3420 Rochester Road Redevelopment
Traffic Impact Study

Project No. 231150
May 21, 2024

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3420 Rochester Road
Traffic Impact Study

Prepared For:
3420 Rochester Road LLC
Southfield, MI

May 21, 2024
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List of Abbreviations/Acronyms

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
City	City of Rochester Hills
DU	dwelling units
EB	eastbound
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
LUC	Land Use Code
MDOT	Michigan Department of Transportation
mph	miles per hour
NB	northbound
RCOC	Road Commission for Oakland County
SCATS	Sydney Coordinated Adaptive Traffic System
SB	southbound
SFT	square foot
TIS	Traffic Impact Study
TMC	Turning Movement Count
TWLTL	two-way left turn lane
WB	westbound
vpd	vehicles per day

References

Institute of Transportation Engineers, 2017, *Trip Generation Handbook*, 3rd Edition.
Institute of Transportation Engineers, 2021, *Trip Generation Manual*, 11th Edition.
Michigan Department of Transportation, 2017, *Geometric Design Guidance*.
Michigan Department of Transportation, 2013, *Michigan Manual on Uniform Traffic Control Devices*.
Transportation Research Board, 2016, *Highway Capacity Manual*, 6th Edition.
Transportation Research Board, 2000, *Highway Capacity Manual: 2000*.

Executive Summary

Fishbeck has completed a traffic impact study (TIS) related to the development of 3420 Rochester Road (M-150) in the City of Rochester Hills (City), Oakland County, Michigan. The existing land use is a gas station with convenience store. The proposed development is a gas station with convenience store and fast-food restaurant with drive through window. The development will be completed and assumed to be open and fully operational in 2024.

The access to the existing site has two driveways on M-150 and one driveway on Nawakwa Road. The proposed development will consolidate the two driveways on M-150 down to one driveway, and the access on Nawakwa Road will remain.

This study was conducted according to the methodologies and guidance published by Institute of Transportation Engineers (ITE), American Association of State Highway and Transportation Officials (AASHTO), Michigan Department of Transportation (MDOT), Road Commission for Oakland County (RCOC), and the City.

Vehicular Turning Movement Counts (TMCs) were collected at the study intersections on Wednesday, June 21, 2023, during the weekday morning (7 a.m. to 9 a.m.) and afternoon (4 p.m. to 6 p.m.) peak periods for the roadway network.

There are two known projects in the site vicinity that would add additional traffic volumes or alter traffic patterns within the study network. The following developments were included:

- The Gateway of Rochester Hills (west of Rochester Road between South Boulevard and M-150)
- Bebb Oak (west side of M-150, between Auburn Road and Wabash Road)

Site-generated traffic was forecast using the information and methodologies specified in the ITE *Trip Generation Manual*. Existing traffic volumes, site layout, and engineering judgement were used to develop a trip distribution model for the a.m. and p.m. peak hours for the new traffic that would be generated by the proposed development.

Operational analyses were conducted for existing, background, and total future conditions based on the *Highway Capacity Manual* (HCM) 6th Edition and HCM 2000 methodologies using Synchro traffic analysis software. Synchro network models were also simulated using SimTraffic to evaluate network operations including intersection queueing.

Based on the findings of the HCM operational analyses and site traffic generation, no mitigations are recommended during the existing, background, and future conditions to the study intersections.

The opinions, findings, and conclusions expressed in this TIS are those of Fishbeck and not necessarily those of the Owner/Applicant, MDOT, RCOC, or the City.

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1.0 Introduction

1.1 Project Overview

On behalf of 3420 Rochester Road LLC, Fishbeck has conducted a TIS related to the development of 3420 Rochester Road (M-150) in the City of Rochester Hills, Oakland County, Michigan. The existing land use is a gas station with convenience store. The proposed development is a gas station with convenience store and fast-food restaurant with drive through window. The development will be completed and assumed to be open and fully operational in 2024.

The access to the existing site has two driveways on M-150 and one driveway on Nawakwa Road. The proposed development will consolidate the two driveways on M-150 down to one driveway, and the access on Nawakwa Road will remain.

The project location and study intersections are displayed in Figure 1.

Figure 1 – Project Location and Study Network

1.2 Study Methodology

The objectives of this TIS were to determine what impacts the proposed project would have on adjacent roadway traffic operations, and to develop recommendations for any improvements necessary to mitigate the project impacts on the studied intersections. Study analyses were completed relative to typical weekday morning and afternoon peak periods.

This study was conducted according to the methodologies and guidance published by ITE, AASHTO, MDOT, and the City.

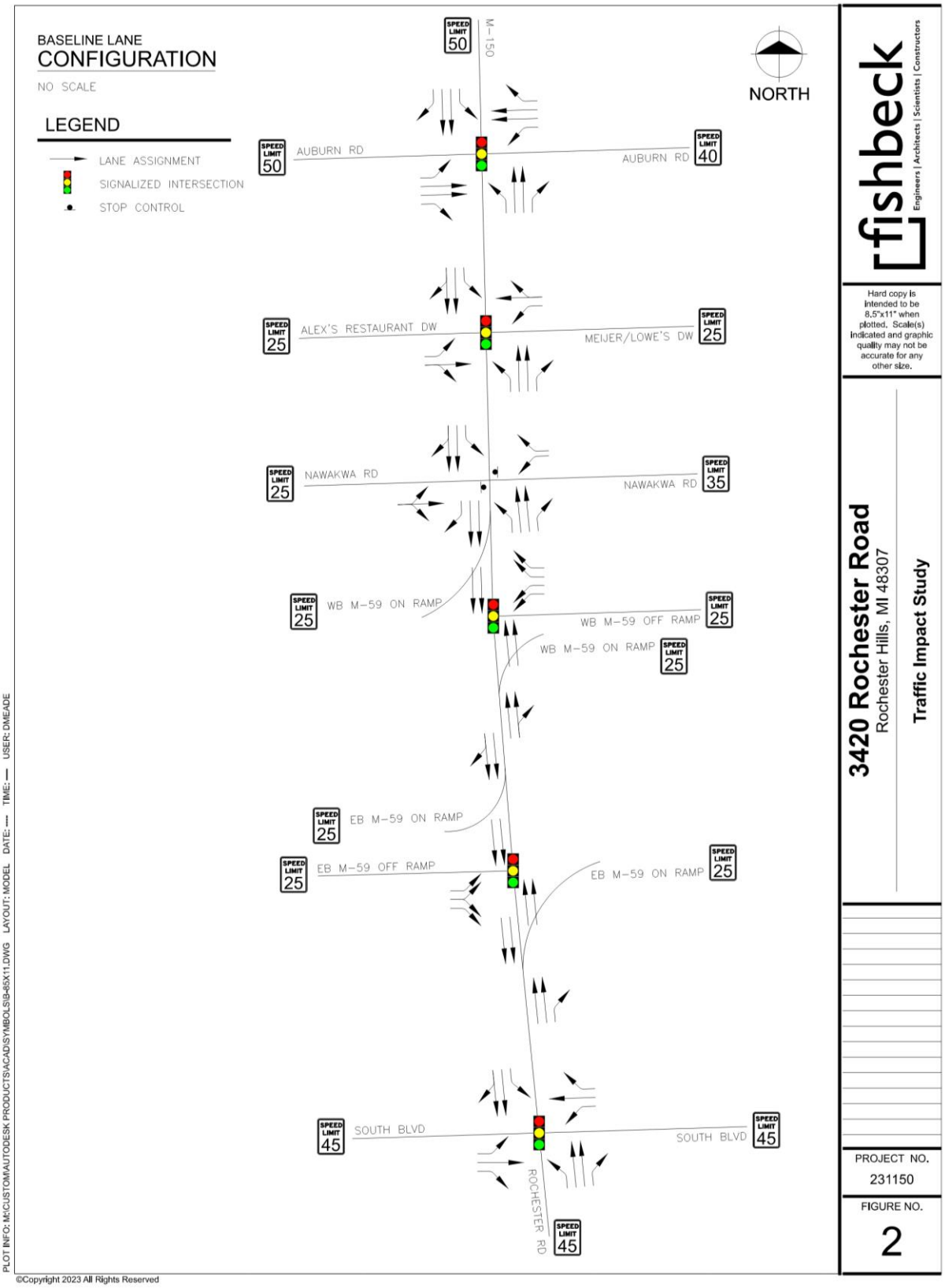
1.3 Intersection Characteristics

Based on the type and size of the proposed development and the likely area of influence for the site trips, traffic operations were analyzed for the following intersections:

- M-150 and Auburn Road (signalized).
- M-150 and Meijer/Lowe's/Alex's Restaurant Driveways (signalized).
- M-150 and Nawakwa Road (Nawakwa Road stop-controlled).
- M-150 and westbound (WB) M-59 off-ramp (signalized).
- M-150 and eastbound (EB) M-59 off-ramp (signalized).
- Rochester Road and South Boulevard (signalized).
- M-150 and Site Driveway (proposed Site Driveway stop-controlled approximately 110 feet south of Nawakwa Road).
- Nawakwa Road and Site Driveway (existing Site Driveway stop-controlled approximately 60 feet west of M-150).

The existing intersection lane configurations, traffic controls, and posted speed limits are displayed in Figure 2.

Figure 2 – Existing Lane Configurations



1.4 Roadway Characteristics

The characteristics of the study area roadways and signalized intersections are described in Tables 1 and 2. The data points referenced were from the Southeast Michigan Council of Governments Traffic Volume and Road Jurisdiction online maps.

Table1 – Roadway Characteristics

Roadway	Jurisdiction	Speed Limit (mph)	No. of Lanes	Roadway Classification	Direction	AADT (vpd)
M-150	MDOT, north of M-59; RCOC, M-59 to South Blvd; City of Troy, south of South Blvd	50, north of South Boulevard 45, south of South Blvd	5, two in each direction with TWLTL	Other Principal Arterial	2-way, north of Auburn Road	39,300 (2021)
					2-way, Auburn to M-59	39,800 (2021)
					2-way, M-59 to South Blvd	38,400 (2020)
					2-way, south of South Blvd	32,000 (2016)
M-59	MDOT	70	6, 3 in each direction	Other Freeway	WB, west of M-150	39,100 (2010)
					WB, east of M-150	38,800 (2010)
					EB, west of M-150	49,700 (2018)
					EB, east of M-150	52,400 (2018)
Auburn Road	MDOT, west of M-150; City, east of M-150	50, west of M-150; 40, east of M-150	2, one in each direction, west of M-150; 5, two in each direction with TWLTL, east of M-150	Minor Arterial	2-way, west of M-150	13,500 (2021)
					2-way, east of M-150	13,000 (2020)
South Boulevard	RCOC	45	2, one in each direction	Minor Arterial	2-way, west of M-150	11,500 (2016)
					2-way, east of M-150	9,700 (2023)
Nawakwa Road	City	25, west of M-150; 35, east of M-150	2, one in each direction	Local	-	-

AADT Average Annual Daily Traffic
mph miles per hour
vpd vehicles per day
TWLTL two-way left-turn lane

Table 2 – Signal Characteristics

Intersection	Jurisdiction	Left Turn Phasing			
		NB	SB	EB	WB
M-150 and Auburn Road	MDOT	Protected	Protected	Protected	Protected
M-150 and Meijer/Lowe's/Alex's Restaurant Driveway	MDOT	Permitted	Permitted	Permitted	Permitted
M-150 and M-59 WB off ramp	MDOT	N/A	N/A	N/A	Permitted
M-150 and M-59 EB off ramp	MDOT	N/A	N/A	Permitted	N/A
Rochester Road and South Boulevard	RCOC	Protected	Protected	Protected	Protected

NB northbound
SB southbound

1.5 Existing Traffic Volumes

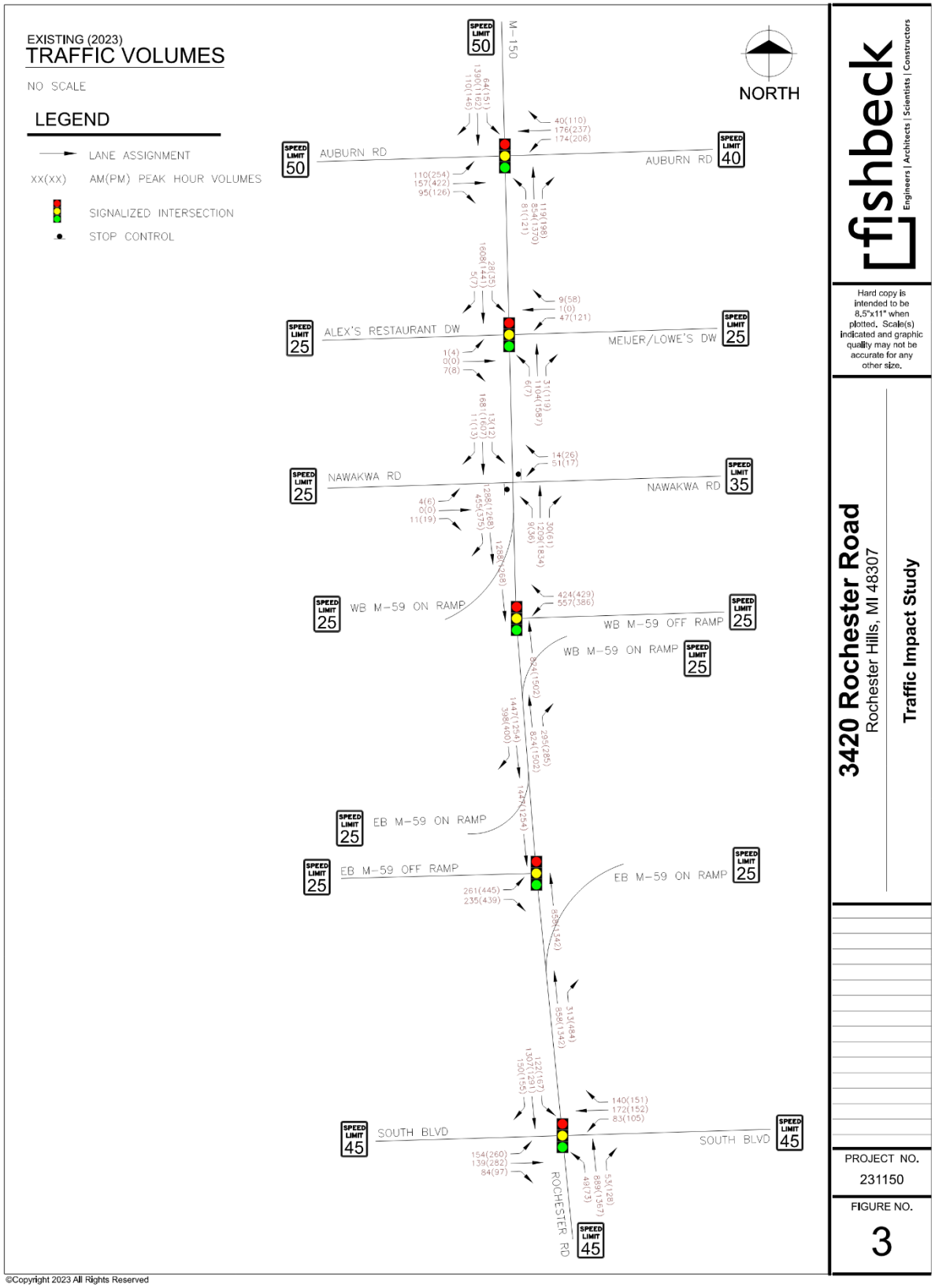
Vehicular TMCs were collected at the following study intersections during the weekday morning (7 a.m. to 9 a.m.) and afternoon (4 p.m. to 6 p.m.) peak periods of the road network on Wednesday, June 21, 2023:

- M-150 and Auburn Road
- M-150 and Meijer/Lowe's/Alex's Restaurant Driveways
- M-150 and Nawakwa Road
- M-150 and WB M-59 off-ramp
- M-150 and EB M-59 off-ramp
- Rochester Road and South Boulevard

Historical traffic data from the MDOT Transportation Data Management System website was reviewed to determine if the 2023 TMCs needed adjusting. Based on this review, there was no compelling evidence to apply an adjustment factor to the collected TMCs.

Traffic volume information can be found in Appendix 1, which includes heavy vehicle data. The existing traffic volumes used in this study are provided in Figure 3.

Figure 3 – Existing Traffic Volumes



2.0 Existing (2023) Conditions Analysis

2.1 Traffic Operations Analysis Methodology

Synchro was used to perform HCM operational analyses during the a.m. and p.m. peak hours for all intersections within this study. According to the most recent edition of the HCM, Level of Service (LOS) is a qualitative measure describing operational conditions of a traffic stream or intersection. LOS ranges from A to F, with LOS A representing desirable traffic operations characterized by low delay and LOS F representing extremely poor traffic operations characterized by excessive delays and long vehicle queues. LOS D is considered acceptable for most areas. Table 3 presents the HCM criteria for various LOSs for unsignalized and signalized intersections. The color coding in the table is used in the LOS analysis summary tables later in this report.

Table 3 – LOS Criteria

LOS	Average Stopped Vehicle Delay (seconds)	
	Unsignalized	Signalized
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

2.2 Existing (2023) Conditions Traffic Analysis

Synchro models for the existing network were created based on the existing traffic volumes, roadway configurations and traffic controls. Where applicable, data concerning the existing intersection and roadway lane configurations, geometry, and traffic control that were observed in the field were entered in the models. The traffic signal timing permits for the signalized intersections were provided by MDOT and RCOC for use in the models.

Traffic signal timings provided by MDOT and RCOC were entered in the peak hour scenarios. The five signalized intersections are a part of RCOC's Sydney Coordinated Adaptive Traffic System (SCATS). SCATS collects traffic flow information and adapts traffic signal phasing to optimize traffic flow. For the a.m. and p.m. peak hour analysis, the traffic signal timing presented in the models were optimized to reflect the adaptive nature of SCATS.

The resulting LOS and delay for the existing conditions are provided in Table 4.

Table 4 – LOS Analysis for Existing (2023) Conditions

Approach	Lane Group	LOS/Delay(s)			
		a.m. Peak Hour		p.m. Peak Hour	
M-150 and Auburn Road (Signalized)					
EB Auburn Road	Left	F	95.0	F	127.4
	Through	D	51.0	E	62.0
	Right	D	54.2	E	58.4
	Overall	E	65.2	F	82.2
WB Auburn Road	Left	F	112.8	F	92.2
	Through	D	46.9	D	54.4
	Right	D	45.7	E	57.6
	Overall	E	76.2	E	69.2
NB M-150	Left	F	84.6	F	88.8
	Through	C	26.6	C	25.1
	Right	C	21.0	A	8.3
	Overall	C	30.4	C	27.7
SB M-150	Left	E	79.6	F	140.8
	Through	D	37.8	D	40.9
	Right	C	21.8	C	26.6
	Overall	D	38.3	D	49.8
Overall		D	43.3	D	49.6
M-150 and Meijer/Lowe's/Alex's Restaurant Driveways (Signalized)					
EB Alex's Restaurant Driveway	Left	E	61.7	E	58.8
	Through/Right	E	61.3	E	54.4
	Overall	E	61.3	E	55.8
WB Meijer's/Lowe's Driveway	Left	E	67.0	E	64.0
	Through/Right	E	61.6	E	57.1
	Overall	E	66.0	E	61.8
NB M-150	Left	A	0.2	A	0.1
	Through	A	0.4	A	0.8
	Right	A	0.0	A	0.1
	Overall	A	0.4	A	0.7
SB M-150	Left	A	0.3	A	1.2
	Through	A	1.3	A	1.2
	Through/Right	A	1.2	A	1.2
	Overall	A	1.7	A	1.2
Overall		A	2.8	A	4.7

Table 4 – LOS Analysis for Existing (2023) Conditions

Approach	Lane Group	LOS/Delay(s)			
		a.m. Peak Hour		p.m. Peak Hour	
M-150 and Nawakwa Road (Stop-Controlled)					
EB Nawakwa Road	Left/Through/Right/Overall	F	99.0	F	792
WB Nawakwa Road	Left	F	244.8	F	5089.7
	Right	B	11.2	C	17.1
	Overall	F	194.5	F	2022.5
NB M-150	Left	B	11.2	B	11.1
	Overall	A	0.1	A	0.2
SB M-150	Left	A	9.4	B	12.4
	Overall	A	0.1	A	0.1
Overall		A	5.3	E	36.7
M-150 and M-59 WB Off Ramp (Signalized)					
EB M-59 Off Ramp	Left	E	57.5	D	53.3
	Right	E	56.1	E	59.7
	Overall	E	56.9	E	56.6
NB M-150	Through/Overall	A	8.2	A	9.8
SB M-150	Through/Overall	C	20.6	A	0.6
Overall		C	29.0	B	17.3
M-150 and M-59 EB Off Ramp (Signalized)					
WB M-59 Off Ramp	Left/Right	E	59.9	E	57.0
	Right	E	70.5	F	82.9
	Overall	E	63.5	E	65.7
NB M-150	Through/Overall	A	0.4	A	1.2
SB M-150	Through/Overall	A	7.6	B	13.7
Overall		B	15.0	C	22.6
Rochester Road and South Boulevard (Signalized)					
EB South Boulevard	Left	F	86.4	F	92.2
	Through	D	54.4	E	59.0
	Right	D	52.6	D	47.6
	Overall	E	67.1	E	70.8
WB South Boulevard	Left	F	82.9	F	88.3
	Through	E	73.5	E	65.6
	Right	E	71.8	E	79.9
	Overall	E	74.9	E	76.7
NB Rochester Road	Left	F	89.0	E	77.6
	Through	C	23.0	D	43.3
	Right	B	17.3	C	24.4
	Overall	C	26.0	D	43.3
SB Rochester Road	Left	E	74.9	F	119.8
	Through	A	4.6	B	12.0
	Through/Right	A	4.8	B	13.0
	Overall	B	10.1	C	23.6
Overall		C	29.5	D	43.2

Further analysis of the LOS results for existing conditions revealed several movements, approaches, and intersections are expected to operate at an acceptable LOS D or better during both the a.m. and p.m. peak hours, with the following exceptions:

- M-150 and Auburn Road:
  - The EB approach operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
    - The EB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The EB through and right turn movements operate at LOS E in the p.m. peak hour.
  - The WB approach operated at LOS E in the a.m. and p.m. peak hours.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E in the p.m. peak hour.
  - The NB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
  - The SB left turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
- M-150 and Meijer/Lowe's/Alex's Restaurant Driveways:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The EB through/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
  - The WB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The WB left turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The WB through/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
- M-150 and Nawakwa Road:
  - The intersection overall operates at LOS E in the p.m. peak hour.
  - The EB approach/left/through/right movements operate at LOS F in the a.m. and p.m. peak hours.
  - The WB approach operates at LOS F in the a.m. and p.m. peak hours.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
- M-150 and M-59 WB Off Ramp:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS E in the a.m. peak hour.
    - The EB right turn movement operates at LOS E in the a.m. and p.m. peak hours.
- M-150 and M-59 EB Off Ramp:
  - The WB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The WB left/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
- Rochester Road and South Boulevard:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The EB through movement operates at LOS E in the p.m. peak hour.
  - The WB approach operated at LOS E in the p.m. peak hour.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The WB through and right turn movements operate at LOS E in the a.m. and p.m. peak hours.
  - The NB left turn movement operates at LOS F and E in the a.m. and p.m. peak hours, respectively.
  - The SB left turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.

SimTraffic simulations were also reviewed to observe network operations and vehicle queues. For existing conditions, study network operations are acceptable, with no significant vehicle queues. The 95th percentile queue lengths were reviewed to determine if turning movements exceed the provided storage length. At the intersection of M-150 and Auburn Road, the NB and EB right turn lanes during the p.m. peak hour and SB right turn lane during the a.m. and p.m. peak hours exceed the provided storage length. At Rochester Road and South

Boulevard, the WB left turn lane during the a.m. and p.m. peak hours and NB right turn lane during the p.m. peak hour exceeds the provided storage length. Where queueing was present in the SimTraffic simulations, vehicles were most likely to clear the queue at the intersection in one traffic signal cycle.

At the intersection of M-150 and Nawakwa Road, poor LOS/delay and queueing is exhibited during the a.m. and p.m. peak hours on the EB and WB approaches. The SimTraffic 95th percentile queue lengths for the EB approach are approximately 35 feet (1 vehicle) and 245 feet (10 vehicles) for the a.m. and p.m. peak hour, respectively. For the WB approach, the left turn queue lengths are approximately 320 feet (13 vehicles) and 390 feet (16 vehicles). In review of the traffic count videos, the queueing is not present on either approach. The traffic count videos present left turning vehicles on the Nawakwa Road approaches turn into the TWLTL then merge into the NB or SB M-150 traffic stream. SimTraffic simulations cannot replicate this occurrence. There are alternative ingress/egress for Nawakwa Road. Nawakwa Road traffic has access to Auburn Road to both the east and west of M-150, and John R Road to the east. No mitigations are recommended for this intersection due to traffic signal warrants not being met, and vehicles, if they experience long delays/queues, will find alternative routes to avoid delays/queueing.

The M-150 corridor within the project limits utilizes traffic signal cycle lengths of 140 seconds with most of the green time provided to M-150. The minor street approaches experience delays resulting in a LOS E or worse as noted above due to the limited green time provided for them. No mitigation for these minor street approaches/movements are recommended as it would add delay to the M-150 corridor.

See Appendix 2 for the existing conditions LOS reports and queueing analysis reports.

3.0 Background (2024) (No Build) Conditions Analysis

United States Census Bureau data was referenced to determine the applicable growth rate for the existing traffic volumes to the project build-out year in 2024. Based on this review, a background growth rate of 0.5% was utilized.

In addition, two background developments were identified and included in the background traffic conditions. The two background developments are The Gateway of Rochester Hills, which is located on the west side of Rochester Road between South Boulevard and M-59 and Bebb Oak, which is located on the west side of M-150 between Auburn Road and Wabash Road. Using the information and methodologies specified in the ITE *Trip Generation Manual*, Fishbeck forecast the weekday a.m. and p.m. peak hour trips associated with the background developments since the trip generation in the TISs used trip generation from previous ITE *Trip Generation Manuals*. The results of the trip generation forecasts for the background developments are provided in Table 5.

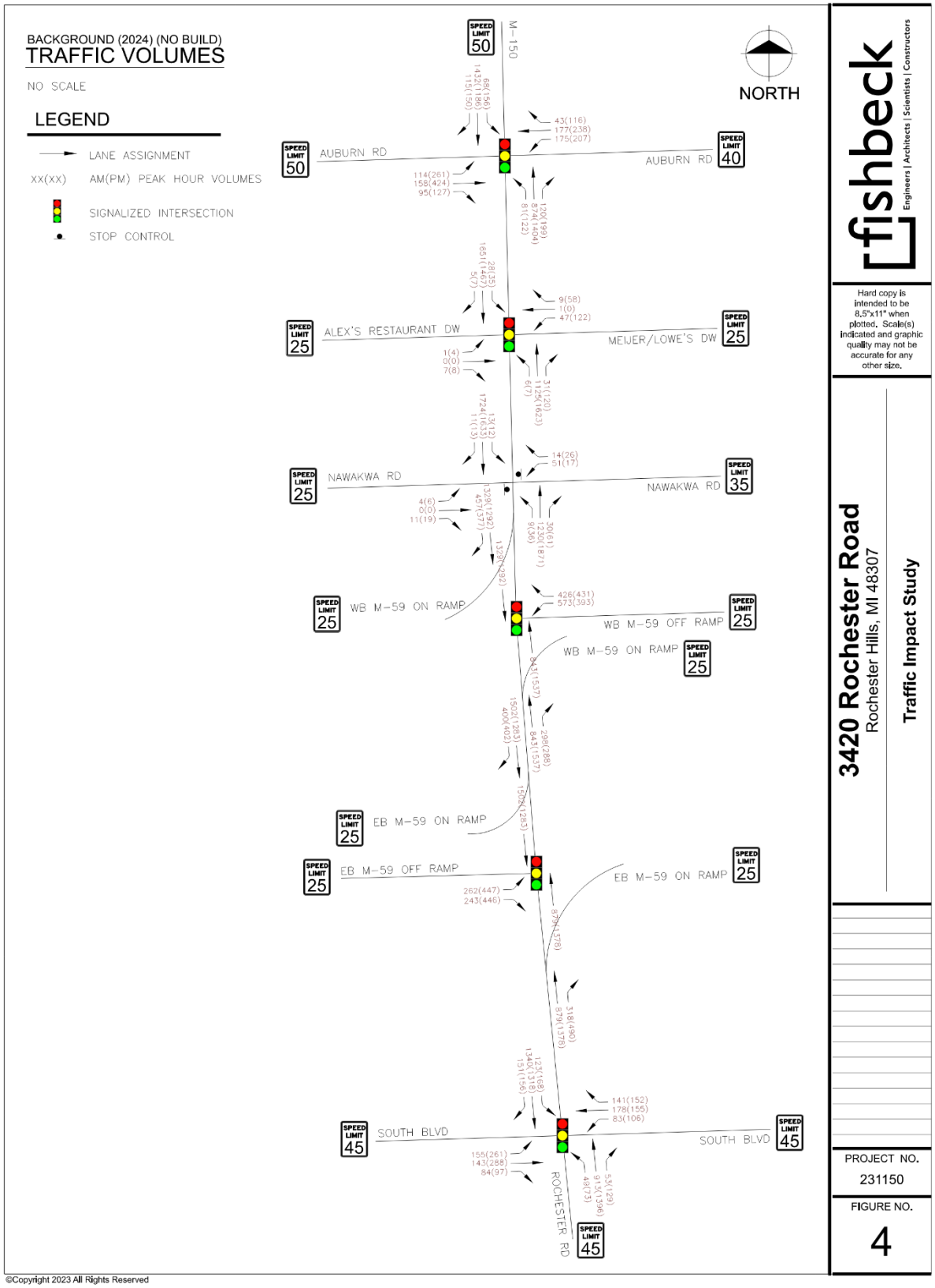
Table 5 – Trip Generation for Background Developments

Development	ITE Land Use	LUC	Units	a.m. Peak Hour			p.m. Peak Hour			Weekday
				In	Out	Total	In	Out	Total	
Gateway of Rochester Hills	Strip Retail Plaza (<40K)	822	11,037 SFT	16	10	26	42	42	84	696
	High-Turnover (Sit-Down) Restaurant	932	6,047 SFT	32	26	58	33	21	54	648
	General Office Building	710	11,856 SFT	24	3	27	5	23	28	182
	Total Trips			72	39	111	80	86	166	1,526
	Internal Capture Reductions: 14% a.m. (11% In, 21% Out), 30% p.m. (31% In, 29% Out)			8	8	16	25	25	50	-
	Pass-by LUC 822 (40% PM)			0	0	0	12	12	24	-
	Pass-by LUC 932 (43% PM)			0	0	0	9	9	18	-
	Total Pass-by Trips			0	0	0	21	21	42	-
	Total New Trips			64	31	95	34	40	74	1,526
Bebb Oak	Multifamily Housing (Mid-Rise)	221	94 DU	7	23	30	23	14	37	402
	Strip Retail Plaza (<40K)	822	10,245 SFT	14	10	24	40	39	79	662
	Fast Casual Restaurant	930	3503 SFT	3	2	5	24	19	43	340
	Total Trips			24	35	59	87	72	159	1,404
	Internal Capture Reductions: 7% a.m. (8% In,6% Out), 44% p.m. (40% In, 49% Out)			2	2	4	35	35	70	-
	Pass-by LUC 822 (40% PM)			0	0	0	11	9	20	-
	Total Pass-by Trips			0	0	0	11	9	20	-
	Total New Trips			22	33	55	41	28	69	1,404

LUC Land Use Code
DU Dwelling Units

For the trip distribution for The Gateway of Rochester Hills development, the trips were distributed based on existing traffic patterns described in Appendix 4. For the trip distribution for Bebb Oak, the percentage to/from was utilized from the development's respective TIS report. Refer to Appendix 3 for additional details related to trip generation including the trip generation and distribution extracted from the background development TIS report. The total background traffic volumes are presented in Figure 4.

Figure 4 – Background Traffic Volumes



3.1 Background (2024) (No Build) Conditions Traffic Analysis

The resulting LOS and delay for the background conditions are provided in Table 6.

Table 6 – LOS Analysis for Background (2024) Conditions

Approach	Lane Group	LOS/Delay(s)			
		a.m. Peak Hour		p.m. Peak Hour	
M-150 and Auburn Road (Signalized)					
EB Auburn Road	Left	F	100.4	F	136.6
	Through	D	51.0	E	58.4
	Right	D	54.2	E	55.8
	Overall	E	67.2	F	83.2
WB Auburn Road	Left	F	114.1	F	123.5
	Through	D	47.0	D	54.5
	Right	D	45.8	E	58.3
	Overall	E	76.6	F	80.8
NB M-150	Left	F	83.6	F	95.9
	Through	B	18.4	C	25.2
	Right	B	14.6	A	7.5
	Overall	C	22.9	C	28.2
SB M-150	Left	E	78.8	F	182.9
	Through	D	39.3	D	41.7
	Right	C	21.9	C	26.6
	Overall	D	39.7	D	54.9
Overall		D	41.7	D	53.1
M-150 and Meijer/Lowe's/Alex's Restaurant Driveways (Signalized)					
EB Alex's Restaurant Driveway	Left	E	61.7	E	58.7
	Through/Right	E	61.3	E	54.3
	Overall	E	61.3	E	55.7
WB Meijers/Lowe's Driveway	Left	E	67.0	E	64.0
	Through/Right	E	61.6	E	57.0
	Overall	E	66.0	E	61.7
NB M-150	Left	A	0.2	A	0.1
	Through	A	0.4	A	0.8
	Right	A	0.0	A	0.1
	Overall	A	0.4	A	0.8
SB M-150	Left	A	0.3	A	1.3
	Through	A	1.3	A	1.3
	Through/Right	A	1.3	A	1.2
	Overall	A	1.3	A	1.3
Overall		A	2.8	A	4.7

Table 6 – LOS Analysis for Background (2024) Conditions

Approach	Lane Group	LOS/Delay(s)			
		a.m. Peak Hour		p.m. Peak Hour	
M-150 and Nawakwa Road (Stop-Controlled)					
EB Nawakwa Road	Left/Through/Right/Overall	F	125.6	F	1071.5
WB Nawakwa Road	Left	F	299.7	F	7811.2
	Right	B	11.5	C	18.1
	Overall	F	237.6	F	3099.1
NB M-150	Left	B	11.6	B	11.1
	Overall	A	0.1	A	0.2
SB M-150	Left	A	9.3	B	13.0
	Overall	A	0.1	A	0.1
Overall		A	6.4	F	53.8
M-150 and M-59 WB Off Ramp (Signalized)					
EB M-59 Off Ramp	Left	E	57.5	D	53.2
	Right	E	55.2	E	59.7
	Overall	E	56.5	E	56.6
NB M-150	Through/Overall	A	8.6	B	10.1
SB M-150	Through/Overall	C	21.4	A	0.6
Overall		C	29.2	B	17.3
M-150 and M-59 EB Off Ramp (Signalized)					
WB M-59 Off Ramp	Left/Right	E	59.7	E	53.9
	Right	E	70.9	E	73.5
	Overall	E	63.5	E	60.5
NB M-150	Through/Overall	A	0.4	A	1.4
SB M-150	Through/Overall	A	8.0	B	14.8
Overall		B	15.1	C	21.5
Rochester Road and South Boulevard (Signalized)					
EB South Boulevard	Left	F	86.5	F	105.8
	Through	D	54.0	E	62.8
	Right	D	52.0	D	48.5
	Overall	E	66.8	E	78.0
WB South Boulevard	Left	F	82.9	F	88.5
	Through	E	74.4	E	66.1
	Right	E	70.2	F	80.0
	Overall	E	74.7	E	77.0
NB Rochester Road	Left	F	89.0	E	77.6
	Through	C	23.7	D	43.1
	Right	B	17.6	C	23.8
	Overall	C	26.6	D	43.1
SB Rochester Road	Left	E	75.1	F	121.5
	Through	A	5.2	B	11.6
	Through/Right	A	5.4	B	12.7
	Overall	B	10.6	C	23.4
Overall		C	29.7	D	44.1

Further analysis of the LOS results for background conditions revealed several movements, approaches, and intersections are expected to continue to operate at an acceptable LOS D or better during both the a.m. and p.m. peak hours, with the following exceptions:

- M-150 and Auburn Road:
  - The EB approach operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
    - The EB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The EB through and right turn movements operate at LOS E in the p.m. peak hour.
  - The WB approach operated at LOS E and F in the a.m. and p.m. peak hours, respectively.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E in the p.m. peak hour.
  - The NB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
  - The SB left turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
- M-150 and Meijer/Lowe's/Alex's Restaurant Driveways:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The EB through/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
  - The WB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The WB left turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The WB through/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
- M-150 and Nawakwa Road:
  - The intersection overall operates at LOS F in the p.m. peak hour.
  - The EB approach/left/through/right movements operate at LOS F in the a.m. and p.m. peak hours.
  - The WB approach operates at LOS F in the a.m. and p.m. peak hours.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
- M-150 and M-59 WB Off Ramp:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS E in the a.m. peak hour.
    - The EB right turn movement operates at LOS E in the a.m. and p.m. peak hours.
- M-150 and M-59 EB Off Ramp:
  - The WB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The WB left/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E in the a.m. and p.m. peak hours.
- Rochester Road and South Boulevard:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The EB through movement operates at LOS E in the p.m. peak hour.
  - The WB approach operated at LOS E in the p.m. peak hour.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The WB through movement operates at LOS E in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
  - The NB left turn movement operates at LOS F and E in the a.m. and p.m. peak hours, respectively.
  - The SB left turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.

SimTraffic simulations were also reviewed to observe network operations and vehicle queues. For background conditions, study network operations are acceptable, with no significant vehicle queues, like existing conditions. The 95th percentile queue lengths were reviewed to determine if turning movements exceed the provided storage length. At the intersection of M-150 and Auburn Road, the NB and EB right turn lanes during the p.m.

peak hour and SB right turn lane during the a.m. and p.m. peak hours exceed the provided storage length. At Rochester Road and South Boulevard, the WB left turn lane during the a.m. and p.m. peak hours and NB right turn lane during the p.m. peak hour exceeds the provided storage length. This is consistent with the existing conditions. Where queueing was present in the SimTraffic simulations, vehicles were most likely to clear the queue at the intersection in one traffic signal cycle.

The intersection of M-150 and Nawakwa Road continues presents poor LOS/delay and long queueing for the EB and WB approaches. As stated in existing conditions, left turning vehicles on the Nawakwa Road approaches turn into the TWLTL then merge into the NB or SB M-150 traffic stream. SimTraffic simulations cannot replicate this occurrence. There are alternative ingress/egress for Nawakwa Road. Nawakwa Road traffic has access to Auburn Road to both the east and west of M-150, and John R Road to the east. No mitigations are recommended for this intersection due to traffic signal warrants would not be met and vehicles, if they experience long delays/queues, will find alternative routes to avoid delays/queueing.

As mentioned during existing conditions, the M-150 corridor within the project limits utilizes traffic signal cycle lengths of 140 seconds with most of the green time provided to M-150. The minor street approaches experience delays resulting in a LOS E or worse as noted above due to the limited green time provided for them. No mitigation for these minor street approaches/movements are recommended as it would add delay to the M-150 corridor.

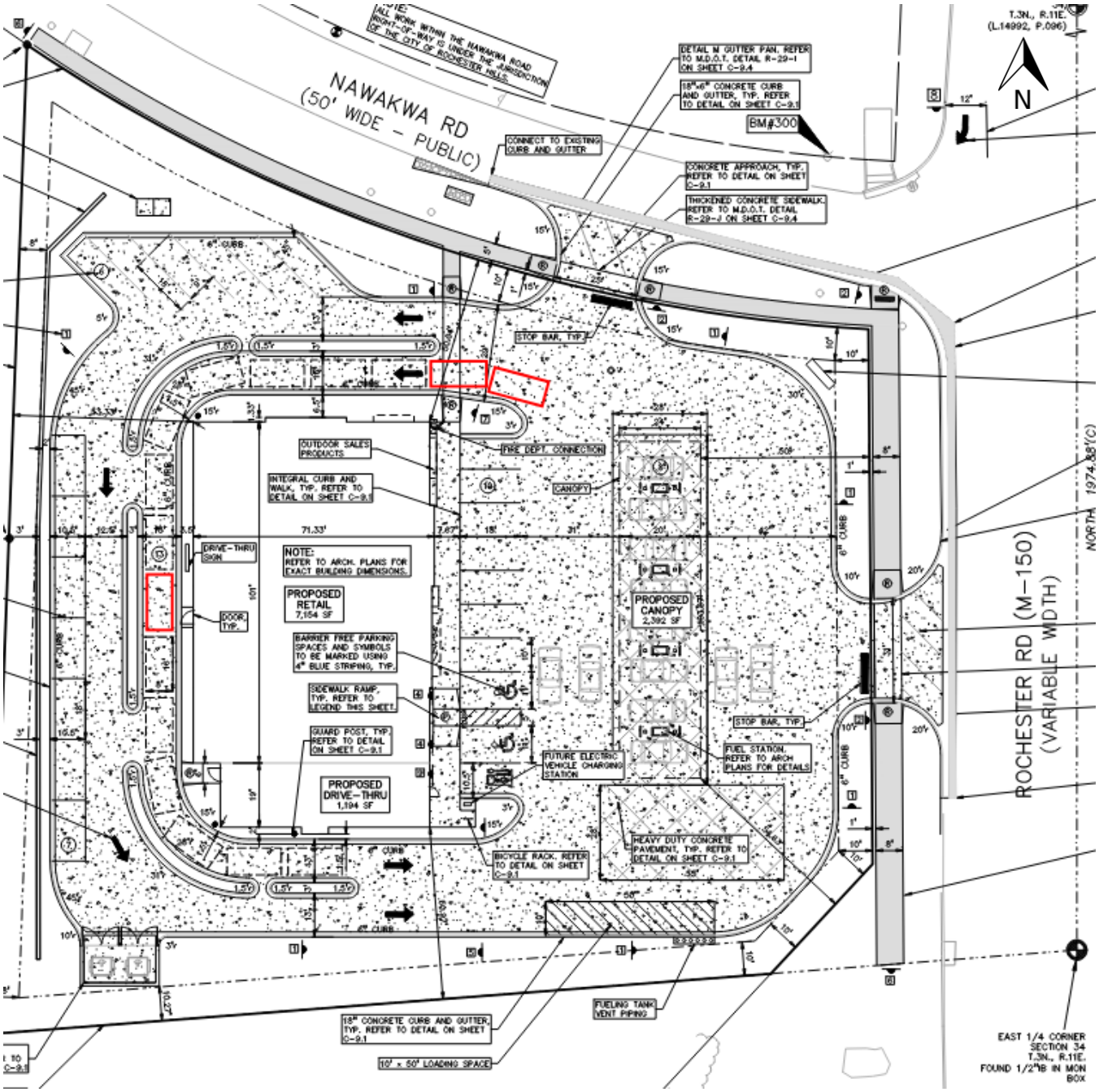
It should be noted there are multiple approaches/movements where delay decreased from existing to background conditions by one or two seconds. This can be attributed to the delay being calculated as an average vehicle delay. When more vehicles are added to an approach, the delay could decrease as more vehicles experience less delay.

See Appendix 4 for the background conditions LOS reports and queueing analysis reports.

4.0 Site Traffic Characteristics

A representation of the current conceptual site plan is provided in Figure 5.

Figure 5 – Conceptual Site Plan



4.1 Trip Generation

Using the information and methodologies specified in the *Trip Generation Manual*, Fishbeck forecast the weekday a.m. and p.m. peak hour trips associated with the proposed development.

A portion of the site-generated trips are anticipated to be "pass-by" in nature, meaning they already exist on the adjacent road network and are interrupted to visit the site. According to ITE methodology, new trips are assumed to return to their direction of origin whereas pass-by trips continue in their original direction of travel. The *Trip*

Generation Manual was used to calculate what percentage of the trips would be pass-by trips, meaning they are vehicles already on the network that would access the development and are not additional trips added to the network. Pass-by rates for LUC 934: Fast-Food Restaurant with Drive-Through Window is 50 percent and 55 percent for the a.m. and p.m. peak hours, respectively. Pass-by rates for LUC 945: Convenience Store/Gas Station is 60 percent and 56 percent for the a.m. and p.m. peak hours, respectively.

Table 7 presents the resulting trip generation for the development. Refer to Appendix 5 for additional information.

Table 7 – Trip Generation for Proposed Development

ITE Land Use	LUC	Units	a.m. Peak Hour			p.m. Peak Hour			Weekday
			In	Out	Total	In	Out	Total	
Fast-Food Restaurant with Drive-Through Window	934	1,243 SFT	27	28	55	21	20	41	581
Convenience Store/Gas Station (GFA 5.5-10k)	945	8 Fueling positions	126	127	253	108	107	215	2,766
Total Trips			154	154	308	129	127	256	3,347
Pass-By Rates, LUC 934: 50% a.m., 55% p.m.			14	14	28	12	11	23	-
Pass-By Rates, LUC 945: 60% a.m.; 56% p.m.			76	76	152	60	60	120	-
Total Pass-by Trips			*90*	*90*	*180*	*72*	*71*	*143*	-
Total New Trips			64	64	128	57	56	113	3,347

The directions that site traffic will travel to and from were based upon existing traffic patterns during the a.m. and p.m. peak hours at the existing gas station with convenience store. The existing traffic patterns reflect the gravity between origins and destinations in the study area, and therefore an accurate indication of where the proposed trips would be coming from and going to. The traffic volumes for the gas station with convenience store are included in Appendix 5. Table 8 provides the probable distribution based on existing traffic patterns.

Table 8 – Trip Distribution

Direction	Via	New Trips				Pass-By Trips		
		a.m. Peak Hour		p.m. Peak Hour		Direction	a.m. Peak Hour	p.m. Peak Hour
		To	From	To	From			
North	M-150	15%	80%	5%	70%	NB	20%	10%
South	M-150	85%	20%	95%	30%	SB	80%	90%

Based on the traffic patterns at the existing gas station with convenience store, it was assumed most of the traffic would make right turns into/out of the proposed development. Due to the traffic on M-150, there are few gaps in traffic for vehicles turning left into or out of the development driveways. This is exhibited in the existing driveway traffic volumes counts. Trips to/from the development were distributed at intersections away from the development based on existing traffic volumes at the intersections. The calculations for the trip distribution are included in Appendix 8.

The trip distribution for the site is indicated in Figure 6. The pass-by volumes are indicated in Figure 7. These trips were added to the background volumes (Figure 4) to result in the future conditions volumes in Figure 8.

