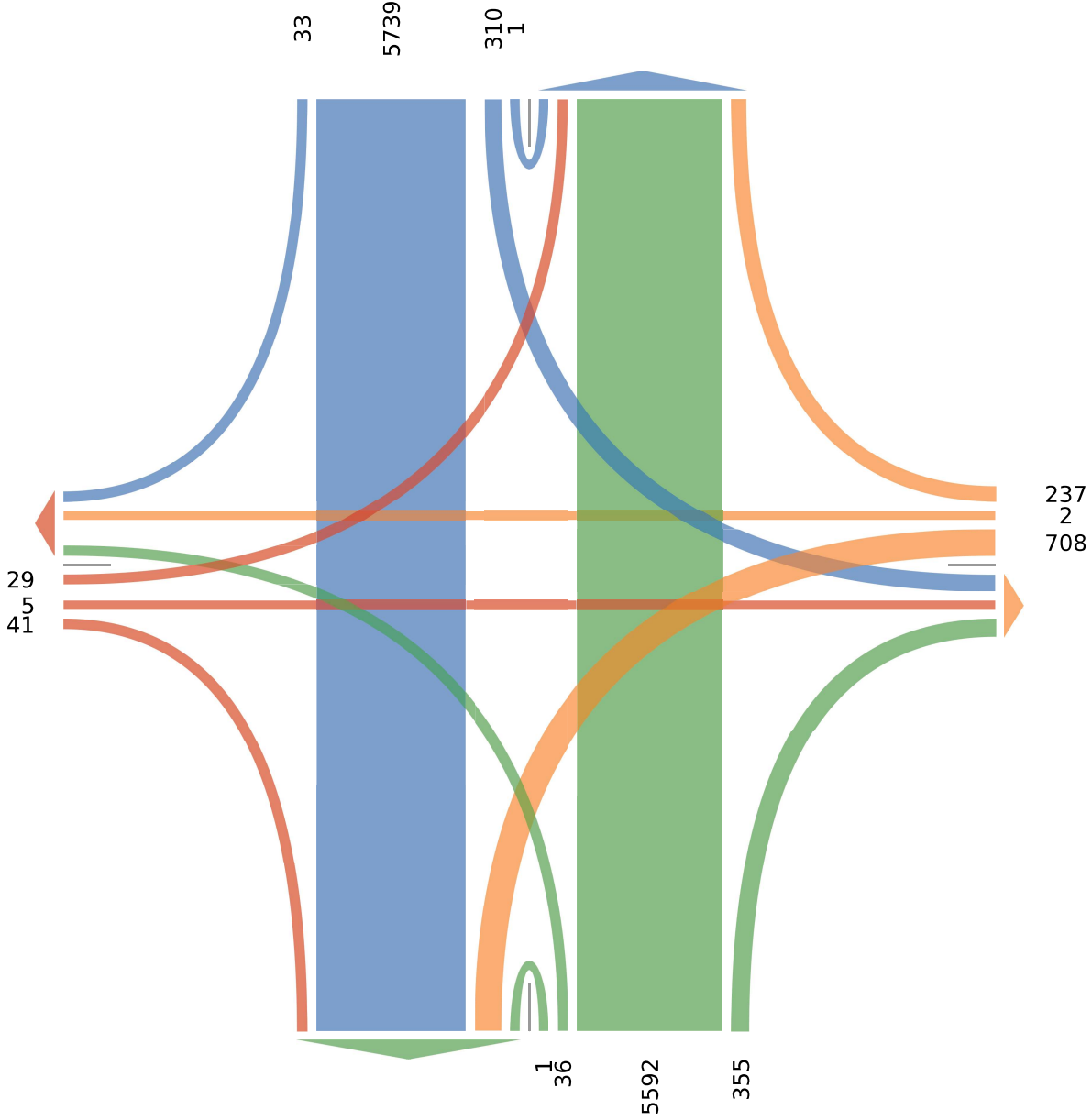
In: 6083

Out: 5859

[W] Meijer-Lowe's/Site Driveway

Total: 146

In: 75 Out: 71



Out: 6489

In: 5984

Total: 12473

[S] Rochester Rd (M-150)