Figure 6 – Trip Generation Volumes

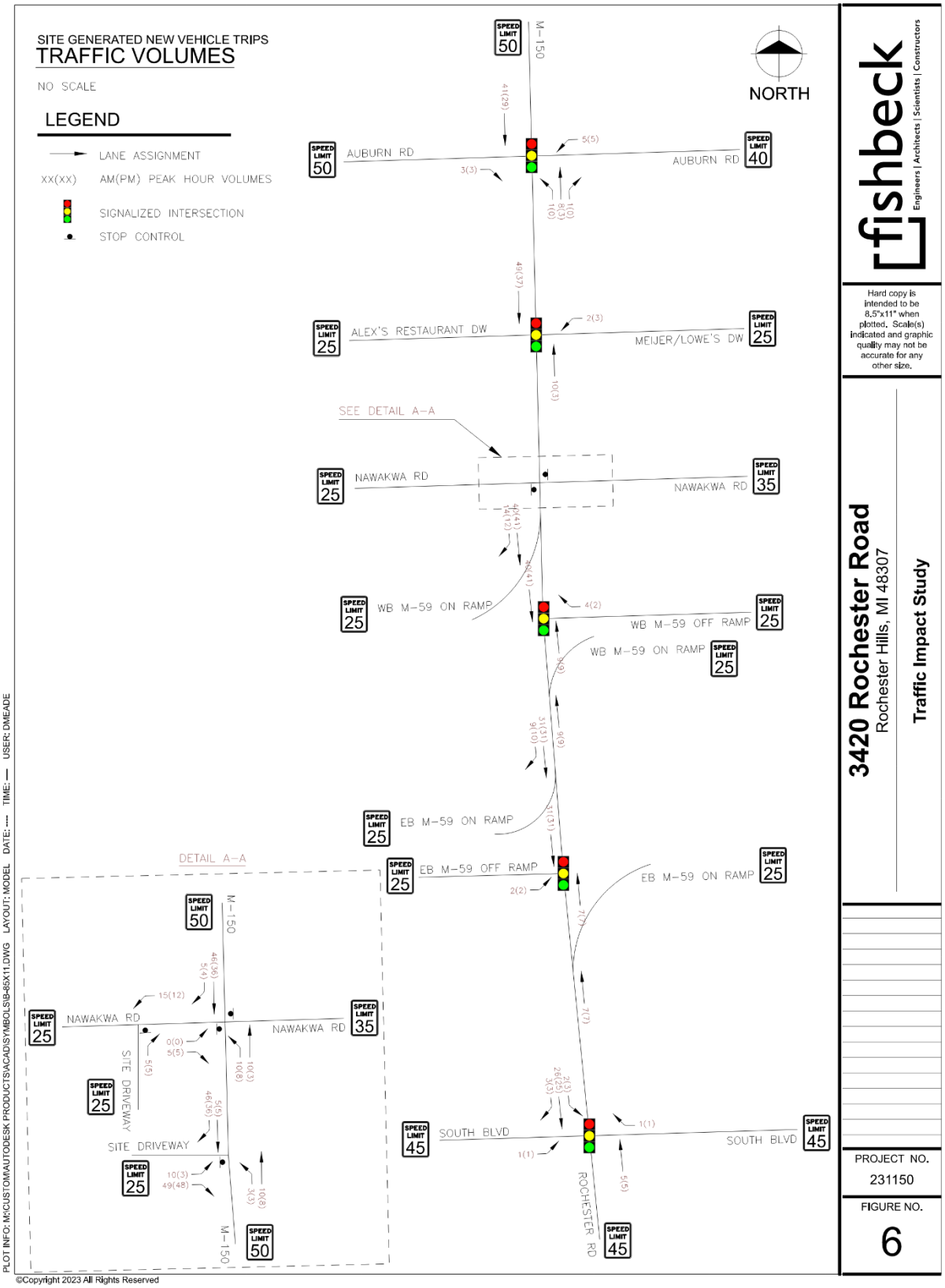


Figure 7 – Pass-By Volumes

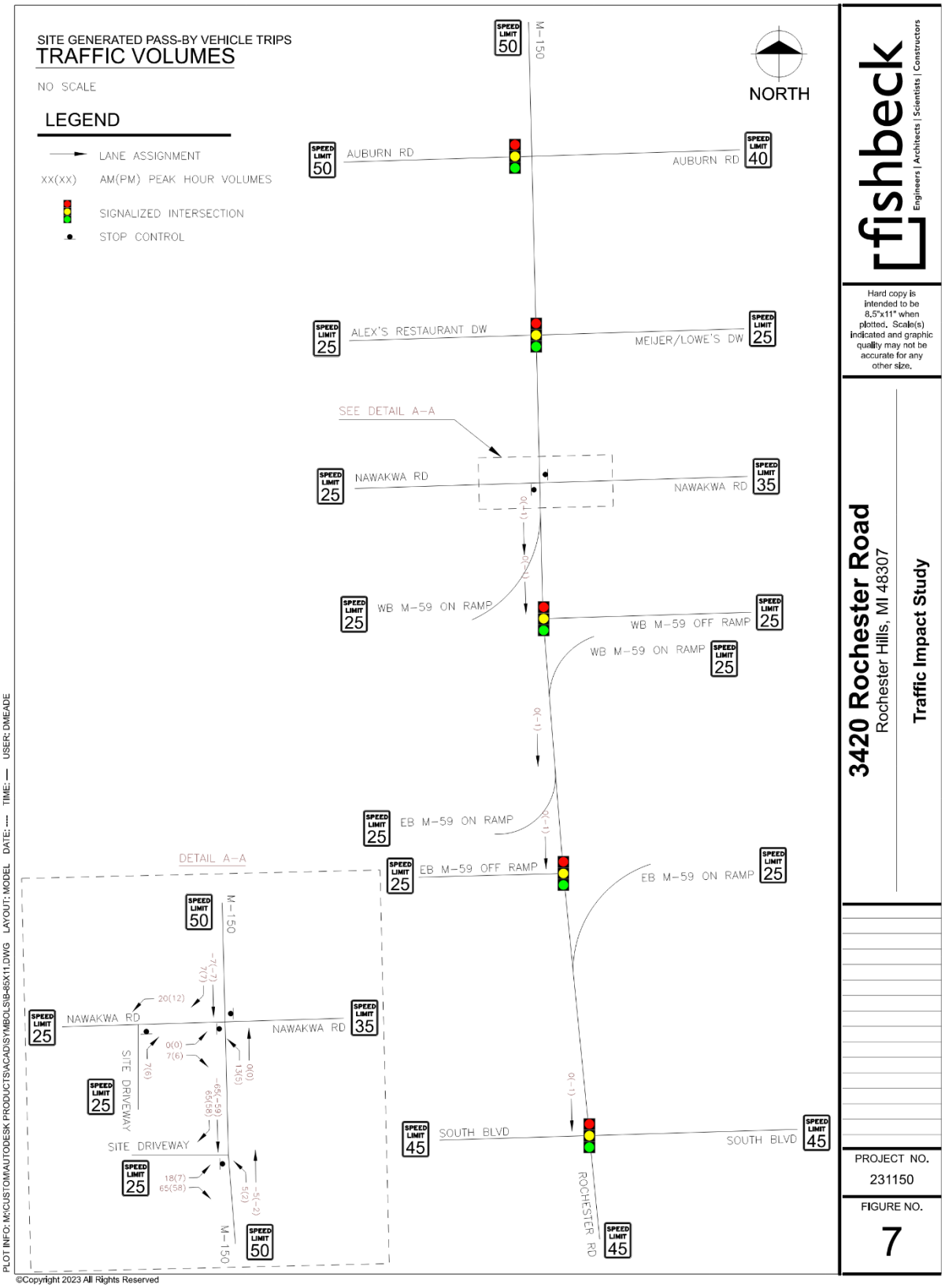
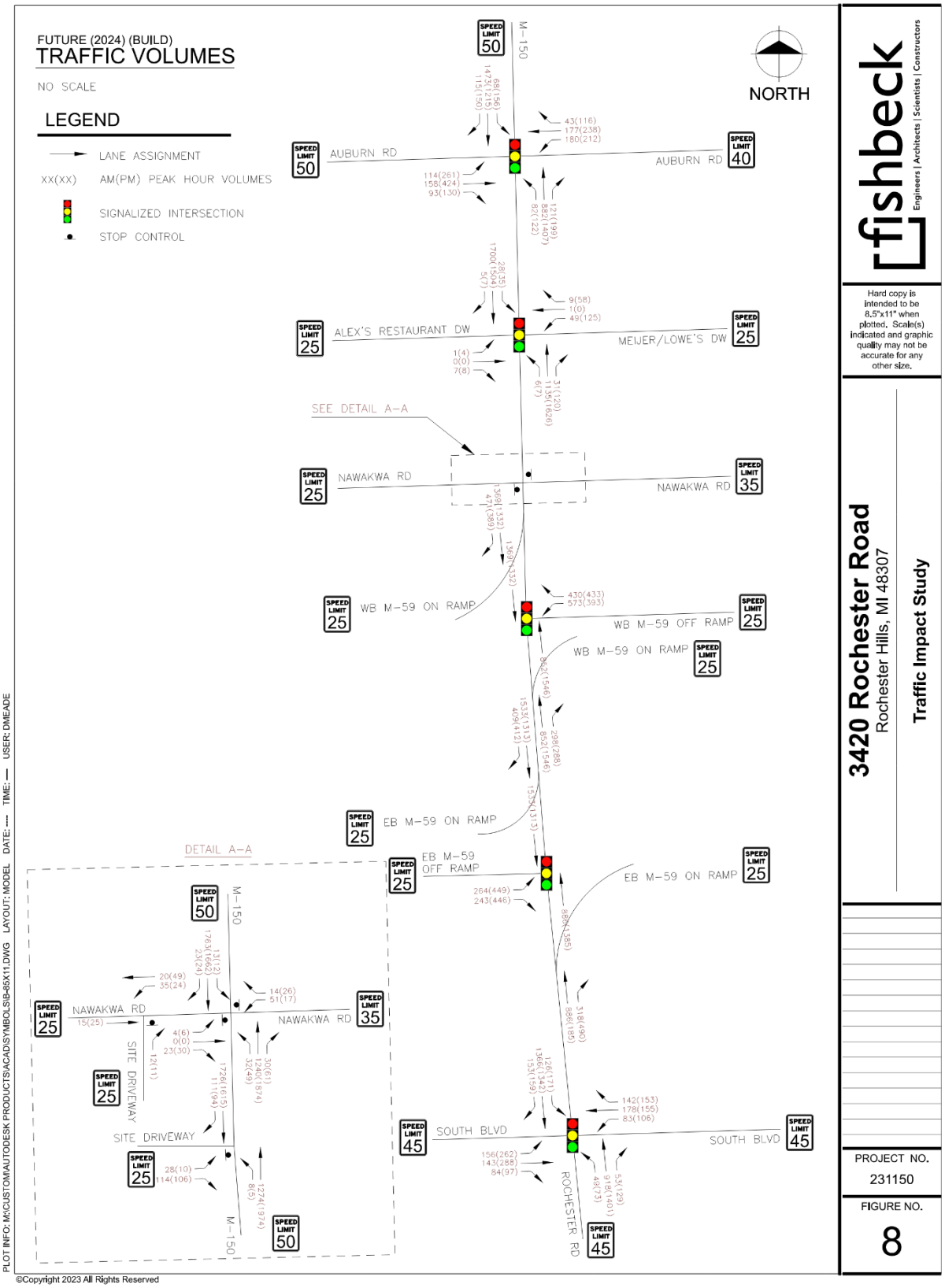


Figure 8 – Future Conditions Volumes



5.0 Future (2024) (Build) Conditions Analysis

5.1 Turn Lane Warrants

For the NB left turn lane on M-150, the existing lane configuration presents a TWLWL, therefore left turn lane warrants are not necessary. For the SB right turn lane on M-150, the existing lane configuration has a through lane drop for the WB M-59 on ramp. Right turn lane warrants for the driveway on M-150 were not reviewed.

5.2 Future (2024) (Build) Conditions Traffic Analysis

The intersection of M-150 and Site Driveway cannot be evaluated using HCM 6th Edition methods due to HCM 6th Edition not supporting more than three through lanes on the major street approach; therefore, HCM 2000 calculations were utilized for this intersection.

The resulting LOS and delay for the future conditions are presented in Table 9.

Table 9 – LOS Analysis for Future (2024) Conditions

Approach	Lane Group	LOS/Delay(s)			
		a.m. Peak Hour		p.m. Peak Hour	
M-150 and Auburn Road (Signalized)					
EB Auburn Road	Left	F	100.4	F	157.9
	Through	D	51.0	E	58.4
	Right	D	54.5	E	56.1
	Overall	E	67.1	F	89.9
WB Auburn Road	Left	F	121.3	F	152.3
	Through	D	47.0	D	54.5
	Right	D	45.8	E	58.3
	Overall	E	80.3	F	92.0
NB M-150	Left	F	83.9	F	95.9
	Through	B	18.4	C	21.8
	Right	B	14.6	A	6.8
	Overall	C	23.0	C	25.3
SB M-150	Left	E	78.8	F	182.9
	Through	D	41.4	D	41.4
	Right	C	22.0	C	25.9
	Overall	D	41.6	D	54.4
Overall		D	43.0	D	54.5

Table 9 – LOS Analysis for Future (2024) Conditions

Approach	Lane Group	LOS/Delay(s)			
		a.m. Peak Hour		p.m. Peak Hour	
M-150 and Meijer/Lowe's/Alex's Restaurant Driveways (Signalized)					
EB Alex's Restaurant Driveway	Left	E	61.7	E	58.4
	Through/Right	E	61.3	E	54.1
	Overall	E	61.3	E	55.4
WB Meijers/Lowe's Driveway	Left	E	67.3	E	63.9
	Through/Right	E	61.6	E	56.7
	Overall	E	66.3	E	61.6
NB M-150	Left	A	0.2	A	0.1
	Through	A	0.4	A	0.8
	Right	A	0.0	A	0.1
	Overall	A	0.4	A	0.8
SB M-150	Left	A	0.3	A	1.3
	Through	A	1.4	A	1.4
	Through/Right	A	1.3	A	1.3
	Overall	A	1.4	A	1.3
Overall		A	2.8	A	4.7
M-150 and Nawakwa Road (Stop-Controlled)					
EB Nawakwa Road	Left/Through/Right/Overall	F	243.2	F	2132.7
WB Nawakwa Road	Left	F	656.1	F	15980.2
	Right	B	11.5	C	18.1
	Overall	F	517.3	F	6328.7
NB M-150	Left	B	12.4	B	11.6
	Overall	A	0.3	A	0.3
SB M-150	Left	A	9.4	B	13.0
	Overall	A	0.1	A	0.1
Overall		C	14.3	F	115.7
M-150 and M-59 WB Off Ramp (Signalized)					
EB M-59 Off Ramp	Left	E	56.3	D	53.1
	Right	D	54.5	E	59.7
	Overall	E	55.5	E	56.6
NB M-150	Through/Overall	A	8.7	B	10.2
SB M-150	Through/Overall	C	22.0	A	0.7
Overall		C	29.1	B	17.2
M-150 and M-59 EB Off Ramp (Signalized)					
WB M-59 Off Ramp	Left/Right	E	59.7	E	53.9
	Right	E	71.0	E	73.6
	Overall	E	63.5	E	60.5
NB M-150	Through/Overall	A	0.5	A	1.4
SB M-150	Through/Overall	A	8.3	B	15.1
Overall		B	15.1	C	21.6

Table 9 – LOS Analysis for Future (2024) Conditions

Approach	Lane Group	LOS/Delay(s)			
		a.m. Peak Hour		p.m. Peak Hour	
Rochester Road and South Boulevard (Signalized)					
EB South Boulevard	Left	F	86.7	F	106.8
	Through	D	53.9	E	62.6
	Right	D	51.9	D	48.4
	Overall	E	66.8	E	78.4
WB South Boulevard	Left	F	82.9	F	88.5
	Through	E	74.4	E	65.9
	Right	E	70.7	F	80.2
	Overall	E	74.8	E	77.0
NB Rochester Road	Left	F	89.0	E	77.6
	Through	C	24.0	D	43.6
	Right	B	17.7	C	23.9
	Overall	C	26.8	D	43.5
SB Rochester Road	Left	E	75.7	F	125.7
	Through	A	5.6	B	13.0
	Through/Right	A	5.9	B	14.5
	Overall	B	11.1	C	25.2
Overall		C	29.9	D	44.9
M-150 and Site Driveway (Stop-Controlled)					
EB Site Driveway	Left	F	215.1	F	108.6
	Right	B	11.3	A	9.8
	Overall	F	51.0	C	18.4
NB M-150	Left/Through	A	1.2	A	0.4
	Overall	A	0.2	A	0.1
SB M-150	Through/Right/Overall	N/A		N/A	
Overall		A	2.2	A	0.6
Nawakwa Road and Site Driveway (Stop-Controlled)					
EB Nawakwa Road	Through/Right/Overall	N/A		N/A	
WB Nawakwa Road	Left	A	7.3	A	7.3
	Overall	A	4.7	A	2.4
NB Site Driveway	Left/Right/Overall	A	8.4	A	8.5
Overall		A	4.2	A	2.3

Further analysis of the LOS results for future conditions revealed several movements, approaches, and intersections are expected to continue to operate at an acceptable LOS D or better during both the a.m. and p.m. peak hours, with the following exceptions:

- M-150 and Auburn Road:
  - The EB approach operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
    - The EB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The EB through and right turn movements operate at LOS E in the p.m. peak hour.
  - The WB approach operated at LOS E and F in the a.m. and p.m. peak hours, respectively.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E in the p.m. peak hour.
  - The NB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
  - The SB left turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
- M-150 and Meijer/Lowe's/Alex's Restaurant Driveways:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The EB through/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
  - The WB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The WB left turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The WB through/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
- M-150 and Nawakwa Road:
  - The intersection overall operates at LOS F in the p.m. peak hours.
  - The EB approach/left/through/right movements operate at LOS F in the a.m. and p.m. peak hours.
  - The WB approach operates at LOS F in the a.m. and p.m. peak hours.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
- M-150 and M-59 WB Off Ramp:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS E in the a.m. peak hour.
    - The EB right turn movement operates at LOS E in the p.m. peak hour.
- M-150 and M-59 EB Off Ramp:
  - The WB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The WB left/right turn movement operates at LOS E in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E in the a.m. and p.m. peak hours.
- Rochester Road and South Boulevard:
  - The EB approach operates at LOS E in the a.m. and p.m. peak hours.
    - The EB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The EB through movement operates at LOS E in the p.m. peak hour.
  - The WB approach operated at LOS E in the p.m. peak hour.
    - The WB left turn movement operates at LOS F in the a.m. and p.m. peak hours.
    - The WB through turn movement operate at LOS E in the a.m. and p.m. peak hours.
    - The WB right turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
  - The NB left turn movement operates at LOS F and E in the a.m. and p.m. peak hours, respectively.
  - The SB left turn movement operates at LOS E and F in the a.m. and p.m. peak hours, respectively.
- M-150 and Site Driveway:
  - The EB approach operates at LOS F in the a.m. peak hour.
    - The EB left turn movement operates at LOS F in the a.m. and p.m. peak hours.

SimTraffic simulations were also reviewed to observe network operations and vehicle queues. For future conditions, study network operations are acceptable, with no significant vehicle queues. The 95th percentile queue lengths were reviewed to determine if turning movements exceed the provided storage length. At the intersection of M-150 and Auburn Road, the EB right turn lane during the p.m. peak hour and NB and SB right turn lanes during the a.m. and p.m. peak hours exceed the provided storage length. At Rochester Road and South

Boulevard, the WB left turn lane during the a.m. and p.m. peak hours and NB right turn lane during the p.m. peak hour exceeds the provided storage length. Where queueing was present in the SimTraffic simulations, vehicles were most likely to clear the queue at the intersection in one traffic signal cycle.

The traffic concerns during the future conditions are the same as existing and background conditions: the poor LOS/delay and queueing on Nawakwa Road approaches at M-150 and the poor LOS/delay on minor street approaches due to long traffic signal cycle length and most of the green time being provided to M-150. There are no recommended mitigations for these traffic concerns.

At the intersection of M-150 and Nawakwa Road, the LOS/delay and queueing increased exponentially from background (no build) conditions to future (build) condition for the overall intersection and EB/WB Nawakwa Road approaches. For the EB Nawakwa Road approach, there are 12 and 11 vehicles distributed from the proposed development to the EB approach, while no vehicles are distributed to the WB approach in the a.m. and p.m. peak hours, respectively. Due to the traffic on M-150, and the additional development trips added to the road network, vehicles on the Nawakwa Road approaches are experiencing more delay. The additional NB left turn and SB through movement vehicles at the Nawakwa Road intersection are a direct conflict with the EB left turn movement. No new trips were distributed to the Nawakwa Road EB left turn movement. Delay is calculated as an average for the vehicles on the approach at the intersection. Since vehicles are experiencing more delay due to the shortage of gaps in traffic, the average is increasing.

The 95th percentile queues at the site driveways were reviewed. For the site driveway on M-150, the EB right turn queues were less than 115 feet (5 vehicles) for right turn lane and 110 feet (4 vehicles) for the left turn lane. The LOS for left turn movement is reported as a LOS F for both the a.m. and p.m. peak hours. With the low numbers of vehicles queueing, there is no mitigations recommended. For the site driveway on Nawakwa Road, the queue length is approximately 40 feet (2 vehicles) and 160 feet (6 vehicles) in the a.m. and p.m. peak hours, respectively. As stated previously, there are queueing issues in the simulations at the M-150 and Nawakwa Road intersection. The site driveway on Nawakwa Road is near the intersection of M-150. Since Nawakwa Road is queueing at M-150 in the simulations, vehicles on the site driveway cannot turn onto Nawakwa Road, and instead queue in the site driveway. As mentioned in existing conditions, this is not occurring in the field. As stated in the previous paragraph, there are only 12 and 11 vehicles assigned to use the Nawakwa Road driveway in the a.m. and p.m. peak hours, respectively. Most of the forecasted traffic is assigned to the M-150 driveway to limit the queueing on the Nawakwa Road driveway.

See Appendix 6 for the future conditions LOS reports and queueing analysis reports.

6.0 Findings and Recommendations

The analyses conducted for this TIS indicate the proposed development will not result in any significant impact to the adjacent road network. Due to the long traffic signal cycle length and priority of traffic signal timing provided to M-150, no mitigations are recommended for the study locations. The proposed site access configuration is appropriate and will facilitate site ingress and egress. Most of the traffic entering/exiting the site will come from and go to the south due to the lack of gaps in SB traffic on Rochester Road for NB vehicles to turn left to enter and travel north to exit. These conclusions are supported by the following key findings:

- Lane configurations and physical capacity are appropriate within the study area.

Based on the findings of the HCM operational analyses and site traffic generation, no mitigations are recommended during the existing, background, and future conditions to the study intersections.

Appendix 1

Traffic Volume Data

Count Date:	6/21/2023
Count Year:	2023
Existing Adj. Year:	2023
Existing Adjustment Rate:	1.00
Growth Rate:	0.5%
Buildout Year:	2024
Scenario:	a.m. Peak Hour

Bckgrd. Dev. A: Gateway of Rochester Hills
Bckgrd. Dev. B: Bebb Oak

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#1001- M-150 & Auburn Road	a.m. Peak Hour		PHF		0.91			0.89			0.90			0.95					
	06/21/23		% Heavy		1%			3%			4%			2%					
	7:45-8:45 AM	2023	Existing	110	157	95	174	176	40	81	854	119	64	1390	110				
		2023	Existing Adj.	110	157	95	174	176	40	81	854	119	64	1390	110				
		2024	Background	111	158	95	175	177	40	81	859	120	64	1397	111				
			Bckgrd. Dev. A								8			21					
			Bckgrd. Dev. B	3					3		7		4	14	4				
			Total Background	114	158	95	175	177	43	81	874	120	68	1432	115				
			Site Generated			3	5			1	8	1		41					
			Pass By																
			Total Site Gen	0	0	3	5	0	0	1	8	1	0	41	0				
			Total Future	114	158	98	180	177	43	82	882	121	68	1473	115				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#2019 - M-150 & Meijer/Lowes/Alex's Restaurant Driveway	a.m. Peak Hour		PHF		0.67			0.71			0.90			0.95					
	06/21/23		% Heavy		0%			5%			4%			2%					
	7:45-8:45 AM	2023	Existing	1	0	7	47	1	9	6	1104	31	28	1608	5				
		2023	Existing Adj.	1	0	7	47	1	9	6	1104	31	28	1608	5				
		2024	Background	1	0	7	47	1	9	6	1110	31	28	1616	5				
			Bckgrd. Dev. A								8			21					
			Bckgrd. Dev. B								7			14					
			Total Background	1	0	7	47	1	9	6	1125	31	28	1651	5				
			Site Generated				2				10			49					
			Pass By																
			Total Site Gen	0	0	0	2	0	0	0	10	0	0	49	0				
			Total Future	1	0	7	49	1	9	6	1135	31	28	1700	5				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#9001 - M-150 & Nawakwa Road	a.m. Peak Hour		PHF		0.75			0.81			0.89			0.91					
	06/21/23		% Heavy		0%			2%			4%			2%					
	8:00-9:00 AM	2023	Existing	4	0	11	51	0	14	9	1212	30	13	1496	11				
		2023	Existing Adj.	4	0	11	51	0	14	9	1209	30	13	1681	11				
		2024	Background	4	0	11	51	0	14	9	1215	30	13	1689	11				
			Bckgrd. Dev. A								8			21					
			Bckgrd. Dev. B								7			14					
			Total Background	4	0	11	51	0	14	9	1230	30	13	1724	11				
			Site Generated	0		5				10	10			46	5				
			Pass By	0		7				13	0			-7	7				
			Total Site Gen	0	0	12	0	0	0	23	10	0	0	39	12				
			Total Future	4	0	23	51	0	14	32	1240	30	13	1763	23				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#3008 - M-150 & WB M-59 Off Ramp	a.m. Peak Hour		PHF					0.91			0.91			0.95					
	06/21/23		% Heavy					2%			4%			2%					
	7:45-8:45 AM	2023	Existing	0	0	0	557	0	424	0	751	295	0	1288	455				
		2023	Existing Adj.	0	0	0	557	0	424	0	824	295	0	1288	455				
		2024	Background	0	0	0	560	0	426	0	828	296	0	1294	457				
			Bckgrd. Dev. A				13				8	2		21					
			Bckgrd. Dev. B								7			14					
			Total Background	0	0	0	573	0	426	0	843	298	0	1329	457				
			Site Generated						4		9			40	14				
			Pass By																
			Total Site Gen	0	0	0	0	0	4	0	9	0	0	40	14				
			Total Future	0	0	0	573	0	430	0	852	298	0	1369	471				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#3021 - M-150 & EB M-59 Off Ramp	a.m. Peak Hour		PHF		0.94						0.88			0.95					
	06/21/23		% Heavy		4%						3%			1%					
	8:00-9:00 AM	2023	Existing	261	0	235	0	0	0	0	858	313	0	1410	398				
		2023	Existing Adj.	261	0	235	0	0	0	0	858	313	0	1447	398				
		2024	Background	262	0	236	0	0	0	0	862	315	0	1454	400				
			Bckgrd. Dev. A			7					10	3		34					
			Bckgrd. Dev. B								7			14					
			Total Background	262	0	243	0	0	0	0	879	318	0	1502	400				
			Site Generated	2							7			31	9				
			Pass By																
			Total Site Gen	2	0	0	0	0	0	0	7	0	0	31	9				
			Total Future	264	0	243	0	0	0	0	886	318	0	1533	409				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#4587 - M-150 & South Blvd	a.m. Peak Hour		PHF		0.83			0.91			0.95			0.92					
	06/21/23		% Heavy		2%			2%			3%			1%					
	8:00-9:00 AM	2023	Existing	154	139	84	83	172	140	49	889	53	122	1307	150				
		2023	Existing Adj.	154	139	84	83	172	140	49	889	53	122	1307	150				
		2024	Background	155	140	84	83	173	141	49	893	53	123	1314	151				
			Bckgrd. Dev. A		3			5			13			12					
			Bckgrd. Dev. B								7			14					
			Total Background	155	143	84	83	178	141	49	913	53	123	1340	151				
			Site Generated	1					1		5		3	26	2				
			Pass By																
			Total Site Gen	1	0	0	0	0	1	0	5	0	3	26	2				
			Total Future	156	143	84	83	178	142	49	918	53	126	1366	153				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#9002 - M-150 & Site Driveway	a.m. Peak Hour		PHF		0.92						0.89			0.91					
	06/21/23		% Heavy		2%						4%			2%					
	8:00-9:00 AM	2023	Existing	0	0	0	0	0	0	0	1248	0	0	1743	0				
		2023	Existing Adj.	0	0	0	0	0	0	0	1248	0	0	1743	0				
		2024	Background	0	0	0	0	0	0	0	1254	0	0	1751	0				
			Bckgrd. Dev. A								8			21					
			Bckgrd. Dev. B								7			14					
			Total Background	0	0	0	0	0	0	0	1269	0	0	1786	0				
			Site Generated	10		49				3	10			5	46				
			Pass By	18		65				5	-5			-65	65				
			Total Site Gen	28	0	114	0	0	0	8	5	0	0	-60	111				
			Total Future	28	0	114	0	0	0	8	1274	0	0	1726	111				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#9003 - Nawakwa Road & Site Driveway	a.m. Peak Hour		PHF		0.75			0.92			0.92								
	06/21/23		% Heavy		0%			2%			2%								
	8:00-9:00 AM	2023	Existing	0	15	0	0	20	0	0	0	0	0	0	0				
		2023	Existing Adj.	0	15	0	0	20	0	0	0	0	0	0	0				
		2024	Background	0	15	0	0	20	0	0	0	0	0	0	0				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Total Background	0	15	0	0	20	0	0	0	0	0	0	0				
			Site Generated				15					5							
			Pass By				20					7							
			Total Site Gen	0	0	0	35	0	0	0	0	12	0	0	0				
			Total Future	0	15	0	35	20	0	0	0	12	0	0	0				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#1001- M-150 & Auburn Road	p.m. Peak Hour 06/21/23 5:00-6:00 PM		PHF		0.93			0.87			0.91			0.88					
			% Heavy		1%			1%			1%			1%					
		2023	Existing	254	422	126	206	237	110	121	1370	198	151	1162	146				
		2023	Existing Adj.	254	422	126	206	237	110	121	1370	198	151	1162	146				
		2024	Background	255	424	127	207	238	111	122	1377	199	152	1168	147				
			Bckgrd. Dev. A								14			9					
			Bckgrd. Dev. B	6					5		13		4	9	3				
			Total Background	261	424	127	207	238	116	122	1404	199	156	1186	150				
			Site Generated			3	5				3			29					
			Pass By																
			Total Site Gen	0	0	3	5	0	0	0	3	0	0	29	0				
			Total Future	261	424	130	212	238	116	122	1407	199	156	1215	150				

Count Date: 6/21/2023
Count Year: 2023
Existing Adj. Year: 2023

Existing Adjustment Rate: 1.00
Growth Rate: 0.5%
Buildout Year: 2024
Scenario: p.m. Peak Hour

Bckgrd. Dev. A: Gateway of Rochester Hills
Bckgrd. Dev. B: Bebb Oak

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#2019 - M-150 & Meijer/Lowes/Alex's Restaurant Driveway	p.m. Peak Hour 06/21/23 4:45-5:45 PM		PHF		0.75			0.86			0.95			0.93					
			% Heavy		0%			1%			1%			1%					
		2023	Existing	4	0	8	121	0	58	7	1587	119	35	1441	7				
		2023	Existing Adj.	4	0	8	121	0	58	7	1587	119	35	1441	7				
		2024	Background	4	0	8	122	0	58	7	1596	120	35	1449	7				
			Bckgrd. Dev. A								14			9					
			Bckgrd. Dev. B								13			9					
			Total Background	4	0	8	122	0	58	7	1623	120	35	1467	7				
			Site Generated				3				3			37					
			Pass By																
			Total Site Gen	0	0	0	3	0	0	0	3	0	0	37	0				
			Total Future	4	0	8	125	0	58	7	1626	120	35	1504	7				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#9001 - M-150 & Nawakwa Road	p.m. Peak Hour 06/21/23 4:45-5:45 PM		PHF		0.69			0.77			0.95			0.93					
			% Heavy		0%			2%			1%			1%					
		2023	Existing	6	0	19	17	0	26	36	1824	61	12	1589	13				
		2023	Existing Adj.	6	0	19	17	0	26	36	1834	61	12	1607	13				
		2024	Background	6	0	19	17	0	26	36	1844	61	12	1615	13				
			Bckgrd. Dev. A								14			9					
			Bckgrd. Dev. B								13			9					
			Total Background	6	0	19	17	0	26	36	1871	61	12	1633	13				
			Site Generated	0		5				8	3			36	4				
			Pass By	0		6				5	0			-7	7				
			Total Site Gen	0	0	11	0	0	0	13	3	0	0	29	11				
			Total Future	6	0	30	17	0	26	49	1874	61	12	1662	24				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#3008 - M-150 & WB M-59 Off Ramp	p.m. Peak Hour 06/21/23 4:45-5:45 PM		PHF					0.94			0.95			0.95					
			% Heavy					0%			1%			1%					
		2023	Existing	0	0	0	386	0	429	0	1491	285	0	1268	375				
		2023	Existing Adj.	0	0	0	386	0	429	0	1502	285	0	1268	375				
		2024	Background	0	0	0	388	0	431	0	1510	286	0	1274	377				
			Bckgrd. Dev. A				5				14	2		9					
			Bckgrd. Dev. B								13			9					
			Total Background	0	0	0	393	0	431	0	1537	288	0	1292	377				
			Site Generated						2		9			41	12				
			Pass By											-1					
			Total Site Gen	0	0	0	0	0	2	0	9	0	0	40	12				
			Total Future	0	0	0	393	0	433	0	1546	288	0	1332	389				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#3021 - M-150 & EB M-59 Off Ramp	p.m. Peak Hour 06/21/23 4:45-5:45 PM		PHF		0.88						0.94			0.90					
			% Heavy		1%						0%			1%					
		2023	Existing	445	0	439	0	0	0	0	1342	484	0	1229	400				
		2023	Existing Adj.	445	0	439	0	0	0	0	1342	484	0	1254	400				
		2024	Background	447	0	441	0	0	0	0	1349	486	0	1260	402				
			Bckgrd. Dev. A			5					16	4		14					
			Bckgrd. Dev. B								13			9					
			Total Background	447	0	446	0	0	0	0	1378	490	0	1283	402				
			Site Generated	2							7			31	10				
			Pass By											-1					
			Total Site Gen	2	0	0	0	0	0	0	7	0	0	30	10				
			Total Future	449	0	446	0	0	0	0	1385	490	0	1313	412				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#4587 - M-150 & South Blvd	p.m. Peak Hour 06/21/23 4:45-5:45 PM		PHF		0.91			0.86			0.92			0.89					
			% Heavy		1%			0%			0%			1%					
		2023	Existing	260	282	97	105	152	151	73	1367	128	167	1291	155				
		2023	Existing Adj.	260	282	97	105	152	151	73	1367	128	167	1291	155				
		2024	Background	261	283	97	106	153	152	73	1374	129	168	1297	156				
			Bckgrd. Dev. A		5			2			9			12					
			Bckgrd. Dev. B								13			9					
			Total Background	261	288	97	106	155	152	73	1396	129	168	1318	156				
			Site Generated	1					1		5		3	25	3				
			Pass By											-1					
			Total Site Gen	1	0	0	0	0	1	0	5	0	3	24	3				
			Total Future	262	288	97	106	155	153	73	1401	129	171	1342	159				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#9002 - M-150 & Site Driveway	p.m. Peak Hour 06/21/23		PHF		0.92						0.95			0.93					
			% Heavy		2%						1%			1%					
		2023	Existing	0	0	0	0	0	0	0	1931	0	0	1643	0				
		2023	Existing Adj.	0	0	0	0	0	0	0	1931	0	0	1643	0				
		2024	Background	0	0	0	0	0	0	0	1941	0	0	1651	0				
			Bckgrd. Dev. A								14			9					
			Bckgrd. Dev. B								13			9					
			Total Background	0	0	0	0	0	0	0	1968	0	0	1669	0				
			Site Generated	3		48				3	8			5	36				
			Pass By	7		58				2	-2			-59	58				
			Total Site Gen	10	0	106	0	0	0	5	6	0	0	-54	94				
			Total Future	10	0	106	0	0	0	5	1974	0	0	1615	94				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#9003 - Nawakwa Road & Site Driveway	p.m. Peak Hour 06/21/23		PHF		0.69			0.92			0.92								
			% Heavy		0%			2%			2%								
		2023	Existing	0	25	0	0	49	0	0	0	0	0	0	0				
		2023	Existing Adj.	0	25	0	0	49	0	0	0	0	0	0	0				
		2024	Background	0	25	0	0	49	0	0	0	0	0	0	0				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Total Background	0	25	0	0	49	0	0	0	0	0	0	0				
			Site Generated				12					5							
			Pass By				12					6							
			Total Site Gen	0	0	0	24	0	0	0	0	11	0	0	0				
			Total Future	0	25	0	24	49	0	0	0	11	0	0	0				

M-150 @ Auburn Rd - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081271, Location: 42.636126, -83.131731

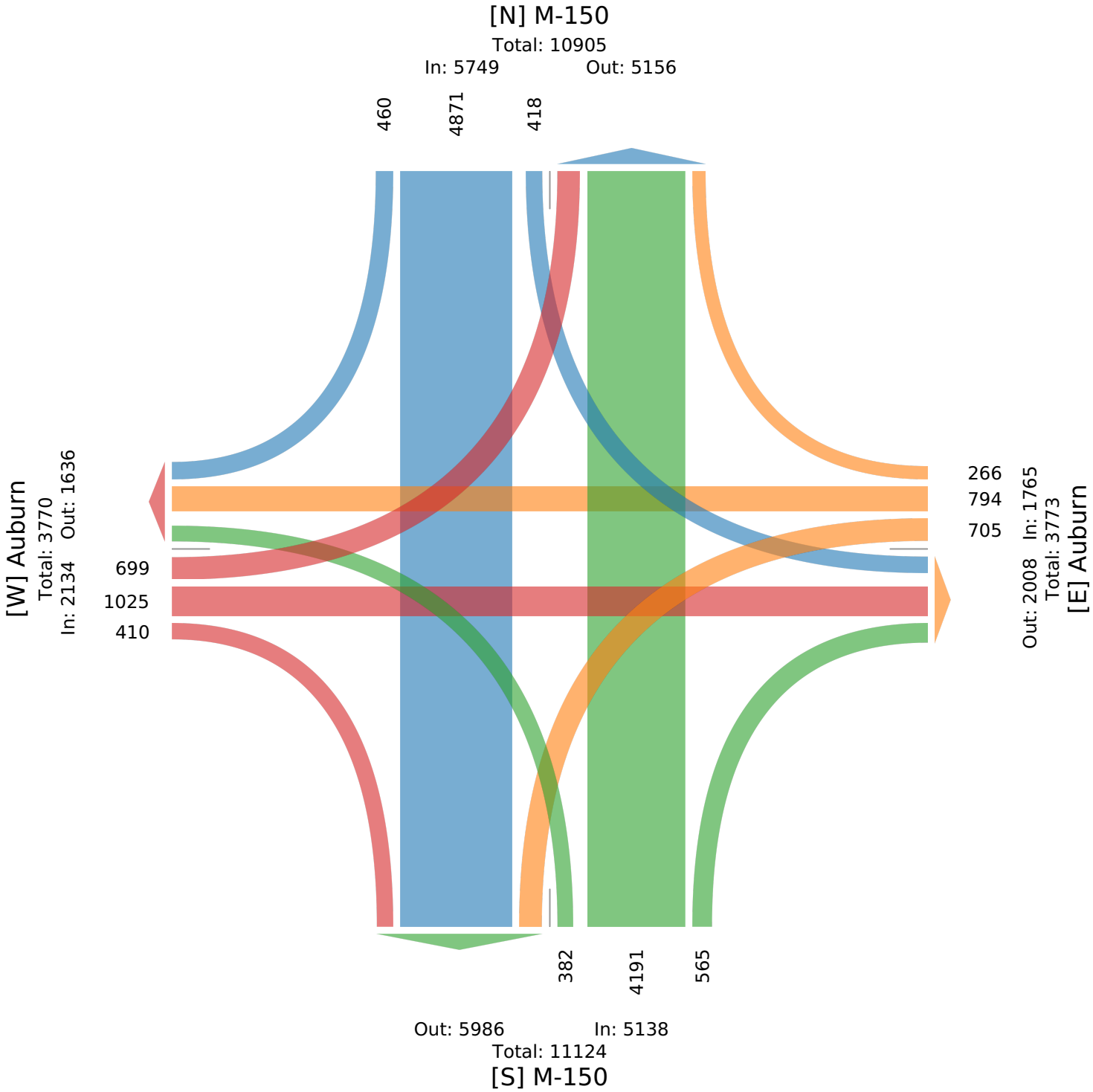
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Auburn					Auburn					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 7:00AM	13	15	23	0	**51**	23	26	2	0	**51**	5	132	14	0	**151**	12	293	21	0	**326**	**579**
7:15AM	17	18	17	0	**52**	25	24	4	0	**53**	11	138	18	0	**167**	8	334	14	0	**356**	**628**
7:30AM	24	24	19	0	**67**	39	40	5	0	**84**	8	161	20	0	**189**	18	343	19	0	**380**	**720**
7:45AM	28	43	25	0	**96**	40	40	12	0	**92**	17	206	29	0	**252**	16	343	31	0	**390**	**830**
Hourly Total	82	100	84	0	**266**	127	130	23	0	**280**	41	637	81	0	**759**	54	1313	85	0	**1452**	**2757**
8:00AM	22	38	22	0	**82**	37	51	9	0	**97**	27	188	26	0	**241**	13	359	32	0	**404**	**824**
8:15AM	32	42	26	0	**100**	55	45	10	0	**110**	19	220	30	0	**269**	21	317	23	0	**361**	**840**
8:30AM	28	34	22	0	**84**	42	40	9	0	**91**	18	240	34	0	**292**	14	371	24	0	**409**	**876**
8:45AM	39	43	26	0	**108**	38	44	11	0	**93**	23	235	36	0	**294**	15	253	27	0	**295**	**790**
Hourly Total	121	157	96	0	**374**	172	180	39	0	**391**	87	883	126	0	**1096**	63	1300	106	0	**1469**	**3330**
4:00PM	51	67	18	0	**136**	46	60	15	0	**121**	52	317	29	0	**398**	36	281	27	0	**344**	**999**
4:15PM	63	99	33	0	**195**	41	63	24	0	**128**	23	334	43	0	**400**	36	264	23	0	**323**	**1046**
4:30PM	53	90	27	0	**170**	51	65	24	0	**140**	30	319	39	0	**388**	40	292	28	0	**360**	**1058**
4:45PM	75	90	26	0	**191**	62	59	31	0	**152**	28	331	49	0	**408**	38	259	45	0	**342**	**1093**
Hourly Total	242	346	104	0	**692**	200	247	94	0	**541**	133	1301	160	0	**1594**	150	1096	123	0	**1369**	**4196**
5:00PM	73	102	40	0	**215**	64	70	25	0	**159**	29	312	37	0	**378**	34	294	35	0	**363**	**1115**
5:15PM	67	107	31	0	**205**	56	53	24	0	**133**	28	366	55	0	**449**	40	334	43	0	**417**	**1204**
5:30PM	62	118	31	0	**211**	44	50	38	0	**132**	35	319	46	0	**400**	35	259	33	0	**327**	**1070**
5:45PM	52	95	24	0	**171**	42	64	23	0	**129**	29	373	60	0	**462**	42	275	35	0	**352**	**1114**
Hourly Total	254	422	126	0	**802**	206	237	110	0	**553**	121	1370	198	0	**1689**	151	1162	146	0	**1459**	**4503**
Total	699	1025	410	0	**2134**	705	794	266	0	**1765**	382	4191	565	0	**5138**	418	4871	460	0	**5749**	**14786**
% Approach	32.8%	48.0%	19.2%	0%	-	39.9%	45.0%	15.1%	0%	-	7.4%	81.6%	11.0%	0%	-	7.3%	84.7%	8.0%	0%	-	-
% Total	4.7%	6.9%	2.8%	0%	**14.4%**	4.8%	5.4%	1.8%	0%	**11.9%**	2.6%	28.3%	3.8%	0%	**34.7%**	2.8%	32.9%	3.1%	0%	**38.9%**	-
Lights	692	1014	403	0	**2109**	681	781	264	0	**1726**	379	4116	550	0	**5045**	415	4805	450	0	**5670**	14550
% Lights	99.0%	98.9%	98.3%	0%	**98.8%**	96.6%	98.4%	99.2%	0%	**97.8%**	99.2%	98.2%	97.3%	0%	**98.2%**	99.3%	98.6%	97.8%	0%	**98.6%**	98.4%
Articulated Trucks	3	3	1	0	**7**	6	5	0	0	**11**	0	24	0	0	**24**	0	30	2	0	**32**	74
% Articulated Trucks	0.4%	0.3%	0.2%	0%	**0.3%**	0.9%	0.6%	0%	0%	**0.6%**	0%	0.6%	0%	0%	**0.5%**	0%	0.6%	0.4%	0%	**0.6%**	0.5%
Buses and Single-Unit Trucks	4	8	6	0	**18**	18	8	2	0	**28**	3	51	15	0	**69**	3	36	8	0	**47**	162
% Buses and Single-Unit Trucks	0.6%	0.8%	1.5%	0%	**0.8%**	2.6%	1.0%	0.8%	0%	**1.6%**	0.8%	1.2%	2.7%	0%	**1.3%**	0.7%	0.7%	1.7%	0%	**0.8%**	1.1%

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

M-150 @ Auburn Rd - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081271, Location: 42.636126, -83.131731

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



M-150 @ Auburn Rd - TMC

Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081271, Location: 42.636126, -83.131731

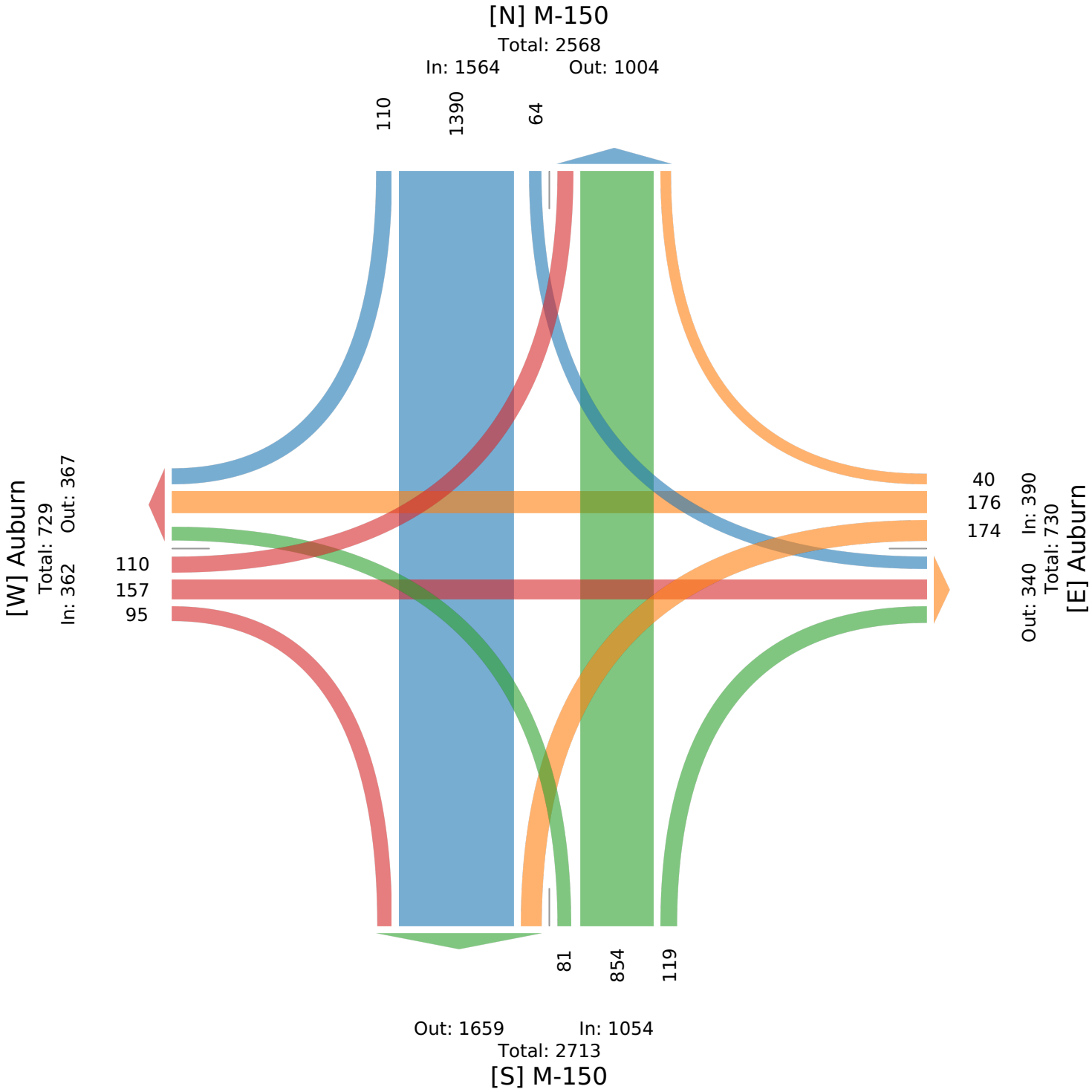
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Auburn					Auburn					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 7:45AM	28	43	25	0	**96**	40	40	12	0	**92**	17	206	29	0	**252**	16	343	31	0	**390**	**830**
8:00AM	22	38	22	0	**82**	37	51	9	0	**97**	27	188	26	0	**241**	13	359	32	0	**404**	**824**
8:15AM	32	42	26	0	**100**	55	45	10	0	**110**	19	220	30	0	**269**	21	317	23	0	**361**	**840**
8:30AM	28	34	22	0	**84**	42	40	9	0	**91**	18	240	34	0	**292**	14	371	24	0	**409**	**876**
Total	110	157	95	0	**362**	174	176	40	0	**390**	81	854	119	0	**1054**	64	1390	110	0	**1564**	**3370**
% Approach	30.4%	43.4%	26.2%	0%	**-**	44.6%	45.1%	10.3%	0%	**-**	7.7%	81.0%	11.3%	0%	**-**	4.1%	88.9%	7.0%	0%	**-**	-
% Total	3.3%	4.7%	2.8%	0%	**10.7%**	5.2%	5.2%	1.2%	0%	**11.6%**	2.4%	25.3%	3.5%	0%	**31.3%**	1.9%	41.2%	3.3%	0%	**46.4%**	-
PHF	0.859	0.913	0.913	-	**0.905**	0.791	0.863	0.833	-	**0.886**	0.750	0.890	0.875	-	**0.902**	0.762	0.937	0.859	-	**0.956**	0.962
Lights	109	156	92	0	**357**	167	172	39	0	**378**	81	814	117	0	**1012**	64	1363	107	0	**1534**	3281
% Lights	99.1%	99.4%	96.8%	0%	**98.6%**	96.0%	97.7%	97.5%	0%	**96.9%**	100%	95.3%	98.3%	0%	**96.0%**	100%	98.1%	97.3%	0%	**98.1%**	97.4%
Articulated Trucks	0	0	1	0	**1**	1	1	0	0	**2**	0	17	0	0	**17**	0	14	1	0	**15**	35
% Articulated Trucks	0%	0%	1.1%	0%	**0.3%**	0.6%	0.6%	0%	0%	**0.5%**	0%	2.0%	0%	0%	**1.6%**	0%	1.0%	0.9%	0%	**1.0%**	1.0%
Buses and Single-Unit Trucks	1	1	2	0	**4**	6	3	1	0	**10**	0	23	2	0	**25**	0	13	2	0	**15**	54
% Buses and Single-Unit Trucks	0.9%	0.6%	2.1%	0%	**1.1%**	3.4%	1.7%	2.5%	0%	**2.6%**	0%	2.7%	1.7%	0%	**2.4%**	0%	0.9%	1.8%	0%	**1.0%**	1.6%

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

M-150 @ Auburn Rd - TMC
Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081271, Location: 42.636126, -83.131731

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



M-150 @ Auburn Rd - TMC

Wed Jun 21, 2023
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081271, Location: 42.636126, -83.131731

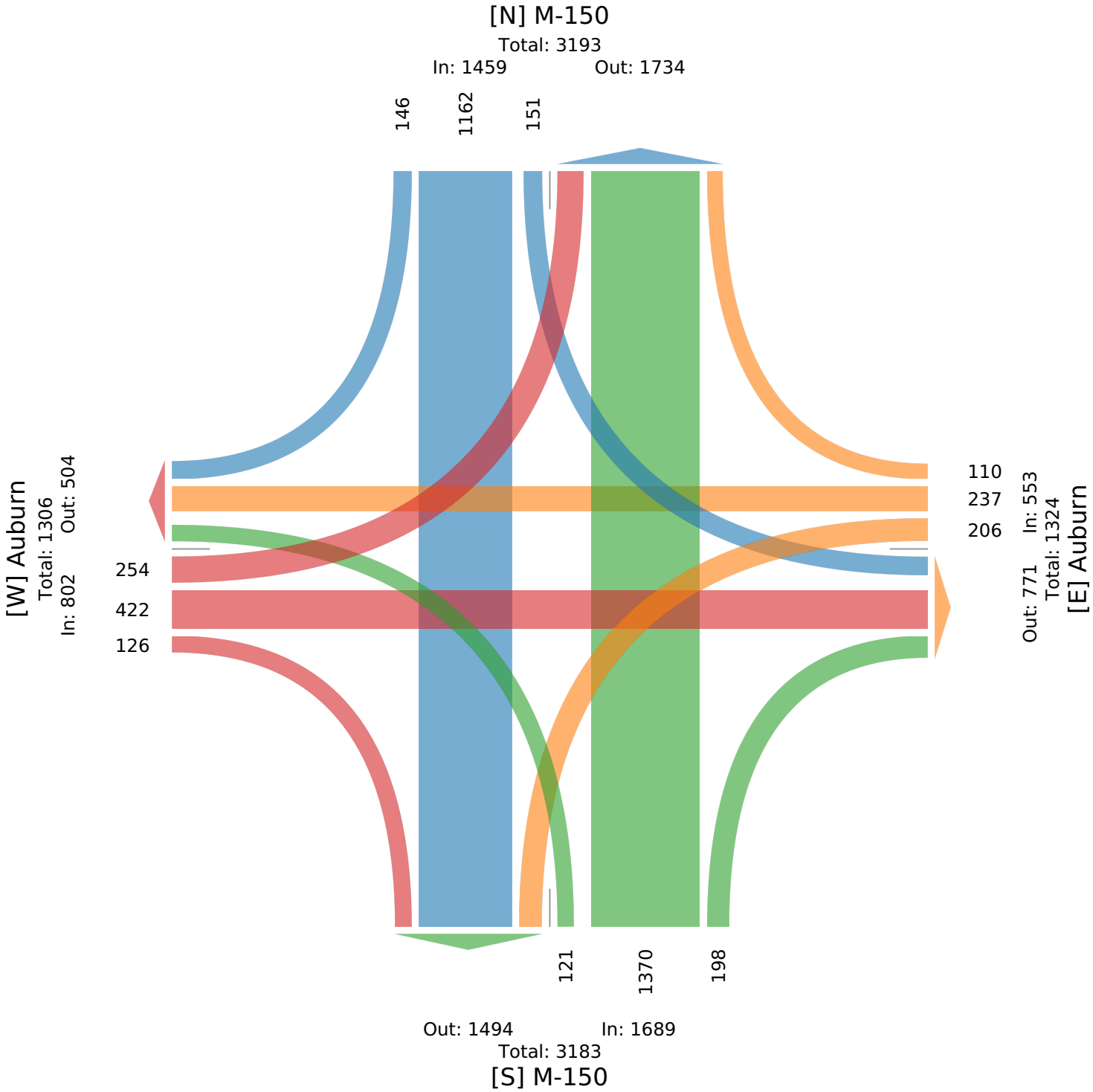
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Auburn					Auburn					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2023-06-21 5:00PM	73	102	40	0	**215**	64	70	25	0	**159**	29	312	37	0	**378**	34	294	35	0	**363**	**1115**
5:15PM	67	107	31	0	**205**	56	53	24	0	**133**	28	366	55	0	**449**	40	334	43	0	**417**	**1204**
5:30PM	62	118	31	0	**211**	44	50	38	0	**132**	35	319	46	0	**400**	35	259	33	0	**327**	**1070**
5:45PM	52	95	24	0	**171**	42	64	23	0	**129**	29	373	60	0	**462**	42	275	35	0	**352**	**1114**
Total	254	422	126	0	**802**	206	237	110	0	**553**	121	1370	198	0	**1689**	151	1162	146	0	**1459**	**4503**
% Approach	31.7%	52.6%	15.7%	0%	**-**	37.3%	42.9%	19.9%	0%	**-**	7.2%	81.1%	11.7%	0%	**-**	10.3%	79.6%	10.0%	0%	**-**	-
% Total	5.6%	9.4%	2.8%	0%	**17.8%**	4.6%	5.3%	2.4%	0%	**12.3%**	2.7%	30.4%	4.4%	0%	**37.5%**	3.4%	25.8%	3.2%	0%	**32.4%**	-
PHF	0.870	0.894	0.788	-	**0.933**	0.805	0.846	0.724	-	**0.869**	0.864	0.918	0.825	-	**0.914**	0.899	0.870	0.849	-	**0.875**	0.935
Lights	254	418	126	0	**798**	203	237	110	0	**550**	121	1365	190	0	**1676**	151	1154	142	0	**1447**	4471
% Lights	100%	99.1%	100%	0%	**99.5%**	98.5%	100%	100%	0%	**99.5%**	100%	99.6%	96.0%	0%	**99.2%**	100%	99.3%	97.3%	0%	**99.2%**	99.3%
Articulated Trucks	0	1	0	0	**1**	1	0	0	0	**1**	0	1	0	0	**1**	0	5	0	0	**5**	8
% Articulated Trucks	0%	0.2%	0%	0%	**0.1%**	0.5%	0%	0%	0%	**0.2%**	0%	0.1%	0%	0%	**0.1%**	0%	0.4%	0%	0%	**0.3%**	0.2%
Buses and Single-Unit Trucks	0	3	0	0	**3**	2	0	0	0	**2**	0	4	8	0	**12**	0	3	4	0	**7**	24
% Buses and Single-Unit Trucks	0%	0.7%	0%	0%	**0.4%**	1.0%	0%	0%	0%	**0.4%**	0%	0.3%	4.0%	0%	**0.7%**	0%	0.3%	2.7%	0%	**0.5%**	0.5%

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

M-150 @ Auburn Rd - TMC
Wed Jun 21, 2023
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081271, Location: 42.636126, -83.131731

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



M-150 @ Meijer/Lowe's/Alex's Restaurant Driv... - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081272, Location: 42.633696, -83.131625

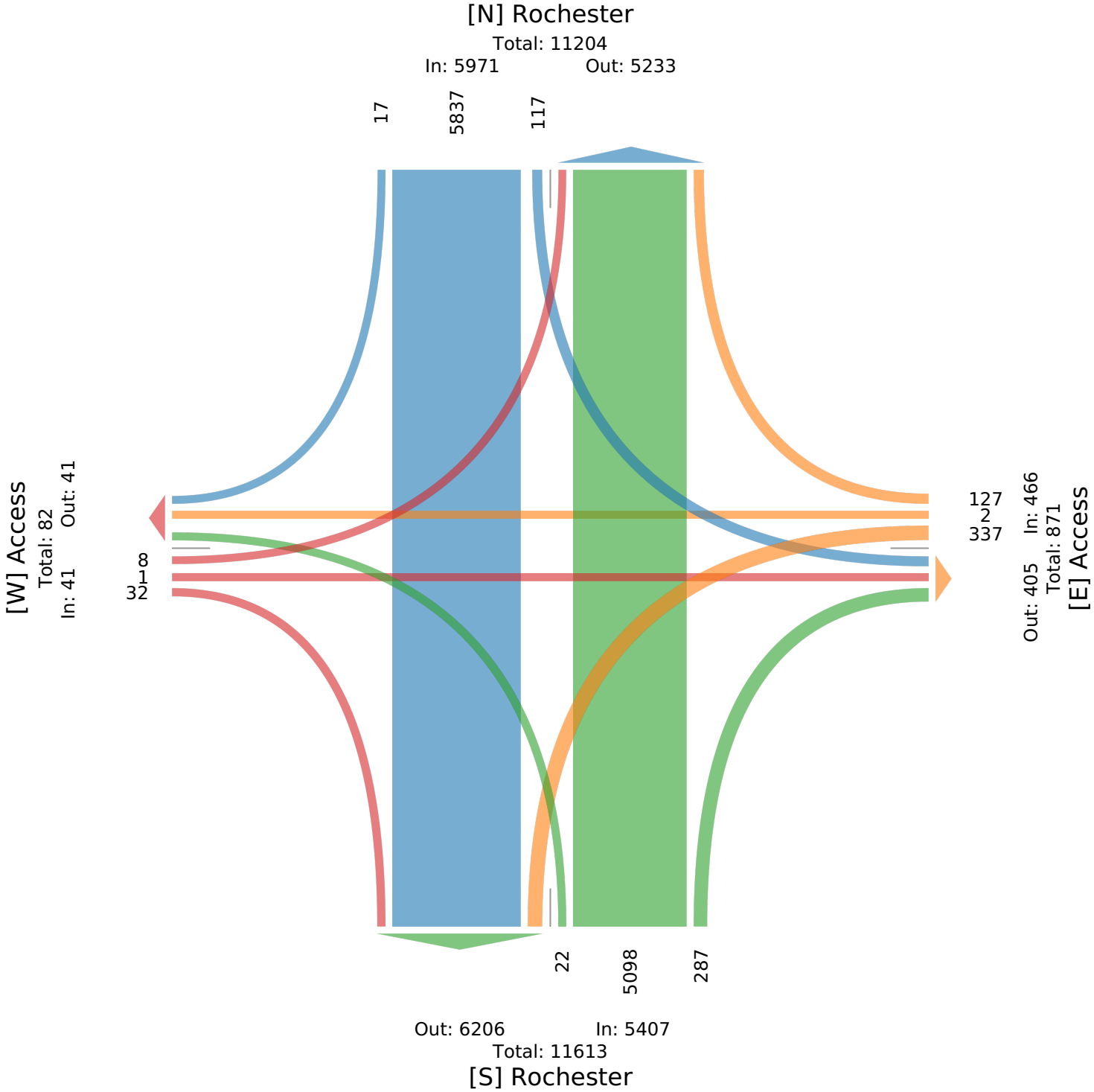
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Access					Access					Rochester					Rochester					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 7:00AM	0	0	1	0	**1**	6	0	0	0	**6**	0	161	6	0	**167**	6	329	0	0	**335**	**509**
7:15AM	0	0	3	0	**3**	6	0	1	0	**7**	0	175	7	0	**182**	2	369	0	0	**371**	**563**
7:30AM	0	0	3	0	**3**	5	0	0	0	**5**	1	228	7	0	**236**	2	402	0	0	**404**	**648**
7:45AM	0	0	0	0	**0**	7	0	1	0	**8**	1	270	4	0	**275**	6	409	1	0	**416**	**699**
Hourly Total	0	0	7	0	**7**	24	0	2	0	**26**	2	834	24	0	**860**	16	1509	1	0	**1526**	**2419**
8:00AM	1	0	2	0	**3**	9	0	4	0	**13**	2	246	6	0	**254**	8	409	1	0	**418**	**688**
8:15AM	0	0	2	0	**2**	14	1	1	0	**16**	1	284	10	0	**295**	8	378	2	0	**388**	**701**
8:30AM	0	0	3	0	**3**	17	0	3	0	**20**	2	304	11	0	**317**	6	412	1	0	**419**	**759**
8:45AM	0	0	1	0	**1**	16	0	5	0	**21**	0	311	11	0	**322**	7	322	3	0	**332**	**676**
Hourly Total	1	0	8	0	**9**	56	1	13	0	**70**	5	1145	38	0	**1188**	29	1521	7	0	**1557**	**2824**
4:00PM	0	0	1	0	**1**	32	1	17	0	**50**	0	377	24	0	**401**	12	336	0	0	**348**	**800**
4:15PM	0	0	0	0	**0**	28	0	18	0	**46**	4	406	39	0	**449**	9	361	0	0	**370**	**865**
4:30PM	0	1	2	0	**3**	46	0	14	0	**60**	0	342	23	0	**365**	9	360	1	0	**370**	**798**
4:45PM	0	0	3	0	**3**	24	0	13	0	**37**	1	403	28	0	**432**	11	360	1	0	**372**	**844**
Hourly Total	0	1	6	0	**7**	130	1	62	0	**193**	5	1528	114	0	**1647**	41	1417	2	0	**1460**	**3307**
5:00PM	1	0	1	0	**2**	38	0	14	0	**52**	2	370	27	0	**399**	11	375	1	0	**387**	**840**
5:15PM	1	0	3	0	**4**	30	0	12	0	**42**	2	408	34	0	**444**	3	393	3	0	**399**	**889**
5:30PM	2	0	1	0	**3**	29	0	19	0	**48**	2	406	30	0	**438**	10	313	2	0	**325**	**814**
5:45PM	3	0	6	0	**9**	30	0	5	0	**35**	4	407	20	0	**431**	7	309	1	0	**317**	**792**
Hourly Total	7	0	11	0	**18**	127	0	50	0	**177**	10	1591	111	0	**1712**	31	1390	7	0	**1428**	**3335**
Total	8	1	32	0	**41**	337	2	127	0	**466**	22	5098	287	0	**5407**	117	5837	17	0	**5971**	**11885**
% Approach	19.5%	2.4%	78.0%	0%	**-**	72.3%	0.4%	27.3%	0%	**-**	0.4%	94.3%	5.3%	0%	**-**	2.0%	97.8%	0.3%	0%	**-**	-
% Total	0.1%	0%	0.3%	0%	**0.3%**	2.8%	0%	1.1%	0%	**3.9%**	0.2%	42.9%	2.4%	0%	**45.5%**	1.0%	49.1%	0.1%	0%	**50.2%**	-
Lights	8	1	32	0	**41**	331	2	125	0	**458**	22	5007	277	0	**5306**	116	5756	17	0	**5889**	11694
% Lights	100%	100%	100%	0%	**100%**	98.2%	100%	98.4%	0%	**98.3%**	100%	98.2%	96.5%	0%	**98.1%**	99.1%	98.6%	100%	0%	**98.6%**	98.4%
Articulated Trucks	0	0	0	0	**0**	3	0	0	0	**3**	0	25	4	0	**29**	0	27	0	0	**27**	59
% Articulated Trucks	0%	0%	0%	0%	**0%**	0.9%	0%	0%	0%	**0.6%**	0%	0.5%	1.4%	0%	**0.5%**	0%	0.5%	0%	0%	**0.5%**	0.5%
Buses and Single-Unit Trucks	0	0	0	0	**0**	3	0	2	0	**5**	0	66	6	0	**72**	1	54	0	0	**55**	132
% Buses and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0.9%	0%	1.6%	0%	**1.1%**	0%	1.3%	2.1%	0%	**1.3%**	0.9%	0.9%	0%	0%	**0.9%**	1.1%

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

M-150 @ Meijer/Lowe's/Alex's Restaurant Driv... - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081272, Location: 42.633696, -83.131625

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



M-150 @ Meijer/Lowe's/Alex's Restaurant Driv... - TMC

Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081272, Location: 42.633696, -83.131625

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

Leg	Access					Access					Rochester					Rochester					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2023-06-21 7:45AM	0	0	0	0	**0**	7	0	1	0	**8**	1	270	4	0	**275**	6	409	1	0	**416**	**699**
8:00AM	1	0	2	0	**3**	9	0	4	0	**13**	2	246	6	0	**254**	8	409	1	0	**418**	**688**
8:15AM	0	0	2	0	**2**	14	1	1	0	**16**	1	284	10	0	**295**	8	378	2	0	**388**	**701**
8:30AM	0	0	3	0	**3**	17	0	3	0	**20**	2	304	11	0	**317**	6	412	1	0	**419**	**759**
Total	1	0	7	0	**8**	47	1	9	0	**57**	6	1104	31	0	**1141**	28	1608	5	0	**1641**	**2847**
% Approach	12.5%	0%	87.5%	0%	**-**	82.5%	1.8%	15.8%	0%	**-**	0.5%	96.8%	2.7%	0%	**-**	1.7%	98.0%	0.3%	0%	**-**	-
% Total	0%	0%	0.2%	0%	**0.3%**	1.7%	0%	0.3%	0%	**2.0%**	0.2%	38.8%	1.1%	0%	**40.1%**	1.0%	56.5%	0.2%	0%	**57.6%**	-
PHF	0.250	-	0.583	-	**0.667**	0.691	0.250	0.563	-	**0.713**	0.750	0.908	0.705	-	**0.900**	0.875	0.976	0.625	-	**0.979**	0.938
Lights	1	0	7	0	**8**	45	1	8	0	**54**	6	1066	29	0	**1101**	27	1579	5	0	**1611**	2774
% Lights	100%	0%	100%	0%	**100%**	95.7%	100%	88.9%	0%	**94.7%**	100%	96.6%	93.5%	0%	**96.5%**	96.4%	98.2%	100%	0%	**98.2%**	97.4%
Articulated Trucks	0	0	0	0	**0**	2	0	0	0	**2**	0	14	1	0	**15**	0	10	0	0	**10**	27
% Articulated Trucks	0%	0%	0%	0%	**0%**	4.3%	0%	0%	0%	**3.5%**	0%	1.3%	3.2%	0%	**1.3%**	0%	0.6%	0%	0%	**0.6%**	0.9%
Buses and Single-Unit Trucks	0	0	0	0	**0**	0	0	1	0	**1**	0	24	1	0	**25**	1	19	0	0	**20**	46
% Buses and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0%	0%	11.1%	0%	**1.8%**	0%	2.2%	3.2%	0%	**2.2%**	3.6%	1.2%	0%	0%	**1.2%**	1.6%

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

M-150 @ Meijer/Lowe's/Alex's Restaurant Driv... - TMC
Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081272, Location: 42.633696, -83.131625

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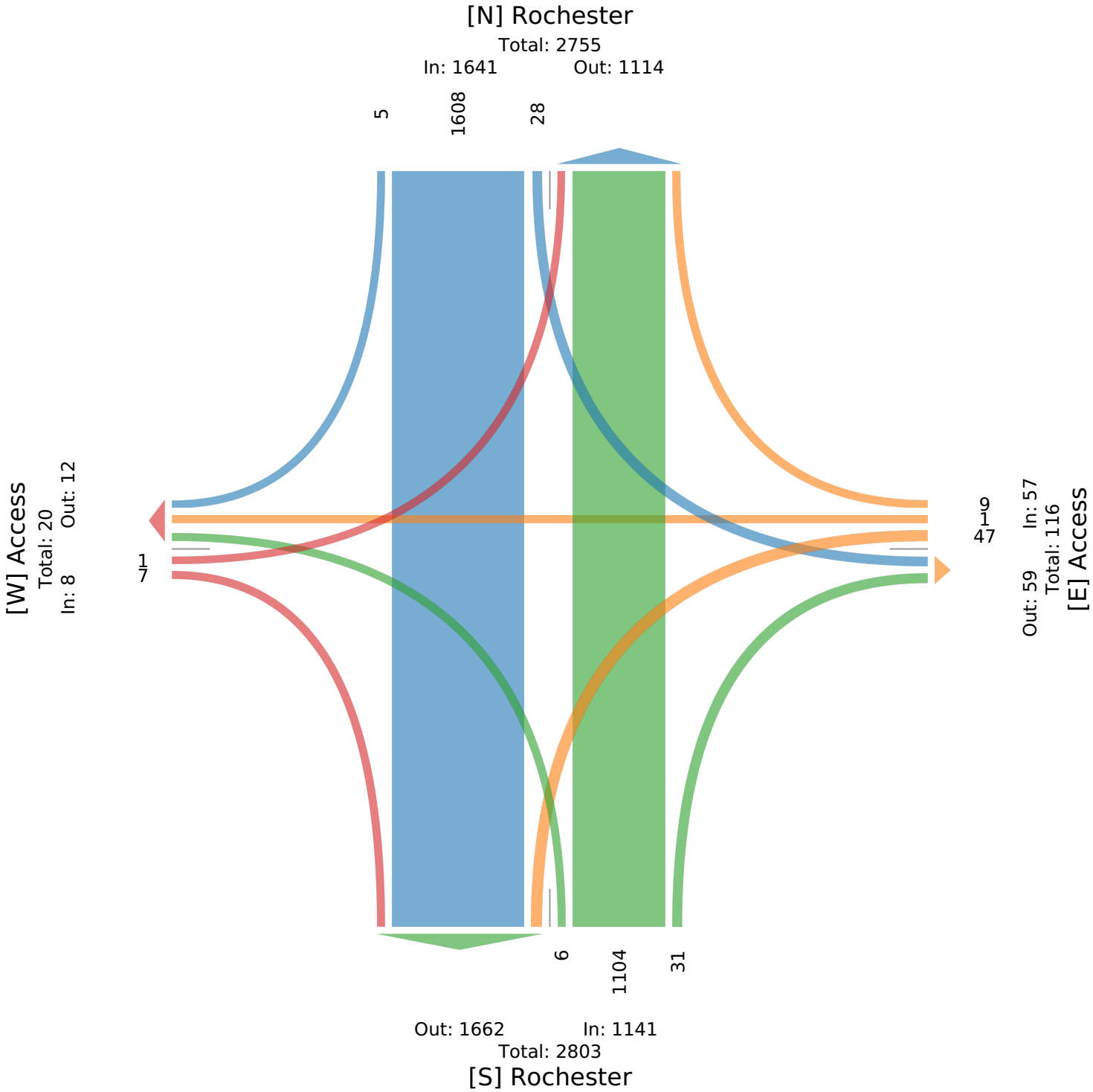
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-150 @ Meijer/Lowe's/Alex's Restaurant Driv... - TMC

Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081272, Location: 42.633696, -83.131625

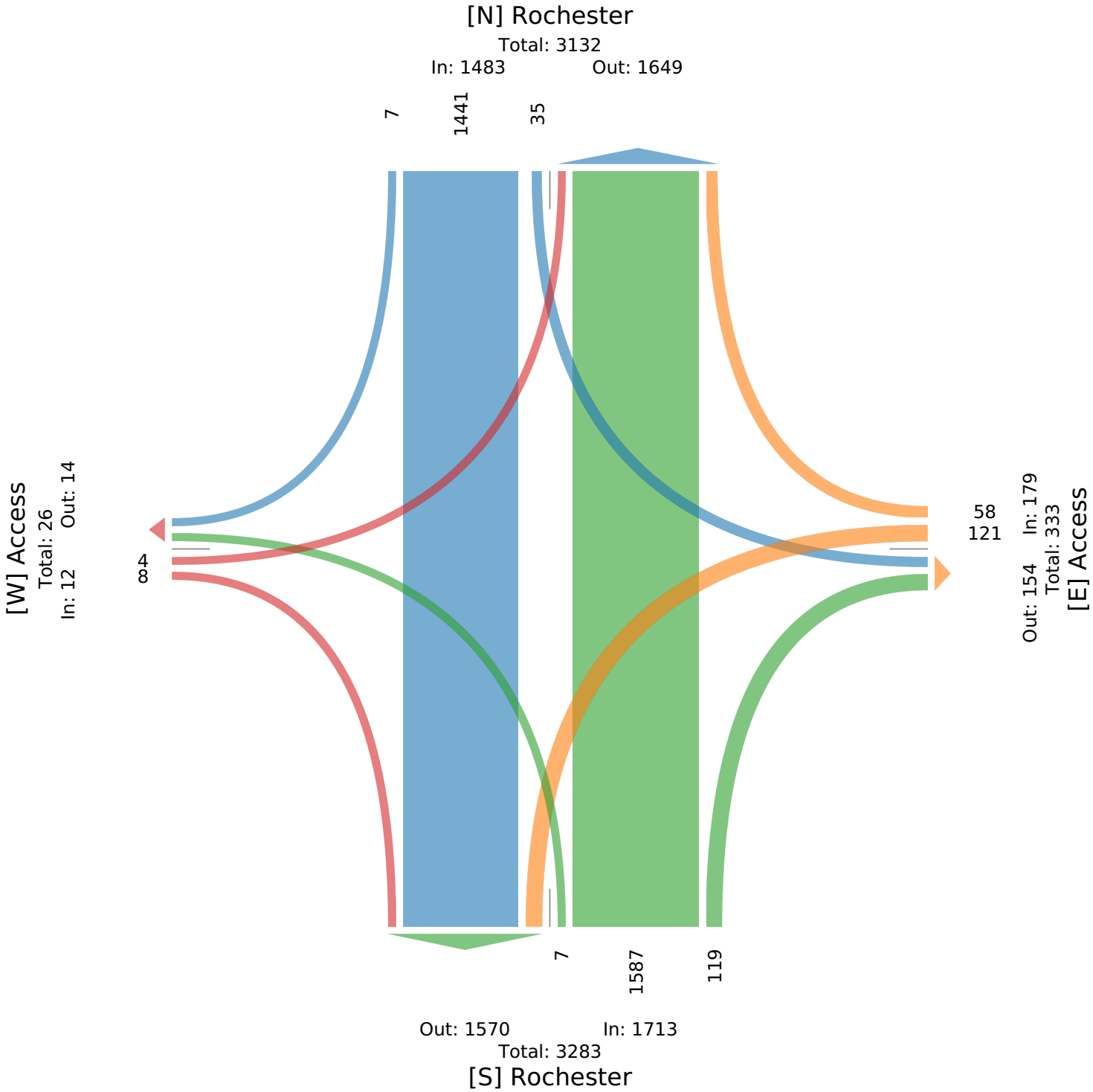
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg / Direction	Access Eastbound					Access Westbound					Rochester Northbound					Rochester Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2023-06-21 4:45PM	0	0	3	0	**3**	24	0	13	0	**37**	1	403	28	0	**432**	11	360	1	0	**372**	**844**
5:00PM	1	0	1	0	**2**	38	0	14	0	**52**	2	370	27	0	**399**	11	375	1	0	**387**	**840**
5:15PM	1	0	3	0	**4**	30	0	12	0	**42**	2	408	34	0	**444**	3	393	3	0	**399**	**889**
5:30PM	2	0	1	0	**3**	29	0	19	0	**48**	2	406	30	0	**438**	10	313	2	0	**325**	**814**
Total	4	0	8	0	**12**	121	0	58	0	**179**	7	1587	119	0	**1713**	35	1441	7	0	**1483**	**3387**
% Approach	33.3%	0%	66.7%	0%	**-**	67.6%	0%	32.4%	0%	**-**	0.4%	92.6%	6.9%	0%	**-**	2.4%	97.2%	0.5%	0%	**-**	-
% Total	0.1%	0%	0.2%	0%	**0.4%**	3.6%	0%	1.7%	0%	**5.3%**	0.2%	46.9%	3.5%	0%	**50.6%**	1.0%	42.5%	0.2%	0%	**43.8%**	-
PHF	0.500	-	0.667	-	**0.750**	0.796	-	0.763	-	**0.861**	0.875	0.972	0.875	-	**0.965**	0.795	0.917	0.583	-	**0.929**	0.952
Lights	4	0	8	0	**12**	120	0	58	0	**178**	7	1573	119	0	**1699**	35	1428	7	0	**1470**	3359
% Lights	100%	0%	100%	0%	**100%**	99.2%	0%	100%	0%	**99.4%**	100%	99.1%	100%	0%	**99.2%**	100%	99.1%	100%	0%	**99.1%**	99.2%
Articulated Trucks	0	0	0	0	**0**	0	0	0	0	**0**	0	2	0	0	**2**	0	6	0	0	**6**	8
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0.1%	0%	0%	**0.1%**	0%	0.4%	0%	0%	**0.4%**	0.2%
Buses and Single-Unit Trucks	0	0	0	0	**0**	1	0	0	0	**1**	0	12	0	0	**12**	0	7	0	0	**7**	20
% Buses and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0.8%	0%	0%	0%	**0.6%**	0%	0.8%	0%	0%	**0.7%**	0%	0.5%	0%	0%	**0.5%**	0.6%

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

M-150 @ Meijer/Lowe's/Alex's Restaurant Driv... - TMC
Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081272, Location: 42.633696, -83.131625

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



M-150 @ Nawakwa Rd - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081273, Location: 42.631271, -83.131594

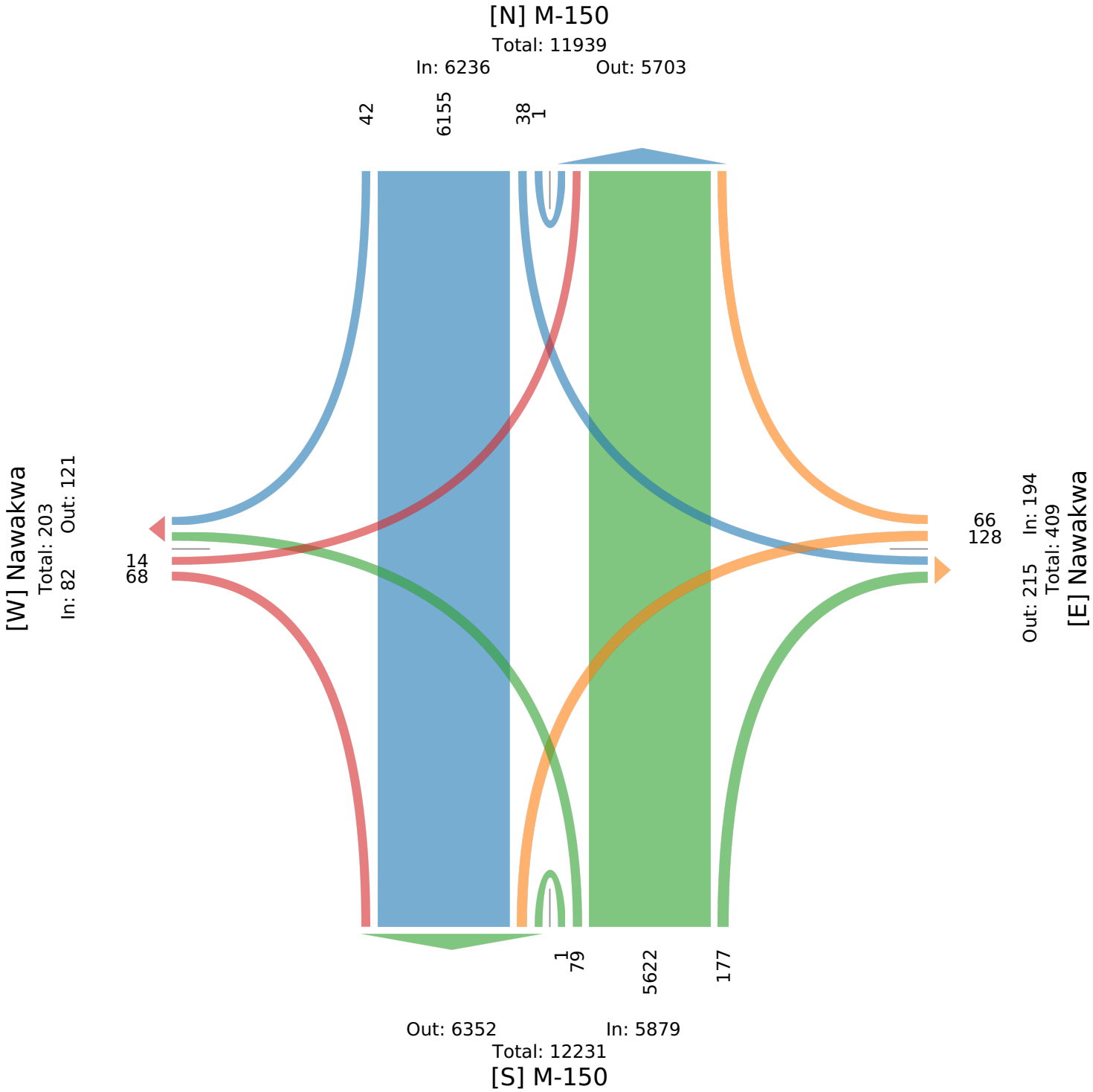
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Nawakwa					Nawakwa					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 7:00AM	0	0	3	0	**3**	5	0	2	0	**7**	2	175	3	0	**180**	1	343	1	0	**345**	**535**
7:15AM	1	0	5	0	**6**	12	0	4	0	**16**	4	178	3	1	**186**	2	373	0	0	**375**	**583**
7:30AM	0	0	6	0	**6**	13	0	2	0	**15**	1	235	4	0	**240**	1	427	3	0	**431**	**692**
7:45AM	0	0	7	0	**7**	6	0	3	0	**9**	2	273	3	0	**278**	1	409	2	0	**412**	**706**
Hourly Total	1	0	21	0	**22**	36	0	11	0	**47**	9	861	13	1	**884**	5	1552	6	0	**1563**	**2516**
8:00AM	0	0	3	0	**3**	11	0	3	0	**14**	0	248	9	0	**257**	5	370	1	0	**376**	**650**
8:15AM	1	0	4	0	**5**	13	0	4	0	**17**	2	308	5	0	**315**	1	384	2	0	**387**	**724**
8:30AM	1	0	4	0	**5**	17	0	3	0	**20**	4	317	6	0	**327**	4	407	5	0	**416**	**768**
8:45AM	2	0	0	0	**2**	10	0	4	0	**14**	3	339	10	0	**352**	3	335	3	0	**341**	**709**
Hourly Total	4	0	11	0	**15**	51	0	14	0	**65**	9	1212	30	0	**1251**	13	1496	11	0	**1520**	**2851**
4:00PM	0	0	3	0	**3**	6	0	3	0	**9**	5	455	16	0	**476**	1	359	2	1	**363**	**851**
4:15PM	0	0	4	0	**4**	7	0	3	0	**10**	8	458	16	0	**482**	4	405	4	0	**413**	**909**
4:30PM	3	0	5	0	**8**	5	0	4	0	**9**	4	387	16	0	**407**	3	399	4	0	**406**	**830**
4:45PM	0	0	3	0	**3**	7	0	6	0	**13**	9	448	13	0	**470**	5	389	3	0	**397**	**883**
Hourly Total	3	0	15	0	**18**	25	0	16	0	**41**	26	1748	61	0	**1835**	13	1552	13	1	**1579**	**3473**
5:00PM	3	0	6	0	**9**	7	0	7	0	**14**	9	455	16	0	**480**	0	419	2	0	**421**	**924**
5:15PM	3	0	3	0	**6**	0	0	5	0	**5**	6	456	20	0	**482**	2	427	6	0	**435**	**928**
5:30PM	0	0	7	0	**7**	3	0	8	0	**11**	12	465	12	0	**489**	5	354	2	0	**361**	**868**
5:45PM	0	0	5	0	**5**	6	0	5	0	**11**	8	425	25	0	**458**	0	355	2	0	**357**	**831**
Hourly Total	6	0	21	0	**27**	16	0	25	0	**41**	35	1801	73	0	**1909**	7	1555	12	0	**1574**	**3551**
Total	14	0	68	0	**82**	128	0	66	0	**194**	79	5622	177	1	**5879**	38	6155	42	1	**6236**	**12391**
% Approach	17.1%	0%	82.9%	0%	**-**	66.0%	0%	34.0%	0%	**-**	1.3%	95.6%	3.0%	0%	**-**	0.6%	98.7%	0.7%	0%	**-**	-
% Total	0.1%	0%	0.5%	0%	**0.7%**	1.0%	0%	0.5%	0%	**1.6%**	0.6%	45.4%	1.4%	0%	**47.4%**	0.3%	49.7%	0.3%	0%	**50.3%**	-
Lights	13	0	67	0	**80**	128	0	63	0	**191**	78	5519	176	1	**5774**	38	6058	39	1	**6136**	12181
% Lights	92.9%	0%	98.5%	0%	**97.6%**	100%	0%	95.5%	0%	**98.5%**	98.7%	98.2%	99.4%	100%	**98.2%**	100%	98.4%	92.9%	100%	**98.4%**	98.3%
Articulated Trucks	0	0	1	0	**1**	0	0	0	0	**0**	0	33	0	0	**33**	0	40	1	0	**41**	75
% Articulated Trucks	0%	0%	1.5%	0%	**1.2%**	0%	0%	0%	0%	**0%**	0%	0.6%	0%	0%	**0.6%**	0%	0.6%	2.4%	0%	**0.7%**	0.6%
Buses and Single-Unit Trucks	1	0	0	0	**1**	0	0	3	0	**3**	1	70	1	0	**72**	0	57	2	0	**59**	135
% Buses and Single-Unit Trucks	7.1%	0%	0%	0%	**1.2%**	0%	0%	4.5%	0%	**1.5%**	1.3%	1.2%	0.6%	0%	**1.2%**	0%	0.9%	4.8%	0%	**0.9%**	1.1%

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

M-150 @ Nawakwa Rd - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081273, Location: 42.631271, -83.131594

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



M-150 @ Nawakwa Rd - TMC

Wed Jun 21, 2023
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081273, Location: 42.631271, -83.131594

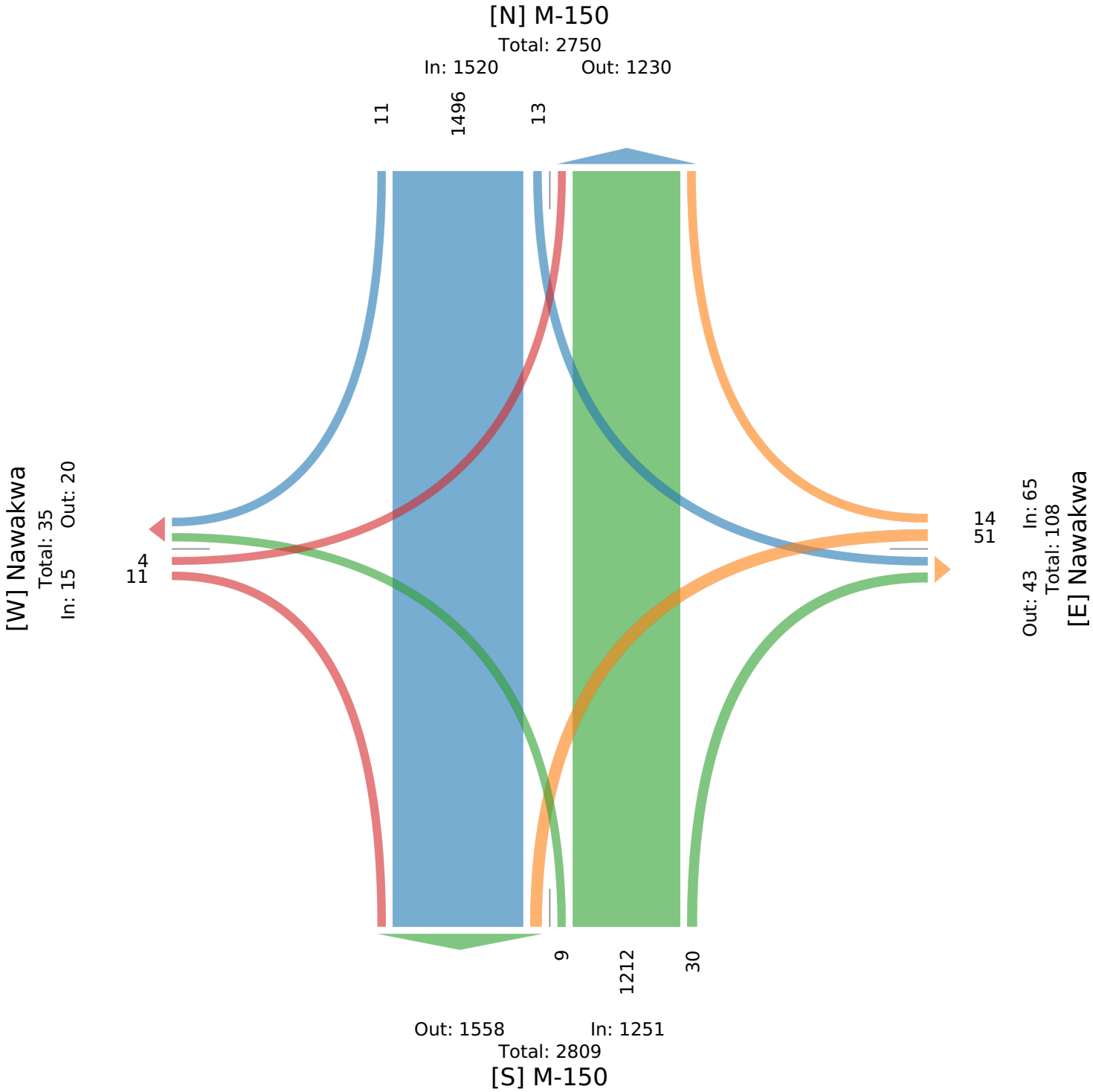
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Nawakwa					Nawakwa					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 8:00AM	0	0	3	0	**3**	11	0	3	0	**14**	0	248	9	0	**257**	5	370	1	0	**376**	**650**
8:15AM	1	0	4	0	**5**	13	0	4	0	**17**	2	308	5	0	**315**	1	384	2	0	**387**	**724**
8:30AM	1	0	4	0	**5**	17	0	3	0	**20**	4	317	6	0	**327**	4	407	5	0	**416**	**768**
8:45AM	2	0	0	0	**2**	10	0	4	0	**14**	3	339	10	0	**352**	3	335	3	0	**341**	**709**
Total	4	0	11	0	**15**	51	0	14	0	**65**	9	1212	30	0	**1251**	13	1496	11	0	**1520**	**2851**
% Approach	26.7%	0%	73.3%	0%	**-**	78.5%	0%	21.5%	0%	**-**	0.7%	96.9%	2.4%	0%	**-**	0.9%	98.4%	0.7%	0%	**-**	-
% Total	0.1%	0%	0.4%	0%	**0.5%**	1.8%	0%	0.5%	0%	**2.3%**	0.3%	42.5%	1.1%	0%	**43.9%**	0.5%	52.5%	0.4%	0%	**53.3%**	-
PHF	0.500	-	0.688	-	**0.750**	0.750	-	0.875	-	**0.813**	0.563	0.894	0.750	-	**0.888**	0.650	0.919	0.550	-	**0.913**	0.928
Lights	4	0	11	0	**15**	51	0	13	0	**64**	8	1169	29	0	**1206**	13	1460	10	0	**1483**	2768
% Lights	100%	0%	100%	0%	**100%**	100%	0%	92.9%	0%	**98.5%**	88.9%	96.5%	96.7%	0%	**96.4%**	100%	97.6%	90.9%	0%	**97.6%**	97.1%
Articulated Trucks	0	0	0	0	**0**	0	0	0	0	**0**	0	15	0	0	**15**	0	13	1	0	**14**	29
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	1.2%	0%	0%	**1.2%**	0%	0.9%	9.1%	0%	**0.9%**	1.0%
Buses and Single-Unit Trucks	0	0	0	0	**0**	0	0	1	0	**1**	1	28	1	0	**30**	0	23	0	0	**23**	54
% Buses and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0%	0%	7.1%	0%	**1.5%**	11.1%	2.3%	3.3%	0%	**2.4%**	0%	1.5%	0%	0%	**1.5%**	1.9%

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

M-150 @ Nawakwa Rd - TMC
Wed Jun 21, 2023
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081273, Location: 42.631271, -83.131594

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



M-150 @ Nawakwa Rd - TMC

Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081273, Location: 42.631271, -83.131594

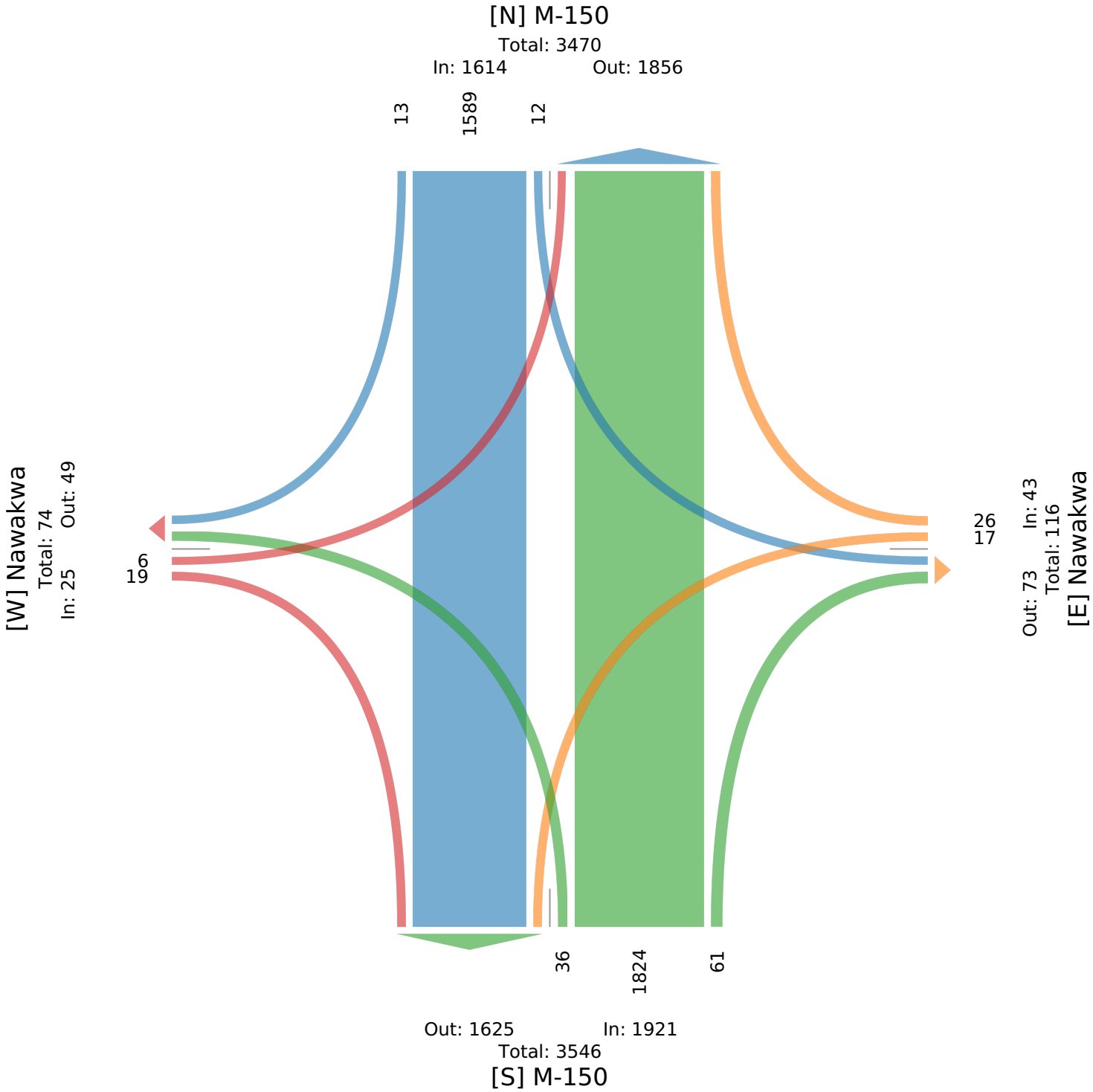
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Nawakwa					Nawakwa					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 4:45PM	0	0	3	0	**3**	7	0	6	0	**13**	9	448	13	0	**470**	5	389	3	0	**397**	**883**
5:00PM	3	0	6	0	**9**	7	0	7	0	**14**	9	455	16	0	**480**	0	419	2	0	**421**	**924**
5:15PM	3	0	3	0	**6**	0	0	5	0	**5**	6	456	20	0	**482**	2	427	6	0	**435**	**928**
5:30PM	0	0	7	0	**7**	3	0	8	0	**11**	12	465	12	0	**489**	5	354	2	0	**361**	**868**
Total	6	0	19	0	**25**	17	0	26	0	**43**	36	1824	61	0	**1921**	12	1589	13	0	**1614**	**3603**
% Approach	24.0%	0%	76.0%	0%	**-**	39.5%	0%	60.5%	0%	**-**	1.9%	95.0%	3.2%	0%	**-**	0.7%	98.5%	0.8%	0%	**-**	-
% Total	0.2%	0%	0.5%	0%	**0.7%**	0.5%	0%	0.7%	0%	**1.2%**	1.0%	50.6%	1.7%	0%	**53.3%**	0.3%	44.1%	0.4%	0%	**44.8%**	-
PHF	0.500	-	0.679	-	**0.694**	0.607	-	0.813	-	**0.768**	0.750	0.981	0.763	-	**0.982**	0.600	0.930	0.542	-	**0.928**	0.971
Lights	6	0	19	0	**25**	17	0	25	0	**42**	36	1811	61	0	**1908**	12	1571	13	0	**1596**	3571
% Lights	100%	0%	100%	0%	**100%**	100%	0%	96.2%	0%	**97.7%**	100%	99.3%	100%	0%	**99.3%**	100%	98.9%	100%	0%	**98.9%**	99.1%
Articulated Trucks	0	0	0	0	**0**	0	0	0	0	**0**	0	2	0	0	**2**	0	7	0	0	**7**	9
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0.1%	0%	0%	**0.1%**	0%	0.4%	0%	0%	**0.4%**	0.2%
Buses and Single-Unit Trucks	0	0	0	0	**0**	0	0	1	0	**1**	0	11	0	0	**11**	0	11	0	0	**11**	23
% Buses and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0%	0%	3.8%	0%	**2.3%**	0%	0.6%	0%	0%	**0.6%**	0%	0.7%	0%	0%	**0.7%**	0.6%

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

M-150 @ Nawakwa Rd - TMC
Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081273, Location: 42.631271, -83.131594

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



M-150 @ WB M-59 Off Ramp - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081274, Location: 42.630209, -83.131534

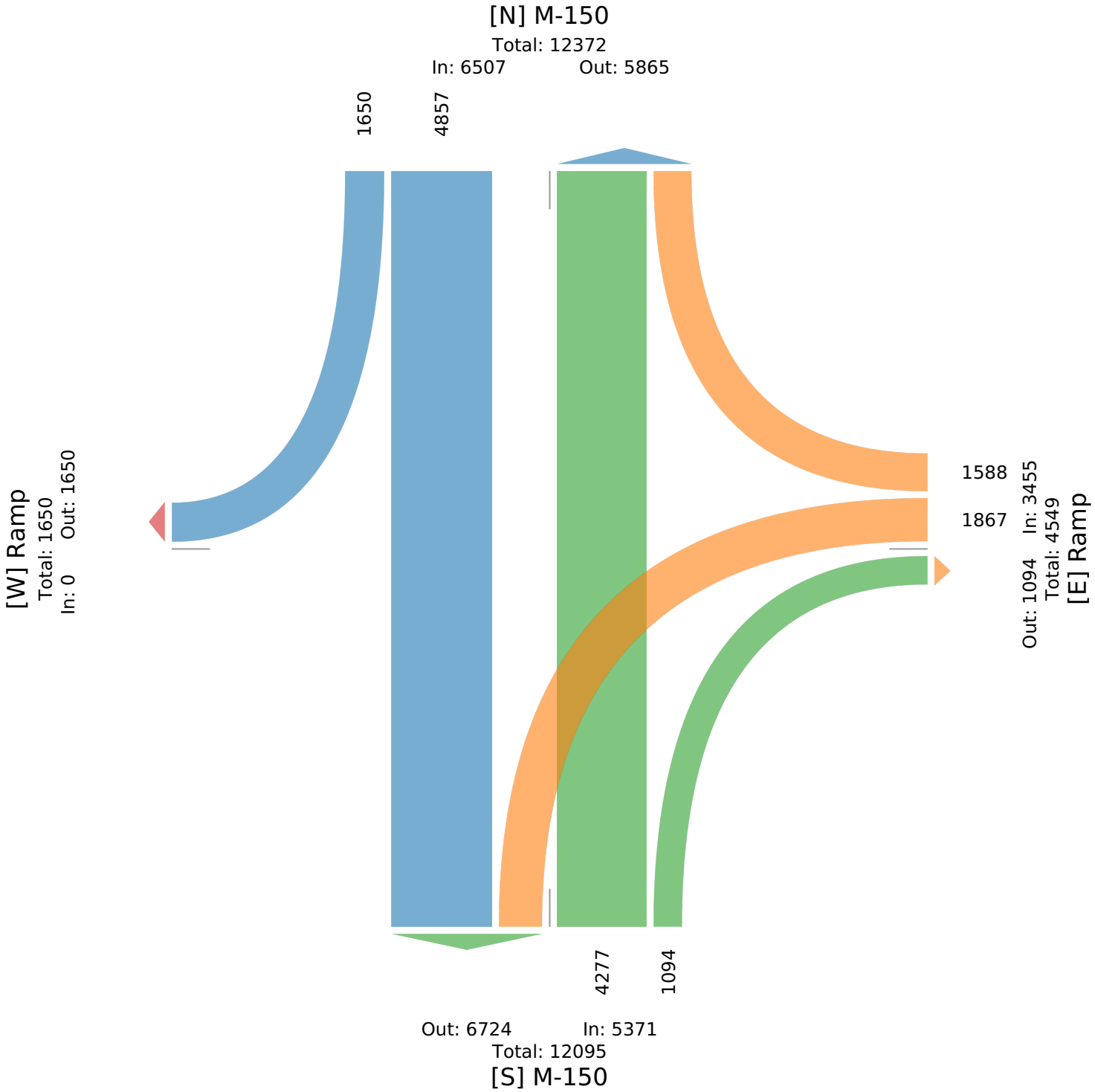
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Ramp			M-150				M-150				
Direction	Westbound			Northbound				Southbound				
Time	L	R	**App**	T	R	U	**App**	T	R	U	**App**	**Int**
2023-06-21 7:00AM	115	72	**187**	108	51	0	**159**	265	92	0	**357**	**703**
7:15AM	164	62	**226**	117	55	0	**172**	286	103	0	**389**	**787**
7:30AM	136	92	**228**	152	72	0	**224**	322	127	0	**449**	**901**
7:45AM	159	112	**271**	171	76	0	**247**	318	113	0	**431**	**949**
Hourly Total	574	338	**912**	548	254	0	**802**	1191	435	0	**1626**	**3340**
8:00AM	136	78	**214**	178	72	0	**250**	327	99	0	**426**	**890**
8:15AM	136	120	**256**	197	66	0	**263**	312	121	0	**433**	**952**
8:30AM	126	114	**240**	205	81	0	**286**	331	122	0	**453**	**979**
8:45AM	136	111	**247**	236	68	0	**304**	272	94	0	**366**	**917**
Hourly Total	534	423	**957**	816	287	0	**1103**	1242	436	0	**1678**	**3738**
4:00PM	92	102	**194**	366	79	0	**445**	281	83	0	**364**	**1003**
4:15PM	108	107	**215**	377	68	0	**445**	308	110	0	**418**	**1078**
4:30PM	71	101	**172**	314	66	0	**380**	282	128	0	**410**	**962**
4:45PM	82	95	**177**	376	87	0	**463**	310	99	0	**409**	**1049**
Hourly Total	353	405	**758**	1433	300	0	**1733**	1181	420	0	**1601**	**4092**
5:00PM	99	116	**215**	358	64	0	**422**	317	111	0	**428**	**1065**
5:15PM	106	111	**217**	376	64	0	**440**	350	81	0	**431**	**1088**
5:30PM	99	107	**206**	381	70	0	**451**	291	84	0	**375**	**1032**
5:45PM	102	88	**190**	365	55	0	**420**	285	83	0	**368**	**978**
Hourly Total	406	422	**828**	1480	253	0	**1733**	1243	359	0	**1602**	**4163**
Total	1867	1588	**3455**	4277	1094	0	**5371**	4857	1650	0	**6507**	**15333**
% Approach	54.0%	46.0%	**-**	79.6%	20.4%	0%	**-**	74.6%	25.4%	0%	**-**	-
% Total	12.2%	10.4%	**22.5%**	27.9%	7.1%	0%	**35.0%**	31.7%	10.8%	0%	**42.4%**	-
Lights	1834	1573	**3407**	4188	1087	0	**5275**	4799	1595	0	**6394**	15076
% Lights	98.2%	99.1%	**98.6%**	97.9%	99.4%	0%	**98.2%**	98.8%	96.7%	0%	**98.3%**	98.3%
Articulated Trucks	17	4	**21**	29	1	0	**30**	24	20	0	**44**	95
% Articulated Trucks	0.9%	0.3%	**0.6%**	0.7%	0.1%	0%	**0.6%**	0.5%	1.2%	0%	**0.7%**	0.6%
Buses and Single-Unit Trucks	16	11	**27**	60	6	0	**66**	34	35	0	**69**	162
% Buses and Single-Unit Trucks	0.9%	0.7%	**0.8%**	1.4%	0.5%	0%	**1.2%**	0.7%	2.1%	0%	**1.1%**	1.1%