[E] Meijer-Lowe's/Site Driveway

Out: 670 In: 947

Total: 1617

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC
 Sat Jun 12, 2021
 Forced Peak (12:30 PM - 1:30 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845031, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.
 625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Meijer-Lowe's/Site Driveway Eastbound							Meijer-Lowe's/Site Driveway Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
2021-06-12 12:30PM	1	1	0	0	1	3	55	0	6	0	8	69		
12:45PM	2	1	4	0	0	7	54	0	8	0	12	74		
1:00PM	4	0	1	0	3	8	53	0	6	0	10	69		
1:15PM	5	0	1	0	0	6	37	0	11	0	9	57		
Total	12	2	6	0	4	24	199	0	31	0	39	269		
% Approach	50.0%	8.3%	25.0%	0%	16.7%	-	74.0%	0%	11.5%	0%	14.5%	-		
% Total	0.3%	0.1%	0.2%	0%	0.1%	0.7%	5.5%	0%	0.9%	0%	1.1%	7.5%		
PHF	0.600	0.500	0.375	-	0.333	0.750	0.905	-	0.705	-	0.813	0.909		
Lights	12	2	6	0	4	24	199	0	31	0	39	269		
% Lights	100%	100%	100%	0%	100%	100%	100%	0%	100%	0%	100%	100%		
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0		
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Buses and Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0		
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Sat Jun 12, 2021

Forced Peak (12:30 PM - 1:30 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845031, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-12 12:30PM	3	369	23	0	6	401	18	412	6	0	0	436	909		
12:45PM	1	353	25	0	7	386	29	403	3	0	0	435	902		
1:00PM	0	362	26	0	1	389	28	389	1	0	0	418	884		
1:15PM	2	388	19	0	6	415	35	392	0	0	0	427	905		
Total	6	1472	93	0	20	1591	110	1596	10	0	0	1716	3600		
% Approach	0.4%	92.5%	5.8%	0%	1.3%	-	6.4%	93.0%	0.6%	0%	0%	-	-		
% Total	0.2%	40.9%	2.6%	0%	0.6%	44.2%	3.1%	44.3%	0.3%	0%	0%	47.7%	-		
PHF	0.500	0.948	0.894	-	0.714	0.958	0.786	0.968	0.417	-	-	0.984	0.990		
Lights	6	1458	92	0	20	1576	110	1588	10	0	0	1708	3577		
% Lights	100%	99.0%	98.9%	0%	100%	99.1%	100%	99.5%	100%	0%	0%	99.5%	99.4%		
Articulated Trucks	0	2	0	0	0	2	0	2	0	0	0	2	4		
% Articulated Trucks	0%	0.1%	0%	0%	0%	0.1%	0%	0.1%	0%	0%	0%	0.1%	0.1%		
Buses and Single-Unit Trucks	0	12	1	0	0	13	0	6	0	0	0	6	19		
% Buses and Single-Unit Trucks	0%	0.8%	1.1%	0%	0%	0.8%	0%	0.4%	0%	0%	0%	0.3%	0.5%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC
 Sat Jun 12, 2021
 Forced Peak (12:30 PM - 1:30 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845031, Location: 42.63371, -83.131637