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

M-150 @ WB M-59 Off Ramp - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081274, Location: 42.630209, -83.131534

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



M-150 @ WB M-59 Off Ramp - TMC

Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081274, Location: 42.630209, -83.131534

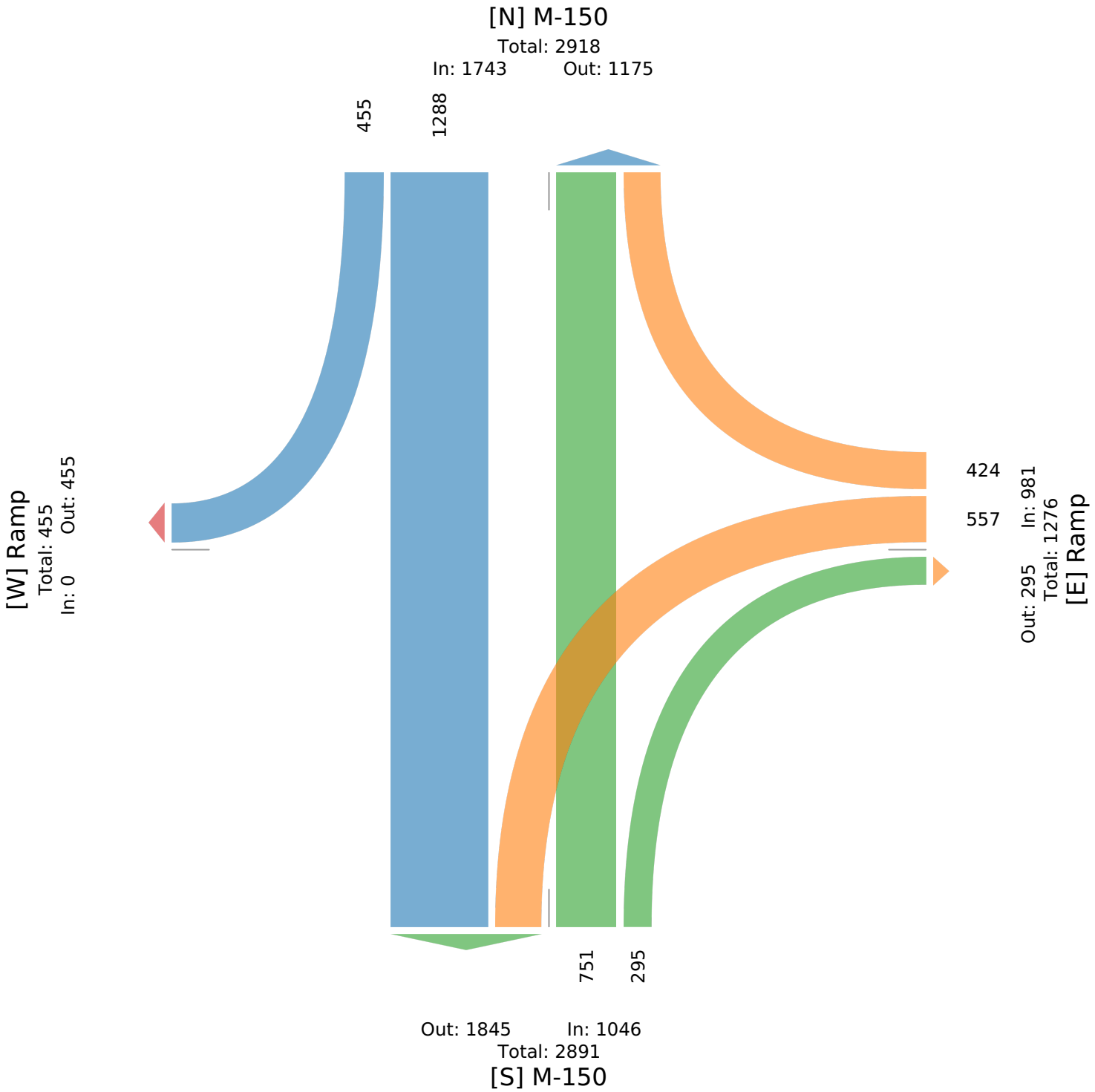
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Ramp			M-150				M-150				
Direction	Westbound			Northbound				Southbound				
Time	L	R	**App**	T	R	U	**App**	T	R	U	**App**	**Int**
2023-06-21 7:45AM	159	112	**271**	171	76	0	**247**	318	113	0	**431**	**949**
8:00AM	136	78	**214**	178	72	0	**250**	327	99	0	**426**	**890**
8:15AM	136	120	**256**	197	66	0	**263**	312	121	0	**433**	**952**
8:30AM	126	114	**240**	205	81	0	**286**	331	122	0	**453**	**979**
Total	557	424	**981**	751	295	0	**1046**	1288	455	0	**1743**	**3770**
% Approach	56.8%	43.2%	**-**	71.8%	28.2%	0%	**-**	73.9%	26.1%	0%	**-**	-
% Total	14.8%	11.2%	**26.0%**	19.9%	7.8%	0%	**27.7%**	34.2%	12.1%	0%	**46.2%**	-
PHF	0.876	0.883	**0.905**	0.916	0.910	-	**0.914**	0.973	0.932	-	**0.962**	0.963
Lights	546	417	**963**	713	293	0	**1006**	1270	434	0	**1704**	3673
% Lights	98.0%	98.3%	**98.2%**	94.9%	99.3%	0%	**96.2%**	98.6%	95.4%	0%	**97.8%**	97.4%
Articulated Trucks	7	2	**9**	16	0	0	**16**	8	10	0	**18**	43
% Articulated Trucks	1.3%	0.5%	**0.9%**	2.1%	0%	0%	**1.5%**	0.6%	2.2%	0%	**1.0%**	1.1%
Buses and Single-Unit Trucks	4	5	**9**	22	2	0	**24**	10	11	0	**21**	54
% Buses and Single-Unit Trucks	0.7%	1.2%	**0.9%**	2.9%	0.7%	0%	**2.3%**	0.8%	2.4%	0%	**1.2%**	1.4%

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

M-150 @ WB M-59 Off Ramp - TMC
Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081274, Location: 42.630209, -83.131534

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



M-150 @ WB M-59 Off Ramp - TMC

Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081274, Location: 42.630209, -83.131534

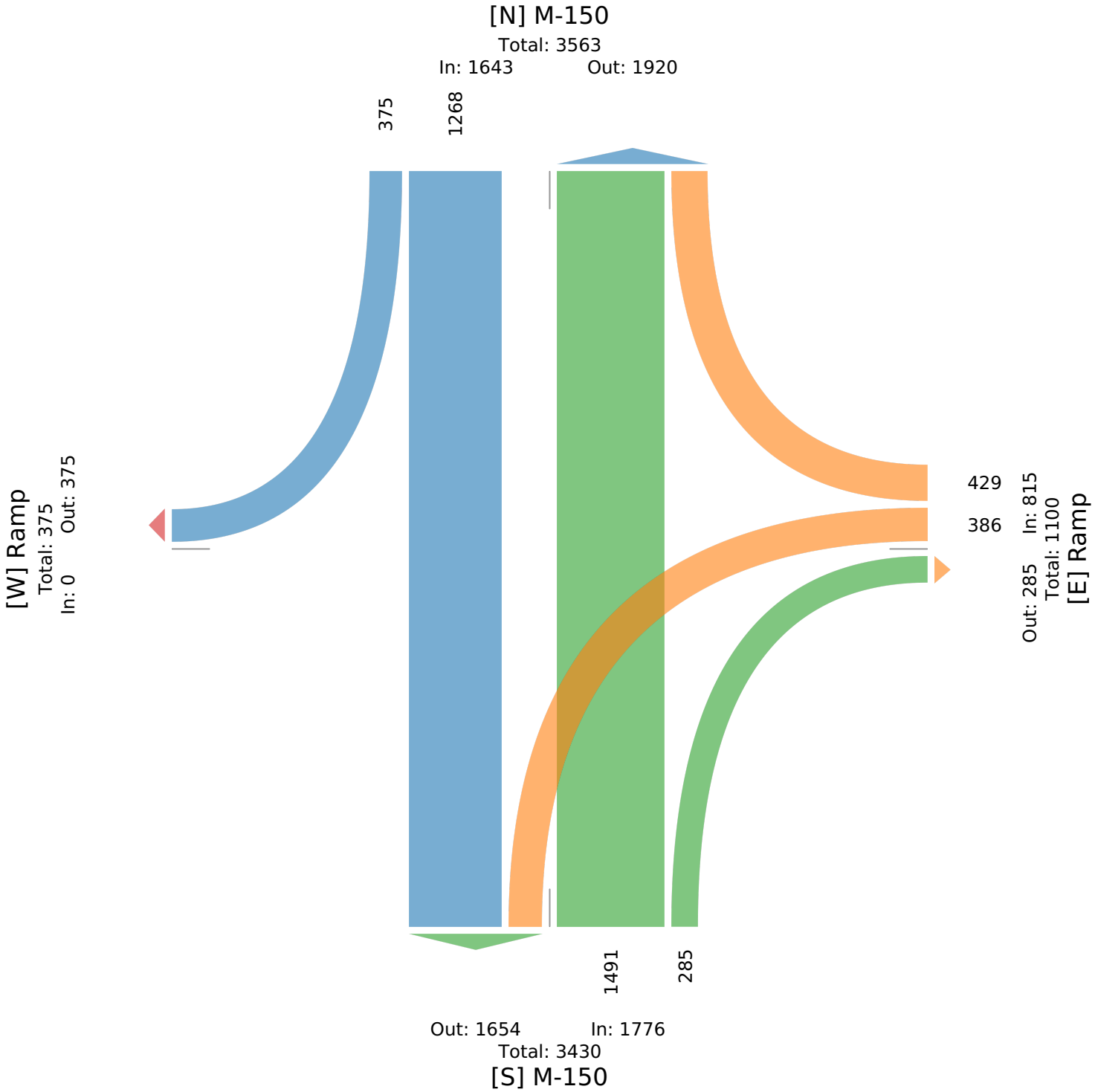
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Ramp			M-150				M-150				
Direction	Westbound			Northbound				Southbound				
Time	L	R	**App**	T	R	U	**App**	T	R	U	**App**	**Int**
2023-06-21 4:45PM	82	95	**177**	376	87	0	**463**	310	99	0	**409**	**1049**
5:00PM	99	116	**215**	358	64	0	**422**	317	111	0	**428**	**1065**
5:15PM	106	111	**217**	376	64	0	**440**	350	81	0	**431**	**1088**
5:30PM	99	107	**206**	381	70	0	**451**	291	84	0	**375**	**1032**
Total	386	429	**815**	1491	285	0	**1776**	1268	375	0	**1643**	**4234**
% Approach	47.4%	52.6%	**-**	84.0%	16.0%	0%	**-**	77.2%	22.8%	0%	**-**	-
% Total	9.1%	10.1%	**19.2%**	35.2%	6.7%	0%	**41.9%**	29.9%	8.9%	0%	**38.8%**	-
PHF	0.910	0.925	**0.939**	0.978	0.819	-	**0.959**	0.906	0.845	-	**0.953**	0.973
Lights	383	429	**812**	1478	284	0	**1762**	1254	369	0	**1623**	4197
% Lights	99.2%	100%	**99.6%**	99.1%	99.6%	0%	**99.2%**	98.9%	98.4%	0%	**98.8%**	99.1%
Articulated Trucks	0	0	**0**	2	0	0	**2**	5	1	0	**6**	8
% Articulated Trucks	0%	0%	**0%**	0.1%	0%	0%	**0.1%**	0.4%	0.3%	0%	**0.4%**	0.2%
Buses and Single-Unit Trucks	3	0	**3**	11	1	0	**12**	9	5	0	**14**	29
% Buses and Single-Unit Trucks	0.8%	0%	**0.4%**	0.7%	0.4%	0%	**0.7%**	0.7%	1.3%	0%	**0.9%**	0.7%

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

M-150 @ WB M-59 Off Ramp - TMC
Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081274, Location: 42.630209, -83.131534

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



M-150 @ EB M-59 Off Ramp - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081275, Location: 42.62666, -83.131178

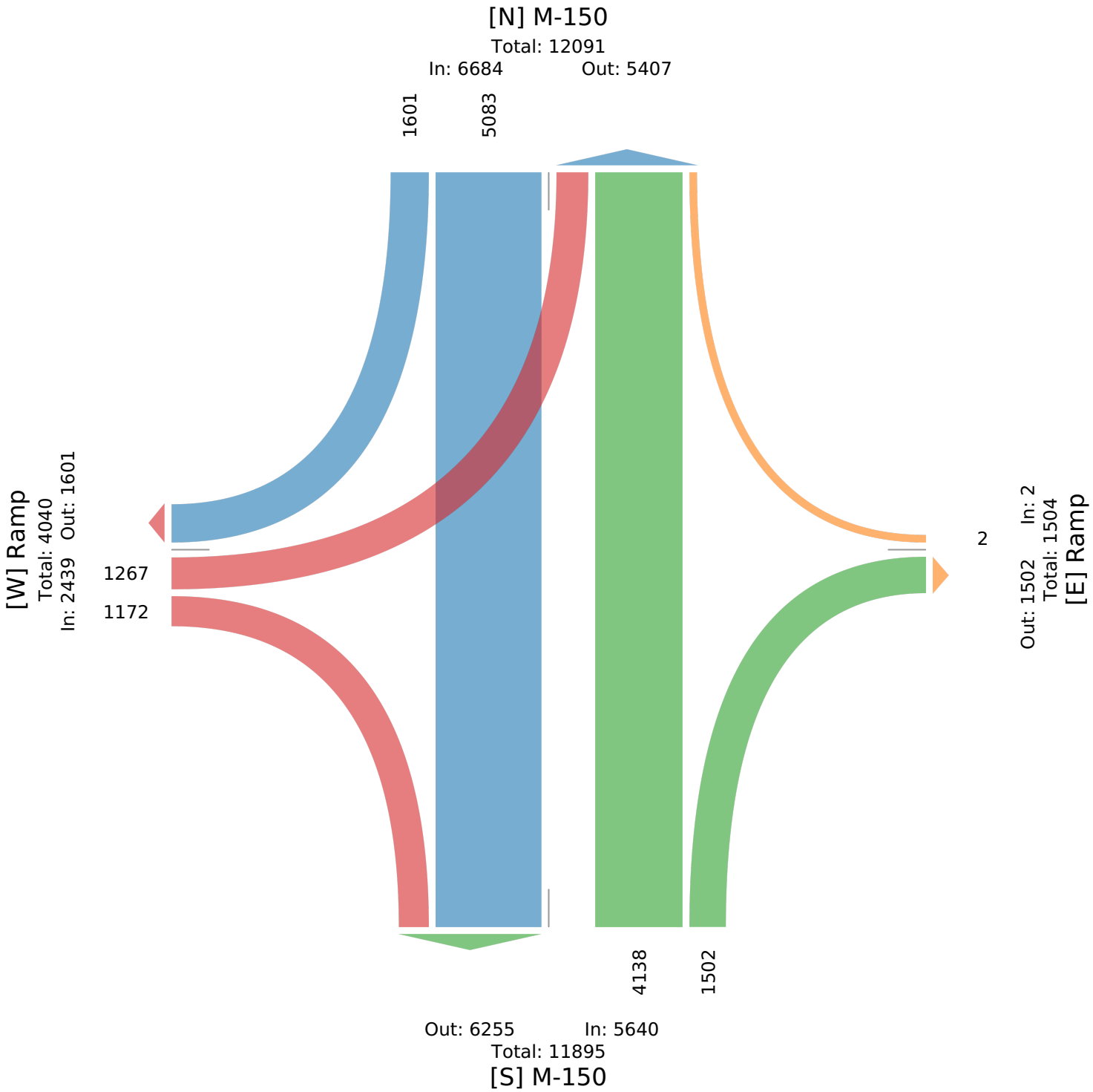
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Ramp					Ramp					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 7:00AM	24	0	39	0	**63**	0	0	1	0	**1**	0	137	75	0	**212**	0	252	98	0	**350**	**626**
7:15AM	33	0	45	0	**78**	0	0	0	0	**0**	0	141	80	0	**221**	0	342	107	0	**449**	**748**
7:30AM	46	0	39	0	**85**	0	0	0	0	**0**	0	176	95	0	**271**	0	338	129	0	**467**	**823**
7:45AM	66	0	60	0	**126**	0	0	1	0	**1**	0	188	96	0	**284**	0	353	113	0	**466**	**877**
Hourly Total	169	0	183	0	**352**	0	0	2	0	**2**	0	642	346	0	**988**	0	1285	447	0	**1732**	**3074**
8:00AM	65	0	50	0	**115**	0	0	0	0	**0**	0	185	77	0	**262**	0	371	97	0	**468**	**845**
8:15AM	67	0	51	0	**118**	0	0	0	0	**0**	0	195	66	0	**261**	0	358	98	0	**456**	**835**
8:30AM	71	0	61	0	**132**	0	0	0	0	**0**	0	225	89	0	**314**	0	351	116	0	**467**	**913**
8:45AM	58	0	73	0	**131**	0	0	0	0	**0**	0	253	81	0	**334**	0	330	87	0	**417**	**882**
Hourly Total	261	0	235	0	**496**	0	0	0	0	**0**	0	858	313	0	**1171**	0	1410	398	0	**1808**	**3475**
4:00PM	94	0	63	0	**157**	0	0	0	0	**0**	0	351	63	0	**414**	0	290	98	0	**388**	**959**
4:15PM	105	0	81	0	**186**	0	0	0	0	**0**	0	327	114	0	**441**	0	296	103	0	**399**	**1026**
4:30PM	101	0	78	0	**179**	0	0	0	0	**0**	0	297	95	0	**392**	0	253	83	0	**336**	**907**
4:45PM	92	0	75	0	**167**	0	0	0	0	**0**	0	361	125	0	**486**	0	284	98	0	**382**	**1035**
Hourly Total	392	0	297	0	**689**	0	0	0	0	**0**	0	1336	397	0	**1733**	0	1123	382	0	**1505**	**3927**
5:00PM	114	0	105	0	**219**	0	0	0	0	**0**	0	339	105	0	**444**	0	296	114	0	**410**	**1073**
5:15PM	122	0	128	0	**250**	0	0	0	0	**0**	0	326	129	0	**455**	0	355	98	0	**453**	**1158**
5:30PM	117	0	131	0	**248**	0	0	0	0	**0**	0	316	125	0	**441**	0	294	90	0	**384**	**1073**
5:45PM	92	0	93	0	**185**	0	0	0	0	**0**	0	321	87	0	**408**	0	320	72	0	**392**	**985**
Hourly Total	445	0	457	0	**902**	0	0	0	0	**0**	0	1302	446	0	**1748**	0	1265	374	0	**1639**	**4289**
Total	1267	0	1172	0	**2439**	0	0	2	0	**2**	0	4138	1502	0	**5640**	0	5083	1601	0	**6684**	**14765**
% Approach	51.9%	0%	48.1%	0%	**-**	0%	0%	100%	0%	**-**	0%	73.4%	26.6%	0%	**-**	0%	76.0%	24.0%	0%	**-**	-
% Total	8.6%	0%	7.9%	0%	**16.5%**	0%	0%	0%	0%	**0%**	0%	28.0%	10.2%	0%	**38.2%**	0%	34.4%	10.8%	0%	**45.3%**	-
Lights	1228	0	1154	0	**2382**	0	0	2	0	**2**	0	4086	1470	0	**5556**	0	5026	1578	0	**6604**	14544
% Lights	96.9%	0%	98.5%	0%	**97.7%**	0%	0%	100%	0%	**100%**	0%	98.7%	97.9%	0%	**98.5%**	0%	98.9%	98.6%	0%	**98.8%**	98.5%
Articulated Trucks	16	0	4	0	**20**	0	0	0	0	**0**	0	19	15	0	**34**	0	27	11	0	**38**	92
% Articulated Trucks	1.3%	0%	0.3%	0%	**0.8%**	0%	0%	0%	0%	**0%**	0%	0.5%	1.0%	0%	**0.6%**	0%	0.5%	0.7%	0%	**0.6%**	0.6%
Buses and Single-Unit Trucks	23	0	14	0	**37**	0	0	0	0	**0**	0	33	17	0	**50**	0	30	12	0	**42**	129
% Buses and Single-Unit Trucks	1.8%	0%	1.2%	0%	**1.5%**	0%	0%	0%	0%	**0%**	0%	0.8%	1.1%	0%	**0.9%**	0%	0.6%	0.7%	0%	**0.6%**	0.9%

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

M-150 @ EB M-59 Off Ramp - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081275, Location: 42.62666, -83.131178

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



M-150 @ EB M-59 Off Ramp - TMC

Wed Jun 21, 2023
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081275, Location: 42.62666, -83.131178

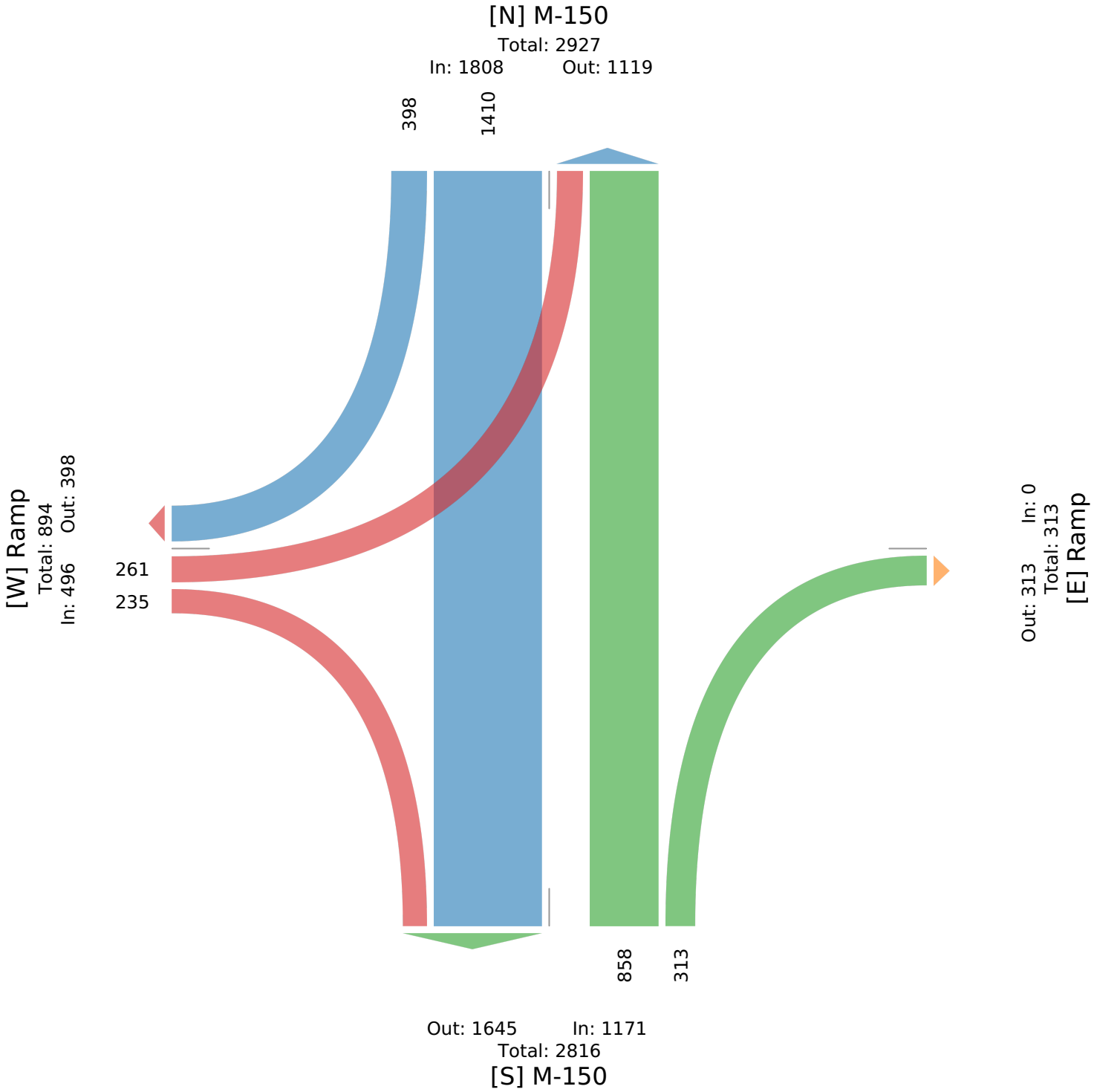
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Ramp					Ramp					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 8:00AM	65	0	50	0	**115**	0	0	0	0	**0**	0	185	77	0	**262**	0	371	97	0	**468**	**845**
8:15AM	67	0	51	0	**118**	0	0	0	0	**0**	0	195	66	0	**261**	0	358	98	0	**456**	**835**
8:30AM	71	0	61	0	**132**	0	0	0	0	**0**	0	225	89	0	**314**	0	351	116	0	**467**	**913**
8:45AM	58	0	73	0	**131**	0	0	0	0	**0**	0	253	81	0	**334**	0	330	87	0	**417**	**882**
Total	261	0	235	0	**496**	0	0	0	0	**0**	0	858	313	0	**1171**	0	1410	398	0	**1808**	**3475**
% Approach	52.6%	0%	47.4%	0%	**-**	0%	0%	0%	0%	**-**	0%	73.3%	26.7%	0%	**-**	0%	78.0%	22.0%	0%	**-**	-
% Total	7.5%	0%	6.8%	0%	**14.3%**	0%	0%	0%	0%	**0%**	0%	24.7%	9.0%	0%	**33.7%**	0%	40.6%	11.5%	0%	**52.0%**	-
PHF	0.919	-	0.805	-	**0.939**	-	-	-	-	**-**	-	0.848	0.879	-	**0.876**	-	0.950	0.858	-	**0.966**	0.952
Lights	248	0	229	0	**477**	0	0	0	0	**0**	0	833	300	0	**1133**	0	1395	389	0	**1784**	3394
% Lights	95.0%	0%	97.4%	0%	**96.2%**	0%	0%	0%	0%	**-**	0%	97.1%	95.8%	0%	**96.8%**	0%	98.9%	97.7%	0%	**98.7%**	97.7%
Articulated Trucks	5	0	2	0	**7**	0	0	0	0	**0**	0	9	5	0	**14**	0	6	5	0	**11**	32
% Articulated Trucks	1.9%	0%	0.9%	0%	**1.4%**	0%	0%	0%	0%	**-**	0%	1.0%	1.6%	0%	**1.2%**	0%	0.4%	1.3%	0%	**0.6%**	0.9%
Buses and Single-Unit Trucks	8	0	4	0	**12**	0	0	0	0	**0**	0	16	8	0	**24**	0	9	4	0	**13**	49
% Buses and Single-Unit Trucks	3.1%	0%	1.7%	0%	**2.4%**	0%	0%	0%	0%	**-**	0%	1.9%	2.6%	0%	**2.0%**	0%	0.6%	1.0%	0%	**0.7%**	1.4%

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

M-150 @ EB M-59 Off Ramp - TMC
Wed Jun 21, 2023
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081275, Location: 42.62666, -83.131178

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



M-150 @ EB M-59 Off Ramp - TMC

Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081275, Location: 42.62666, -83.131178

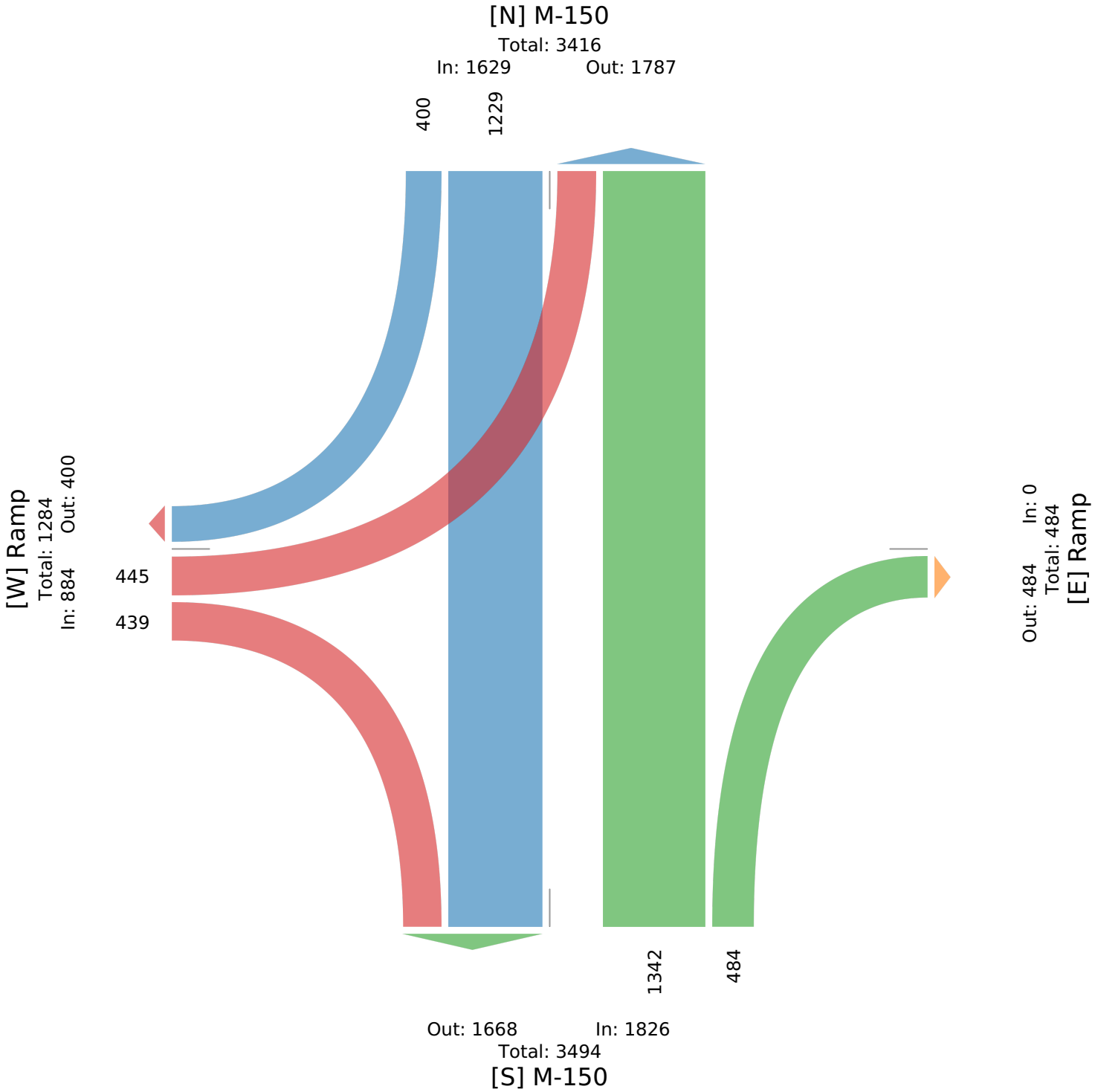
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Ramp					Ramp					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2023-06-21 4:45PM	92	0	75	0	**167**	0	0	0	0	**0**	0	361	125	0	**486**	0	284	98	0	**382**	**1035**
5:00PM	114	0	105	0	**219**	0	0	0	0	**0**	0	339	105	0	**444**	0	296	114	0	**410**	**1073**
5:15PM	122	0	128	0	**250**	0	0	0	0	**0**	0	326	129	0	**455**	0	355	98	0	**453**	**1158**
5:30PM	117	0	131	0	**248**	0	0	0	0	**0**	0	316	125	0	**441**	0	294	90	0	**384**	**1073**
Total	445	0	439	0	**884**	0	0	0	0	**0**	0	1342	484	0	**1826**	0	1229	400	0	**1629**	**4339**
% Approach	50.3%	0%	49.7%	0%	**-**	0%	0%	0%	0%	**-**	0%	73.5%	26.5%	0%	**-**	0%	75.4%	24.6%	0%	**-**	-
% Total	10.3%	0%	10.1%	0%	**20.4%**	0%	0%	0%	0%	**0%**	0%	30.9%	11.2%	0%	**42.1%**	0%	28.3%	9.2%	0%	**37.5%**	-
PHF	0.912	-	0.838	-	**0.884**	-	-	-	-	**-**	-	0.929	0.938	-	**0.939**	-	0.865	0.877	-	**0.899**	0.937
Lights	437	0	435	0	**872**	0	0	0	0	**0**	0	1339	484	0	**1823**	0	1218	394	0	**1612**	4307
% Lights	98.2%	0%	99.1%	0%	**98.6%**	0%	0%	0%	0%	**-**	0%	99.8%	100%	0%	**99.8%**	0%	99.1%	98.5%	0%	**99.0%**	99.3%
Articulated Trucks	2	0	0	0	**2**	0	0	0	0	**0**	0	0	0	0	**0**	0	3	4	0	**7**	9
% Articulated Trucks	0.4%	0%	0%	0%	**0.2%**	0%	0%	0%	0%	**-**	0%	0%	0%	0%	**0%**	0%	0.2%	1.0%	0%	**0.4%**	0.2%
Buses and Single-Unit Trucks	6	0	4	0	**10**	0	0	0	0	**0**	0	3	0	0	**3**	0	8	2	0	**10**	23
% Buses and Single-Unit Trucks	1.3%	0%	0.9%	0%	**1.1%**	0%	0%	0%	0%	**-**	0%	0.2%	0%	0%	**0.2%**	0%	0.7%	0.5%	0%	**0.6%**	0.5%

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

M-150 @ EB M-59 Off Ramp - TMC
Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081275, Location: 42.62666, -83.131178

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



M-150 @ South Blvd - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081276, Location: 42.623028, -83.130712

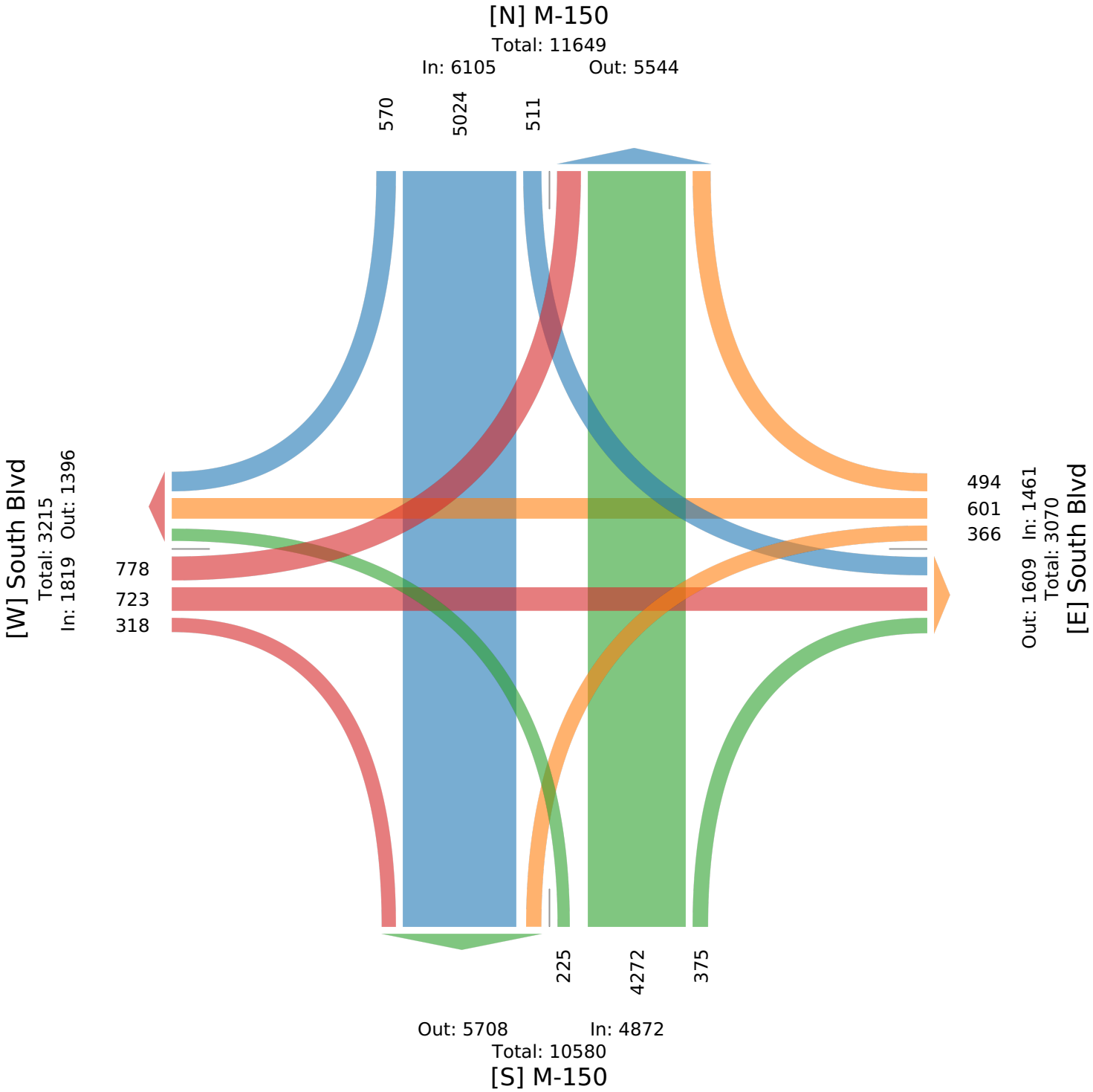
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Blvd					South Blvd					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 7:00AM	36	17	14	0	**67**	16	21	13	0	**50**	9	149	12	0	**170**	15	282	13	0	**310**	**597**
7:15AM	38	21	13	0	**72**	13	25	17	0	**55**	6	163	11	0	**180**	22	329	19	0	**370**	**677**
7:30AM	36	26	10	0	**72**	22	31	21	0	**74**	7	201	18	0	**226**	15	316	27	0	**358**	**730**
7:45AM	40	31	18	0	**89**	25	44	24	0	**93**	12	203	16	0	**231**	28	310	34	0	**372**	**785**
Hourly Total	150	95	55	0	**300**	76	121	75	0	**272**	34	716	57	0	**807**	80	1237	93	0	**1410**	**2789**
8:00AM	34	27	20	0	**81**	22	39	24	0	**85**	9	227	17	0	**253**	25	369	36	0	**430**	**849**
8:15AM	29	48	16	0	**93**	18	43	39	0	**100**	10	201	11	0	**222**	33	310	35	0	**378**	**793**
8:30AM	38	29	22	0	**89**	20	48	40	0	**108**	15	229	14	0	**258**	31	333	27	0	**391**	**846**
8:45AM	53	35	26	0	**114**	23	42	37	0	**102**	15	232	11	0	**258**	33	295	52	0	**380**	**854**
Hourly Total	154	139	84	0	**377**	83	172	140	0	**395**	49	889	53	0	**991**	122	1307	150	0	**1579**	**3342**
4:00PM	51	42	22	0	**115**	28	41	31	0	**100**	20	345	28	0	**393**	39	293	33	0	**365**	**973**
4:15PM	65	65	20	0	**150**	26	49	37	0	**112**	20	316	34	0	**370**	31	287	46	0	**364**	**996**
4:30PM	54	51	18	0	**123**	25	43	39	0	**107**	12	314	25	0	**351**	30	264	51	0	**345**	**926**
4:45PM	80	66	20	0	**166**	29	45	38	0	**112**	12	343	33	0	**388**	23	302	42	0	**367**	**1033**
Hourly Total	250	224	80	0	**554**	108	178	145	0	**431**	64	1318	120	0	**1502**	123	1146	172	0	**1441**	**3928**
5:00PM	50	73	28	0	**151**	27	43	49	0	**119**	25	328	23	0	**376**	42	304	38	0	**384**	**1030**
5:15PM	53	70	23	0	**146**	23	33	32	0	**88**	17	378	30	0	**425**	44	361	47	0	**452**	**1111**
5:30PM	77	73	26	0	**176**	26	31	32	0	**89**	19	318	42	0	**379**	58	324	28	0	**410**	**1054**
5:45PM	44	49	22	0	**115**	23	23	21	0	**67**	17	325	50	0	**392**	42	345	42	0	**429**	**1003**
Hourly Total	224	265	99	0	**588**	99	130	134	0	**363**	78	1349	145	0	**1572**	186	1334	155	0	**1675**	**4198**
Total	778	723	318	0	**1819**	366	601	494	0	**1461**	225	4272	375	0	**4872**	511	5024	570	0	**6105**	**14257**
% Approach	42.8%	39.7%	17.5%	0%	-	25.1%	41.1%	33.8%	0%	-	4.6%	87.7%	7.7%	0%	-	8.4%	82.3%	9.3%	0%	-	-
% Total	5.5%	5.1%	2.2%	0%	**12.8%**	2.6%	4.2%	3.5%	0%	**10.2%**	1.6%	30.0%	2.6%	0%	**34.2%**	3.6%	35.2%	4.0%	0%	**42.8%**	-
Lights	762	711	313	0	**1786**	361	590	491	0	**1442**	224	4199	372	0	**4795**	502	4965	560	0	**6027**	14050
% Lights	97.9%	98.3%	98.4%	0%	**98.2%**	98.6%	98.2%	99.4%	0%	**98.7%**	99.6%	98.3%	99.2%	0%	**98.4%**	98.2%	98.8%	98.2%	0%	**98.7%**	98.5%
Articulated Trucks	4	1	2	0	**7**	1	1	0	0	**2**	0	25	1	0	**26**	2	24	1	0	**27**	62
% Articulated Trucks	0.5%	0.1%	0.6%	0%	**0.4%**	0.3%	0.2%	0%	0%	**0.1%**	0%	0.6%	0.3%	0%	**0.5%**	0.4%	0.5%	0.2%	0%	**0.4%**	0.4%
Buses and Single-Unit Trucks	12	11	3	0	**26**	4	10	3	0	**17**	1	48	2	0	**51**	7	35	9	0	**51**	145
% Buses and Single-Unit Trucks	1.5%	1.5%	0.9%	0%	**1.4%**	1.1%	1.7%	0.6%	0%	**1.2%**	0.4%	1.1%	0.5%	0%	**1.0%**	1.4%	0.7%	1.6%	0%	**0.8%**	1.0%

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

M-150 @ South Blvd - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081276, Location: 42.623028, -83.130712

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



M-150 @ South Blvd - TMC

Wed Jun 21, 2023
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081276, Location: 42.623028, -83.130712

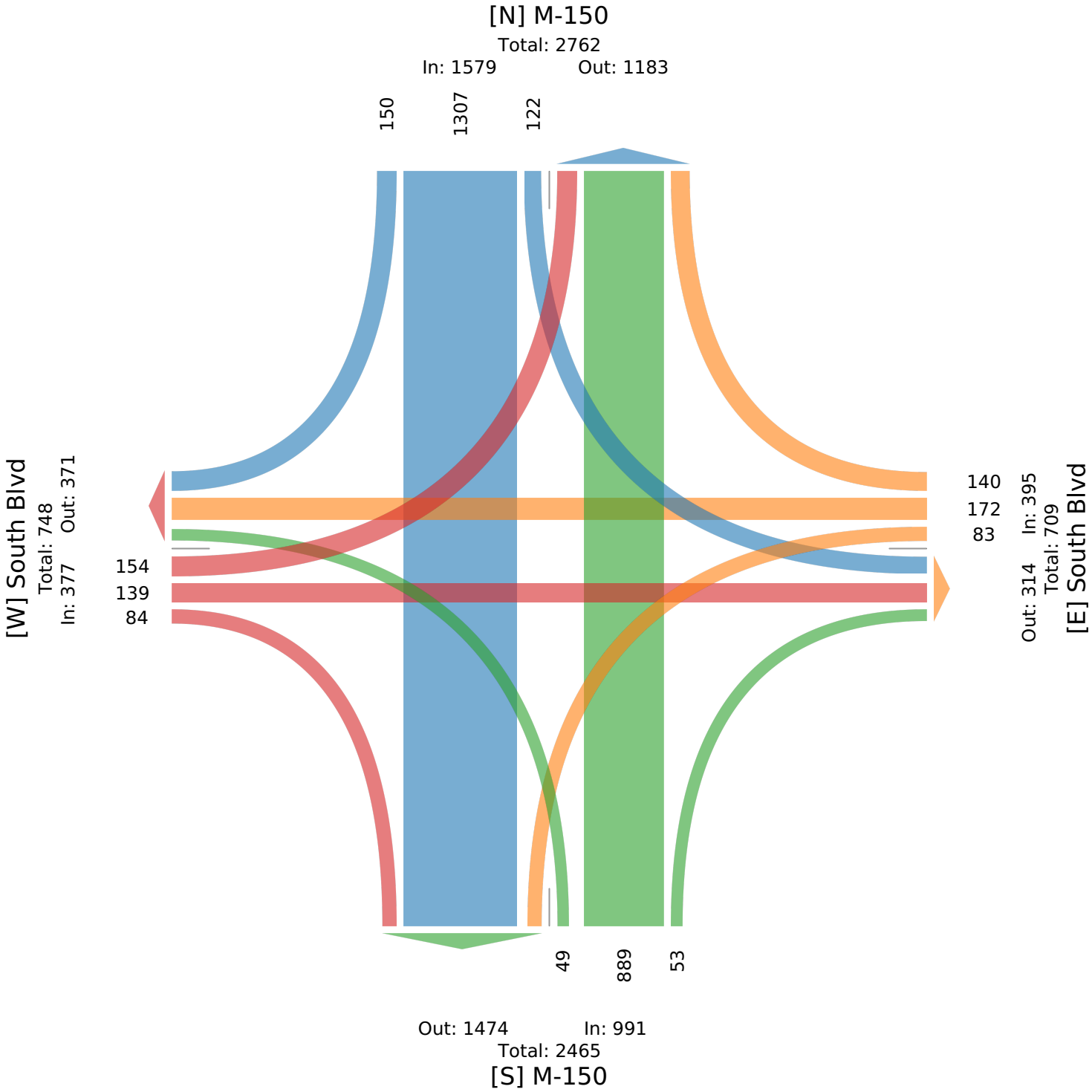
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Blvd					South Blvd					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 8:00AM	34	27	20	0	**81**	22	39	24	0	**85**	9	227	17	0	**253**	25	369	36	0	**430**	**849**
8:15AM	29	48	16	0	**93**	18	43	39	0	**100**	10	201	11	0	**222**	33	310	35	0	**378**	**793**
8:30AM	38	29	22	0	**89**	20	48	40	0	**108**	15	229	14	0	**258**	31	333	27	0	**391**	**846**
8:45AM	53	35	26	0	**114**	23	42	37	0	**102**	15	232	11	0	**258**	33	295	52	0	**380**	**854**
Total	154	139	84	0	**377**	83	172	140	0	**395**	49	889	53	0	**991**	122	1307	150	0	**1579**	**3342**
% Approach	40.8%	36.9%	22.3%	0%	-	21.0%	43.5%	35.4%	0%	-	4.9%	89.7%	5.3%	0%	-	7.7%	82.8%	9.5%	0%	-	-
% Total	4.6%	4.2%	2.5%	0%	**11.3%**	2.5%	5.1%	4.2%	0%	**11.8%**	1.5%	26.6%	1.6%	0%	**29.7%**	3.7%	39.1%	4.5%	0%	**47.2%**	-
PHF	0.726	0.724	0.808	-	**0.827**	0.902	0.896	0.875	-	**0.914**	0.817	0.958	0.779	-	**0.960**	0.924	0.886	0.721	-	**0.918**	0.978
Lights	149	138	84	0	**371**	79	168	139	0	**386**	49	855	53	0	**957**	119	1291	146	0	**1556**	3270
% Lights	96.8%	99.3%	100%	0%	**98.4%**	95.2%	97.7%	99.3%	0%	**97.7%**	100%	96.2%	100%	0%	**96.6%**	97.5%	98.8%	97.3%	0%	**98.5%**	97.8%
Articulated Trucks	1	0	0	0	**1**	1	0	0	0	**1**	0	9	0	0	**9**	1	6	0	0	**7**	18
% Articulated Trucks	0.6%	0%	0%	0%	**0.3%**	1.2%	0%	0%	0%	**0.3%**	0%	1.0%	0%	0%	**0.9%**	0.8%	0.5%	0%	0%	**0.4%**	0.5%
Buses and Single-Unit Trucks	4	1	0	0	**5**	3	4	1	0	**8**	0	25	0	0	**25**	2	10	4	0	**16**	54
% Buses and Single-Unit Trucks	2.6%	0.7%	0%	0%	**1.3%**	3.6%	2.3%	0.7%	0%	**2.0%**	0%	2.8%	0%	0%	**2.5%**	1.6%	0.8%	2.7%	0%	**1.0%**	1.6%

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

M-150 @ South Blvd - TMC
Wed Jun 21, 2023
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081276, Location: 42.623028, -83.130712

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



M-150 @ South Blvd - TMC

Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081276, Location: 42.623028, -83.130712