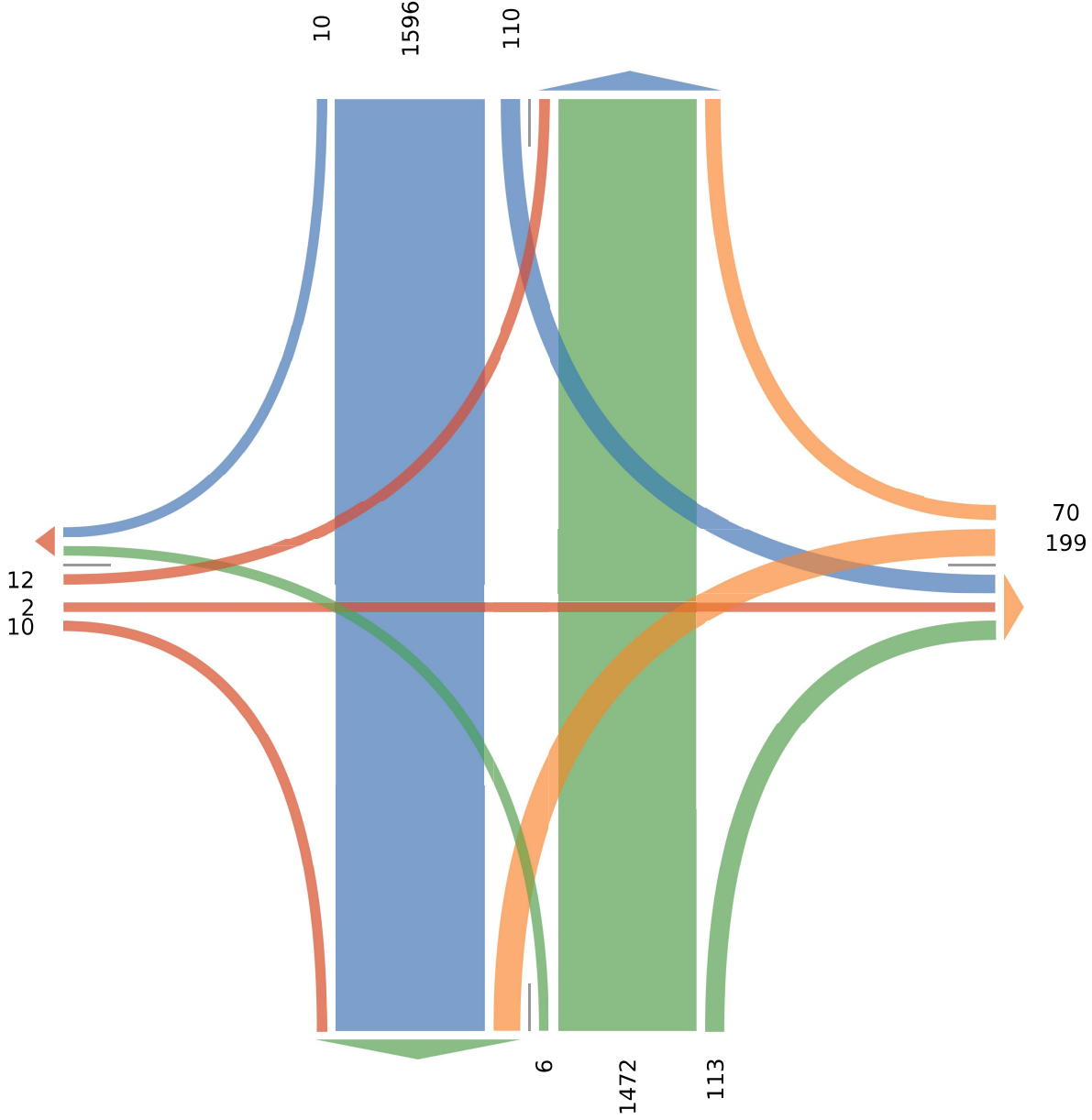
[N] Rochester Rd (M-150)

Total: 3270

In: 1716 Out: 1554

[W] Meijer-Lowe's/Site Driveway

Total: 40
 In: 24 Out: 16



Out: 1805 In: 1591
 Total: 3396
 [S] Rochester Rd (M-150)

Out: 225 In: 269
 Total: 494
 [E] Meijer-Lowe's/Site Driveway

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Sat Jun 12, 2021

Forced Peak (5:15 PM - 6:15 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845031, Location: 42.63371, -83.131637



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Meijer-Lowe's/Site Driveway Eastbound							Meijer-Lowe's/Site Driveway Westbound						
	L	T	R	U	RR	App	L	T	R	U	RR	App		
Time														
2021-06-12 5:15PM	0	1	2	0	0	3	3	38	0	6	0	8	52	
5:30PM	1	1	0	0	3	5	5	30	0	5	0	8	43	
5:45PM	2	1	4	0	0	7	7	44	0	6	0	8	58	
6:00PM	0	0	0	0	0	0	0	35	0	3	0	8	46	
Total	3	3	6	0	3	15	15	147	0	20	0	32	199	
% Approach	20.0%	20.0%	40.0%	0%	20.0%	-	-	73.9%	0%	10.1%	0%	16.1%	-	
% Total	0.1%	0.1%	0.2%	0%	0.1%	0.5%	0.5%	4.7%	0%	0.6%	0%	1.0%	6.4%	
PHF	0.375	0.750	0.375	-	0.250	0.536	0.536	0.835	-	0.833	-	1.000	0.858	
Lights	3	3	6	0	3	15	15	147	0	20	0	32	199	
% Lights	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	100%	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Buses and Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC

Sat Jun 12, 2021

Forced Peak (5:15 PM - 6:15 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845031, Location: 42.63371, -83.131637