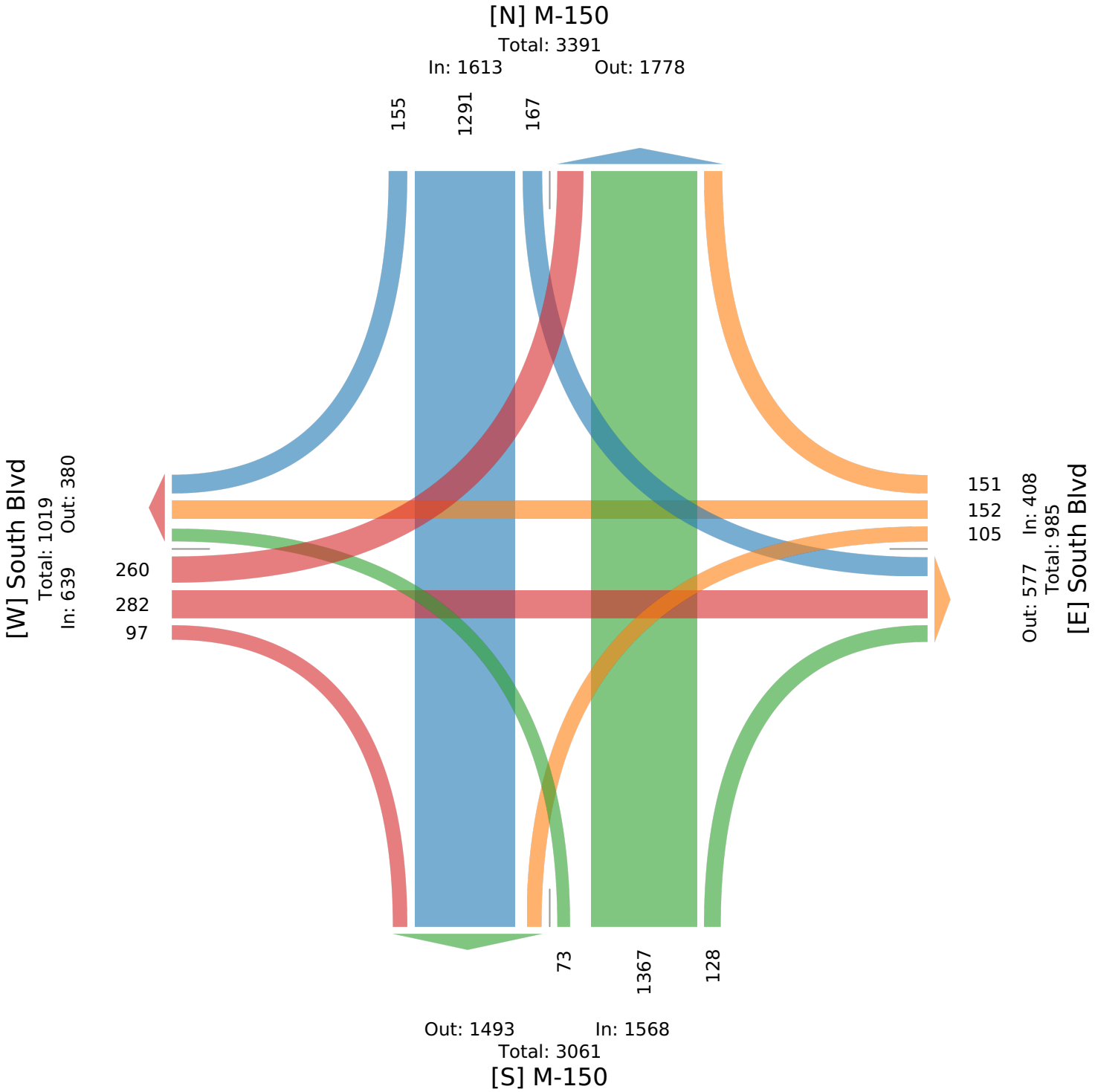
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Blvd					South Blvd					M-150					M-150					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-06-21 4:45PM	80	66	20	0	**166**	29	45	38	0	**112**	12	343	33	0	**388**	23	302	42	0	**367**	**1033**
5:00PM	50	73	28	0	**151**	27	43	49	0	**119**	25	328	23	0	**376**	42	304	38	0	**384**	**1030**
5:15PM	53	70	23	0	**146**	23	33	32	0	**88**	17	378	30	0	**425**	44	361	47	0	**452**	**1111**
5:30PM	77	73	26	0	**176**	26	31	32	0	**89**	19	318	42	0	**379**	58	324	28	0	**410**	**1054**
Total	260	282	97	0	**639**	105	152	151	0	**408**	73	1367	128	0	**1568**	167	1291	155	0	**1613**	**4228**
% Approach	40.7%	44.1%	15.2%	0%	-	25.7%	37.3%	37.0%	0%	-	4.7%	87.2%	8.2%	0%	-	10.4%	80.0%	9.6%	0%	-	-
% Total	6.1%	6.7%	2.3%	0%	**15.1%**	2.5%	3.6%	3.6%	0%	**9.6%**	1.7%	32.3%	3.0%	0%	**37.1%**	3.9%	30.5%	3.7%	0%	**38.2%**	-
PHF	0.813	0.966	0.866	-	**0.908**	0.905	0.844	0.770	-	**0.857**	0.730	0.904	0.762	-	**0.922**	0.720	0.894	0.824	-	**0.892**	0.951
Lights	260	276	95	0	**631**	105	152	151	0	**408**	73	1363	128	0	**1564**	164	1278	153	0	**1595**	4198
% Lights	100%	97.9%	97.9%	0%	**98.7%**	100%	100%	100%	0%	**100%**	100%	99.7%	100%	0%	**99.7%**	98.2%	99.0%	98.7%	0%	**98.9%**	99.3%
Articulated Trucks	0	1	0	0	**1**	0	0	0	0	**0**	0	0	0	0	**0**	0	3	1	0	**4**	5
% Articulated Trucks	0%	0.4%	0%	0%	**0.2%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0.2%	0.6%	0%	**0.2%**	0.1%
Buses and Single-Unit Trucks	0	5	2	0	**7**	0	0	0	0	**0**	0	4	0	0	**4**	3	10	1	0	**14**	25
% Buses and Single-Unit Trucks	0%	1.8%	2.1%	0%	**1.1%**	0%	0%	0%	0%	**0%**	0%	0.3%	0%	0%	**0.3%**	1.8%	0.8%	0.6%	0%	**0.9%**	0.6%

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

M-150 @ South Blvd - TMC
Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1081276, Location: 42.623028, -83.130712

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



Sunoco Eastern Access Points and SR 150 - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092944, Location: 42.630997, -83.13162

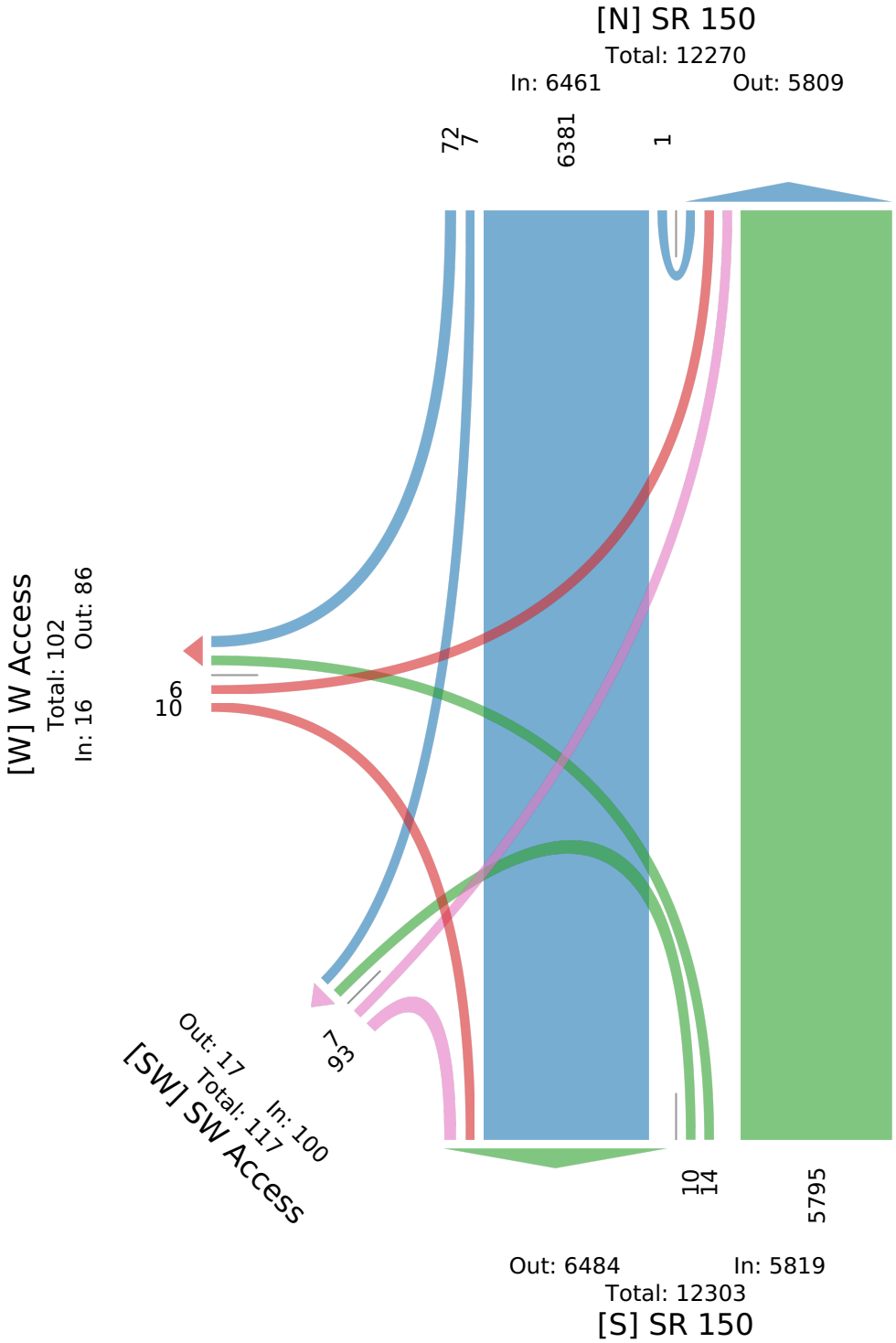
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	W Access					SR 150					SR 150					SW Access					
Direction	Eastbound					Northbound					Southbound					Northeastbound					
Time	L	R	HR	U	**App**	HL	L	T	U	**App**	T	BR	R	U	**App**	HL	BL	HR	U	**App**	**Int**
2023-06-21 7:00AM	0	0	0	0	**0**	0	0	182	0	**182**	350	0	3	0	**353**	0	0	4	0	**4**	**539**
7:15AM	0	0	0	0	**0**	1	0	184	0	**185**	392	1	0	0	**393**	0	0	3	0	**3**	**581**
7:30AM	0	1	0	0	**1**	0	1	241	0	**242**	438	0	9	0	**447**	0	0	5	0	**5**	**695**
7:45AM	1	0	0	0	**1**	0	1	277	0	**278**	454	0	3	0	**457**	0	1	5	0	**6**	**742**
Hourly Total	1	1	0	0	**2**	1	2	884	0	**887**	1634	1	15	0	**1650**	0	1	17	0	**18**	**2557**
8:00AM	0	0	0	0	**0**	0	0	257	0	**257**	419	1	8	1	**429**	0	0	3	0	**3**	**689**
8:15AM	0	0	0	0	**0**	1	1	315	0	**317**	426	0	3	0	**429**	0	0	10	0	**10**	**756**
8:30AM	1	0	0	0	**1**	1	1	321	0	**323**	436	0	3	0	**439**	0	1	4	0	**5**	**768**
8:45AM	0	1	0	0	**1**	1	0	351	0	**352**	350	0	2	0	**352**	0	0	4	0	**4**	**709**
Hourly Total	1	1	0	0	**2**	3	2	1244	0	**1249**	1631	1	16	1	**1649**	0	1	21	0	**22**	**2922**
4:00PM	0	0	0	0	**0**	0	1	468	0	**469**	352	1	1	0	**354**	0	3	3	0	**6**	**829**
4:15PM	2	0	0	0	**2**	0	3	474	0	**477**	403	0	7	0	**410**	0	0	6	0	**6**	**895**
4:30PM	0	0	0	0	**0**	1	0	403	0	**404**	403	1	3	0	**407**	0	1	7	0	**8**	**819**
4:45PM	0	2	0	0	**2**	0	2	454	0	**456**	393	2	7	0	**402**	0	0	6	0	**6**	**866**
Hourly Total	2	2	0	0	**4**	1	6	1799	0	**1806**	1551	4	18	0	**1573**	0	4	22	0	**26**	**3409**
5:00PM	0	3	0	0	**3**	0	1	473	0	**474**	422	1	7	0	**430**	0	0	8	0	**8**	**915**
5:15PM	1	0	0	0	**1**	3	1	459	0	**463**	423	0	4	0	**427**	0	0	7	0	**7**	**898**
5:30PM	0	2	0	0	**2**	2	1	487	0	**490**	367	0	5	0	**372**	0	0	9	0	**9**	**873**
5:45PM	1	1	0	0	**2**	0	1	449	0	**450**	353	0	7	0	**360**	0	1	9	0	**10**	**822**
Hourly Total	2	6	0	0	**8**	5	4	1868	0	**1877**	1565	1	23	0	**1589**	0	1	33	0	**34**	**3508**
Total	6	10	0	0	**16**	10	14	5795	0	**5819**	6381	7	72	1	**6461**	0	7	93	0	**100**	**12396**
% Approach	37.5%	62.5%	0%	0%	**-**	0.2%	0.2%	99.6%	0%	**-**	98.8%	0.1%	1.1%	0%	**-**	0%	7.0%	93.0%	0%	**-**	-
% Total	0%	0.1%	0%	0%	**0.1%**	0.1%	0.1%	46.7%	0%	**46.9%**	51.5%	0.1%	0.6%	0%	**52.1%**	0%	0.1%	0.8%	0%	**0.8%**	-
Lights	6	9	0	0	**15**	9	13	5694	0	**5716**	6277	7	71	1	**6356**	0	6	93	0	**99**	12186
% Lights	100%	90.0%	0%	0%	**93.8%**	90.0%	92.9%	98.3%	0%	**98.2%**	98.4%	100%	98.6%	100%	**98.4%**	0%	85.7%	100%	0%	**99.0%**	98.3%
Articulated Trucks	0	0	0	0	**0**	0	0	34	0	**34**	44	0	0	0	**44**	0	0	0	0	**0**	78
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	0.6%	0%	**0.6%**	0.7%	0%	0%	0%	**0.7%**	0%	0%	0%	0%	**0%**	0.6%
Buses and Single-Unit Trucks	0	1	0	0	**1**	1	1	67	0	**69**	60	0	1	0	**61**	0	1	0	0	**1**	132
% Buses and Single-Unit Trucks	0%	10.0%	0%	0%	**6.3%**	10.0%	7.1%	1.2%	0%	**1.2%**	0.9%	0%	1.4%	0%	**0.9%**	0%	14.3%	0%	0%	**1.0%**	1.1%

*BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

Sunoco Eastern Access Points and SR 150 - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092944, Location: 42.630997, -83.13162

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



Sunoco Eastern Access Points and SR 150 - TMC

Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092944, Location: 42.630997, -83.13162

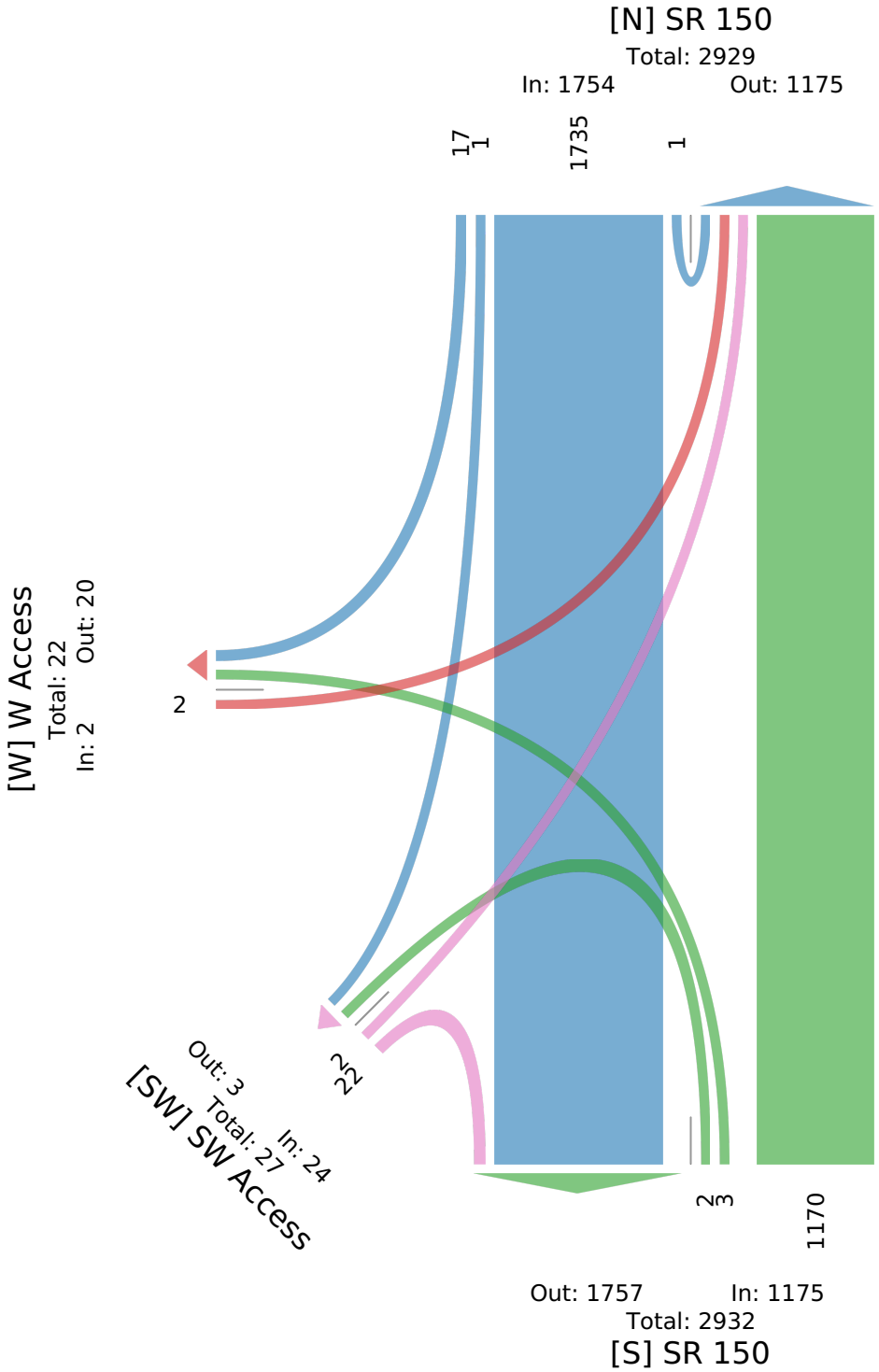
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	W Access					SR 150					SR 150					SW Access					
Direction	Eastbound					Northbound					Southbound					Northeastbound					
Time	L	R	HR	U	**App**	HL	L	T	U	**App**	T	BR	R	U	**App**	HL	BL	HR	U	**App**	**Int**
2023-06-21 7:45AM	1	0	0	0	**1**	0	1	277	0	**278**	454	0	3	0	**457**	0	1	5	0	**6**	**742**
8:00AM	0	0	0	0	**0**	0	0	257	0	**257**	419	1	8	1	**429**	0	0	3	0	**3**	**689**
8:15AM	0	0	0	0	**0**	1	1	315	0	**317**	426	0	3	0	**429**	0	0	10	0	**10**	**756**
8:30AM	1	0	0	0	**1**	1	1	321	0	**323**	436	0	3	0	**439**	0	1	4	0	**5**	**768**
Total	2	0	0	0	**2**	2	3	1170	0	**1175**	1735	1	17	1	**1754**	0	2	22	0	**24**	**2955**
% Approach	100%	0%	0%	0%	**-**	0.2%	0.3%	99.6%	0%	**-**	98.9%	0.1%	1.0%	0.1%	**-**	0%	8.3%	91.7%	0%	**-**	-
% Total	0.1%	0%	0%	0%	**0.1%**	0.1%	0.1%	39.6%	0%	**39.8%**	58.7%	0%	0.6%	0%	**59.4%**	0%	0.1%	0.7%	0%	**0.8%**	-
PHF	0.500	-	-	-	**0.500**	0.500	0.750	0.911	-	**0.909**	0.955	0.250	0.531	0.250	**0.960**	-	0.500	0.550	-	**0.600**	0.962
Lights	2	0	0	0	**2**	2	2	1127	0	**1131**	1699	1	16	1	**1717**	0	1	22	0	**23**	2873
% Lights	100%	0%	0%	0%	**100%**	100%	66.7%	96.3%	0%	**96.3%**	97.9%	100%	94.1%	100%	**97.9%**	0%	50.0%	100%	0%	**95.8%**	97.2%
Articulated Trucks	0	0	0	0	**0**	0	0	19	0	**19**	17	0	0	0	**17**	0	0	0	0	**0**	36
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	1.6%	0%	**1.6%**	1.0%	0%	0%	0%	**1.0%**	0%	0%	0%	0%	**0%**	1.2%
Buses and Single-Unit Trucks	0	0	0	0	**0**	0	1	24	0	**25**	19	0	1	0	**20**	0	1	0	0	**1**	46
% Buses and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0%	33.3%	2.1%	0%	**2.1%**	1.1%	0%	5.9%	0%	**1.1%**	0%	50.0%	0%	0%	**4.2%**	1.6%

*BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

Sunoco Eastern Access Points and SR 150 - TMC
Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092944, Location: 42.630997, -83.13162

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



Sunoco Eastern Access Points and SR 150 - TMC

Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092944, Location: 42.630997, -83.13162

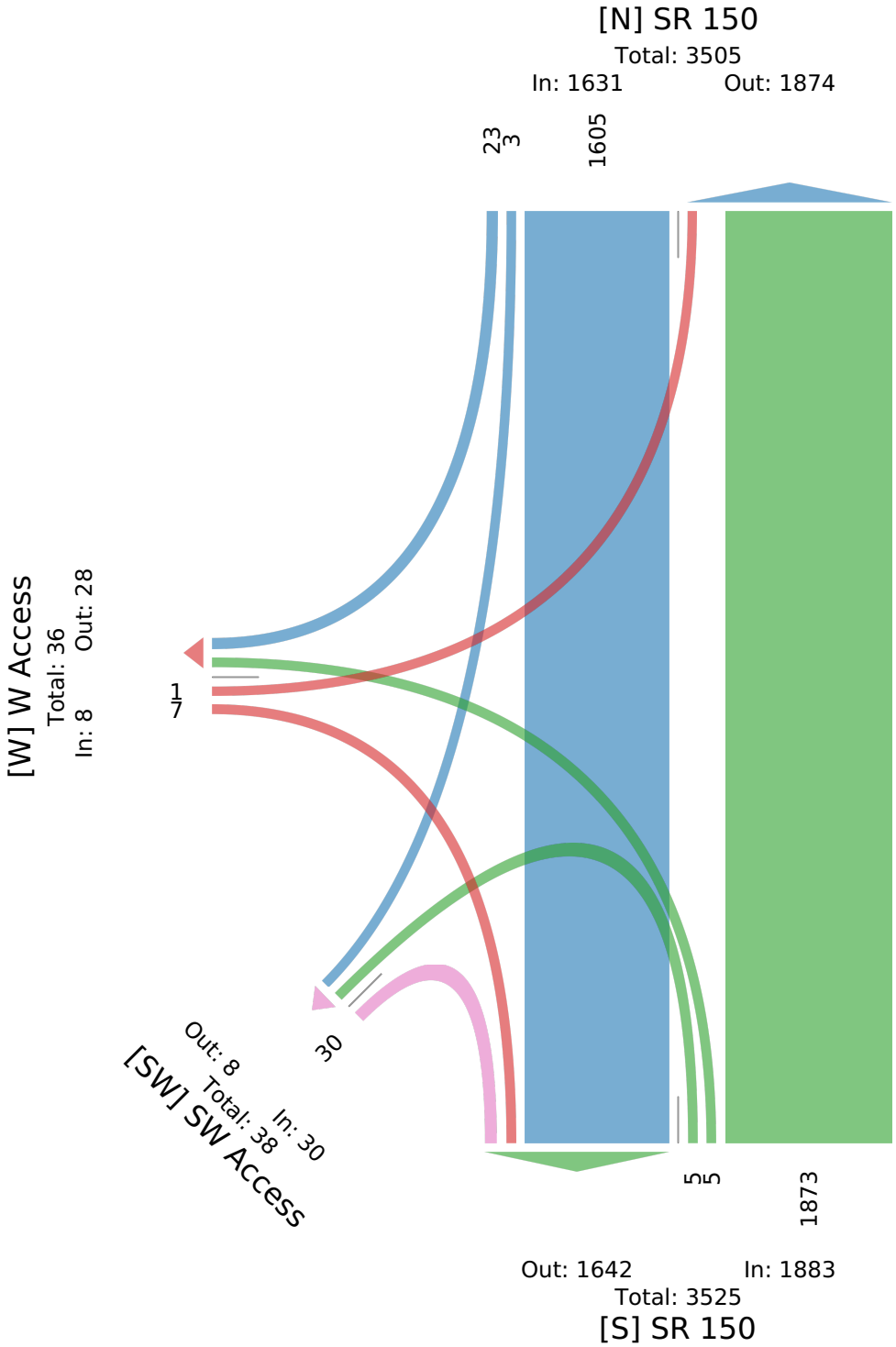
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	W Access					SR 150					SR 150					SW Access					
Direction	Eastbound					Northbound					Southbound					Northeastbound					
Time	L	R	HR	U	**App**	HL	L	T	U	**App**	T	BR	R	U	**App**	HL	BL	HR	U	**App**	**Int**
2023-06-21 4:45PM	0	2	0	0	**2**	0	2	454	0	**456**	393	2	7	0	**402**	0	0	6	0	**6**	**866**
5:00PM	0	3	0	0	**3**	0	1	473	0	**474**	422	1	7	0	**430**	0	0	8	0	**8**	**915**
5:15PM	1	0	0	0	**1**	3	1	459	0	**463**	423	0	4	0	**427**	0	0	7	0	**7**	**898**
5:30PM	0	2	0	0	**2**	2	1	487	0	**490**	367	0	5	0	**372**	0	0	9	0	**9**	**873**
Total	1	7	0	0	**8**	5	5	1873	0	**1883**	1605	3	23	0	**1631**	0	0	30	0	**30**	**3552**
% Approach	12.5%	87.5%	0%	0%	**-**	0.3%	0.3%	99.5%	0%	**-**	98.4%	0.2%	1.4%	0%	**-**	0%	0%	100%	0%	**-**	-
% Total	0%	0.2%	0%	0%	**0.2%**	0.1%	0.1%	52.7%	0%	**53.0%**	45.2%	0.1%	0.6%	0%	**45.9%**	0%	0%	0.8%	0%	**0.8%**	-
PHF	0.250	0.583	-	-	**0.667**	0.417	0.625	0.961	-	**0.961**	0.949	0.375	0.821	-	**0.948**	-	-	0.833	-	**0.833**	0.970
Lights	1	7	0	0	**8**	5	5	1860	0	**1870**	1589	3	23	0	**1615**	0	0	30	0	**30**	3523
% Lights	100%	100%	0%	0%	**100%**	100%	100%	99.3%	0%	**99.3%**	99.0%	100%	100%	0%	**99.0%**	0%	0%	100%	0%	**100%**	99.2%
Articulated Trucks	0	0	0	0	**0**	0	0	2	0	**2**	6	0	0	0	**6**	0	0	0	0	**0**	8
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	0.1%	0%	**0.1%**	0.4%	0%	0%	0%	**0.4%**	0%	0%	0%	0%	**0%**	0.2%
Buses and Single-Unit Trucks	0	0	0	0	**0**	0	0	11	0	**11**	10	0	0	0	**10**	0	0	0	0	**0**	21
% Buses and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0%	0%	0.6%	0%	**0.6%**	0.6%	0%	0%	0%	**0.6%**	0%	0%	0%	0%	**0%**	0.6%

*BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

Sunoco Eastern Access Points and SR 150 - TMC
Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092944, Location: 42.630997, -83.13162

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



Sunoco Gas Station Northern Access - TMC

Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092942, Location: 42.631297, -83.132023

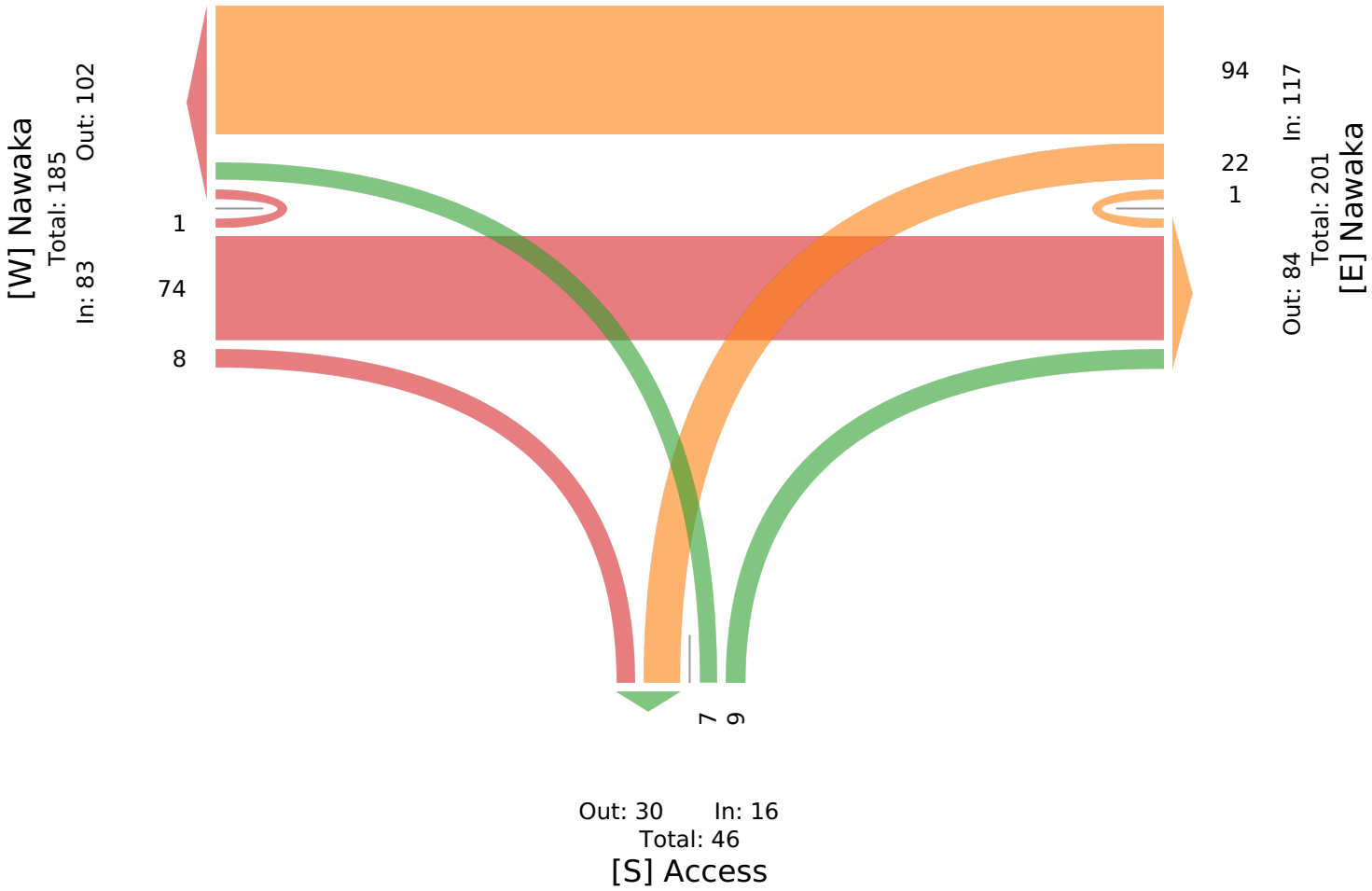
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Nawaka				Nawaka				Access				
Direction	Eastbound				Westbound				Northbound				
Time	T	R	U	**App**	L	T	U	**App**	L	R	U	**App**	**Int**
2023-06-21 7:00AM	2	0	0	**2**	1	1	0	**2**	0	1	0	**1**	**5**
7:15AM	6	1	0	**7**	1	3	0	**4**	0	0	0	**0**	**11**
7:30AM	7	0	0	**7**	1	2	0	**3**	0	1	0	**1**	**11**
7:45AM	7	0	0	**7**	0	5	0	**5**	0	0	0	**0**	**12**
Hourly Total	22	1	0	**23**	3	11	0	**14**	0	2	0	**2**	**39**
8:00AM	2	0	0	**2**	0	1	0	**1**	0	0	0	**0**	**3**
8:15AM	5	1	0	**6**	2	2	0	**4**	0	0	0	**0**	**10**
8:30AM	4	0	0	**4**	2	7	0	**9**	2	0	0	**2**	**15**
8:45AM	1	0	0	**1**	1	5	0	**6**	0	1	0	**1**	**8**
Hourly Total	12	1	0	**13**	5	15	0	**20**	2	1	0	**3**	**36**
4:00PM	2	0	0	**2**	1	6	0	**7**	0	0	0	**0**	**9**
4:15PM	4	1	0	**5**	2	9	0	**11**	1	0	0	**1**	**17**
4:30PM	5	1	0	**6**	2	7	0	**9**	1	3	0	**4**	**19**
4:45PM	4	1	1	**6**	3	9	0	**12**	2	0	0	**2**	**20**
Hourly Total	15	3	1	**19**	8	31	0	**39**	4	3	0	**7**	**65**
5:00PM	7	0	0	**7**	3	8	0	**11**	0	2	0	**2**	**20**
5:15PM	6	0	0	**6**	1	8	1	**10**	0	0	0	**0**	**16**
5:30PM	7	2	0	**9**	2	12	0	**14**	1	1	0	**2**	**25**
5:45PM	5	1	0	**6**	0	9	0	**9**	0	0	0	**0**	**15**
Hourly Total	25	3	0	**28**	6	37	1	**44**	1	3	0	**4**	**76**
Total	74	8	1	**83**	22	94	1	**117**	7	9	0	**16**	**216**
% Approach	89.2%	9.6%	1.2%	**-**	18.8%	80.3%	0.9%	**-**	43.8%	56.3%	0%	**-**	-
% Total	34.3%	3.7%	0.5%	**38.4%**	10.2%	43.5%	0.5%	**54.2%**	3.2%	4.2%	0%	**7.4%**	-
Lights	74	8	1	**83**	21	88	1	**110**	7	6	0	**13**	206
% Lights	100%	100%	100%	**100%**	95.5%	93.6%	100%	**94.0%**	100%	66.7%	0%	**81.3%**	95.4%
Articulated Trucks	0	0	0	**0**	0	0	0	**0**	0	1	0	**1**	1
% Articulated Trucks	0%	0%	0%	**0%**	0%	0%	0%	**0%**	0%	11.1%	0%	**6.3%**	0.5%
Buses and Single-Unit Trucks	0	0	0	**0**	1	6	0	**7**	0	2	0	**2**	9
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	4.5%	6.4%	0%	**6.0%**	0%	22.2%	0%	**12.5%**	4.2%

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

Sunoco Gas Station Northern Access - TMC
Wed Jun 21, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092942, Location: 42.631297, -83.132023

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



Sunoco Gas Station Northern Access - TMC

Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092942, Location: 42.631297, -83.132023

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

Leg	Nawaka				Nawaka				Access				
Direction	Eastbound				Westbound				Northbound				
Time	T	R	U	**App**	L	T	U	**App**	L	R	U	**App**	**Int**
2023-06-21 7:45AM	7	0	0	**7**	0	5	0	**5**	0	0	0	**0**	**12**
8:00AM	2	0	0	**2**	0	1	0	**1**	0	0	0	**0**	**3**
8:15AM	5	1	0	**6**	2	2	0	**4**	0	0	0	**0**	**10**
8:30AM	4	0	0	**4**	2	7	0	**9**	2	0	0	**2**	**15**
Total	18	1	0	**19**	4	15	0	**19**	2	0	0	**2**	**40**
% Approach	94.7%	5.3%	0%	**-**	21.1%	78.9%	0%	**-**	100%	0%	0%	**-**	-
% Total	45.0%	2.5%	0%	**47.5%**	10.0%	37.5%	0%	**47.5%**	5.0%	0%	0%	**5.0%**	-
PHF	0.643	0.250	-	**0.679**	0.500	0.536	-	**0.528**	0.250	-	-	**0.250**	0.667
Lights	18	1	0	**19**	4	12	0	**16**	2	0	0	**2**	37
% Lights	100%	100%	0%	**100%**	100%	80.0%	0%	**84.2%**	100%	0%	0%	**100%**	92.5%
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	3	0	**3**	0	0	0	**0**	3
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	0%	20.0%	0%	**15.8%**	0%	0%	0%	**0%**	7.5%

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

Sunoco Gas Station Northern Access - TMC
Wed Jun 21, 2023
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092942, Location: 42.631297, -83.132023

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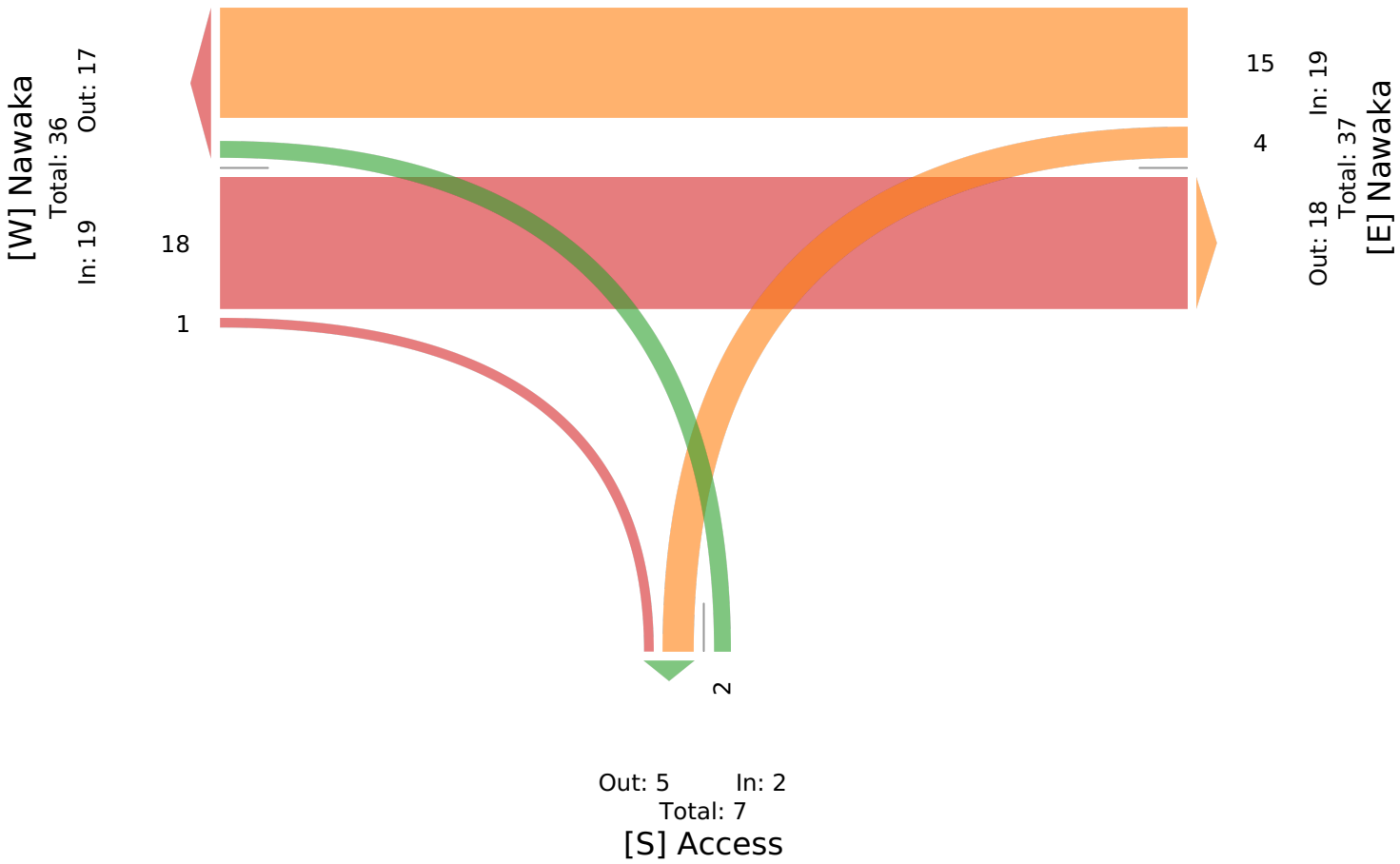
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Sunoco Gas Station Northern Access - TMC

Wed Jun 21, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1092942, Location: 42.631297, -83.132023

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

Leg	Nawaka				Nawaka				Access				
Direction	Eastbound				Westbound				Northbound				
Time	T	R	U	**App**	L	T	U	**App**	L	R	U	**App**	**Int**
2023-06-21 4:45PM	4	1	1	**6**	3	9	0	**12**	2	0	0	**2**	**20**
5:00PM	7	0	0	**7**	3	8	0	**11**	0	2	0	**2**	**20**
5:15PM	6	0	0	**6**	1	8	1	**10**	0	0	0	**0**	**16**
5:30PM	7	2	0	**9**	2	12	0	**14**	1	1	0	**2**	**25**
Total	24	3	1	**28**	9	37	1	**47**	3	3	0	**6**	**81**
% Approach	85.7%	10.7%	3.6%	**-**	19.1%	78.7%	2.1%	**-**	50.0%	50.0%	0%	**-**	-
% Total	29.6%	3.7%	1.2%	**34.6%**	11.1%	45.7%	1.2%	**58.0%**	3.7%	3.7%	0%	**7.4%**	-
PHF	0.857	0.375	0.250	**0.778**	0.750	0.771	0.250	**0.839**	0.375	0.375	-	**0.750**	0.810
Lights	24	3	1	**28**	9	37	1	**47**	3	3	0	**6**	81
% Lights	100%	100%	100%	**100%**	100%	100%	100%	**100%**	100%	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, T: Thru, U: U-Turn

Sunoco Gas Station Northern Access - TMC
Wed Jun 21, 2023
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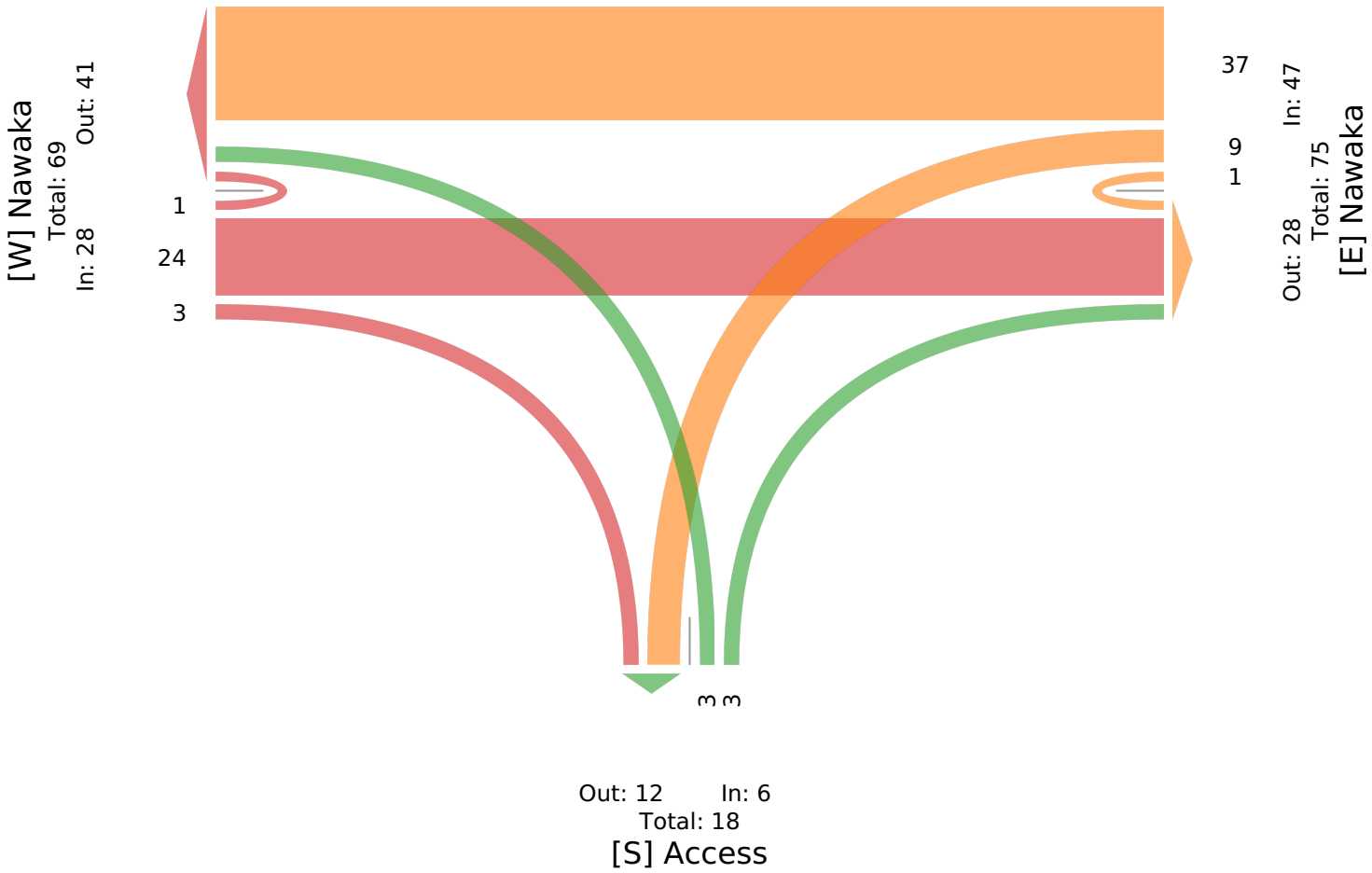

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: WB M-59 OFF Ramp & Rochester Rd DATE: 1/4/12

CITY/TOWNSHIP: Rochester Hills BY: E Labiano

COUNTY#: 4307 STATE#: 63043-01-008 CHARGES: 78 0 43070

PLEASE PERFORM THE FOLLOWING:

____ ELECTRICAL DEVICE: ____ INSTALL ____ MODERNIZE ____ MAINTENANCE

____ UNDERGROUND: _____

____ EDISON OK: ____ YES ____ NO JOB#: _____

____ COORDINATE W/DISTRICT 7: _____

DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
____ CHANGE TIMING.....																			
____ CHANGE OFFSET.....																			
____ CHANGE CYCLE LENGTH.....																			
____ ADD DIAL/SPLIT.....																			

X CHANGE BREAKOUT OR EPROM: Rev 3 (Flexi changes)

____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

RECEIVED
JAN 26 2012
ROAD COMMISSION FOR OAKLAND COUNTY
TRAFFIC OPERATIONS

____ REPROGRAM TBC

____ INSTALL INTERCONNECT: ____ TBC ____ MINITROL ____ TONE

____ MBT OK: ____ YES ____ NO

____ NO CHANGE - RECORD CORRECTION

X OTHER: Requires a checksum change

APPROVED BY: _____ DATE: 1/9/12

DATE INSTALLED: 1-24-12

INSTALLED BY: Schjolin

INTERSECTION :- 4307 WB M50 Off Ramp & Rochester Road
DESCRIPTION PROMS :- X04307 / F2004
SOFTWARE :- MOD 52 SCATS
INPUTS :-

1. SB Rochester L (LK)
2. SB Rochester R (LK)
3. NB Rochester L (LK)
4. NB Rochester R (LK)
5. WB M59 Off Ramp L (LK)
6. WB M59 Off Ramp CL (LK)
7. WB M59 Off Ramp CR (LK)
8. WB M59 Off Ramp R (LK)

Note : All detectors are autoscope (SOLO cameras)

APPROACHES :-
A APP 1 : SB Rochester L,R
A APP 2 : NB Rochester L,R
B APP 1 : WB M59 Off Ramp L,CL,CR,R

FLEXIDATA :-

SEQUENCE	A,B	A,B
AUTO REL		
R- REL	A	A
R+ REL	B	B
Q- REL		
Q+ REL		

PEDESTRIANS :-

SPECIAL FEATURES :-
Personality revision is 3 (=C).
A stage has a permanent demand.
Demand for B stage in flexi and isol, set ZNEG to disable.
ZPOS sets demand to turn on "NTOR" Case Sign.

P44-16 CABINET

LOAD SWITCH 2	NB Rochester	A	FLA
LOAD SWITCH 4	WB M59 Off Ramp	B	FLR
LOAD SWITCH 6	SB Rochester	C	FLA
LOAD SWITCH 7	Disappearing Case sign (G ONLY)		

JUMPERS
C52-PB10, C56-PB10, D22-D26, D35-D50, D52-PB10, D56-PB10, 8RED-PB9, 9RED-PB9, 10RED-PB9, 11RED-PB9, 12RED-PB9

SIGNAL MONITOR: 2-6, 2-7, 6-7
ALL SWITCHES EXCEPT DUAL SELECT A&B; GY ENABLE; SSM 2, 4, 6.
MINIMUM FLASH = 4 + 2 + 1

NOTES:
HOOK UP CONTINUOUS GREEN ARROW (CR) ON PB11

```
********************************
* CONTROLLER INFORMATION SHEET *
*     FOR SITE NO. 4307        *
*         E LABIANO            *
*         16-DEC-2011          *
********************************
```

Checksums:

Ti:	67/147
Pers:	D8/330
Total:	BF/277

FLEXILINK PLAN DATA

Intersection # 4307 **State #** 63043-01-008 **Date:** 01/03/12 **Prepared By:** E. LABIANO

Intersection: WB M59 Off Ramp & Rochester Road **City:** Rochester Hills

Hours of Operation: 7 Days: 24 Hours **Approved By:** Rachel Jones

Hours of Flashing: None

Note: Z+ in plan 1, 2, 3, 4 run NTOR case sign.

		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8
0	CL		140	140	140	90	140	140	140	90
1	A		0	0	0	0	0	0	0	0
2	B		90	98	92	57	90	98	92	57
3	C									
4	D									
5	E									
6	F									
7	G									
8	R-									
9	R+									
10	Of (Y-)		114	24	129	80	114	24	129	80
11	Y+	C								
12	Z-									
13	Z+		C	C	C	C				
14	Q-									
15	Q+									
16	XH									
17	XL									

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0.
Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

							Timers		
Phase	**Direction**	**Min**	**Max**	**ECO**	**Amber**	**All Red**	**Gap**	**Hdwy**	**Waste**
A	Rochester	10.0	89.0		4.3	1.9	3.0	1.2	10.0
B	WB M59 Off Ramp	7.0	37.0		3.5	2.5	3.0	1.2	10.0

	Day	Hours	Plan#
SC1	8	5:00	6
SC2	8	7:00	2
SC3	8	10:00	1
SC4	8	14:00	3
SC5	8	19:00	1
SC6	13	7:00	4
SC7	13	8:00	1
SC8	14	0:00	8
SC9	/14	21:00	5
SC10	14	22:00	8
SC11			
SC12			

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		X		

DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON,FRI,SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

Co# 4307

Autoscope SOLO

Mod 50

Mini-Hub II Detector Port Master
Front Panel Input/Output Pin Assignment

The Mini-Hub II has inputs and outputs available through the front panel Input/ Output connector and through the back edge connector. The pin assignments for the Mini-Hub II front connector are listed in the following table. Edge connector pins are identified by NUMBER on the component (front) side of the board. Edge connector pins are identified by LETTER on the backside of board.

#	Mini-Hub II conn.	Edge conn.	Front Harness	Description	D-Conn. Term #	D-Conn. Detector Descript.	On Print Detector number	Phase
1	Output 1 LED	F	1	SB ROCHESTER THRU L	1	Det 9	1	6
1	Output 2 LED	W	14	SB ROCHESTER THRU R	2	Det 10	2	6
2	Output 3 LED	S	2	NB ROCHESTER THRU L	3	Det 11	3	2
2	Output 4 LED	Y	15	NB ROCHESTER THRU R	4	Det 12	4	2
3	Output 5 LED	(JP1)4	3	WB MS9 OFF RAMP LT L	5	Det 13	5	4
3	Output 6 LED	(JP7)5	16	WB MS9 OFF RAMP LT R	6	Det 14	6	4
4	Output 7 LED	(JP2)8	4	WB MS9 OFF RAMP RT L	7	Det 15	7	4
4	Output 8 LED	(JP8)9	17	WB MS9 OFF RAMP RT R	8	Det 16	8	4
	Output 9 LED	(JP3)13	5					
	Output 10 LED	(JP9)14	18					
	Output 11 LED	(JP4)17	6					
	Output 12 LED	(JP10)18	19					
	Output 13 LED		7					
	Output 14 LED		20					
	Output 15 LED		8					
	Output 16 LED		21					
	Input 1 LED	(JP5)1	9					
	Input 2 LED	(JP11)2	22	LS 2 RED (C-30)				
	Input 3 LED	(JP6)3	10					
	Input 4 LED	(JP12)10	23	LS 4 RED (C-36)				
	Input 5 LED		11					
	Input 6 LED		24	LS 6 RED (D-30)				
	Input 7 LED		12					
	Input 8 LED	(withJP14*)	25					

*Input 8 with JP14 inserted becomes 24VDC through Input/ Output Connector on front panel.
Logic Ground is the GREY (pin 13) wire form Input/ Output connector on front panel.