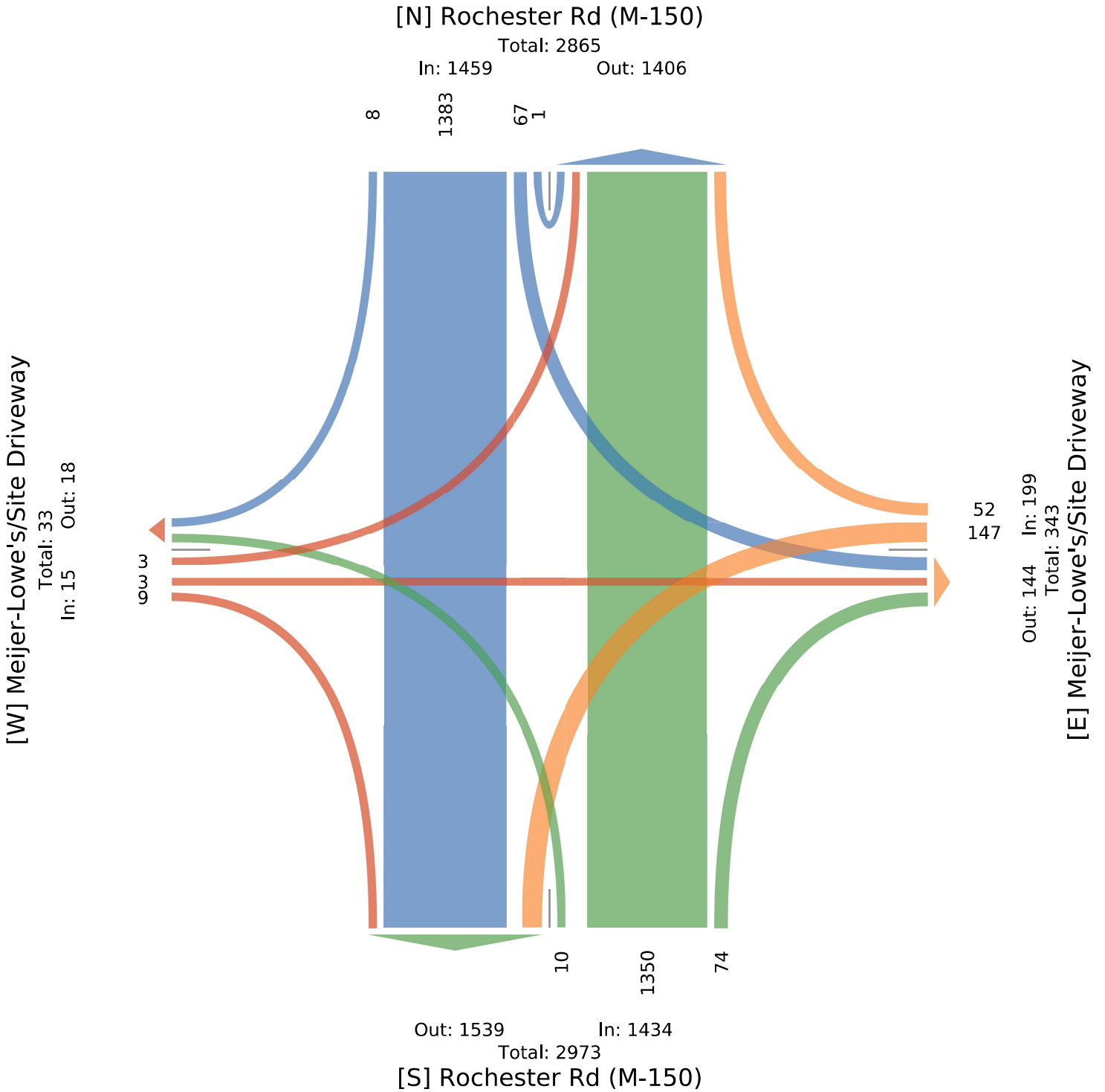


Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rochester Rd (M-150) Northbound							Rochester Rd (M-150) Southbound							Int
	L	T	R	U	RR	App	L	T	R	U	RR	App			
2021-06-12 5:15PM	5	326	12	0	3	346	19	349	2	0	0	370	771		
5:30PM	2	357	17	0	7	383	15	329	1	0	0	345	776		
5:45PM	2	350	13	0	7	372	13	324	0	0	0	337	774		
6:00PM	1	317	15	0	0	333	20	381	5	1	0	407	786		
Total	10	1350	57	0	17	1434	67	1383	8	1	0	1459	3107		
% Approach	0.7%	94.1%	4.0%	0%	1.2%	-	4.6%	94.8%	0.5%	0.1%	0%	-	-		
% Total	0.3%	43.5%	1.8%	0%	0.5%	46.2%	2.2%	44.5%	0.3%	0%	0%	47.0%	-		
PHF	0.500	0.945	0.838	-	0.607	0.936	0.838	0.907	0.400	0.250	-	0.896	0.988		
Lights	10	1346	57	0	17	1430	67	1378	8	1	0	1454	3098		
% Lights	100%	99.7%	100%	0%	100%	99.7%	100%	99.6%	100%	100%	0%	99.7%	99.7%		
Articulated Trucks	0	1	0	0	0	1	0	1	0	0	0	1	2		
% Articulated Trucks	0%	0.1%	0%	0%	0%	0.1%	0%	0.1%	0%	0%	0%	0.1%	0.1%		
Buses and Single-Unit Trucks	0	3	0	0	0	3	0	4	0	0	0	4	7		
% Buses and Single-Unit Trucks	0%	0.2%	0%	0%	0%	0.2%	0%	0.3%	0%	0%	0%	0.3%	0.2%		

* L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Rochester Rd (M-150) and Meijer-Lowe's/Site ... - TMC
 Sat Jun 12, 2021
 Forced Peak (5:15 PM - 6:15 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845031, Location: 42.63371, -83.131637



Rochester Rd (M-150) and Hickory Lawn Rd - TMC

Thu Jun 10, 2021

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845026, Location: 42.632825, -83.131615