Chapter 5
Connecting Solo MVP Power and Communications Cables

Usually, the Solo cable (the "pigtail" cable from the Solo MVP) is spliced to a Branch Cable, either in a junction box or in the hand-hole at the pole base. The Branch cable runs from the splice point to the cabinet, and terminates to the ACIP. Use the chart below (copy the blank table provided in Appendix A) to record which pairs of the Solo cable are spliced to the Branch cable pairs. For Branch cable lengths of 300 ft or less, a separate cable to power the Solo Pro is not normally necessary.

Be sure to use splicing methods and materials appropriate for low voltage communications splicing. When splicing is completed, properly seal the splice.

When the branch cables are brought into the cabinet, label each cable, starting with cable 1 from the Solo MVP viewing Phases 2 and 5, and working clockwise around the intersection, labeling cables 2, 3, and 4.

Terminate the cables to the ACIP in the same order. Taking care to assign the Sensor numbers (in the Autoscope Properties Editor) in the same order as the cables are terminated will facilitate easier maintenance and troubleshooting.

An example is shown in the table below. In this example, a separate power cable is shown. In installations where a 6-pair branch cable is used, power and communications are usually combined in one cable.

A blank copy of this table is provided for duplication in Appendix A.

DRAIN WIRE of Solo MVP to WHT of GRN/WHT pair
then at CABINET WHT to Shield of BRANCH CABLE

Appendix A
Solo System-Wide Interconnections

to Ground Lug
INTERFACE PANEL

Duplicate the following table to keep track of all Solo MVP connections.

Solo MVP ____ (write in sensor number)			Branch Power Cable (write in wire color)	Branch Communications Cable (write in wire color)			Communications Interface Panel	
PIN	PAIR COLOR	WIRE COLOR	WIRE COLOR	PAIR	PAIR COLOR	WIRE COLOR	SIGNAL	TERMINAL
A	BRN/BLK	* BRN *	BRN		BRN/WHT	BRN	24V PWR	1
B	BRN/BLK	* BLK *	WHT		BRN/WHT	WHT	24V RTN	2
N	----	*GRN/YEL*	GRN		GRN/WHT	GRN	EARTH GND	3
P	BLU/BLK	BLU	BLU	1	BLU/WHT	BLU	SUP RX+	4
U	BLU/BLK	BLK	WHT	1	BLU/WHT	WHT	SUP RX-	5
D	RED/BLK	RED	RED	2	RED/BLU	RED	SUP TX+	6
R	RED/BLK	BLK	BLU	2	RED/BLU	BLU	SUP TX-	7
F	YEL/BLK	YEL	ORG	3	ORG/WHT	ORG	DET+	8
E	YEL/BLK	BLK	WHT	3	ORG/WHT	WHT	DET-	9
J	WHI/BLK	WHI	GREY	4	GREY/WHT	GREY	VIDEO+	10
H	WHI/BLK	BLK	WHT	4	GREY/WHT	WHT	VIDEO-	11

* IS SEPERATE POWER FEED BRN — BLK
— WHT

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: EB M-59 OFF Ramp & Rochester Rd DATE: 12/16/11

CITY/TOWNSHIP: Rochester Hills BY: E Labiano

COUNTY#: 4309 STATE#: 63043-01-021 CHARGES: 78 0 43090

PLEASE PERFORM THE FOLLOWING:

____ ELECTRICAL DEVICE: ____ INSTALL ____ MODERNIZE ____ MAINTENANCE

____ UNDERGROUND: _____

____ EDISON OK: ____ YES ____ NO JOB#: _____

____ COORDINATE W/DISTRICT 7: _____

DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
____ CHANGE TIMING.....																			
____ CHANGE OFFSET.....																			
____ CHANGE CYCLE LENGTH.....																			
____ ADD DIAL/SPLIT.....																			

X CHANGE BREAKOUT OR EPROM: Rev 2

____ CHANGE HOURS OF OPERATION: (schedules)

OLD: _____

NEW: _____

RECEIVED
JAN 26 2012
ROAD COMMISSION FOR OAKLAND COUNTY
TRAFFIC OPERATIONS

____ REPROGRAM TBC

____ INSTALL INTERCONNECT: ____ TBC ____ MINITROL ____ TONE

____ MBT OK: ____ YES ____ NO

____ NO CHANGE - RECORD CORRECTION

X OTHER: Requires a checksum change

APPROVED BY: _____ DATE: 12/19/11

DATE INSTALLED: 1-24-12

INSTALLED BY: Subjolin

INTERSECTION :- 4309 EB M59 Off Ramp & Rochester Rd
DESCRIPTION PROMS :- X04309 / F2003
SOFTWARE :- MOD 52 SCATS
INPUTS :-
1. EB M59 Off Ramp L (LK)
2. EB M59 Off Ramp R (LK)
3. EB M59 Off Ramp RT (NL)
4. NB Rochester L (LK)
5. NB Rochester R (LK)
6. SB Rochester L (LK)
7. SB Rochester R (LK)

NOTE : All detectors are autoscope (solo cameras).

APPROACHES :-
A APP 1 : NB Rochester L,R
B APP 1 : EB M59 Off Ramp L,R EB M59 Off Ramp RT
A APP 2 : SB Rochester L,R

FLEXIDATA :-		PEDESTRIANS :-
SEQUENCE	A,B	A,B
AUTO REL		
R- REL	A	A
R+ REL	B	B
Q- REL		
Q+ REL		

SPECIAL FEATURES :-
Personality revision is 2 (=B).
A stage has a permanent demand.
Demand for B stage in flexi and isol, set ZNEG to disable.

P44-16 CABINET

LOAD SWITCH 2	NB Rochester	A	FLA
LOAD SWITCH 6	SB Rochester	B	FLA
LOAD SWITCH 8	EB M59 Off Ramp	C	FLR

JUMPERS
C52-PB10, C56-PB10, D22-D26, D52-PB10, D56-PB10, 4RED-PB9, 9RED-PB9, 10RED-PB9, 11RED-PB9, 12RED-PB9

MMU: (MENU : SET/VIEW CONFIG)

Dual Indication Enable:	R+G: Channel 2,6,8 R+Y: Channel 2,6,8 G+Y: Channel 2,6,8
Red Fail Enable:	Enable: Channel 2, 6 & 8
Unit Options:	All OFF except: Recurrent pulse Program Memory Card
Y & R Clearance Disable:	Channel 2, 6 & 8 Enabled
Program Card:	Compatible Channels: 2-6 Min Flash Time : 4+2+1 Min Yellow Change Disable: None Voltage Monitor Latch: NONE

NOTES:
HOOK UP CONTINUOUS GREEN ARROW (AR) ON PB11

```
**********************************
* CONTROLLER INFORMATION SHEET *
*     FOR SITE NO. 4309        *
*          E LABIANO           *
*          16-DEC-2011         *
**********************************
```

CHECKSUMS:
TI: AE/256
PERS: 63/143
TOTAL: CD/315

FLEXILINK PLAN DATA

Intersection # 4309 **State #** 63043-01-021 **Date:** 12/16/11 **Prepared By:** E LABIANO

Intersection: EB M59 Off Ramp & Rochester Road **City:** Rochester Hills

Hours of Operation: 7 Days: 24 Hours **Approved By:** Rachel Jones

Hours of Flashing: None

		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8
0	CL		140	140	140	90				
1	A		0	0	0	0				
2	B		90	106	102	63				
3	C									
4	D									
5	E									
6	F									
7	G									
8	R-									
9	R+									
10	Of (Y-)		118	27	120	72				
11	Y+	C								
12	Z-									
13	Z+									
14	Q-									
15	Q+									
16	XH									
17	XL									

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0.
Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

							Timers		
Phase	**Direction**	**Min**	**Max**	**ECO**	**Amber**	**All Red**	**Gap**	**Hdwy**	**Waste**
A	Rochester	10.0	60.0		4.3	1.9	3.0	1.2	10.0
B	EB M59 Off Ramp	7.0	20.0		3.5	2.5	3.0	1.2	10.0
C									
D									
E									
F									
G									

	Day	Hours	Plan#
SC1	8	5:00	2
SC2	8	10:00	1
SC3	8	14:00	3
SC4	8	19:00	1
SC5	13	8:00	1
SC6	13	19:00	4
SC7	14	0:00	4
SC8	14	22:00	4
SC9			
SC10			

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		X		

DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON,FRI,SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

4309

Autoscope SOLO

Mod 50

Mini-Hub II Detector Port Master
Front Panel Input/Output Pin Assignment

The Mini-Hub II has inputs and outputs available through the front panel Input/ Output connector and through the back edge connector. The pin assignments for the Mini-Hub II front connector are listed in the following table. Edge connector pins are identified by NUMBER on the component (front) side of the board. Edge connector pins are identified by LETTER on the backside of board.

#	Mini-Hub II conn.	Edge conn.	Front Harness	Description	D-Conn. Term #	D- Conn. Detector Descript.	On Print Detector number	Phase
1	Output 1 LED	F	1	EB MS9 OFF RAMP L	1	Det 9	1	8
1	Output 2 LED	W	14	EB MS9 OFF RAMP C	2	Det 10	2	8
1	Output 3 LED	S	2	EB MS9 OFF RAMP R	3	Det 11	3	8
2	Output 4 LED	Y	15	NB ROCHESTER L	4	Det 12	4	2
2	Output 5 LED	(JP1)4	3	NB ROCHESTER R	5	Det 13	5	2
3	Output 6 LED	(JP7)5	16	SB ROCHESTER L	6	Det 14	6	6
3	Output 7 LED	(JP2)8	4	SB ROCHESTER R	7	Det 15	7	6
	Output 8 LED	(JP8)9	17					
	Output 9 LED	(JP3)13	5					
	Output 10 LED	(JP9)14	18					
	Output 11 LED	(JP4)17	6					
	Output 12 LED	(JP10)18	19					
	Output 13 LED		7					
	Output 14 LED		20					
	Output 15 LED		8					
	Output 16 LED		21					
	Input 1 LED	(JP5)1	9					
	Input 2 LED	(JP11)2	22	LS2 RED (C-30)				
	Input 3 LED	(JP6)3	10					
	Input 4 LED	(JP12)10	23					
	Input 5 LED		11					
	Input 6 LED		24	LS6 RED (D-30)				
	Input 7 LED		12					
	Input 8 LED	(withJP14*)	25	LS8 RED (D-36)				

*Input 8 with JP14 inserted becomes 24VDC through Input/ Output Connector on front panel. Logic Ground is the GREY (pin 13) wire form Input/ Output connector on front panel.

Chapter 5
Connecting Solo MVP Power and Communications Cables

Usually, the Solo cable (the "pigtail" cable from the Solo MVP) is spliced to a Branch Cable, either in a junction box or in the hand-hole at the pole base. The Branch cable runs from the splice point to the cabinet, and terminates to the ACIP. Use the chart below (copy the blank table provided in Appendix A) to record which pairs of the Solo cable are spliced to the Branch cable pairs. For Branch cable lengths of 300 ft or less, a separate cable to power the Solo Pro is not normally necessary.

Be sure to use splicing methods and materials appropriate for low voltage communications splicing. When splicing is completed, properly seal the splice.

When the branch cables are brought into the cabinet, label each cable, starting with cable 1 from the Solo MVP viewing Phases 2 and 5, and working clockwise around the intersection, labeling cables 2, 3, and 4.

Terminate the cables to the ACIP in the same order. Taking care to assign the Sensor numbers (in the Autoscope Properties Editor) in the same order as the cables are terminated will facilitate easier maintenance and troubleshooting.

An example is shown in the table below. In this example, a separate power cable is shown. In installations where a 6-pair branch cable is used, power and communications are usually combined in one cable.

A blank copy of this table is provided for duplication in Appendix A.

DRAIN WIRE of Solo MVP to WHT of GRN/WHI pair then at CABINET WIRE to Shield of BRANCH CABLE to Ground Lug INTERFACE PANEL.

Appendix A
Solo System-Wide Interconnections

Duplicate the following table to keep track of all Solo MVP connections.

Solo MVP ____ (write in sensor number)			Branch Power Cable (write in wire color)	Branch Communications Cable (write in wire color)			Communications Interface Panel	
PIN	PAIR COLOR	WIRE COLOR	WIRE COLOR	PAIR	PAIR COLOR	WIRE COLOR	SIGNAL	TERMINAL
A	BRN/BLK	* BRN *	BRN		BRN/WHI	BRN	24V PWR	1
B	BRN/BLK	* BLK *	WHI		BRN/WHI	WHI	24V RTN	2
N	----	*GRN/YEL*	GRN		GRN/WHI	GRN	EARTH GND	3
P	BLU/BLK	BLU	BLU	1	BLU/WHI	BLU	SUP RX+	4
U	BLU/BLK	BLK	WHT	1	BLU/WH	WHI	SUP RX-	5
D	RED/BLK	RED	RED	2	RED/BLU	RED	SUP TX+	6
R	RED/BLK	BLK	BLU	2	RED/BLU	BLU	SUP TX-	7
F	YEL/BLK	YEL	ORG	3	ORG/WHT	ORG	DET+	8
E	YEL/BLK	BLK	WHT	3	ORG/WHT	WHT	DET-	9
J	WHI/BLK	WHI	GREY	4	GREY/WHI	GREY	VIDEO+	10
H	WHI/BLK	BLK	WHT	4	GREY/WHI	WHI	VIDEO-	11

* IS SEPERATE POWER FEED BRN — BLK
BLK — WHT

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: Rochester & Meijers / Lowes DATE: 12/15/11

CITY/TOWNSHIP: Rochester Hills BY: E Labiano

COUNTY#: 12200 STATE#: _____ CHARGES: 78 12200 0

PLEASE PERFORM THE FOLLOWING:

____ ELECTRICAL DEVICE: ____ INSTALL ____ MODERNIZE ____ MAINTENANCE

____ UNDERGROUND: _____

____ EDISON OK: ____ YES ____ NO JOB#: _____

____ COORDINATE W/DISTRICT 7: _____

	DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
	SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
____	CHANGE TIMING.....																			
____	CHANGE OFFSET.....																			
____	CHANGE CYCLE LENGTH.....																			
____	ADD DIAL/SPLIT.....																			

X CHANGE BREAKOUT OR EPROM: Rev 3

____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

RECEIVED
JAN 26 2012
ROAD COMMISSION FOR OAKLAND COUNTY
TRAFFIC OPERATIONS

____ REPROGRAM TBC

____ INSTALL INTERCONNECT: ____ TBC ____ MINITROL ____ TONE

____ MBT OK: ____ YES ____ NO

____ NO CHANGE - RECORD CORRECTION

X OTHER: Requires a checksum change

APPROVED BY: _____ DATE: 12/16/11

DATE INSTALLED: 1-24-12

INSTALLED BY: Schjolin

INTERSECTION :-12200 M-150 (Rochester Rd) & Meijer's/Lowe's Dr.
DESCRIPTION PROMS :- X00020R / F4808
CONTROLLER TYPE :- STANDARD PERSONALITY CONTROLLER
SOFTWARE :- MOD 52 SCATS/SCATS

PHYSICAL INPUTS :-

1.	EB ALEX LT	(LK)
2.	EB ALEX	(LK)
3.	NB ROCHESTER LT	(LK)
4.	NB ROCHESTER L	(LK)
5.	NB ROCHESTER R	(LK)
6.	NB ROCHESTER RT	(NL)
7.	Meijer's/Lowe's Dr.	(LK)
8.	Meijer's/Lowe's Dr.	(LK)
9.	SB ROCHESTER LT	(LK)
10.	SB ROCHESTER L	(LK)
11.	SB ROCHESTER R	(LK)

NOTE: ALL DETECTION IS AUTOSCOPE SOLOS

Ped2: (WA & WC) ROCHESTER RD PED WEST WFG
Ped4: (WB) LOWES/MEIJERS PED NOTH P.B.

APPROACHES :-
A APPR 1 : ROCHESTER RD (M-150)
B APPR 1 : LOWES/MEIJERS
A APPR 2 : ROCHESTER RD (M-150)
B APPR 2 : ALEX DR.

FLEXIDATA:-

SEQUENCE	A,B	A,B
AUTO REL		
R- REL	A	A
R+ REL	B	B
Q- REL		
Q+ REL		
LOOKAHEAD		

PEDESTRIANS:-
PED2: ROCHESTER RD PED WEST LEG WFG
PED4: LOWES/MEIJERS PED NOTH LEG P.B.

SPECIAL FEATURES :-
Controller Software must be C7V4R146 or later (VC=4)
A STAGE HAS A PERMANENT DEMAND
DEMAND FOR STAGE B IN FLEXI AND ISOLATED. SET Z- TO DISABLE.
The personality revision number is currently 3 (=C).

Backpanel for size P44-16 cabinet:

Load Switch 2:	ROCHESTER RD	A&C FLA
Load Switch 4:	LOWES/MEIJERS	B&D FLR
Load Switch 13:	ROCHESTER RD PED	WA&WC -
Load Switch 14:	LOWES/MEIJERS PED	WB -

Jumper:
A28-A29, A34-A35, A37-A38, A43-A44, B52-B53, B55-B56, C52-PB10, C56-PB10, D22-D26, D52-PB10, D56-PB10, 6R-PB10, 8R-PB9, 9R-PB9, 10R-PB9, 11R-PB9, 12R-PB9,

Signal Monitor: NONE.
All switches OFF EXCEPT: Dual Select A&B; G&Y Enable;SSM 2,4.
Minimum Flash = 4 + 2 + 1

```
**********************************
* CONTROLLER INFORMATION SHEET *
*       FOR SITE NO. 12200     *
*         ED LABIANO           *
*  DATE :  1-Nov-2007 12:10    *
**********************************
```

Checksums:
Times C6/306
Pers 2B/053
Total ED/355

FLEXILINK PLAN DATA

Intersection # 12200 **State #** 63131-01-019 **Date:** 12/15/11 **Prepared By:** ED LABIANO

Intersection: M-150 (Rochester Rd) & Meijer's/Lowe's Dr. **City:** ROCHESTER

Hours of Operation: 7 days: 24 hours **Approved By:** R JONES

Hours of Flashing: NONE

		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8
0	CL		140	140	140	90				
1	A		0	0	0	0				
2	B		112	112	100	72				
3	C									
4	D									
5	E									
6	F									
7	G									
8	R-									
9	R+									
10	Of (Y-)		114	125	1	40				
11	Y+	C								
12	Z-									
13	Z+									
14	Q-									
15	Q+		98	98	86	58				
16	XH									
17	XL									

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0. Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

							Timers		
Phase	**Direction**	**Min**	**Max**	**ECO**	**Amber**	**All Red**	**Gap**	**Hdwy**	**Waste**
A	M-150 (Rochester Rd)	10.0	50.0		4.7	1.6	3.0	1.0	6.0
B	Meijer's/Lowe's Dr.	7.0	30.0		3.5	2.5	3.0	1.0	6.0
C									
D									
E									
F									
G									

	Day	Hours	Plan#
SC1	8	5:00	2
SC2	8	10:00	1
SC3	8	14:00	3
SC4	8	19:00	1
SC5	14	0:00	4
SC6	14	22:00	4
SC7	13	8:00	1
SC8			
SC9			
SC10			

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2
Rochester ped west leg	7.0	13.5	3.5
Lowes/Meijers ped north leg	7.0	15.3	4.7

Q+ Terminates PED 2 in FLEXI

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		X		

DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON,FRI,SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

Autoscope SOLO #1 CO# 12200

Mini-Hub II Detector Port Master
Front Panel Input/Output Pin Assignment

The Mini-Hub II has inputs and outputs available through the front panel Input/ Output connector and through the back edge connector. The pin assignments for the Mini-Hub II front connector are listed in the following table. Edge connector pins are identified by NUMBER on the component (front) side of the board. Edge connector pins are identified by LETTER on the backside of board.

am #	Mini-Hub II conn.	Edge conn.	Front Harness	Description	D-Conn. Term #	D-Conn. Detector Descript.	On Print Detector number	Phase
1	Output 1 LED	F	1	EB Alex Dr LT	1	Det 9	1	4
1	Output 2 LED	W	14	EB Alex	2	Det 10	2	4
2	Output 3 LED	S	2	NB Rochester LT	3	Det 11	3	2
2	Output 4 LED	Y	15	NB Rochester L	4	Det 12	4	2
3	Output 5 LED	(JP1)4	3	NB Rochester R	5	Det 13	5	2
3	Output 6 LED	(JP7)5	16	NB Rochester RT	6	Det 14	6	2
	Output 7 LED	(JP2)8	4					
	Output 8 LED	(JP8)9	17					
	Output 9 LED	(JP3)13	5					
	Output 10 LED	(JP9)14	18					
	Output 11 LED	(JP4)17	6					
	Output 12 LED	(JP10)18	19					
	Output 13 LED		7					
	Output 14 LED		20					
	Output 15 LED		8					
	Output 16 LED		21					
	Input 1 LED	(JP5)1	9					
	Input 2 LED	(JP11)2	22	LS2 Red (C30)				
	Input 3 LED	(JP6)3	10					
	Input 4 LED	(JP12)10	23	LS4 Red (C36)				
	Input 5 LED		11					
	Input 6 LED		24					
	Input 7 LED		12					
	Input 8 LED	(withJP14*)	25					

*Input 8 with JP14 inserted becomes 24VDC through Input/ Output Connector on front panel.
Logic Ground is the GREY (pin 13) wire form Input/ Output connector on front panel.

Chapter 5
Connecting Solo MVP Power and Communications Cables

Usually, the Solo cable (the "pigtail" cable from the Solo MVP) is spliced to a Branch Cable, either in a junction box or in the hand-hole at the pole base. The Branch cable runs from the splice point to the cabinet, and terminates to the ACIP. Use the chart below (copy the blank table provided in Appendix A) to record which pairs of the Solo cable are spliced to the Branch cable pairs. For Branch cable lengths of 300 ft or less, a separate cable to power the Solo Pro is not normally necessary.

Be sure to use splicing methods and materials appropriate for low voltage communications splicing. When splicing is completed, properly seal the splice.

When the branch cables are brought into the cabinet, label each cable, starting with cable 1 from the Solo MVP viewing Phases 2 and 5, and working clockwise around the intersection, labeling cables 2, 3, and 4.

Terminate the cables to the ACIP in the same order. Taking care to assign the Sensor numbers (in the Autoscope Properties Editor) in the same order as the cables are terminated will facilitate easier maintenance and troubleshooting.

An example is shown in the table below. In this example, a separate power cable is shown. In installations where a 6-pair branch cable is used, power and communications are usually combined in one cable.

A blank copy of this table is provided for duplication in Appendix A.

DRAIN WIRE of Solo MVP to WHT of GRN/WHI pair
then at CABINET WHI to Shield of BRANCH CABLE

Appendix A

and to Ground Lug in INTERFACE PANEL.

Solo System-Wide Interconnections

Duplicate the following table to keep track of all Solo MVP connections:

Solo MVP ____ (write in sensor number)			Branch Power Cable (write in wire color)	Branch Communications Cable (write in wire color)			Communications Interface Panel	
PIN	PAIR COLOR	WIRE COLOR	WIRE COLOR	PAIR	PAIR COLOR	WIRE COLOR	SIGNAL	TERMINAL
A	BRN/BLK	* BRN *	BRN		BRN/WH	BRN	24V PWR	1
B	BRN/BLK	* BLK *	WHI		BRN/WHI	WHI	24V RTN	2
N	—	*GRN/YEL*	GRN		GRN/WHI	GRN	EARTH GND	3
P	BLU/BLK	BLU	BLU	1	BLK/WHI	BLU	SUP RX+	4
U	BLU/BLK	BLK	WHT	1	BLU/WH	WHI	SUP RX-	5
D	RED/BLK	RED	RED	2	RED/BLU	RED	SUP TX+	6
R	RED/BLK	BLK	BLU	2	RED/BLU	BLU	SUP TX-	7
F	YEL/BLK	YEL	ORG	3	ORG/WHT	ORG	DET+	8
E	YEL/BLK	BLK	WHT	3	ORG/WHT	WHT	DET-	9
J	WHI/BLK	WHI	GREY	4	GREY/WHI	GREY	VIDEO+	10
H	WHI/BLK	BLK	WHT	4	GREY/WHI	WHI	VIDEO-	11

* IS SEPERATE POWER FEED BRN — BLK
BLK — WHT

Autoscope SOLO #2

COH 12200

Mini-Hub II Detector Port Master
Front Panel Input/Output Pin Assignment

The Mini-Hub II has inputs and outputs available through the front panel Input/ Output connector and through the back edge connector. The pin assignments for the Mini-Hub II front connector are listed in the following table. Edge connector pins are identified by NUMBER on the component (front) side of the board. Edge connector pins are identified by LETTER on the backside of board.

am #	Mini-Hub II conn.	Edge conn.	Front Harness	Description	D-Conn. Term #	D-Conn. Detector Descript.	On Print Detector number	Phase
1	Output 1 LED	F	1	Meijer's/Lowes Dr L	7	Det 15	7	4
1	Output 2 LED	W	14	Meijer's/Lowes Dr R	8	Det 16	8	4
2	Output 3 LED	S	2	SB Rochester LT	9	Det 17	9	2
3	Output 4 LED	Y	15	SB Rochester L	10	Det 18	10	2
3	Output 5 LED	(JP1)4	3	SB RochesterR	11	Det 19	11	2
	Output 6 LED	(JP7)5	16					
	Output 7 LED	(JP2)8	4					
	Output 8 LED	(JP8)9	17					
	Output 9 LED	(JP3)13	5					
	Output 10 LED	(JP9)14	18					
	Output 11 LED	(JP4)17	6					
	Output 12 LED	(JP10)18	19					
	Output 13 LED		7					
	Output 14 LED		20					
	Output 15 LED		8					
	Output 16 LED		21					
	Input 1 LED	(JP5)1	9					
	Input 2 LED	(JP11)2	22	LS 2 Red (C30)				
	Input 3 LED	(JP6)3	10					
	Input 4 LED	(JP12)10	23	LS 4 Red (C36)				
	Input 5 LED		11					
	Input 6 LED		24					
	Input 7 LED		12					
	Input 8 LED	(withJP14*)	25					

*Input 8 with JP14 inserted becomes 24VDC through Input/ Output Connector on front panel. Logic Ground is the GREY (pin 13) wire form Input/ Output connector on front panel.

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A blank copy of this table is provided for duplication in Appendix A.

DRAIN WIRE of Solo MVP to WHT of GRN/WHT pair
then at CABINET WHT to Shield of BRANCH CABLE
and to Ground Lug on INTERFACE PANEL.

Appendix A
Solo System-Wide Interconnections

Duplicate the following table to keep track of all Solo MVP connections:

Solo MVP ____ (write in service number)			Branch Power Cable (write in wire color)	Branch Communications Cable (write in wire color)			Communications Interface Panel	
PIN	PAIR COLOR	WIRE COLOR	WIRE COLOR	PAIR	PAIR COLOR	WIRE COLOR	SIGNAL	TERMINAL
A	BRN/BLK	* BRN *	BRN		BRN/WHT	BRN	24V PWR	1
B	BRN/BLK	* BLK *	WHT		BRN/WHT	WHT	24V RTN	2
N	—	*GRN/YEL*	GRN		GRN/WHT	GRN	EARTH GND	3
P	BLU/BLK	BLU	BLU	1	BLK/WHT	BLU	SUP RX+	4
U	BLU/BLK	BLK	WHT	1	BLK/WHT	WHT	SUP RX-	5
D	RED/BLK	RED	RED	2	RED/BLK	RED	SUP TX+	6
R	RED/BLK	BLK	BLK	2	RED/BLK	BLK	SUP TX-	7
F	YEL/BLK	YEL	ORG	3	ORG/WHT	ORG	DET+	8
E	YEL/BLK	BLK	WHT	3	ORG/WHT	WHT	DET-	9
J	WHT/BLK	WHT	GREY	4	GREY/WHT	GREY	VIDEO+	10
H	WHT/BLK	BLK	WHT	4	GREY/WHT	WHT	VIDEO-	11

* IS SEPERATE POWER FEED BRN — BLK
BLK — WHT

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: Auburn & Rochester DATE: 3/21/18

CITY/TOWNSHIP: Rochester Hills BY: Dawn Bierlein

COUNTY#: 13201 STATE#: _____ CHARGES: 78 013201 0

PLEASE PERFORM THE FOLLOWING:

_____ ELECTRICAL DEVICE: ____ INSTALL _____ MODERNIZE _____ MAINTENANCE

OAKLAND COUNTY

_____ UNDERGROUND: _____

_____ EDISON OK: _____ YES _____ NO JOB#: _____

APR 10 2018

_____ COORDINATE W/DISTRICT 7: _____

TRAFFIC OPERATIONS

	DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
	SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
_____	CHANGE TIMING.....																			
_____	CHANGE OFFSET.....																			
_____	CHANGE CYCLE LENGTH.....																			
_____	ADD DIAL/SPLIT.....																			

_____ CHANGE BREAKOUT OR EPROM: _____

_____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

_____ REPROGRAM TBC

_____ INSTALL INTERCONNECT: _____ TBC _____ MINITROL _____ TONE

_____ MBT OK: _____ YES _____ NO

_____ NO CHANGE - RECORD CORRECTION

__X__ OTHER: ~~Added~~ HOOK UP detector 20 (EB Auburn RT (Backpanel VD4 – 131)) PER PAPERWORK

(Requires a checksum change) (Rev 2).

APPROVED BY: _____ DATE: 3/29/18

DATE INSTALLED: 4/5/18

INSTALLED BY: JAMES OBERTS

INTERSECTION :- 13201 Rochester & Auburn
DESCRIPTION PROMS :- X00020R / F4808
CONTROLLER TYPE :- STANDARD PERSONALITY CONTROLLER
SOFTWARE TYPE :- MOD 52 SCATS
PHYSICAL INPUTS :-

INPUTS :-

1. NB ROCHESTER LT(LK)
2. NB ROCHESTER LT ADV(LK)
3. NB ROCHESTER L (LK)
4. NB ROCHESTER C (LK)
5. NB ROCHESTER RT(NL)
6. WB AUBURN LT (LK)
7. WB AUBURN LT ADV(LK)
8. WB AUBURN RD L (LK)
9. WB AUBURN RD C (LK)
10. WB AUBURN RD RT(NL)
11. SB ROCHESTER LT(LK)
12. SB ROCHESTER LT ADV(LK)
13. SB ROCHESTER L (LK)
14. SB ROCHESTER C (LK)
15. SB ROCHESTER RT(NL)
16. EB AUBURN LT (LK)
17. EB AUBURN LT ADV(LK) (BACKPANEL VD1 - 101)
18. EB AUBURN L (LK) (BACKPANEL VD2 - 109)
19. EB AUBURN R (LK) (BACKPANEL VD3 - 123)
20. EB AUBURN RT (NL) (BACKPANEL VD4 - 131)

Note: All detectors are Autoscope 2004

PED 2: NB ROCHESTER PED (EAST LEG) P.B
PED 4: WB Auburn PED (NORTH LEG) P.B.
PED 6: SB ROCHESTER PED (WEST LEG) P.B.
PED 8: EB Auburn PED (SOUTH LEG) P.B.

APPROACHES :-

A APPR 1 : SB ROCHESTER
A APPR 2 : NB ROCHESTER
B APPR 1 : EB Auburn LT
B APPR 2 : WB Auburn LT
B APPR 3 : EB Auburn
B APPR 4 : WB Auburn
C APPR 1 : EB Auburn
C APPR 2 : WB Auburn
D APPR 1 : SB ROCHESTER LT
D APPR 2 : NB ROCHESTER LT
D APPR 3 : NB ROCHESTER
D APPR 4 : SB ROCHESTER

FLEXIDATA:-

SEQUENCE	A,B,C,D	A,B,C,D
AUTO REL		
R- REL	A	A
R+ REL	B	B
Q- REL	C	C
Q+ REL	D	D
LOOKAHEAD		

PEDESTRIANS:-

1. -
2. NB ROCHESTER PED (EAST LEG) P.B.
3. -
4. WB Auburn PED (NORTH LEG) P.B.
5. -
6. SB ROCHESTER PED (WEST LEG) P.B.
7. -
8. EB Auburn PED (SOUTH LEG) P.B.

SPECIAL FEATURES :-

The personality revision number is currently 2 (=B)
A STAGE HAS A PERMANENT DEMAND
DEMAND FOR STAGES B, C, D IN FLEXI AND ISOLATED. SET XSF8 TO DISABLE.
Night Flash code: Set Y+ to activate the night flash in Flexilink

SCATS XSF BIT1 ignores demand for vg 1 so holds SB LT signal red.
SCATS XSF BIT2 ignores demand for vg 3 so holds EB LT signal red.
SCATS XSF BIT3 ignores demand for vg 5 so holds NB LT signal red.
SCATS XSF BIT4 ignores demand for vg 7 so holds WB LT signal red.

IN MASTERLINK AND FLEXILINK:
Z- ON CAUSES D1 TURN TO APPEAR AND HOLD IN D STAGE
Z+ ON CAUSES D2 TURN TO APPEAR AND HOLD IN D STAGE
Z- & Z+ ON CAUSES BOTH TURNS TO APPEAR AND HOLD IN D
B1-C O/L OR B2-C O/L MAY APPEAR IN B1 OR B2 RESPECTIVELY
HOWEVER IF THE OVERLAP TERMINATES IN B THEN THE C AMBER
AND C RED TIMES ARE USED FOR B STAGE
Set BT = nS in SCATS data to enable Z5 flag in B stage to C.
This allows termination of o/lap phase minimum timer if the
appropriate phase o/lap is to occur and C is next, otherwise
phase minimum is guaranteed by phase minimum timer.

Backpanel for size P44-16 cabinet:

Load Switch 1:	SB Rochester LT	CL	FLR
Load Switch 2:	NB Rochester	A	FLR
Load Switch 3:	EB Auburn LT	DL	FLR
Load Switch 4:	WB Auburn	B	FLR
Load Switch 5:	NB Rochester LT	AL	FLR
Load Switch 6:	SB Rochester	C	FLR
Load Switch 7:	WB Auburn LT	BL	FLR
Load Switch 8:	EB Auburn	B	FLR
Load Switch 9:	NB Rochester Ped (East Leg)	WA	
Load Switch 10:	WB Auburn Ped (North Leg)	WB	
Load Switch 11:	SB Rochester Ped (West Leg)	WC	
Load Switch 12:	EB Auburn Ped (South Leg)	WD	

Jumpers:
189-190, 191-192, 193-194, 195-196, 197-198, 199-200, 201-202, 207-208,
211-212, 213-214, 215-216, 217-218, 219-220, 221-222, 223-224, 229-230,
233-234, 235-236, 237-238, 239-240, 241-242, 243-244, 245-246, 251-252,
255-256, 257-258, 259-260, 261-262, 263-264, 265-266, 267-268, 273-274,
298-302, 321-322, 323-324, 325-326, 327-328, 329-PB1, 334-335, 343-344,
345-346, 347-348, 349-350, 351-PB1, 356-357, 365-366, 367-368, 369-370,
371-372, 373-PB1, 378-379, 387-388, 389-390, 391-392, 393-394, 395-PB1,
400-401.

MMU: (MENU : SET/VIEW CONFIG)

Dual Indication Enable:	R+G: Channel 1, 2, 3, 4, 5, 6, 7, 8 R+Y: Channel 1, 2, 3, 4, 5, 6, 7, 8 G+Y: Channel 1, 2, 3, 4, 5, 6, 7, 8
Red Fail Enable:	Enable: Channel 1, 2, 3, 4, 5, 6, 7, 8
Unit Options:	All OFF except: Recurrent pulse Program Memory Card
Y & R Clearance Disable:	Channel 1, 2, 3, 4, 5, 6, 7, 8 Enabled
Program Card:	Compatible Channels: 1-5, 1-6, 2-5, 2-6, 3-7, 3-8, 4-7, 4-8. Min Flash Time: 4+2+1 Min Yellow Change Disable: None Voltage Monitor Latch: NONE

```
*********************************
* CONTROLLER INFORMATION SHEET *
*     FOR SITE NO.    13201    *
*          Dawn Bierlein       *
*  DATE :    21-MAR-2018       *
```

CHECKSUMS:
TIMES: EC/354
PERS: A6/246
TOTAL: 4A/112

FLEXILINK PLAN DATA

Intersection # 13201 **State #** 63132-01-001 **Date:** 03/21/18 **Prepared By:** Dawn Bierlein

Intersection: Auburn & Rochester Road **City:** Rochester Hills

Hours of Operation: 7 Days: 24 hrs **Approved By:** R Jones

Hours of Flashing: None

		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8
0	CL		100	140	140					
1	A		0	0	0					
2	B		42	76	64					
3	C		63	102	91					
4	D		81	125	121					
5	E									
6	F									
7	G									
8	R-									
9	R+									
10	Of (Y-)		0	0	0					
11	Y+	C								
12	Z-									
13	Z+									
14	Q-									
15	Q+									
16	XH									
17	XL									

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0.
Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

							Timers		
Phase	**Direction**	**Min**	**Max**	**ECO**	**Amber**	**All Red**	**Gap**	**Hdwy**	**Waste**
A	Rochester	10.0	40.0		4.7	1.9	3.0	1.2	10.0
B	Auburn LT	4.0	12.0		4.3	2.3	3.2	1.2	10.0
C	Auburn THRU	10.0	20.0		4.3	2.3	3.0	1.2	10.0
D	Rochester LT	4.0	12.0		4.7	1.9	3.2	1.2	10.0
E									
F									
G									

	Day	Hours	Plan#
SC1	14	0:00	1
SC2	8	6:00	2
SC3	8	10:00	1
SC4	8	14:00	3
SC5	8	19:00	1
SC6			
SC7			
SC8			
SC9			
SC10			

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2
NB Rochester Eleg PED	7.0	18.0	4.7
WB Auburn Nleg PED	7.0	23.0	4.3
SB Rochester Wleg PED	7.0	12.0	4.7
EB Auburn Sleg PED	7.0	17.0	4.3

Normal Operating Mode

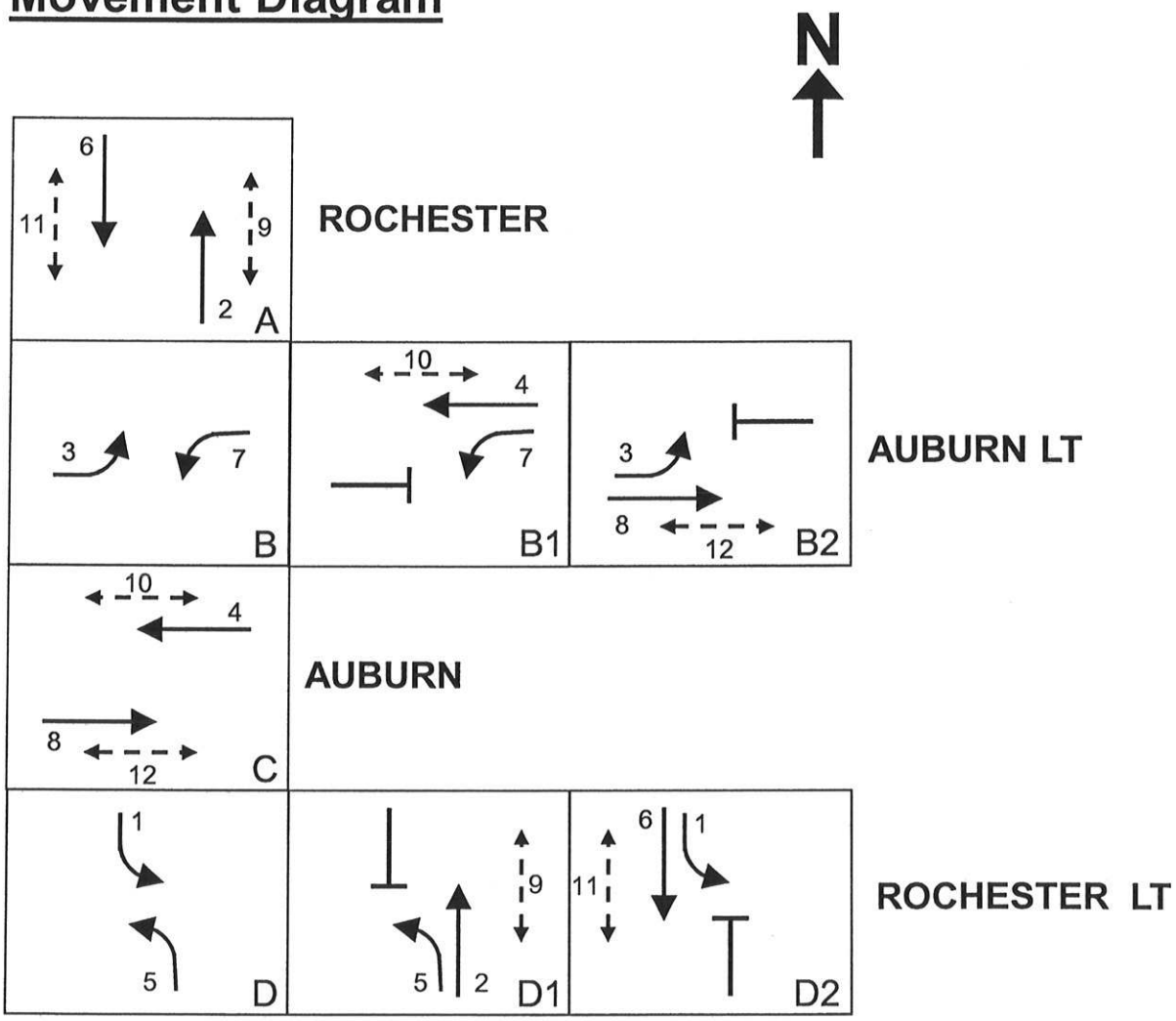
Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		X		

DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON,FRI,SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

#13201 – AUBURN & ROCHESTER

- **Movement Diagram**



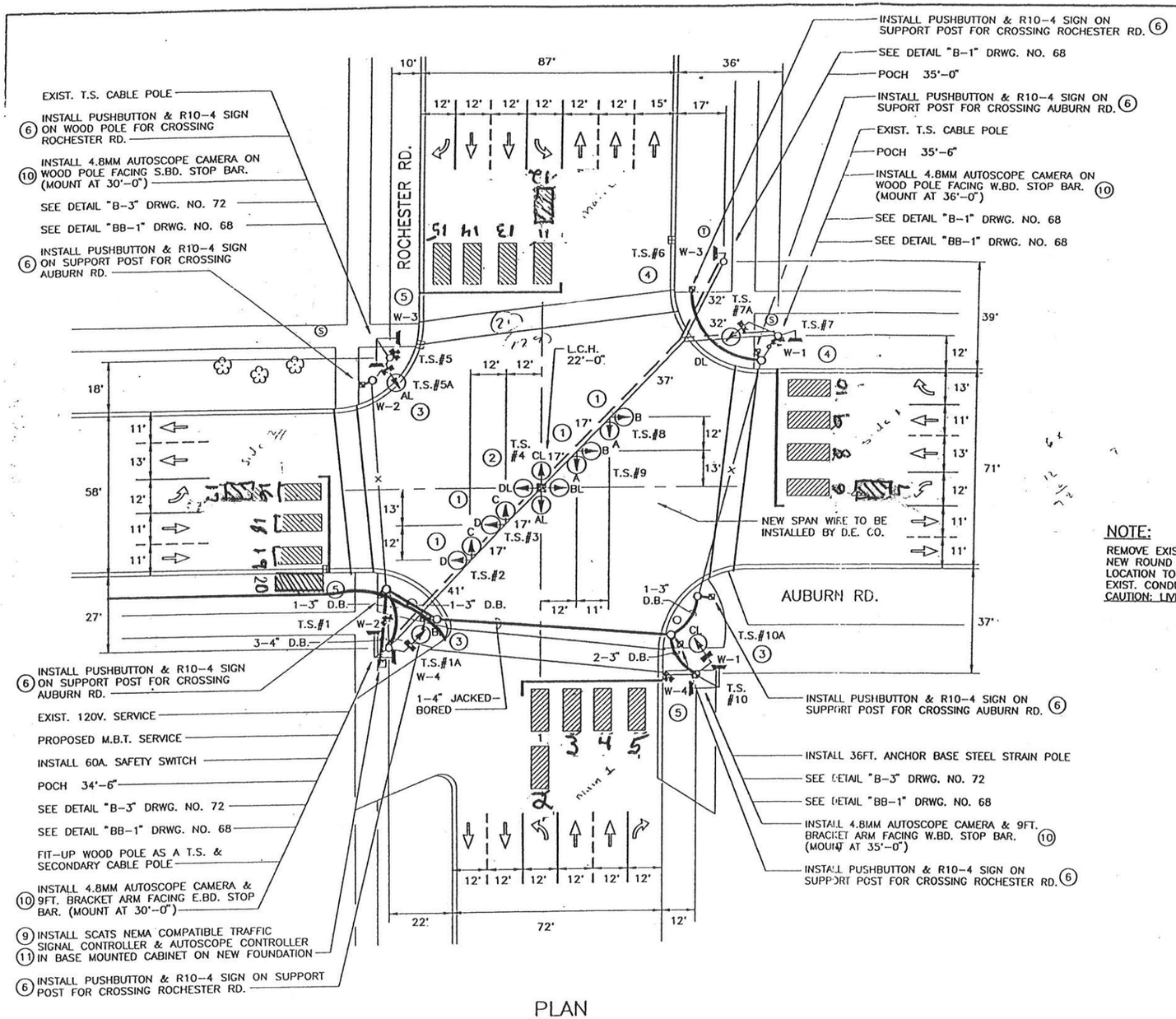
Autoscope 37-Pin Male Output Harness (33457G2) Wiring

Autoscope Output Harness Pins #1 & #20 to Logic Common & Pins #18 & # 37 to +24 VDC

Camera Number	EIM Switch Position	EIM LED#	Output Harness Pin#	D-Conn Pin (1,2,..)	Vehicle Detector No.		Detector Description	Phase No. (1,2,3,...)
					D-Conn format (9,10,...)	On Print (1,2,..)		
1	1	1	29	1	9	1	NB Rochester LT	5
	1	2	30	2	10	2	NB Rochester LT ADV	5
	1	3	31	3	11	3	NB Rochester L	2
	1	4	32	4	12	4	NB Rochester R	2
	1	5	33	5	13	5	NB Rochester RT	2
	1	6	34					
	1	7	35					
	1	8	36					
2	2	1	10	6	14	6	WB Auburn LT	7
	2	2	11	7	15	7	WB Auburn LT ADV	7
	2	3	12	8	16	8	WB Auburn L	4
	2	4	13	9	17	9	WB Auburn R	4
	2	5	14	10	18	10	WB Auburn RT	4
	2	6	15					
	2	7	16					
	2	8	17					
3	3	1	21	11	19	11	SB Rochester LT	1
	3	2	22	12	20	12	SB Rochester LT ADV	1
	3	3	23	13	21	13	SB Rochester L	6
	3	4	24	14	22	14	SB Rochester R	6
	3	5	25	15	23	15	SB Rochester RT	6
	3	6	26					
	3	7	27					
	3	8	28					
4	4	1	2	16	24	16	EB Auburn LT	3
	4	2	3	17	(VD1 - 101)	17	EB Auburn LT ADV	3
	4	3	4	18	(VD2 - 109)	18	EB Auburn L	8
	4	4	5	19	(VD3 - 123)	19	EB Auburn R	8
	4	5	6	20	(VD4 - 131)	20	EB Auburn RT	8
	4	6	7					
	4	7	8					
	4	8	9					

Autoscope 37-Pin Female Input Harness (33457G3) Wiring

EIM Switch Position	EIM LED#	Input Harness Pin#	Phase Status Input From +24 VDC	Backpanel Terminal Position and Number
5	1	29	Phase 8 Green	LS 8 Green (180)
5	1	30	Phase 7 Green	LS 7 Green (177)
5	1	31	Phase 6 Green	LS 6 Green (174)
5	1	32	Phase 5 Green	LS 5 Green (171)
5	1	33	Phase 4 Green	LS 4 Green (168)
5	1	34	Phase 3 Green	LS 3 Green (165)
5	1	35	Phase 2 Green	LS 2 Green (162)
5	1	36	Phase 1 Green	LS 1 Green (159)
6	2	10	Phase 8 Red	LS 8 Red (178)
6	2	11	Phase 7 Red	LS 7 Red (175)
6	2	12	Phase 6 Red	LS 6 Red (172)
6	2	13	Phase 5 Red	LS 5 Red (169)
6	2	14	Phase 4 Red	LS 4 Red (166)
6	2	15	Phase 3 Red	LS 3 Red (163)
6	2	16	Phase 2 Red	LS 2 Red (160)
6	2	17	Phase 1 Red	LS 1 Red (157)



PLAN

SCALE: 1"=20'

LIST OF MATERIALS			
NO.	ITEM	QUANTITIES	CODE NO.
(1)	2-WAY SPAN WIRE MOUNTED T.S.	4 EACH	6910241
(2)	4-WAY SPAN WIRE MOUNTED T.S.	1 EACH	6910245
(3)	1-WAY BRACKET ARM MOUNTED T.S.	4 EACH	6910251
(4)	1-WAY BRACKET ARM MOUNTED PEDESTRIAN T.S.	2 EACH	6910255
(5)	2-WAY BRACKET ARM MOUNTED PEDESTRIAN T.S.	3 EACH	6910257
(6)	PUSHBUTTON & SIGN	8 EACH	6910287
(7)	ONE-WAY CASE SIGN, 12"X27"	4 EACH	6910300
(8)	FOUR-WAY CASE SIGN, 12"X27"	1 EACH	6910302
(9)	SOLID STATE ACTUATED CONTROLLER & CABINET	1 EACH	6910337
(10)	AUTOSCOPE CAMERA	4 EACH	6917340
(11)	AUTOSCOPE CONTROLLER	1 EACH	6917341
	DIRECT BURIAL CONDUIT, 1-1 1/4" D.B.	90 LIN. FT.	6910351
	DIRECT BURIAL CONDUIT, 1-3"	60 LIN. FT.	6900062
	DIRECT BURIAL CONDUIT, 2-3"	30 LIN. FT.	6900065
	DIRECT BURIAL CONDUIT, 3-4"	25 LIN. FT.	6907061
	JACKED-BORED CONDUIT	80 LIN. FT.	6910368
	HANDHOLE (ROUND)	6 EACH	6910369
	FIT-UP WOOD POLE AS A T.S. & SECONDARY CABLE POLE	1 EACH	6910403
	ANCHOR BASE STEEL STRAIN POLE, 36FT.	1 EACH	6910424
	ANCHOR BASE STEEL STRAIN POLE FOUNDATION	1 EACH	6910426
	BASE MOUNT CONTROLLER FOUNDATION	1 EACH	6910427
	SAFETY SWITCH	1 EACH	6910458
	CLAMP-ON BRACKET ARM, 9FT.	2 EACH	6917410
	PUSHBUTTON SUPPORT	7 EACH	6917285
	600V., 1-2/C#4 SECONDARY CABLE	70 LIN. FT.	6910470
	REMOVE HANDHOLE	4 EACH	6910176

NOTE:

REMOVE EXIST. HANDHOLE (4) & BUILD NEW ROUND HANDHOLE (4) IN SAME LOCATION TO ACCOMMODATE NEW & EXIST. CONDUIT. AS SHOWN ON PLANS. CAUTION: LIVE CABLES!!

INSTALL PIPE EXTENSIONS AS SHOWN:

T.S.#2 = 46" PIPE EXTENSION
T.S.#3 = 18" PIPE EXTENSION
T.S.#8 = 26" PIPE EXTENSION
T.S.#9 = 8" PIPE EXTENSION

MOVEMENT DIAGRAM

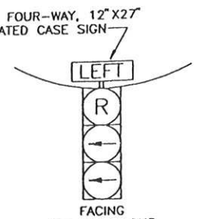
(A) STAGE	(B) STAGE	(C) STAGE	(D) STAGE ALTERNATIVES		
			(D)	(D1)	(D2)
V1 / V2	V1 / V3	V2 / V4	V7 / V8	V7 / V5	V6 / V8

STAGE ALTERNATIVES	
(A1)	(A2)
V7 / V5	V8 / V6

NOTE:

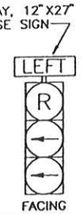
1. USE 1-1 1/4" DIRECT BURIAL CONDUIT FOR PUSHBUTTON CABLE TO SUPPORT POST.

⑧ INSTALL FOUR-WAY, 12"X27" ILLUMINATED CASE SIGN



FACING ALL DIRECTIONS
T.S.#4

⑦⑦ INSTALL ONE-WAY, 12"X27" ⑦⑦ ILLUMINATED CASE SIGN



FACING LEFT TURN LANE
(T.S.#1A, T.S.#5A, T.S.#7A, T.S.#10A)

LOAD	AMPS	WATTS
SIGNALS	0	0
CASE SIGNS	0	0

DATE REVISIONS

BOARD OF ROAD COMMISSIONERS OF OAKLAND COUNTY
TRAFFIC-SAFETY DEPARTMENT

M.D.O.T. PLAN NO. 63132-01-00

AUBURN RD. & ROCHESTER RD.

CO. 13201 ATS 11

ASSOCIATE CONSULTANT
MANSELL ASSOCIATES INC.
ENGINEERING CONSULTANTS
(313) 473-7070
32580 Grand River
Farmington, MI 48336

PRIME CONSULTANT
HAMP
AT

DATE	DRAWN BY	APPROVED	JOB NO.
12-22-93	MAI		M1345A

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: Rochester & SOUTH BLVD DATE: 3/24/22

CITY/TOWNSHIP: Troy BY: ELA

COUNTY#: 587 STATE#: _____ CHARGES: 00587 G

PLEASE PERFORM THE FOLLOWING:

_____ ELECTRICAL DEVICE: ____ INSTALL _____ MODERNIZE _____ MAINTENANCE

_____ UNDERGROUND: _____

_____ EDISON OK: _____ YES _____ NO JOB#: _____

_____ COORDINATE W/DISTRICT 7: _____

DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
_____ CHANGE TIMING.....																			
_____ CHANGE OFFSET.....																			
_____ CHANGE CYCLE LENGTH.....																			
_____ ADD DIAL/SPLIT.....																			

X CHANGE BREAKOUT OR EPROM: Rev 3 (Flex)

_____ CHANGE HOURS OF OPERATION:

OLD: _____

NEW: _____

Road Commission For
Oakland County

SEP 16 2022

Traffic Operations

_____ REPROGRAM TBC

_____ INSTALL INTERCONNECT: _____ TBC _____ MINITROL _____ TONE

_____ MBT OK: _____ YES _____ NO

X NO CHANGE - RECORD CORRECTION (LOCKING DETS)

X OTHER: requires a checksum change

Rev 3

APPROVED BY: _____ DATE: 9/13/22

DATE INSTALLED: 9/14/22

INSTALLED BY: Dave, James

INTERSECTION :- 587 Rochester & South Blvd
DESCRIPTION PROMS :- X00069 / F4808
CONTROLLER TYPE :- STANDARD PERSONALITY CONTROLLER
SOFTWARE TYPE :- MOD 52 SCATS S30 **TS2**
INPUTS :-

1. SB ROCHESTER LT (LK)
2. SB ROCHESTER LT ADV (LK)
3. SB ROCHESTER L (LK)
4. SB ROCHESTER R (LK)
5. EB SOUTH BLVD LT (LK)
6. EB SOUTH BLVD LT ADV (LK)
7. EB SOUTH BLVD (LK)
8. EB SOUTH BLVD RT (NL)
9. NB ROCHESTER LT (LK)
10. NB ROCHESTER LT ADV (LK))
11. NB ROCHESTER L (LK)
12. NB ROCHESTER R (LK)
13. NB ROCHESTER RT (LK)
14. WB SOUTH BLVD LT (LK)
15. WB SOUTH BLVD LT ADV (LK)
16. WB SOUTH BLVD L (LK)
17. WB SOUTH BLVD RT (NL)

NOTE: ALL DETECTORS ARE LOOPS.

PED 2: NB ROCHESTER PED EAST P.B. (WA)
PED 4: WB SOUTH BLVD PED NORTH P.B. (WB)
PED 6: SB ROCHESTER PED WEST P.B. (WC)
PED 8: EB SOUTH BLVD PED SOUTH P.B. (WD)

Opticom 1: TB2 PREEMPT INPUT 3 (CALLS NB & SB ROCHESTER).
Opticom 2: TB2 PREEMPT INPUT 4 (CALLS EB & WB SOOTH BLVD).

APPROACHES :-

A APPR 1 : SB ROCHESTER	A APPR 2 : NB ROCHESTER
B APPR 1 : EB SOUTH BLVD LT	B APPR 2 : WB SOUTH BLVD LT
C APPR 1 : EB SOUTH BLVD	C APPR 2 : WB SOUTH BLVD
D APPR 1 : SB ROCHESTER LT	D APPR 2 : NB ROCHESTER LT

FLEXIDATA :-

SEQUENCE	A,B,C,D	A,B,C,D
AUTO REL		
R- REL	A	A
R+ REL	B	B
Q- REL	C	C
Q+ REL	D	D

PEDESTRIANS :-

1. NO PED 1
2. NB ROCHESTER PED (EAST)
3. NO PED 3
4. WB SOUTH BLVD PED (NORTH)
5. NO PED 5
6. SB ROCHESTER PED (WEST)
7. NO PED 7
8. EB SOUTH BLVD PED (SOUTH)

SPECIAL FEATURES :-
Personality revision is 3 (=C).

A STAGE HAS A PERMANENT DEMAND
DEMAND FOR STAGES B,C,D IN FLEXI AND ISOLATED. SET XSF9 (XH=1) TO DISABLE.
Opticom 1 CALLS NB & SB ROCHESTER.
Opticom 2 CALLS EB & WB SOUTH BLVD.

The XSF bits below will call & extend or only call the LT phase.
XSF 1 (XL Value = 1) calls and extends EBLT (Max Recall).
XSF 2 (XL Value = 2) only calls WBLT (Min Recall).
XSF 3 (XL Value = 4) calls and extends NBLT (Max Recall).
XSF 4 (XL Value = 8) only calls SBLT (Min Recall).
XSF 5 (XL Value = 10) calls and extends WBLT (Max Recall).
XSF 6 (XL Value = 20) only calls EBLT (Min Recall).
XSF 7 (XL Value = 40) calls and extends SBLT (Max Recall).
XSF 8 (XL Value = 80) only calls NBLT (Min Recall).

Night Flash code: Set Y+ to activate the night flash in Flexilink.
Pedestrians have automatic introduction using SCATS Y-.

WB SOUTH BLVD PED NORTH introduction is suppressed when OPTICOM is active.
SB ROCHESTER PED WEST introduction is suppressed when OPTICOM is active.

NB ROCHESTER PED EAST introduction is suppressed when OPTICOM is active.
EB SOUTH BLVD PED SOUTH introduction is suppressed when OPTICOM is active.

Set BT = nS in SCATS data to enable Z5 flag in B stage to C. This allows termination of o/lap phase minimum timer if the appropriate phase o/lap is to occur and C is next, otherwise phase minimum is guaranteed by phase minimum timer.

BACKPANEL :- SIZE P44-16 TS2 CABINET

LOAD SWITCH 1:	SB ROCHESTER LT & WB SOUTH BLVD RT	CL & BR	FLR
LOAD SWITCH 2:	NB ROCHESTER	A	FLR
LOAD SWITCH 3:	EB SOUTH BLVD LT	DL	FLR
LOAD SWITCH 4:	WB SOUTH BLVD	B	FLR
LOAD SWITCH 5:	NB ROCHESTER LT & EB SOUTH BLVD RT	AL & DR	FLR
LOAD SWITCH 6:	SB ROCHESTER	C	FLR
LOAD SWITCH 7:	WB SOUTH BLVD LT & NB ROCHESTER RT	BL & AR	FLR
LOAD SWITCH 8:	EB SOUTH BLVD	D	FLR
LOAD SWITCH 9:	NB ROCHESTER PED EAST	WA	
LOAD SWITCH 10:	WB SOUTH BLVD PED NORTH	WB	
LOAD SWITCH 11:	SB ROCHESTER PED WEST	WC	
LOAD SWITCH 12:	EB SOUTH BLVD PED SOUTH	WD	

MMU 2 :-(MENU : SET/VIEW CONFIG)

Field Check Enable

Channel 1: G, Y, R
Channel 2: G, Y, R
Channel 3: G, Y, R
Channel 4: G, Y, R
Channel 5: G, Y, R
Channel 6: G, Y, R
Channel 7: G, Y, R
Channel 8: G, Y, R

Dual Indication Enable:

R+G: Channel 1,2,3,4,5,6,7,8,9,10,11,12
R+Y: Channel 1,2,3,4,5,6,7,8
G+Y: Channel 1,2,3,4,5,6,7,8,

Red Fail Enable: Enable: Channel 1,2,3,4,5,6,7,8

Y & R Clearance Disable: Channel 1,2,3,4,5,6,7,8 Enabled

Flashing Yellow Arrow: None

Unit Options:

All OFF except:
Recurrent pulse
LED Guard
Program Memory Card

Program Card:

Compatible Channels: 1-5,1-6,1-11,2-5,2-6,2-9,
2-11,3-7,3-8,3-12,4-7,4-8,4-10,4-12,5-9,6-9,6-11,
7-10,8-10,8-12,9-11,10-12
Min Flash Time : 4+2+1
Min Yellow Change Disable: 9,10,11,12
Voltage Monitor Latch: None

Note :- Add Jumper 16 MMU Flash - 116 Monitor ST Out

```
**********************************
* CONTROLLER INFORMATION SHEET *
*     FOR SITE NO. 587         *
*          E LABIANO           *
*       24-MARCH-2022          *
**********************************
```

CHECKSUMS
TIMES: 43 / 103
PERS: 29 / 051
TOTAL: 6A / 152

FLEXILINK PLAN DATA

Intersection # 587 **State #** _____ **Date:** 03/24/22 **Prepared By:** ELA

Intersection: Rochester & South Blvd **City:** Troy

Hours of Operation: 7 Days: 24 Hours **Approved By:** Rachel Jones

Hours of Flashing: None

		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8
0	CL		140	140	140	90				
1	A		0	0	0	0				
2	B		78	65	76	45				
3	C		98	90	95	59				
4	D		120	120	120	76				
5	E									
6	F									
7	G									
8	R-									
9	R+									
10	Of (Y-)		103	44	122	52				
11	Y+	C								
12	Z-									
13	Z+									
14	Q-									
15	Q+									
16	XH									
17	XL									

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0.
Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

							Timers		
Phase	**Direction**	**Min**	**Max**	**ECO**	**Amber**	**All Red**	**Gap**	**Hdwy**	**Waste**
A	Rochester	10.0	40.0		4.3	1.7	3.0	1.2	10.0
B	South Blvd LT	5.0	15.0		4.3	2.0	3.0	1.2	10.0
C	South Blvd	10.0	40.0		4.3	2.0	3.0	1.2	10.0
D	Rochester LT	5.0	15.0		4.3	1.7	3.0	1.2	10.0
E									
F									
G									

	Day	Hours	Plan#
SC1	14	0:00	4
SC2	14	22:00	4
SC3	13	8:00	2
SC4	13	19:00	4
SC5	8	5:00	2
SC6	8	10:00	1
SC7	8	14:00	3
SC8	8	19:00	1
SC9			
SC10			

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2
NB Rochester Ped East (Ped 2)	7.0	14.0	3.0
WB South Blvd Ped North (Ped 4)	7.0	15.0	3.3
SB Rochester Ped West (Ped 6)	7.0	17.0	3.0
EB South Blvd Ped South (Ped 8)	7.0	20.0	3.3

TSM15 = Opticom Min Alarm Time = 10
TSM16 = Opticom Max Alarm Time = 200

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		X		

DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON,FRI,SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

TS2 LOOP DETECTORS BIU #1

CO#587

Detector # on print	Description	Phase	Output
1	SB ROCHESTER LT	1	1
2	SB ROCHESTER LT ADV	1	2
3	SB ROCHESTER L	6	3
4	SB ROCHESTER R	6	4
5	EB SOUTH BLVD LT	3	5
6	EB SOUTH BLVD LT ADV	3	6
7	EB SOUTH BLVD	8	7
8	EB SOUTH BLVD RT	8	8
9	NB ROCHESTER LT	5	9
10	NB ROCHESTER LT ADV	5	10
11	NB ROCHESTER L	2	11
12	NB ROCHESTER R	2	12
13	NB ROCHESTER RT	2	13
14	WB SOUTH BLVD LT	7	14
15	WB SOUTH BLVD LT ADV	7	15
16	WB SOUTH BLVD	4	16

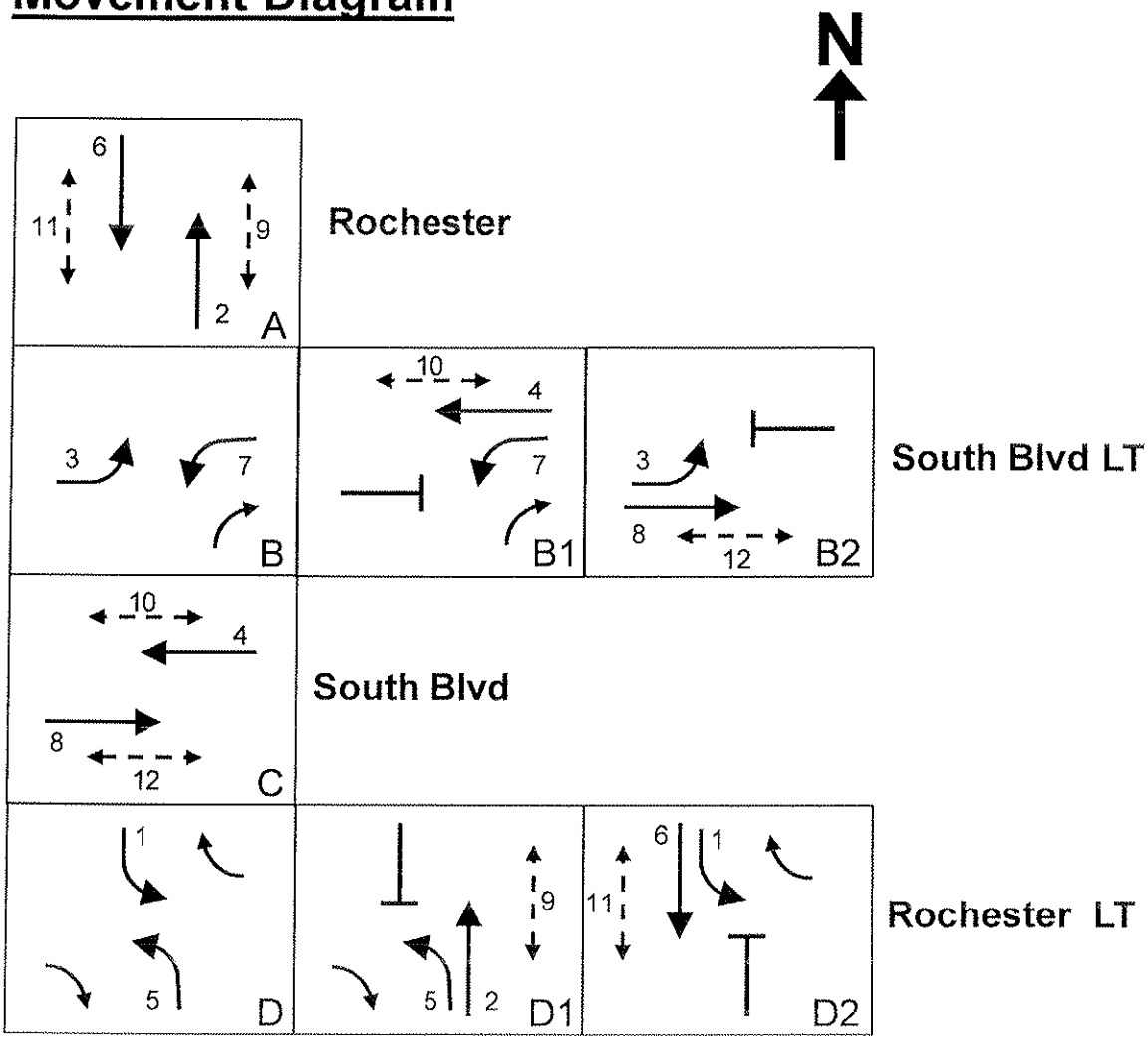
TS2 LOOP DETECTORS BIU #2

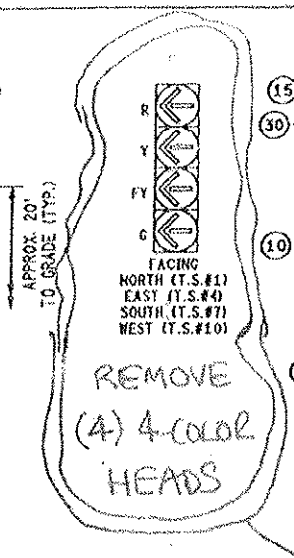
CO#587

Detector # on print	Description	Phase	Output
17	WB SOUTH BLVD RT	4	17
			18
			19
			20
			21
			22
			23
			24
			25
			26
			27
			28
			29
			30
			31
			32

#587 – Rochester & South Blvd

- **Movement Diagram**





ALL NEW LOOPS SHALL BE PREFORMED TYPE. COORDINATE INSTALLATION WITH STAGED ROAD CONSTRUCTION.

NEW STEEL POLES AND ANCHOR BOLTS WILL BE FURNISHED BY R.C.O.C. AND INSTALLED BY THE CONTRACTOR.

SCATS
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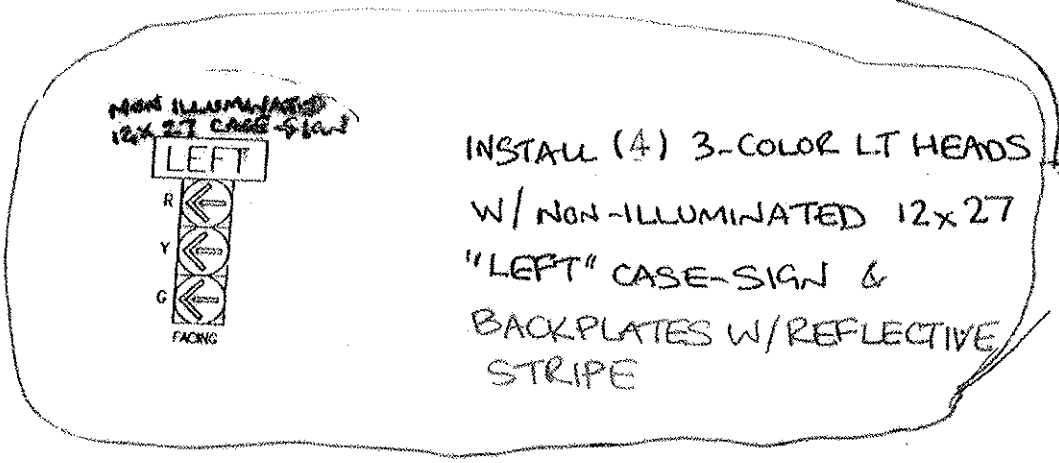
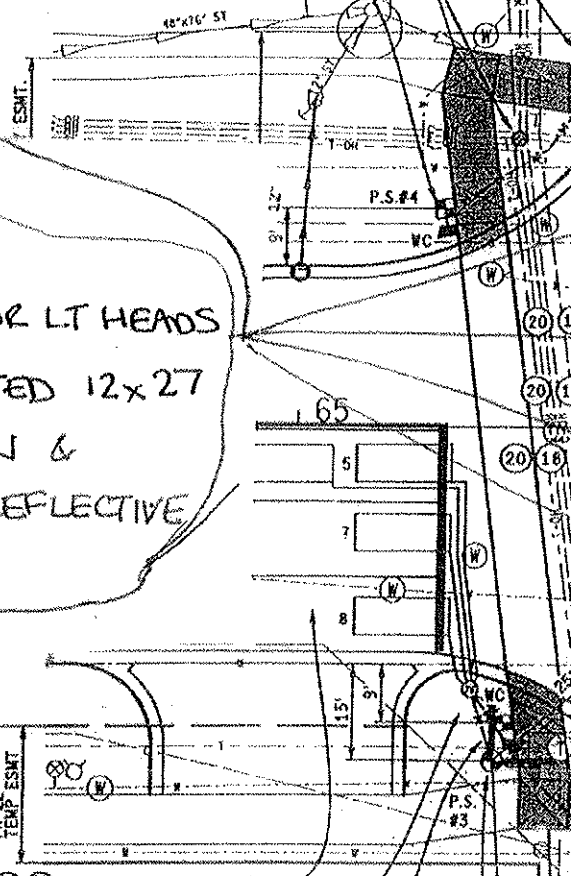


NO		
1		
2		
3		
4		
5		
6	Controller and Cabinet, Digital Type, Delivered, RCOC	1 Ea
7	Controller Fdn, Base Mount	1 Ea
8	Pedestal, Alum	1 Ea
9	Pedestal, Fdn	1 Ea
10	Pushbutton and Sign	8 Ea
11	Pushbutton Support Post, RCOC	6 Ea
12	Serv Disconnect	1 Ea
13	Span Wire, Box, RCOC	1 Ea
14	Tether Wire, Box, RCOC	1 Ea
15	Strain Pole, Steel, Anchor Base, 30 foot, RCOC Supplied	3 Ea
16	Strain Pole, Steel, Anchor Fdn, RCOC	3 Ea
17	TS, One Way Span Wire Mtd (LED)	5 Ea
18	TS, One Way Span Wire Mtd, FYA (LED)	4 Ea
19	TS, One Way Span Wire Mtd, Five Sect (LED)	3 Ea
20	Backplate, TS	12 Ea
21	TS, Pedestrian, One Way Bracket Arm Mtd (LED) Countdown	3 Ea
22	TS, Pedestrian, Two Way Bracket Arm Mtd (LED) Countdown	2 Ea
23	TS, Pedestrian, One Way Pedestal Mtd (LED) Countdown	1 Ea
24	Traffic Loop, Presence (Preformed), RCOC	17 Ea
25	Digital Loop Detector	5 Ea
26	Optical Priority Control System, RCOC	1 Ea
27	Street Name Sign, Two Way, 8 foot, RCOC	4 Ea
28	Street Name Sign Bracket Arm, 10 foot, RCOC	4 Ea
29	Cellular Modem, Integrate, RCOC	1 Ea
30	Bracket Arm, 9 foot, RCOC	1 Ea
31	Video Surveillance, Camera, RCOC	1 Ea
	Conduit, DB, 1, 1 1/4 inch	160 Ft
	Conduit, DB, 1, 3 Inch	175 Ft
	Conduit, DB, 2, 3 Inch	25 Ft
	Conduit, DB, 3, 4 Inch	10 Ft
	Cable, Sec, 600V, 1, 2/C#4, #6 Ground, RCOC	100 Ft

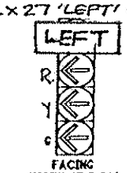
(24)(24)(24)(24) INSTALL (4) 6'x15' LOOPS
(1) INSTALL H.H.
(15)(16) INSTALL 30 FT. STEEL STRAIN POLE & FDN.
(30)(31) INSTALL SURVEILLANCE CAMERA & 9 FT. ARM
(21) SEE DETAIL "B-1" DETAIL SHEET OC-4
POCH (PULLOFF) 27'-6"
(10)(11) INSTALL PUSHBUTTON & R10-3e SIGN ON P.B. SUPPORT POST FOR CROSSING ROCHESTER RD.
EXIST. 65'/4 ITC WOOD POLE
(8)(9) INSTALL PEDESTAL & FDN.
(23) SEE DETAIL "B-2" DETAIL SHEET OC-5
(10) INSTALL PUSHBUTTON & R10-3e SIGN FOR CROSSING SOUTH BLVD.

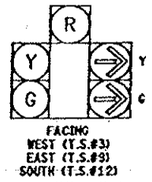


(24)(24)(24)(24) INSTALL (4) 6'x15' LOOPS
(1) INSTALL H.H.
(10)(11) INSTALL PUSHBUTTON & R10-3e SIGN ON P.B. SUPPORT POST FOR CROSSING SOUTH BLVD.
(15)(16) INSTALL 30 FT. STEEL STRAIN POLE & FDN.
(22) SEE DETAIL "D-1" DETAIL SHEET OC-4
(27)(27)(28)(28) INSTALL (2) 2-WAY ILLUMINATED STREET NAME SIGNS ON 10 FT. TRUSS ARM
POCH (PULLOFF) 28'-6"
(10)(11) INSTALL PUSHBUTTON & R10-3e SIGN ON P.B. SUPPORT POST FOR CROSSING ROCHESTER RD.
EXIST. 65'/2 ITC WOOD POLE

NOTES:
1. INSTALL 1-1 1/4" D.B. CONDUIT FROM THE NEW SUPPORT POSTS TO H.H.
2. EXACT LOCATIONS FOR SUPPORT POSTS SHALL BE DETERMINED BY THE RCOC FIELD ENGINEER.
3. SEE DETAIL GRADING SHEETS FOR SIDEWALK DETAIL GRADES. COORDINATE SIDEWALK AND SIGNAL CONSTRUCTION.
4. EXACT LOCATION OF VEHICLE DETECTORS SHALL BE DETERMINED BY THE RCOC FIELD ENGINEER

NON-ILLUMINATED
12'x27' 'LEFT' CS





ALL NEW LOOPS SHALL BE PREFORMED TYPE. COORDINATE INSTALLATION WITH STAGED ROAD CONSTRUCTION.

NEW STEEL POLES AND ANCHOR BOLTS WILL BE FURNISHED BY R.C.O.C. AND INSTALLED BY THE CONTRACTOR.

SCATS COMMUNICATION SHALL BE VIA AT&T CELLULAR MODEM. INSTALLATION SHALL BE COORDINATED WITH THE R.C.O.C. FIELD ENGINEER.

ALL SPAN WIRE POLE CONTACT HEIGHTS SHALL BE COORDINATED WITH THE FIELD ENGINEER SO THAT A MINIMUM 18 FT. UNDERCLEARANCE IS MAINTAINED. PAYMENT IS INCLUDED IN THE INSTALLATION OF "Span Wire, Box, RCOC" ON THIS CONTRACT.)

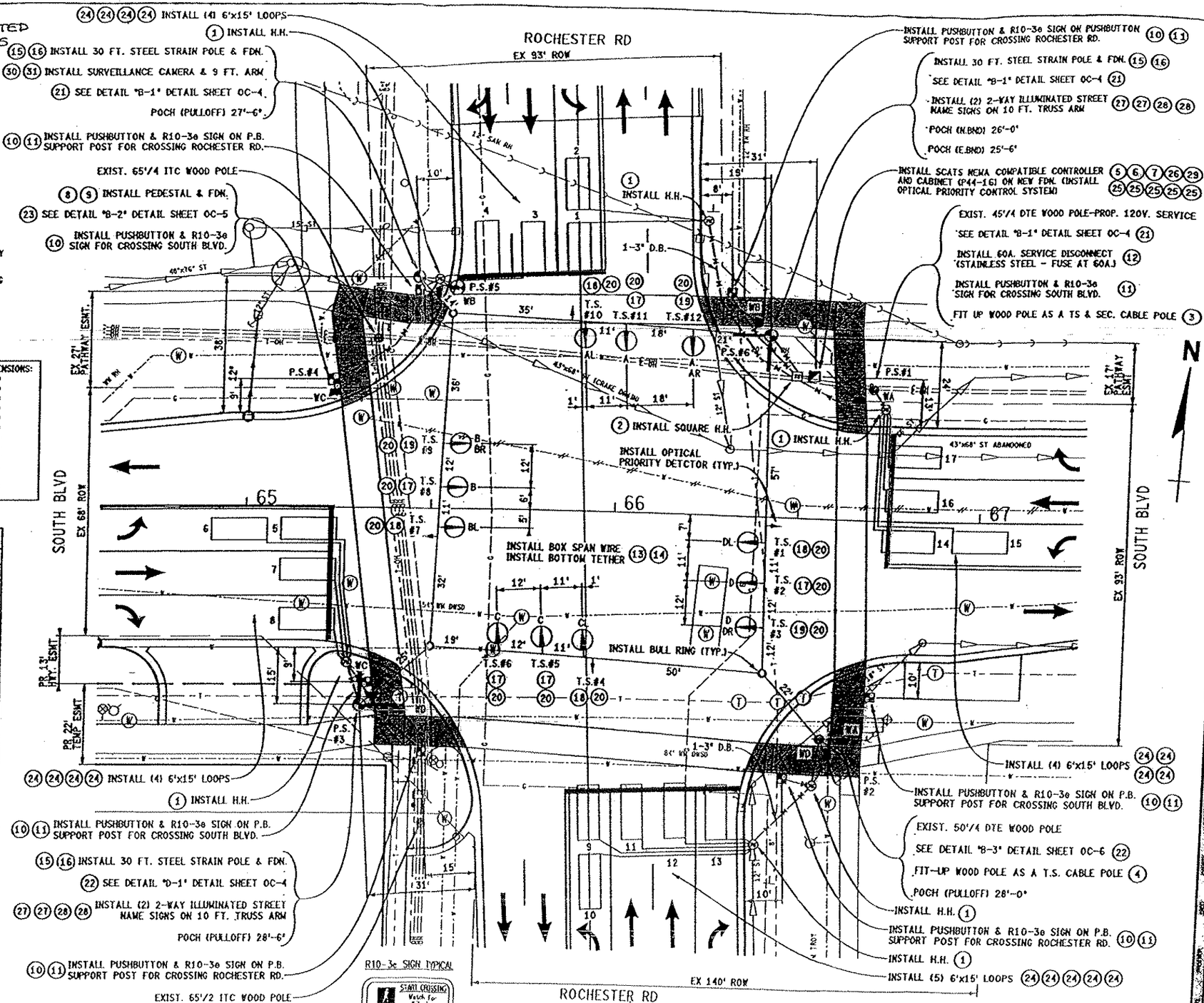
FOR 120V. SERVICE CONTACT MR. DENNIS MERCIER DTE ENERGY, 248-427-2954. NO COST TO CONTRACTOR.

INSTALL PIPE EXTENSIONS:

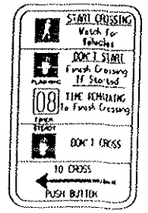
T.S.#1	0'
T.S.#2	12'
T.S.#3	17'
T.S.#4	0'
T.S.#5	14'
T.S.#6	18'
T.S.#7	0'
T.S.#8	12'
T.S.#9	12'
T.S.#10	0'
T.S.#11	12'
T.S.#12	16'

LIST OF MATERIAL (CAT 2)

NO.	ITEM	QUANTITIES
(1)	Hh, Round	5 Ea
(2)	Hh, Square, RCOC	1 Ea
(3)	Wood Pole, Fit Up, TS and Sec Cable Pole	1 Ea
(4)	Wood Pole, Fit Up, TS Cable Pole	1 Ea
(5)	Controller and Cabinet, Digital Type, RCOC	1 Ea
(6)	Controller and Cabinet, Digital Type, Delivered, RCOC	1 Ea
(7)	Controller Fdn, Base Mount	1 Ea
(8)	Pedestal, Alum	1 Ea
(9)	Pedestal, Fdn	1 Ea
(10)	Pushbutton and Sign	8 Ea
(11)	Pushbutton Support Post, RCOC	6 Ea
(12)	Serv Disconnect	1 Ea
(13)	Span Wire, Box, RCOC	1 Ea
(14)	Tether Wire, Box, RCOC	1 Ea
(15)	Strain Pole, Steel, Anchor Base, 30 foot, RCOC Supplied	3 Ea
(16)	Strain Pole, Steel, Anchor Fdn, RCOC	3 Ea
(17)	TS, One Way Span Wire Mtd (LED)	5 Ea
(18)	TS, One Way Span Wire Mtd, FYA (LED)	4 Ea
(19)	TS, One Way Span Wire Mtd, Five Sect (LED)	3 Ea
(20)	Backplate, TS	12 Ea
(21)	TS, Pedestrian, One Way Bracket Arm Mtd (LED) Countdown	3 Ea
(22)	TS, Pedestrian, Two Way Bracket Arm Mtd (LED) Countdown	2 Ea
(23)	TS, Pedestrian, One Way Pedestal Mtd (LED) Countdown	1 Ea
(24)	Traffic Loop, Presence (Preformed), RCOC	17 Ea
(25)	Digital Loop Detector	5 Ea
(26)	Optical Priority Control System, RCOC	1 Ea
(27)	Street Name Sign, Two Way, 8 foot, RCOC	4 Ea
(28)	Street Name Sign Bracket Arm, 10 foot, RCOC	4 Ea
(29)	Cellular Modem, Integrate, RCOC	1 Ea
(30)	Bracket Arm, 9 foot, RCOC	1 Ea
(31)	Video Surveillance, Camera, RCOC	1 Ea
◯	Conduit, DB, 1, 1 1/4 inch	160 Ft
◯	Conduit, DB, 1, 3 inch	175 Ft
◯	Conduit, DB, 2, 3 inch	25 Ft
◯	Conduit, DB, 3, 4 inch	10 Ft
◯	Cable, Sec, 600V, 1, 2/C#4, #6 Ground, RCOC	100 Ft



R10-3e SIGN TYPICAL



NOTES:
1. INSTALL 1-1 1/4" D.B. CONDUIT FROM THE NEW SUPPORT POSTS TO H.H.
2. EXACT LOCATIONS FOR SUPPORT POSTS SHALL BE DETERMINED BY THE RCOC FIELD ENGINEER.
3. SEE DETAIL GRADING SHEETS FOR SIDEWALK DETAIL GRADES. COORDINATE SIDEWALK AND SIGNAL CONSTRUCTION.
4. EXACT LOCATION OF VEHICLE DETECTORS SHALL BE DETERMINED BY THE RCOC FIELD ENGINEER.

PEDESTRIAN COUNTDOWN LEGEND

FINAL PLAN
SCALE: 1"=30' (11"X17")

APPROACH SPEEDS:

N.BD.	45 MPH
S.BD.	45 MPH
E.BD.	45 MPH
W.BD.	45 MPH

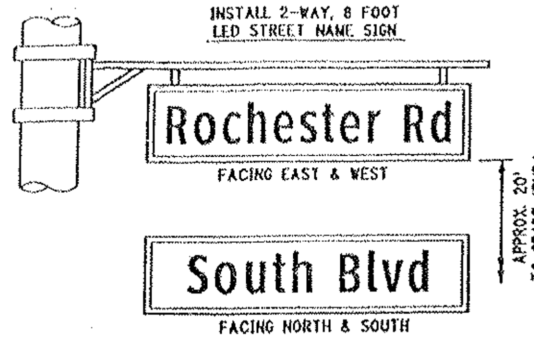
CONDUIT TYPICALS:

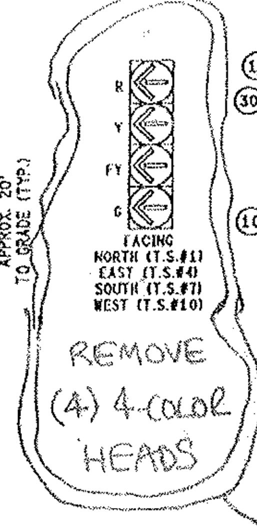
STEEL POLE TO H.H.	2-3" & 1-1 1/4"
WOOD POLE TO H.H.	1-3"
PEDESTAL TO H.H.	1-3" & 1-1 1/4"
SUPPORT POST TO H.H.	1-1 1/4"

CONTROLLER TO H.H. SHALL BE 3-4", 1-3" & 1-1/4" (CAP 1-3" IN H.H. & CABINET FOR R.C.O.C. USE ONLY)

CO. 587
ATS 955

CITY OF TROY, CITY OF ROCHESTER HILLS, & ROAD COMMISSION FOR OAKLAND COUNTY
SOUTH BOULEVARD
TRAFFIC SIGNAL CONSTRUCTION PLAN





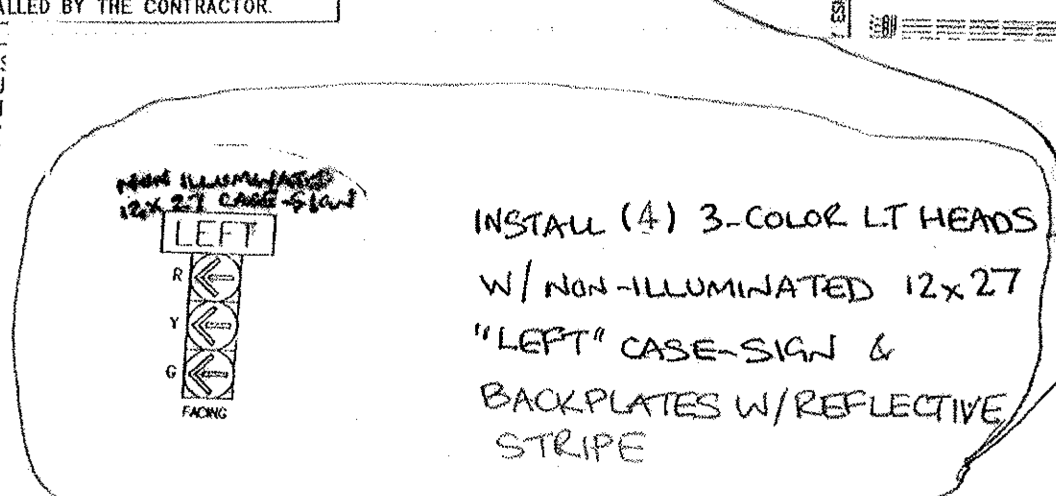
ALL NEW LOOPS SHALL BE PREFORMED TYPE. COORDINATE INSTALLATION WITH STAGED ROAD CONSTRUCTION.

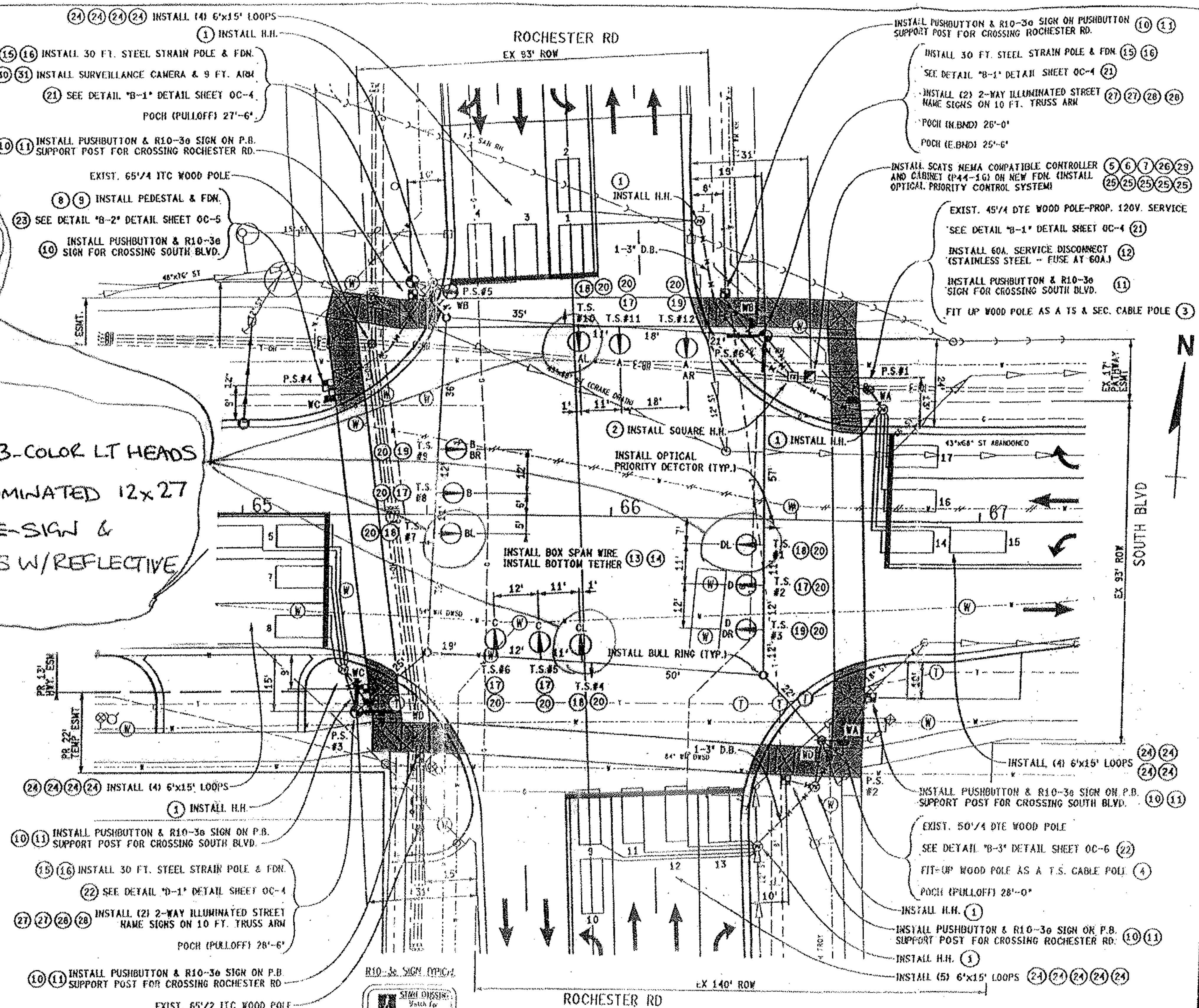
NEW STEEL POLES AND ANCHOR BOLTS WILL BE FURNISHED BY R.C.O.C. AND INSTALLED BY THE CONTRACTOR.

SCATS CELLU COORI

ALL S COORI A MIN PAYMI *Spar

FOR DTE





No.	Item	Qty
1		
2		
3		
4		
5		
6	Controller and Cabinet, Digital Type, Delivered, RCOC	1 Ea
7	Controller Fdn, Base Mount	1 Ea
8	Pedestal, Alum	1 Ea
9	Pedestal, Fdn	1 Ea
10	Pushbutton and Sign	8 Ea
11	Pushbutton Support Post, RCOC	6 Ea
12	Serv Disconnect	1 Ea
13	Span Wire, Box, RCOC	1 Ea
14	Tether Wire, Box, RCOC	1 Ea
15	Strain Pole, Steel, Anchor Base, 30 foot, RCOC Supplied	3 Ea
16	Strain Pole, Steel, Anchor Fdn, RCOC	3 Ea
17	TS, One Way Span Wire Mtd (LED)	5 Ea
18	TS, One Way Span Wire Mtd, FYA (LED)	4 Ea
19	TS, One Way Span Wire Mtd, Five Sect (LED)	3 Ea
20	Backplate, TS	12 Ea
21	TS, Pedestrian, One Way Bracket Arm Mtd (LED) Countdown	3 Ea
22	TS, Pedestrian, Two Way Bracket Arm Mtd (LED) Countdown	2 Ea
23	TS, Pedestrian, One Way Pedestal Mtd (LED) Countdown	1 Ea
24	Traffic Loop, Presence (Preformed), RCOC	17 Ea
25	Digital Loop Detector	5 Ea
26	Optical Priority Control System, RCOC	1 Ea
27	Street Name Sign, Two Way, 8 foot, RCOC	4 Ea
28	Street Name Sign Bracket Arm, 10 foot, RCOC	4 Ea
29	Cellular Modem, Integrate, RCOC	1 Ea
30	Bracket Arm, 9 foot, RCOC	1 Ea
31	Video Surveillance, Camera, RCOC	1 Ea
	Conduit, DB, 1, 1 1/4 inch	160 Ft
	Conduit, DB, 1, 3 inch	175 Ft
	Conduit, DB, 2, 3 inch	25 Ft
	Conduit, DB, 3, 4 inch	10 Ft
	Cable, Sec, 600V, 1, 2/C#4, #6 Ground, RCOC	100 Ft

NOTES:
1. INSTALL 1-1 1/4" D.D. CONDUIT FROM THE NEW SUPPORT POSTS TO H.H.
2. EXACT LOCATIONS FOR SUPPORT POSTS SHALL BE DETERMINED BY THE RCOC FIELD ENGINEER.
3. SEE DETAIL GRADING SHEETS FOR SIDEWALK DETAIL GRADES. COORDINATE SIDEWALK AND SIGNAL CONSTRUCTION.
4. EXACT LOCATION OF VEHICLE DETECTORS SHALL BE DETERMINED BY THE RCOC FIELD ENGINEER

R10-3e SIGN TYPICAL

PEDESTRIAN COUNTDOWN LEGEND

INSTALL PLAN

SCALE: 1"=30' (11"X17")

APPROACH SPEEDS:
N.BD. 45 MPH
S.BD. 45 MPH
E.BD. 45 MPH
W.BD. 45 MPH

CONDUIT TYPICALS:

STEEL POLE TO H.H.	2-3" & 1-1 1/4"
WOOD POLE TO H.H.	1-3"
PEDESTAL TO H.H.	1-3" & 1-1 1/4"
SUPPORT POST TO H.H.	1-1 1/4"

CONTROLLER TO H.H. SHALL BE 3-4", 1-3" & 1-1/4" (CAP 1-3" IN H.H. & CABINET FOR R.C.O.C. USE ONLY)

CO. 587
ATS 955

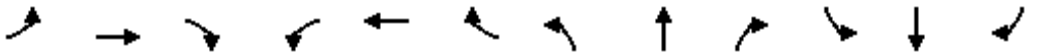
OHM
34000 PLYMOUTH ROAD LIVONIA, MI 48150

City of Troy
Rochester Hills Michigan
Road Commission for Oakland County

CITY OF TROY, CITY OF ROCHESTER HILLS, & ROAD COMMISSION FOR OAKLAND COUNTY
SOUTH BOULEVARD
TRAFFIC SIGNAL CONSTRUCTION PLAN

Appendix 2

Existing LOS Output Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	157	95	174	176	40	81	854	119	64	1390	110
Future Volume (veh/h)	110	157	95	174	176	40	81	854	119	64	1390	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2064	1984	1984	1953	1953	1953	1938	1938	1938	1969	1969	1969
Adj Flow Rate, veh/h	121	173	104	196	198	45	90	949	132	67	1463	116
Peak Hour Factor	0.91	0.91	0.91	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	3	3	3	4	4	4	2	2	2
Cap, veh/h	146	657	293	205	779	348	112	1771	790	87	1744	778
Arrive On Green	0.07	0.17	0.17	0.11	0.21	0.21	0.06	0.48	0.48	0.05	0.47	0.47
Sat Flow, veh/h	1966	3770	1682	1860	3711	1655	1845	3681	1642	1875	3741	1668
Grp Volume(v), veh/h	121	173	104	196	198	45	90	949	132	67	1463	116
Grp Sat Flow(s),veh/h/ln	1966	1885	1682	1860	1856	1655	1845	1841	1642	1875	1870	1668
Q Serve(g_s), s	8.5	5.6	7.6	14.7	6.2	3.1	6.7	25.2	6.4	4.9	48.0	5.6
Cycle Q Clear(g_c), s	8.5	5.6	7.6	14.7	6.2	3.1	6.7	25.2	6.4	4.9	48.0	5.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	146	657	293	205	779	348	112	1771	790	87	1744	778
V/C Ratio(X)	0.83	0.26	0.35	0.96	0.25	0.13	0.80	0.54	0.17	0.77	0.84	0.15
Avail Cap(c_a), veh/h	146	657	293	205	779	348	150	1771	790	153	1744	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.9	50.0	50.9	62.0	46.1	44.9	64.9	25.4	20.5	66.0	32.7	21.4
Incr Delay (d2), s/veh	31.1	1.0	3.3	50.8	0.8	0.8	19.7	1.2	0.5	13.5	5.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	2.7	3.4	9.7	2.9	1.3	3.7	10.8	2.5	2.6	21.6	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	95.0	51.0	54.2	112.8	46.9	45.7	84.6	26.6	21.0	79.6	37.8	21.8
LnGrp LOS	F	D	D	F	D	D	F	C	C	E	D	C
Approach Vol, veh/h		398			439			1171			1646	
Approach Delay, s/veh		65.2			76.2			30.4			38.3	
Approach LOS		E			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.1	73.9	17.0	36.0	15.1	71.9	22.0	31.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 11	* 62	* 10	* 29	* 11	* 62	* 15	* 24
Max Q Clear Time (g_c+I1), s	6.9	27.2	10.5	8.2	8.7	50.0	16.7	9.6
Green Ext Time (p_c), s	0.0	7.5	0.0	1.2	0.0	7.7	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	43.3
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	7	47	1	9	6	1104	31	28	1608	5
Future Volume (veh/h)	1	0	7	47	1	9	6	1104	31	28	1608	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	1922	1922	1922	1938	1938	1938	1969	1969	1969
Adj Flow Rate, veh/h	1	0	10	66	1	13	7	1227	34	29	1693	5
Peak Hour Factor	0.67	0.67	0.67	0.71	0.71	0.71	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	5	5	5	4	4	4	2	2	2
Cap, veh/h	139	0	118	139	8	106	291	3103	1384	422	3224	10
Arrive On Green	0.07	0.00	0.07	0.07	0.07	0.07	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1422	0	1695	1371	118	1529	284	3681	1642	440	3826	11
Grp Volume(v), veh/h	1	0	10	66	0	14	7	1227	34	29	827	871
Grp Sat Flow(s),veh/h/ln	1422	0	1695	1371	0	1647	284	1841	1642	440	1870	1967
Q Serve(g_s), s	0.1	0.0	0.8	6.6	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.2	0.0	0.8	7.4	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.93	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	139	0	118	139	0	114	291	3103	1384	422	1576	1658
V/C Ratio(X)	0.01	0.00	0.09	0.47	0.00	0.12	0.02	0.40	0.02	0.07	0.52	0.53
Avail Cap(c_a), veh/h	264	0	266	259	0	259	291	3103	1384	422	1576	1658
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.7	0.0	61.0	64.5	0.0	61.1	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.3	2.5	0.0	0.5	0.2	0.4	0.0	0.3	1.3	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	2.4	0.0	0.5	0.0	0.2	0.0	0.0	0.5	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.7	0.0	61.3	67.0	0.0	61.6	0.2	0.4	0.0	0.3	1.3	1.2
LnGrp LOS	E	A	E	E	A	E	A	A	A	A	A	A
Approach Vol, veh/h		11			80			1268			1727	
Approach Delay, s/veh		61.3			66.0			0.4			1.2	
Approach LOS		E			E			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	124.3	15.7	124.3	15.7
Change Period (Y+Rc), s	* 6.3	6.0	* 6.3	6.0
Max Green Setting (Gmax), s	* 1.1E2	22.0	* 1.1E2	22.0
Max Q Clear Time (g_c+I1), s	2.0	3.2	2.0	9.4
Green Ext Time (p_c), s	11.5	0.0	20.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	2.8
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	11	51	0	14	9	1209	30	13	1681	11
Future Vol, veh/h	4	0	11	51	0	14	9	1209	30	13	1681	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	85	50	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	81	81	81	89	89	89	91	91	91
Heavy Vehicles, %	0	0	0	2	2	2	4	4	4	2	2	2
Mvmt Flow	5	0	15	63	0	17	10	1358	34	14	1847	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2580	3293	930	2330	-	679	1859	0	0	1392	0	0
Stage 1	1881	1881	-	1378	-	-	-	-	-	-	-	-
Stage 2	699	1412	-	952	-	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.54	-	6.94	4.18	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.52	-	3.32	2.24	-	-	2.22	-	-
Pot Cap-1 Maneuver	*18	*1	*399	*64	0	*595	*588	-	-	838	-	-
Stage 1	*376	*329	-	*528	0	-	-	-	-	-	-	-
Stage 2	*564	*445	-	*374	0	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1		1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*17	*1	*399	*~ 60	-	*595	*588	-	-	838	-	-
Mov Cap-2 Maneuver	*17	*1	-	*~ 60	-	-	-	-	-	-	-	-
Stage 1	*370	*324	-	*519	-	-	-	-	-	-	-	-
Stage 2	*538	*437	-	*354	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	99	194.5	0.1	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 588	-	-	57	60	595	838	-	-
HCM Lane V/C Ratio	0.017	-	-	0.351	1.049	0.029	0.017	-	-
HCM Control Delay (s)	11.2	-	-	99	244.8	11.2	9.4	-	-
HCM Lane LOS	B	-	-	F	F	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	5	0.1	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	557	424	824	0	0	1288
Future Volume (veh/h)	557	424	824	0	0	1288
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1969	1969	1938	0	0	1969
Adj Flow Rate, veh/h	612	466	905	0	0	1356
Peak Hour Factor	0.91	0.91	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	2	2	4	0	0	2
Cap, veh/h	741	598	2610	0	0	2652
Arrive On Green	0.20	0.20	0.71	0.00	0.00	0.48
Sat Flow, veh/h	3638	2937	3875	0	0	3938
Grp Volume(v), veh/h	612	466	905	0	0	1356
Grp Sat Flow(s),veh/h/ln	1819	1468	1841	0	0	1870
Q Serve(g_s), s	22.5	21.0	13.3	0.0	0.0	35.2
Cycle Q Clear(g_c), s	22.5	21.0	13.3	0.0	0.0	35.2
Prop In Lane	1.00	1.00		0.00	0.00	
Lane Grp Cap(c), veh/h	741	598	2610	0	0	2652
V/C Ratio(X)	0.83	0.78	0.35	0.00	0.00	0.51
Avail Cap(c_a), veh/h	1013	818	2610	0	0	2652
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	0.67
Upstream Filter(I)	1.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	53.4	52.7	7.9	0.0	0.0	19.9
Incr Delay (d2), s/veh	4.1	3.3	0.4	0.0	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.8	8.1	4.6	0.0	0.0	16.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	57.5	56.1	8.2	0.0	0.0	20.6
LnGrp LOS	E	E	A	A	A	C
Approach Vol, veh/h	1078		905			1356
Approach Delay, s/veh	56.9		8.2			20.6
Approach LOS	E		A			C