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hickory Lawn Rd Eastbound				Rochester Rd (M-150) Northbound				Rochester Rd (M-150) Southbound				
Time	L	R	U	App	L	T	U	App	T	R	U	App	Int
2021-06-10 7:00AM	0	0	0	0	0	177	0	177	266	0	0	266	443
7:15AM	0	1	0	1	1	210	0	211	302	0	0	302	514
7:30AM	0	2	0	2	1	251	0	252	393	0	0	393	647
7:45AM	0	1	0	1	0	289	0	289	337	0	0	337	627
Hourly Total	0	4	0	4	2	927	0	929	1298	0	0	1298	2231
8:00AM	0	1	0	1	1	215	0	216	335	0	0	335	552
8:15AM	0	1	0	1	1	247	0	248	357	0	0	357	606
8:30AM	0	0	0	0	2	251	0	253	327	1	0	328	581
8:45AM	0	1	0	1	2	291	1	294	315	0	0	315	610
Hourly Total	0	3	0	3	6	1004	1	1011	1334	1	0	1335	2349
4:00PM	0	3	0	3	4	401	0	405	422	0	0	422	830
4:15PM	0	2	0	2	5	391	1	397	417	1	0	418	817
4:30PM	0	2	0	2	5	423	1	429	409	1	0	410	841
4:45PM	0	4	0	4	4	425	0	429	389	2	0	391	824
Hourly Total	0	11	0	11	18	1640	2	1660	1637	4	0	1641	3312
5:00PM	0	1	0	1	1	411	0	412	448	0	0	448	861
5:15PM	0	2	0	2	3	410	1	414	414	0	0	414	830
5:30PM	0	2	0	2	0	412	0	412	439	0	0	439	853
5:45PM	0	0	0	0	1	442	0	443	351	0	0	351	794
Hourly Total	0	5	0	5	5	1675	1	1681	1652	0	0	1652	3338
Total	0	23	0	23	31	5246	4	5281	5921	5	0	5926	11230
% Approach	0%	100%	0%	-	0.6%	99.3%	0.1%	-	99.9%	0.1%	0%	-	-
% Total	0%	0.2%	0%	0.2%	0.3%	46.7%	0%	47.0%	52.7%	0%	0%	52.8%	-
Lights	0	23	0	23	31	5148	4	5183	5817	5	0	5822	11028
% Lights	0%	100%	0%	100%	100%	98.1%	100%	98.1%	98.2%	100%	0%	98.2%	98.2%
Articulated Trucks	0	0	0	0	0	45	0	45	28	0	0	28	73
% Articulated Trucks	0%	0%	0%	0%	0%	0.9%	0%	0.9%	0.5%	0%	0%	0.5%	0.7%
Buses and Single-Unit Trucks	0	0	0	0	0	53	0	53	76	0	0	76	129
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	1.0%	0%	1.0%	1.3%	0%	0%	1.3%	1.1%

*L: Left, R: Right, T: Thru, U: U-Turn

Rochester Rd (M-150) and Hickory Lawn Rd - TMC
 Thu Jun 10, 2021
 Full Length (7 AM-9 AM, 4 PM-6 PM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845026, Location: 42.632825, -83.131615

[N] Rochester Rd (M-150)

Total: 11172

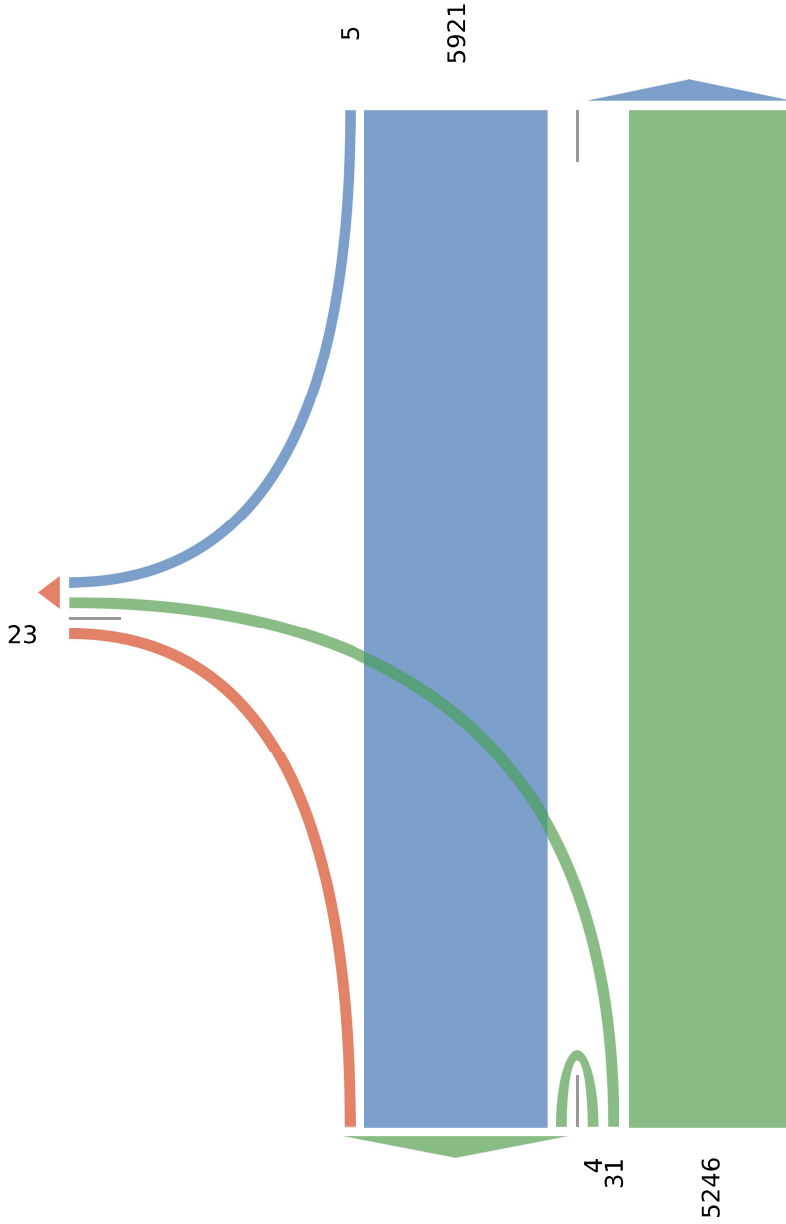
In: 5926

Out: 5246

[W] Hickory Lawn Rd

Total: 59

In: 23 Out: 36



Out: 5948

In: 5281

Total: 11229

[S] Rochester Rd (M-150)

Rochester Rd (M-150) and Hickory Lawn Rd - TMC

Thu Jun 10, 2021

AM Peak (7:30 AM - 8:30 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 845026, Location: 42.632825, -83.131615



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Hickory Lawn Rd Eastbound				Rochester Rd (M-150) Northbound				Rochester Rd (M-150) Southbound				
Time	L	R	U	App	L	T	U	App	T	R	U	App	Int
2021-06-10 7:30AM	0	2	0	2	1	251	0	252	393	0	0	393	647
7:45AM	0	1	0	1	0	289	0	289	337	0	0	337	627
8:00AM	0	1	0	1	1	215	0	216	335	0	0	335	552
8:15AM	0	1	0	1	1	247	0	248	357	0	0	357	606
Total	0	5	0	5	3	1002	0	1005	1422	0	0	1422	2432
% Approach	0%	100%	0%	-	0.3%	99.7%	0%	-	100%	0%	0%	-	-
% Total	0%	0.2%	0%	0.2%	0.1%	41.2%	0%	41.3%	58.5%	0%	0%	58.5%	-
PHF	-	0.625	-	0.625	0.750	0.867	-	0.869	0.905	-	-	0.905	0.940
Lights	0	5	0	5	3	961	0	964	1394	0	0	1394	2363
% Lights	0%	100%	0%	100%	100%	95.9%	0%	95.9%	98.0%	0%	0%	98.0%	97.2%
Articulated Trucks	0	0	0	0	0	14	0	14	8	0	0	8	22
% Articulated Trucks	0%	0%	0%	0%	0%	1.4%	0%	1.4%	0.6%	0%	0%	0.6%	0.9%
Buses and Single-Unit Trucks	0	0	0	0	0	27	0	27	20	0	0	20	47
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	2.7%	0%	2.7%	1.4%	0%	0%	1.4%	1.9%

* L: Left, R: Right, T: Thru, U: U-Turn

Rochester Rd (M-150) and Hickory Lawn Rd - TMC
 Thu Jun 10, 2021
 AM Peak (7:30 AM - 8:30 AM)
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 845026, Location: 42.632825, -83.131615

[N] Rochester Rd (M-150)

Total: 2424
 In: 1422 Out: 1002

1422

[W] Hickory Lawn Rd

Total: 8
 In: 5 Out: 3

5



Out: 1427 In: 1005
 Total: 2432
 [S] Rochester Rd (M-150)