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	105.5			105.5	34.5
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 89			* 89	39.0
Max Q Clear Time (g_c+I1), s	15.3			37.2	24.5
Green Ext Time (p_c), s	6.8			12.5	4.0

Intersection Summary	
HCM 6th Ctrl Delay	29.0
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBT] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	261	235	0	858	1447	0
Future Volume (veh/h)	261	235	0	858	1447	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1744	1744	0	1758	1786	0
Adj Flow Rate, veh/h	347	176	0	975	1523	0
Peak Hour Factor	0.94	0.94	0.88	0.88	0.95	0.95
Percent Heavy Veh, %	4	4	0	3	1	0
Cap, veh/h	470	209	0	2577	2618	0
Arrive On Green	0.14	0.14	0.00	1.00	0.77	0.00
Sat Flow, veh/h	3322	1478	0	3516	3572	0
Grp Volume(v), veh/h	347	176	0	975	1523	0
Grp Sat Flow(s),veh/h/ln	1661	1478	0	1670	1697	0
Q Serve(g_s), s	14.0	16.3	0.0	0.0	26.1	0.0
Cycle Q Clear(g_c), s	14.0	16.3	0.0	0.0	26.1	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	470	209	0	2577	2618	0
V/C Ratio(X)	0.74	0.84	0.00	0.38	0.58	0.00
Avail Cap(c_a), veh/h	712	317	0	2577	2618	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.6	58.6	0.0	0.0	6.6	0.0
Incr Delay (d2), s/veh	2.3	11.9	0.0	0.4	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	6.8	0.0	0.2	7.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	59.9	70.5	0.0	0.4	7.6	0.0
LnGrp LOS	E	E	A	A	A	A
Approach Vol, veh/h	523			975	1523	
Approach Delay, s/veh	63.5			0.4	7.6	
Approach LOS	E			A	A	

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	114.2			114.2	25.8
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 98			* 98	30.0
Max Q Clear Time (g_c+I1), s	2.0			28.1	18.3
Green Ext Time (p_c), s	7.6			16.1	1.5

Intersection Summary		
HCM 6th Ctrl Delay	15.0	
HCM 6th LOS	B	

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	154	139	84	83	172	140	49	889	53	122	1307	150
Future Volume (veh/h)	154	139	84	83	172	140	49	889	53	122	1307	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1953	1953	1953	1984	1984	1984
Adj Flow Rate, veh/h	186	167	101	91	189	154	52	936	56	133	1421	163
Peak Hour Factor	0.83	0.83	0.83	0.91	0.91	0.91	0.95	0.95	0.95	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	1	1	1
Cap, veh/h	212	328	278	114	225	191	68	1907	851	157	1912	218
Arrive On Green	0.11	0.17	0.17	0.06	0.11	0.11	0.04	0.51	0.51	0.17	1.00	1.00
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1860	3711	1655	1890	3411	388
Grp Volume(v), veh/h	186	167	101	91	189	154	52	936	56	133	780	804
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1860	1856	1655	1890	1885	1915
Q Serve(g_s), s	13.7	10.8	7.5	6.7	13.2	12.6	3.9	23.0	2.4	9.6	0.0	0.0
Cycle Q Clear(g_c), s	13.7	10.8	7.5	6.7	13.2	12.6	3.9	23.0	2.4	9.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	212	328	278	114	225	191	68	1907	851	157	1057	1073
V/C Ratio(X)	0.88	0.51	0.36	0.80	0.84	0.81	0.77	0.49	0.07	0.85	0.74	0.75
Avail Cap(c_a), veh/h	250	418	354	157	319	271	93	1907	851	229	1057	1073
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.2	53.1	51.8	64.9	60.7	60.5	66.9	22.1	17.1	57.5	0.0	0.0
Incr Delay (d2), s/veh	25.2	1.2	0.8	18.0	12.8	11.3	22.2	0.9	0.1	17.3	4.6	4.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	5.4	3.2	3.7	7.3	5.8	2.2	9.8	0.9	4.9	1.4	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.4	54.4	52.6	82.9	73.5	71.8	89.0	23.0	17.3	74.9	4.6	4.8
LnGrp LOS	F	D	D	F	E	E	F	C	B	E	A	A
Approach Vol, veh/h		454			434			1044			1717	
Approach Delay, s/veh		67.1			74.9			26.0			10.1	
Approach LOS		E			E			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.6	78.0	14.8	29.6	11.1	84.5	22.1	22.3
Change Period (Y+Rc), s	* 6	* 6	6.3	6.3	* 6	* 6	6.3	6.3
Max Green Setting (Gmax), s	* 13	* 57	11.7	29.7	* 7	* 67	18.7	22.7
Max Q Clear Time (g_c+I1), s	11.6	25.0	8.7	12.8	5.9	2.0	15.7	15.2
Green Ext Time (p_c), s	0.1	7.1	0.0	1.0	0.0	15.6	0.1	0.9

Intersection Summary	
HCM 6th Ctrl Delay	29.5
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	211	157	117	130	297	150	124	96	165	261	279	245
Average Queue (ft)	98	78	32	52	165	72	35	27	75	141	141	48
95th Queue (ft)	175	137	84	107	279	129	86	66	143	237	239	134
Link Distance (ft)		671	671			667	667			361	361	
Upstream Blk Time (%)											0	
Queuing Penalty (veh)											0	
Storage Bay Dist (ft)	500			130	500			150	500			170
Storage Blk Time (%)			0	1			0				6	
Queuing Penalty (veh)			0	1			0				7	

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	214	585	631	345
Average Queue (ft)	69	367	398	132
95th Queue (ft)	184	555	592	360
Link Distance (ft)		721	721	
Upstream Blk Time (%)		1	1	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)	500			270
Storage Blk Time (%)		2	23	
Queuing Penalty (veh)		1	26	

Intersection: 2019: M-150 (Rochester Road) & Alex's Driveway/Meijer/Lowes Driveway (PB)

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	6	31	111	35	31	87	123	24	64	118	172
Average Queue (ft)	1	6	44	6	4	28	35	2	18	38	71
95th Queue (ft)	7	26	95	25	18	72	89	12	48	94	149
Link Distance (ft)	202	202	347	347		466	466			378	378
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					250			190	250		
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3008: M-150 (Rochester Road) & WB M-59 Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	299	389	483	297	162	173	171	179
Average Queue (ft)	209	265	224	167	75	93	112	125
95th Queue (ft)	308	368	370	261	138	157	179	191
Link Distance (ft)			629		150	150	42	42
Upstream Blk Time (%)			0		0	1	20	24
Queuing Penalty (veh)			0		1	3	131	157
Storage Bay Dist (ft)	200	200		200				
Storage Blk Time (%)	2	27	12	3				
Queuing Penalty (veh)	10	113	91	26				

Intersection: 3021: M-150 (Rochester Road) & EB M-59 Off Ramp

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	LR	R	T	T	T	T
Maximum Queue (ft)	260	300	286	131	162	222	238
Average Queue (ft)	106	188	167	60	79	126	134
95th Queue (ft)	237	270	262	121	145	204	216
Link Distance (ft)			501	112	112	175	175
Upstream Blk Time (%)				1	3	1	2
Queuing Penalty (veh)				4	13	9	13
Storage Bay Dist (ft)	230	230					
Storage Blk Time (%)	0	3	3				
Queuing Penalty (veh)	0	4	10				

Intersection: 3108: WB M-59 On Ramp & M-150 (Rochester Road)

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	43	18	24	61	11
Average Queue (ft)	2	1	2	7	0
95th Queue (ft)	22	13	18	37	8
Link Distance (ft)	42	42	141	141	141
Upstream Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3121: EB M-59 On Ramp & M-150 (Rochester Road)

Movement	SB
Directions Served	R
Maximum Queue (ft)	29
Average Queue (ft)	2
95th Queue (ft)	15
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	50
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3208: M-150 (Rochester Road) & WB M-59 On Ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	703
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3221: M-150 (Rochester Road) & EB M-59 On Ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	L	T
Maximum Queue (ft)	263	227	96	155	309	96	128	342	424	216	187	418
Average Queue (ft)	132	104	36	81	146	41	48	166	215	25	102	238
95th Queue (ft)	220	187	72	153	250	80	100	277	340	121	165	377
Link Distance (ft)		759			1237			793	793			707
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		250	80		250	500			250	500	
Storage Blk Time (%)		0		16	36				5			0
Queuing Penalty (veh)		1		50	80				2			0

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

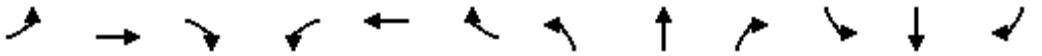
Movement	SB
Directions Served	TR
Maximum Queue (ft)	437
Average Queue (ft)	262
95th Queue (ft)	396
Link Distance (ft)	707
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9001: M-150 (Rochester Road) & Nawakwa Rd

Movement	EB	WB	WB	NB	NB	NB	SB
Directions Served	LTR	L	R	L	T	R	L
Maximum Queue (ft)	47	161	77	27	8	4	41
Average Queue (ft)	14	63	11	4	0	0	8
95th Queue (ft)	41	132	50	16	6	3	30
Link Distance (ft)	377	381			141	141	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			85	50			100
Storage Blk Time (%)		18		0			
Queuing Penalty (veh)		3		0			

Zone Summary

Zone wide Queuing Penalty: 757



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	254	422	126	206	237	110	121	1370	198	151	1162	146
Future Volume (veh/h)	254	422	126	206	237	110	121	1370	198	151	1162	146
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	273	454	135	237	272	126	133	1505	218	172	1320	166
Peak Hour Factor	0.93	0.93	0.93	0.87	0.87	0.87	0.91	0.91	0.91	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	262	633	282	261	630	281	156	1573	702	167	1596	712
Arrive On Green	0.14	0.17	0.17	0.14	0.17	0.17	0.16	0.83	0.83	0.09	0.42	0.42
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	273	454	135	237	272	126	133	1505	218	172	1320	166
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	19.4	15.9	10.2	17.3	9.1	9.4	9.6	45.9	4.1	12.4	43.5	8.8
Cycle Q Clear(g_c), s	19.4	15.9	10.2	17.3	9.1	9.4	9.6	45.9	4.1	12.4	43.5	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	633	282	261	630	281	156	1573	702	167	1596	712
V/C Ratio(X)	1.04	0.72	0.48	0.91	0.43	0.45	0.85	0.96	0.31	1.03	0.83	0.23
Avail Cap(c_a), veh/h	262	633	282	262	630	281	167	1573	702	167	1596	712
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.3	55.1	52.7	59.5	52.3	52.5	57.6	10.6	7.1	63.8	35.8	25.8
Incr Delay (d2), s/veh	67.1	6.9	5.7	32.7	2.2	5.1	31.1	14.5	1.2	77.0	5.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.9	8.0	4.6	10.5	4.4	4.3	5.5	7.7	1.4	9.4	20.1	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	127.4	62.0	58.4	92.2	54.5	57.6	88.8	25.1	8.3	140.8	40.9	26.6
LnGrp LOS	F	E	E	F	D	E	F	C	A	F	D	C
Approach Vol, veh/h		862			635			1856			1658	
Approach Delay, s/veh		82.2			69.2			27.7			49.8	
Approach LOS		F			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	65.0	26.0	30.0	18.1	65.9	25.9	30.1
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 58	* 19	* 23	* 12	* 58	* 19	* 23
Max Q Clear Time (g_c+I1), s	14.4	47.9	21.4	11.4	11.6	45.5	19.3	17.9
Green Ext Time (p_c), s	0.0	7.1	0.0	1.6	0.0	7.3	0.0	1.5

Intersection Summary	
HCM 6th Ctrl Delay	49.6
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	8	121	0	58	7	1587	119	35	1441	7
Future Volume (veh/h)	4	0	8	121	0	58	7	1587	119	35	1441	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	5	0	11	141	0	67	7	1671	125	38	1549	8
Peak Hour Factor	0.75	0.75	0.75	0.86	0.86	0.86	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	168	0	207	216	0	205	315	2979	1329	261	3039	16
Arrive On Green	0.12	0.00	0.12	0.12	0.00	0.12	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1355	0	1695	1415	0	1682	334	3770	1682	265	3846	20
Grp Volume(v), veh/h	5	0	11	141	0	67	7	1671	125	38	759	798
Grp Sat Flow(s),veh/h/ln	1355	0	1695	1415	0	1682	334	1885	1682	265	1885	1981
Q Serve(g_s), s	0.5	0.0	0.8	13.7	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.6	0.0	0.8	14.5	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	168	0	207	216	0	205	315	2979	1329	261	1489	1565
V/C Ratio(X)	0.03	0.00	0.05	0.65	0.00	0.33	0.02	0.56	0.09	0.15	0.51	0.51
Avail Cap(c_a), veh/h	283	0	351	336	0	348	315	2979	1329	261	1489	1565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.7	0.0	54.3	60.7	0.0	56.2	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.1	3.3	0.0	0.9	0.1	0.8	0.1	1.2	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.4	5.2	0.0	2.3	0.0	0.3	0.1	0.1	0.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.8	0.0	54.4	64.0	0.0	57.1	0.1	0.8	0.1	1.2	1.2	1.2
LnGrp LOS	E	A	D	E	A	E	A	A	A	A	A	A
Approach Vol, veh/h		16			208			1803			1595	
Approach Delay, s/veh		55.8			61.8			0.7			1.2	
Approach LOS		E			E			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	116.9	23.1	116.9	23.1
Change Period (Y+Rc), s	* 6.3	6.0	* 6.3	6.0
Max Green Setting (Gmax), s	* 99	29.0	* 99	29.0
Max Q Clear Time (g_c+I1), s	2.0	7.6	2.0	16.5
Green Ext Time (p_c), s	21.9	0.0	17.7	0.6

Intersection Summary	
HCM 6th Ctrl Delay	4.7
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	36.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	0	19	17	0	26	36	1834	61	12	1607	13
Future Vol, veh/h	6	0	19	17	0	26	36	1834	61	12	1607	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	85	50	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	77	77	77	95	95	95	93	93	93
Heavy Vehicles, %	0	0	0	2	2	2	1	1	1	1	1	1
Mvmt Flow	9	0	28	22	0	34	38	1931	64	13	1728	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2803	3832	871	2897	-	966	1742	0	0	1995	0	0
Stage 1	1761	1761	-	2007	-	-	-	-	-	-	-	-
Stage 2	1042	2071	-	890	-	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.54	-	6.94	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.52	-	3.32	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	*~ 6	*0	*421	*~ 3	0	*330	*629	-	-	*497	-	-
Stage 1	*397	*347	-	*312	0	-	-	-	-	-	-	-
Stage 2	*313	*274	-	*395	0	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1		1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*~ 5	*0	*421	*~ 3	-	*330	*629	-	-	*497	-	-
Mov Cap-2 Maneuver	*~ 5	*0	-	*~ 3	-	-	-	-	-	-	-	-
Stage 1	*373	*338	-	*293	-	-	-	-	-	-	-	-
Stage 2	*264	*258	-	*359	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 792	$ 2022.5	0.2	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 629	-	-	20	3	330	* 497	-	-
HCM Lane V/C Ratio	0.06	-	-	1.812	7.359	0.102	0.026	-	-
HCM Control Delay (s)	11.1	-	-	$ 792	$ 5089.7	17.1	12.4	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	4.8	4.3	0.3	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	386	429	1502	0	0	1268
Future Volume (veh/h)	386	429	1502	0	0	1268
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	2000	2000	1984	0	0	1984
Adj Flow Rate, veh/h	411	456	1581	0	0	1335
Peak Hour Factor	0.94	0.94	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	1	0	0	1
Cap, veh/h	681	550	2747	0	0	2747
Arrive On Green	0.18	0.18	0.73	0.00	0.00	1.00
Sat Flow, veh/h	3695	2983	3969	0	0	3969
Grp Volume(v), veh/h	411	456	1581	0	0	1335
Grp Sat Flow(s),veh/h/ln	1848	1492	1885	0	0	1885
Q Serve(g_s), s	14.3	20.6	27.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.3	20.6	27.4	0.0	0.0	0.0
Prop In Lane	1.00	1.00		0.00	0.00	
Lane Grp Cap(c), veh/h	681	550	2747	0	0	2747
V/C Ratio(X)	0.60	0.83	0.58	0.00	0.00	0.49
Avail Cap(c_a), veh/h	1003	810	2747	0	0	2747
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	52.4	55.0	8.9	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.9	4.7	0.9	0.0	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	8.2	9.6	0.0	0.0	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	53.3	59.7	9.8	0.0	0.0	0.6
LnGrp LOS	D	E	A	A	A	A
Approach Vol, veh/h	867		1581			1335
Approach Delay, s/veh	56.6		9.8			0.6
Approach LOS	E		A			A

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	108.2			108.2	31.8
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 90			* 90	38.0
Max Q Clear Time (g_c+I1), s	29.4			2.0	22.6
Green Ext Time (p_c), s	17.0			12.6	3.2

Intersection Summary	
HCM 6th Ctrl Delay	17.3
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBT] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	445	439	0	1342	1254	0
Future Volume (veh/h)	445	439	0	1342	1254	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1786	1786	0	1800	1786	0
Adj Flow Rate, veh/h	659	335	0	1428	1393	0
Peak Hour Factor	0.88	0.88	0.94	0.94	0.90	0.90
Percent Heavy Veh, %	1	1	0	0	1	0
Cap, veh/h	805	358	0	2313	2295	0
Arrive On Green	0.24	0.24	0.00	1.00	0.68	0.00
Sat Flow, veh/h	3402	1514	0	3600	3572	0
Grp Volume(v), veh/h	659	335	0	1428	1393	0
Grp Sat Flow(s),veh/h/ln	1701	1514	0	1710	1697	0
Q Serve(g_s), s	25.7	30.4	0.0	0.0	31.6	0.0
Cycle Q Clear(g_c), s	25.7	30.4	0.0	0.0	31.6	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	805	358	0	2313	2295	0
V/C Ratio(X)	0.82	0.94	0.00	0.62	0.61	0.00
Avail Cap(c_a), veh/h	826	368	0	2313	2295	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.6	52.4	0.0	0.0	12.4	0.0
Incr Delay (d2), s/veh	6.4	30.5	0.0	1.2	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.8	14.7	0.0	0.4	10.8	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	57.0	82.9	0.0	1.2	13.7	0.0
LnGrp LOS	E	F	A	A	B	A
Approach Vol, veh/h	994			1428	1393	
Approach Delay, s/veh	65.7			1.2	13.7	
Approach LOS	E			A	B	

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	100.9			100.9	39.1
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 94			* 94	34.0
Max Q Clear Time (g_c+I1), s	2.0			33.6	32.4
Green Ext Time (p_c), s	14.4			13.4	0.8

Intersection Summary		
HCM 6th Ctrl Delay	22.6	
HCM 6th LOS	C	

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	282	97	105	152	151	73	1367	128	167	1291	155
Future Volume (veh/h)	260	282	97	105	152	151	73	1367	128	167	1291	155
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	2000	2000	2000	1984	1984	1984
Adj Flow Rate, veh/h	286	310	107	122	177	176	79	1486	139	188	1451	174
Peak Hour Factor	0.91	0.91	0.91	0.86	0.86	0.86	0.92	0.92	0.92	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	0	0	0	0	0	0	1	1	1
Cap, veh/h	306	409	347	147	242	205	101	1676	748	189	1656	197
Arrive On Green	0.16	0.21	0.21	0.08	0.12	0.12	0.05	0.44	0.44	0.20	0.98	0.98
Sat Flow, veh/h	1890	1984	1682	1905	2000	1695	1905	3800	1695	1890	3394	403
Grp Volume(v), veh/h	286	310	107	122	177	176	79	1486	139	188	800	825
Grp Sat Flow(s),veh/h/ln	1890	1984	1682	1905	2000	1695	1905	1900	1695	1890	1885	1912
Q Serve(g_s), s	20.9	20.6	7.6	8.8	11.9	14.3	5.7	50.3	7.0	13.9	9.5	10.7
Cycle Q Clear(g_c), s	20.9	20.6	7.6	8.8	11.9	14.3	5.7	50.3	7.0	13.9	9.5	10.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	306	409	347	147	242	205	101	1676	748	189	920	933
V/C Ratio(X)	0.93	0.76	0.31	0.83	0.73	0.86	0.78	0.89	0.19	0.99	0.87	0.88
Avail Cap(c_a), veh/h	306	449	381	173	310	263	190	1676	748	189	920	933
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.9	52.3	47.1	63.7	59.3	60.3	65.5	35.9	23.8	56.0	1.0	1.0
Incr Delay (d2), s/veh	34.3	6.7	0.5	24.5	6.3	19.5	12.2	7.3	0.5	63.9	11.0	12.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.7	10.8	3.2	5.2	6.4	7.1	3.1	23.9	2.9	9.1	3.4	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	92.2	59.0	47.6	88.3	65.6	79.9	77.6	43.3	24.4	119.8	12.0	13.0
LnGrp LOS	F	E	D	F	E	E	E	D	C	F	B	B
Approach Vol, veh/h		703			475			1704			1813	
Approach Delay, s/veh		70.8			76.7			43.3			23.6	
Approach LOS		E			E			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	67.7	17.1	35.2	13.4	74.3	29.0	23.3
Change Period (Y+Rc), s	* 6	* 6	6.3	6.3	* 6	* 6	6.3	6.3
Max Green Setting (Gmax), s	* 14	* 57	12.7	31.7	* 14	* 57	22.7	21.7
Max Q Clear Time (g_c+I1), s	15.9	52.3	10.8	22.6	7.7	12.7	22.9	16.3
Green Ext Time (p_c), s	0.0	3.6	0.0	1.3	0.1	15.3	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	43.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	484	426	346	178	313	188	190	179	362	440	441	245
Average Queue (ft)	286	173	147	92	171	107	76	77	151	346	363	166
95th Queue (ft)	481	288	260	173	274	175	157	144	324	471	488	316
Link Distance (ft)		671	671			667	667			363	363	
Upstream Blk Time (%)		0							0	11	17	
Queuing Penalty (veh)		0							0	97	145	
Storage Bay Dist (ft)	500			130	500			150	500			170
Storage Blk Time (%)	2	0	13	3			2	2	0	11	42	0
Queuing Penalty (veh)	4	0	17	7			2	2	1	14	84	3

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	340	536	582	345
Average Queue (ft)	189	288	308	120
95th Queue (ft)	334	423	461	302
Link Distance (ft)		721	721	
Upstream Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)	500			270
Storage Blk Time (%)		0	12	
Queuing Penalty (veh)		0	18	

Intersection: 2019: M-150 (Rochester Road) & Alex's Driveway/Meijer/Lowes Driveway (PB)

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	43	40	180	78	40	126	146	50	90	101	115
Average Queue (ft)	5	6	93	29	6	56	68	12	33	37	56
95th Queue (ft)	25	28	166	63	25	108	131	37	72	87	107
Link Distance (ft)	202	202	347	347		466	466			378	378
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					250			190	250		
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3008: M-150 (Rochester Road) & WB M-59 Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	285	362	416	280	245	252	178	185
Average Queue (ft)	147	208	207	170	163	197	138	161
95th Queue (ft)	254	304	315	251	242	267	200	210
Link Distance (ft)			629		150	150	42	42
Upstream Blk Time (%)			0		8	12	24	27
Queuing Penalty (veh)			0		56	94	151	173
Storage Bay Dist (ft)	200	200		200				
Storage Blk Time (%)	0	12	11	3				
Queuing Penalty (veh)	1	53	67	19				

Intersection: 3021: M-150 (Rochester Road) & EB M-59 Off Ramp

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	LR	R	T	T	T	T
Maximum Queue (ft)	320	410	513	205	238	267	268
Average Queue (ft)	221	313	320	120	149	171	170
95th Queue (ft)	333	418	482	182	217	247	247
Link Distance (ft)			501	112	112	175	175
Upstream Blk Time (%)			2	10	16	5	5
Queuing Penalty (veh)			0	66	107	30	30
Storage Bay Dist (ft)	230	230					
Storage Blk Time (%)	2	29	30				
Queuing Penalty (veh)	4	63	202				

Intersection: 3108: WB M-59 On Ramp & M-150 (Rochester Road)

Movement	NB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	11	104	121	21
Average Queue (ft)	0	12	32	1
95th Queue (ft)	8	54	89	15
Link Distance (ft)	42	141	141	141
Upstream Blk Time (%)	0	0	0	
Queuing Penalty (veh)	0	0	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3121: EB M-59 On Ramp & M-150 (Rochester Road)

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	5	6	48
Average Queue (ft)	0	0	4
95th Queue (ft)	4	4	26
Link Distance (ft)	703	703	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 3208: M-150 (Rochester Road) & WB M-59 On Ramp

Movement	NB	NB
Directions Served	T	T
Maximum Queue (ft)	51	86
Average Queue (ft)	3	13
95th Queue (ft)	23	52
Link Distance (ft)	703	703
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		1
Queuing Penalty (veh)		4

Intersection: 3221: M-150 (Rochester Road) & EB M-59 On Ramp

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	10	11
Average Queue (ft)	0	0
95th Queue (ft)	5	8
Link Distance (ft)	241	112
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	L	T
Maximum Queue (ft)	404	320	149	154	247	157	403	763	805	325	521	666
Average Queue (ft)	241	193	49	83	113	63	112	489	545	159	190	351
95th Queue (ft)	369	297	104	148	202	127	368	788	842	403	384	608
Link Distance (ft)		759			1237			793	793			707
Upstream Blk Time (%)								2	6			1
Queuing Penalty (veh)								0	0			8
Storage Bay Dist (ft)	500		250	80		250	500			250	500	
Storage Blk Time (%)		3		17	24		0	9	40			5
Queuing Penalty (veh)		11		51	64		0	6	51			8

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	SB
Directions Served	TR
Maximum Queue (ft)	675
Average Queue (ft)	366
95th Queue (ft)	618
Link Distance (ft)	707
Upstream Blk Time (%)	1
Queuing Penalty (veh)	11
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9001: M-150 (Rochester Road) & Nawakwa Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	LTR	L	R	L	T	T	R	L	TR
Maximum Queue (ft)	166	177	74	58	22	5	4	40	69
Average Queue (ft)	59	76	18	17	1	0	0	9	3
95th Queue (ft)	191	227	59	43	14	3	3	31	50
Link Distance (ft)	377	381			141	141	141		298
Upstream Blk Time (%)	2	3							
Queuing Penalty (veh)	0	0							
Storage Bay Dist (ft)			85	50				100	
Storage Blk Time (%)		31		0	0				
Queuing Penalty (veh)		8		4	0				

Zone Summary

Zone wide Queuing Penalty: 1736

Appendix 3

Background Development Trip Generation Calculations

Development	ITE Land Use	Land Use Code	Units	a.m. Peak Hour			p.m. Peak Hour			Weekday	Notes
				In	Out	Total	In	Out	Total		
Gateway of Rochester Hills	Strip Retail Plaza (<40K)	822	11,037 SFT	16	10	26	42	42	84	696	
	High-Turnover (Sit-Down) Restaurant	932	6,047 SFT	32	26	58	33	21	54	648	
	Hotel	310	108 Rooms	26	21	47	27	25	52	747	Opened; Trips removed
	General Office Building	710	11,856 SFT	24	3	27	5	23	28	182	
	Total Trips			72	39	111	80	86	166	1,526	
	Total Internal Capture			8	8	16	25	25	50	-	
	Pass-by LUC 822 (40% PM)			0	0	0	12	12	24	-	
	Pass-by LUC 932 (43% PM)			0	0	0	9	9	18	-	
	Total Pass-by Trips			0	0	0	21	21	42	-	
	Total New Trips			64	31	95	34	40	74	1,526	
Bebb Oak	Multifamily Housing (Mid-Rise)	221	94 DU	7	23	30	23	14	37	402	
	Strip Retail Plaza (<40K)	822	10,245 SFT	14	10	24	40	39	79	662	
	Fast Casual Restaurant	930	3503 SFT	3	2	5	24	19	43	340	
	Total Trips			24	35	59	87	72	159	1,404	
	Total Internal Capture			2	2	4	35	35	70	-	
	Pass-by LUC 822 (40% PM)			0	0	0	11	9	20	-	
	Total Pass-by Trips			0	0	0	11	9	20	-	
	Total New Trips			22	33	55	41	28	69	1,404	

Gateway of Rochester Hills

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 822	**Strip Retail Plaza (<40K)**	**SFT**	**11037**					
AM	Ln (T) = 0.66 Ln(X) + 1.84		26	0.57	2.36	5	0%	Low number of studies and R2; Use Average Rate
PM	Ln (T) = 0.71 Ln(X) + 2.72		84	0.56	6.59	25	40%	Use Fitted Curve
Weekday	T = 42.20 (X) +229.68		695	0.96	54.45	4	-	R2 greater than 0.75; Use Fitted Curve

	AM			PM			Weekday		
	Ingress	Egress	Total	Ingress	Egress	Total	Ingress	Egress	Total
Directional Distribution	60%	40%	100%	50%	50%	100%	50%	50%	100%
Volume Distribution	**16**	**10**	**26**	**42**	**42**	**84**	**348**	**348**	**696**

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 932	**High-Turnover (Sit-Down) Restaurant**	**SFT**	**6047**					
AM	No Equation		58	-	9.57	37	0%	Use Average Rate
PM	No Equation		54	-	9.05	104	43%	Use Fitted Curve
Weekday	No Equation		648	-	107.2	50	-	Use Average Rate

	AM			PM			Weekday		
	Ingress	Egress	Total	Ingress	Egress	Total	Ingress	Egress	Total
Directional Distribution	55%	45%	100%	61%	39%	100%	50%	50%	100%
Volume Distribution	**32**	**26**	**58**	**33**	**21**	**54**	**324**	**324**	**648**

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 310	**Hotel**	**Rooms**	**108**					
AM	T = 0.5 (X) - 7.45		47	0.84	0.46	28	-	Use Fitted Curve
PM	T = 0.74 (X) - 27.89		52	0.78	0.59	31	-	Use Fitted Curve
Weekday	T = 10.84 (X) - 423.51		747	0.85	7.99	7	-	R2 greater than 0.75; Use Fitted Curve

	AM			PM			Weekday		
	Ingress	Egress	Total	Ingress	Egress	Total	Ingress	Egress	Total
Directional Distribution	56%	44%	100%	51%	49%	100%	50%	50%	100%
Volume Distribution	**26**	**21**	**47**	**27**	**25**	**52**	**374**	**373**	**747**

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 710	**General Office Building**	**SFT**	**11856**					
AM	Ln (T) = 0.86 Ln(X) + 1.16		27	0.78	1.52	221	-	Use Fitted Curve
PM	Ln (T) = 0.83 Ln(X) + 1.29		28	0.77	1.44	232	-	Use Fitted Curve
Weekday	Ln (T) = 0.87 Ln(X) + 3.05		182	0.78	10.84	59	-	Use Fitted Curve

	AM			PM			Weekday		
	Ingress	Egress	Total	Ingress	Egress	Total	Ingress	Egress	Total
Directional Distribution	88%	12%	100%	17%	83%	100%	50%	50%	100%
Volume Distribution	**24**	**3**	**27**	**5**	**23**	**28**	**91**	**91**	**182**

Bebb Oak

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 822	**Strip Retail Plaza (<40K)**	**SFT**	**10245**					
AM	Ln (T) = 0.66 Ln(X) + 1.84		24	0.57	2.36	5	0%	Low number of studies and R2; Use Average Rate
PM	Ln (T) = 0.71 Ln(X) + 2.72		79	0.56	6.59	25	40%	Use Fitted Curve
Weekday	T = 42.20 (X) +229.68		662	0.96	54.45	4	-	R2 greater than 0.75; Use Fitted Curve

	AM			PM			Weekday		
	Ingress	Egress	Total	Ingress	Egress	Total	Ingress	Egress	Total
Directional Distribution	60%	40%	100%	50%	50%	100%	50%	50%	100%
Volume Distribution	**14**	**10**	**24**	**40**	**39**	**79**	**331**	**331**	**662**

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 221	**Multifamily Housing (Mid-Rise)**	**DU**	**94**					
AM	T = 0.44 (X) - 11.61		30	0.91	0.37	30	-	Use Fitted Curve
PM	T = 0.39 (X) + 0.34		37	0.91	0.39	31	-	Use Fitted Curve
Weekday	T = 4.77 (X) - 46.46		402	0.93	4.54	11	-	Use Fitted Curve

	AM			PM			Weekday		
	Ingress	Egress	Total	Ingress	Egress	Total	Ingress	Egress	Total
Directional Distribution	23%	77%	100%	61%	39%	100%	50%	50%	100%
Volume Distribution	**7**	**23**	**30**	**23**	**14**	**37**	**201**	**201**	**402**

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 930	**Fast Casual Restaurant**	**SFT**	**3503**					
AM	No equation		5	-	1.43	1	-	Use Average Rate
PM	T = 0.74 (X) - 27.89		44	0.65	12.55	15	-	R2 less than 0.75, # of studies less than 20; Use Average Rate
Weekday	No equation		340	-	97.14	1	-	Use Average Rate

	AM			PM			Weekday		
	Ingress	Egress	Total	Ingress	Egress	Total	Ingress	Egress	Total
Directional Distribution	50%	50%	100%	55%	45%	100%	50%	50%	100%
Volume Distribution	**3**	**2**	**5**	**24**	**19**	**43**	**170**	**170**	**340**

Internal Capture Rates - Gateway of Rochester Hills

	Land Use Code	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		In	Out	In	Out	In	Out	In	Out
Internal Capture Reductions: 14% a.m. (11% In, 21% Out), 30% p.m. (31% In, 29% Out)	710	17%	67%	40%	17%	4	2	2	4
	822	13%	20%	29%	26%	2	2	12	11
	932	6%	15%	33%	48%	2	4	11	10
	310					0	0	0	0
					Total	8	8	25	25

Internal Capture Rates - Bebb Oak

	Land Use Code	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		In	Out	In	Out	In	Out	In	Out
Internal Capture Reductions: 7% a.m. (8% In,6% Out), 44% p.m. (40% In, 49% Out)	822	0%	10%	30%	44%	0	1	12	17
	930	67%	0%	42%	58%	2	0	10	11
	221	0%	4%	57%	50%	0	1	13	7
					Total	2	2	35	35

Trip Distribution - Gateway of Rochester Hills

Direction	Via	New Trips				New Trips			
		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour	
		To	From	To	From	To	From	To	From
North	M-150	27%	33%	35%	25%	8	21	14	9
South	M-150	39%	21%	30%	27%	12	13	12	9
East	M-59 WB Off Ramp		20%		14%	0	13	0	5
	M-59 EB On Ramp	8%		10%		3	0	4	0
	South Blvd	8%	8%	11%	7%	3	5	5	2
West	M-59 EB Off Ramp		10%		16%	0	7	0	5
	M-59 WB On Ramp	8%		6%		2	0	2	0
	South Blvd	10%	8%	8%	11%	3	5	3	4
Total		100%	100%	100%	100%	31	64	40	34

Trip Distribution - Bebb Oak

Direction	Via	New Trips				New Trips			
		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour	
		To	From	To	From	To	From	To	From
North	M-150	24%	38%	32%	30%	8	8	9	12
South	M-150	42%	29%	32%	32%	14	7	9	13
East	Wabash/Barclay	8%	6%	7%	9%	3	1	2	4
	Auburn Road	12%	13%	15%	12%	4	3	4	5
West	Wabash/Barclay	1%	2%	2%	2%	0	0	1	1
	Auburn Road	13%	12%	12%	15%	4	3	3	6
Total		100%	100%	100%	100%	33	22	28	41

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Gateway of Rochester Hills	**Organization:**	Fishbeck
Project Location:		**Performed By:**	JAM
Scenario Description:		**Date:**	
Analysis Year:	2024	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				27	24	3
Retail				26	16	10
Restaurant				58	32	26
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				111	72	39

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	1	0	0	0
Retail	1		1	0	0	0
Restaurant	3	1		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	111	72	39
Internal Capture Percentage	14%	11%	21%
External Vehicle-Trips[5]	95	64	31
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	17%	67%
Retail	13%	20%
Restaurant	6%	15%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Gateway of Rochester Hills	**Organization:**	Fishbeck
Project Location:		**Performed By:**	JAM
Scenario Description:		**Date:**	
Analysis Year:	2024	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				28	5	23
Retail				84	42	42
Restaurant				54	33	21
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				166	80	86

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	1	0	0	0
Retail	1		10	0	0	0
Restaurant	1	9		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	166	80	86
Internal Capture Percentage	30%	31%	29%
External Vehicle-Trips[5]	116	55	61
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	40%	17%
Retail	29%	26%
Restaurant	33%	48%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Bebb Oak	**Organization:**	Fishbeck
Project Location:		**Performed By:**	JAM
Scenario Description:		**Date:**	
Analysis Year:	2024	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				24	14	10
Restaurant				5	3	2
Cinema/Entertainment				0		
Residential				30	7	23
Hotel				0		
All Other Land Uses[2]				0		
				59	24	35

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		1	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	1	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	59	24	35
Internal Capture Percentage	7%	8%	6%
External Vehicle-Trips[5]	55	22	33
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	10%
Restaurant	67%	0%
Cinema/Entertainment	N/A	N/A
Residential	0%	4%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Bebb Oak	**Organization:**	Fishbeck
Project Location:		**Performed By:**	JAM
Scenario Description:		**Date:**	
Analysis Year:	2024	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				79	40	39
Restaurant				43	24	19
Cinema/Entertainment				0		
Residential				37	23	14
Hotel				0		
All Other Land Uses[2]				0		
				159	87	72

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		7	0	10	0
Restaurant	0	8		0	3	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	3	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	159	87	72
Internal Capture Percentage	44%	40%	49%
External Vehicle-Trips[5]	89	52	37
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	30%	44%
Restaurant	42%	58%
Cinema/Entertainment	N/A	N/A
Residential	57%	50%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

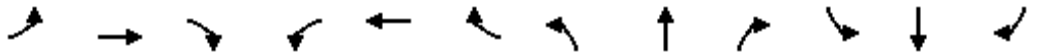
[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Appendix 4

Background LOS Output Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	158	95	175	177	43	81	874	120	68	1432	115
Future Volume (veh/h)	114	158	95	175	177	43	81	874	120	68	1432	115
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2064	1984	1984	1953	1953	1953	1938	1938	1938	1969	1969	1969
Adj Flow Rate, veh/h	125	174	104	197	199	48	90	971	133	72	1507	121
Peak Hour Factor	0.91	0.91	0.91	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	3	3	3	4	4	4	2	2	2
Cap, veh/h	146	657	293	205	779	348	112	1759	785	93	1745	778
Arrive On Green	0.07	0.17	0.17	0.11	0.21	0.21	0.08	0.64	0.64	0.05	0.47	0.47
Sat Flow, veh/h	1966	3770	1682	1860	3711	1655	1845	3681	1642	1875	3741	1668
Grp Volume(v), veh/h	125	174	104	197	199	48	90	971	133	72	1507	121
Grp Sat Flow(s),veh/h/ln	1966	1885	1682	1860	1856	1655	1845	1841	1642	1875	1870	1668
Q Serve(g_s), s	8.8	5.6	7.6	14.8	6.3	3.3	6.7	20.7	4.6	5.3	50.4	5.8
Cycle Q Clear(g_c), s	8.8	5.6	7.6	14.8	6.3	3.3	6.7	20.7	4.6	5.3	50.4	5.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	146	657	293	205	779	348	112	1759	785	93	1745	778
V/C Ratio(X)	0.86	0.26	0.35	0.96	0.26	0.14	0.80	0.55	0.17	0.78	0.86	0.16
Avail Cap(c_a), veh/h	146	657	293	205	779	348	150	1759	785	153	1745	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.1	50.0	50.9	62.0	46.2	45.0	63.5	17.1	14.2	65.8	33.4	21.5
Incr Delay (d2), s/veh	36.4	1.0	3.3	52.1	0.8	0.8	20.0	1.3	0.5	13.1	6.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	2.7	3.4	9.8	3.0	1.4	3.7	7.2	1.7	2.8	22.9	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	100.4	51.0	54.2	114.1	47.0	45.8	83.6	18.4	14.6	78.8	39.3	21.9
LnGrp LOS	F	D	D	F	D	D	F	B	B	E	D	C
Approach Vol, veh/h		403			444			1194			1700	
Approach Delay, s/veh		67.2			76.6			22.9			39.7	
Approach LOS		E			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.5	73.5	17.0	36.0	15.1	71.9	22.0	31.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 11	* 62	* 10	* 29	* 11	* 62	* 15	* 24
Max Q Clear Time (g_c+I1), s	7.3	22.7	10.8	8.3	8.7	52.4	16.8	9.6
Green Ext Time (p_c), s	0.0	7.8	0.0	1.2	0.0	6.7	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	41.7
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	7	47	1	9	6	1125	31	28	1651	5
Future Volume (veh/h)	1	0	7	47	1	9	6	1125	31	28	1651	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	1922	1922	1922	1938	1938	1938	1969	1969	1969
Adj Flow Rate, veh/h	1	0	10	66	1	13	7	1250	34	29	1738	5
Peak Hour Factor	0.67	0.67	0.67	0.71	0.71	0.71	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	5	5	5	4	4	4	2	2	2
Cap, veh/h	139	0	118	139	8	106	281	3103	1384	414	3225	9
Arrive On Green	0.07	0.00	0.07	0.07	0.07	0.07	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1422	0	1695	1371	118	1529	272	3681	1642	430	3826	11
Grp Volume(v), veh/h	1	0	10	66	0	14	7	1250	34	29	849	894
Grp Sat Flow(s),veh/h/ln	1422	0	1695	1371	0	1647	272	1841	1642	430	1870	1967
Q Serve(g_s), s	0.1	0.0	0.8	6.6	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.2	0.0	0.8	7.4	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.93	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	139	0	118	139	0	114	281	3103	1384	414	1576	1658
V/C Ratio(X)	0.01	0.00	0.09	0.47	0.00	0.12	0.02	0.40	0.02	0.07	0.54	0.54
Avail Cap(c_a), veh/h	264	0	266	259	0	259	281	3103	1384	414	1576	1658
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.7	0.0	61.0	64.5	0.0	61.1	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.3	2.5	0.0	0.5	0.2	0.4	0.0	0.3	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	2.4	0.0	0.5	0.0	0.2	0.0	0.0	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.7	0.0	61.3	67.0	0.0	61.6	0.2	0.4	0.0	0.3	1.3	1.3
LnGrp LOS	E	A	E	E	A	E	A	A	A	A	A	A
Approach Vol, veh/h		11			80			1291			1772	
Approach Delay, s/veh		61.3			66.0			0.4			1.3	
Approach LOS		E			E			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	124.3	15.7	124.3	15.7
Change Period (Y+Rc), s	* 6.3	6.0	* 6.3	6.0
Max Green Setting (Gmax), s	* 1.1E2	22.0	* 1.1E2	22.0
Max Q Clear Time (g_c+I1), s	2.0	3.2	2.0	9.4
Green Ext Time (p_c), s	11.9	0.0	21.4	0.2

Intersection Summary	
HCM 6th Ctrl Delay	2.8
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	11	51	0	14	9	1230	30	13	1724	11
Future Vol, veh/h	4	0	11	51	0	14	9	1230	30	13	1724	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	85	50	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	81	81	81	89	89	89	91	91	91
Heavy Vehicles, %	0	0	0	2	2	2	4	4	4	2	2	2
Mvmt Flow	5	0	15	63	0	17	10	1382	34	14	1895	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2640	3365	954	2378	-	691	1907	0	0	1416	0	0
Stage 1	1929	1929	-	1402	-	-	-	-	-	-	-	-
Stage 2	711	1436	-	976	-	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.54	-	6.94	4.18	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.52	-	3.32	2.24	-	-	2.22	-	-
Pot Cap-1 Maneuver	*14	*1	*377	*~ 57	0	*573	*555	-	-	854	-	-
Stage 1	*355	*311	-	*540	0	-	-	-	-	-	-	-
Stage 2	*543	*457	-	*353	0	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1		1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*14	*1	*377	*~ 54	-	*573	*555	-	-	854	-	-
Mov Cap-2 Maneuver	*14	*1	-	*~ 54	-	-	-	-	-	-	-	-
Stage 1	*349	*306	-	*530	-	-	-	-	-	-	-	-
Stage 2	*517	*449	-	*334	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	125.6	237.6	0.1	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 555	-	-	48	54	573	854	-	-
HCM Lane V/C Ratio	0.018	-	-	0.417	1.166	0.03	0.017	-	-
HCM Control Delay (s)	11.6	-	-	125.6	299.7	11.5	9.3	-	-
HCM Lane LOS	B	-	-	F	F	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	5.5	0.1	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	573	426	843	0	0	1329
Future Volume (veh/h)	573	426	843	0	0	1329
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1969	1969	1938	0	0	1969
Adj Flow Rate, veh/h	630	468	926	0	0	1399
Peak Hour Factor	0.91	0.91	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	2	2	4	0	0	2
Cap, veh/h	759	612	2593	0	0	2635
Arrive On Green	0.21	0.21	0.70	0.00	0.00	0.47
Sat Flow, veh/h	3638	2937	3875	0	0	3938
Grp Volume(v), veh/h	630	468	926	0	0	1399
Grp Sat Flow(s),veh/h/ln	1819	1468	1841	0	0	1870
Q Serve(g_s), s	23.2	21.0	13.9	0.0	0.0	36.9
Cycle Q Clear(g_c), s	23.2	21.0	13.9	0.0	0.0	36.9
Prop In Lane	1.00	1.00		0.00	0.00	
Lane Grp Cap(c), veh/h	759	612	2593	0	0	2635
V/C Ratio(X)	0.83	0.76	0.36	0.00	0.00	0.53
Avail Cap(c_a), veh/h	1013	818	2593	0	0	2635
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	0.67
Upstream Filter(I)	1.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	53.0	52.2	8.2	0.0	0.0	20.7
Incr Delay (d2), s/veh	4.5	3.0	0.4	0.0	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	8.1	4.9	0.0	0.0	17.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	57.5	55.2	8.6	0.0	0.0	21.4
LnGrp LOS	E	E	A	A	A	C
Approach Vol, veh/h	1098		926			1399
Approach Delay, s/veh	56.5		8.6			21.4
Approach LOS	E		A			C

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	104.8			104.8	35.2
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 89			* 89	39.0
Max Q Clear Time (g_c+I1), s	15.9			38.9	25.2
Green Ext Time (p_c), s	7.0			13.1	4.0

Intersection Summary	
HCM 6th Ctrl Delay	29.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBT] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	262	243	0	879	1502	0
Future Volume (veh/h)	262	243	0	879	1502	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1744	1744	0	1758	1786	0
Adj Flow Rate, veh/h	353	179	0	999	1581	0
Peak Hour Factor	0.94	0.94	0.88	0.88	0.95	0.95
Percent Heavy Veh, %	4	4	0	3	1	0
Cap, veh/h	477	212	0	2570	2611	0
Arrive On Green	0.14	0.14	0.00	1.00	0.77	0.00
Sat Flow, veh/h	3322	1478	0	3516	3572	0
Grp Volume(v), veh/h	353	179	0	999	1581	0
Grp Sat Flow(s),veh/h/ln	1661	1478	0	1670	1697	0
Q Serve(g_s), s	14.3	16.5	0.0	0.0	28.2	0.0
Cycle Q Clear(g_c), s	14.3	16.5	0.0	0.0	28.2	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	477	212	0	2570	2611	0
V/C Ratio(X)	0.74	0.84	0.00	0.39	0.61	0.00
Avail Cap(c_a), veh/h	712	317	0	2570	2611	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.5	58.4	0.0	0.0	7.0	0.0
Incr Delay (d2), s/veh	2.3	12.4	0.0	0.4	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	7.0	0.0	0.2	8.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	59.7	70.9	0.0	0.4	8.0	0.0
LnGrp LOS	E	E	A	A	A	A
Approach Vol, veh/h	532			999	1581	
Approach Delay, s/veh	63.5			0.4	8.0	
Approach LOS	E			A	A	

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	113.9			113.9	26.1
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 98			* 98	30.0
Max Q Clear Time (g_c+I1), s	2.0			30.2	18.5
Green Ext Time (p_c), s	7.8			17.3	1.6

Intersection Summary		
HCM 6th Ctrl Delay	15.1	
HCM 6th LOS	B	

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	143	84	83	178	141	49	913	53	123	1340	151
Future Volume (veh/h)	155	143	84	83	178	141	49	913	53	123	1340	151
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1953	1953	1953	1984	1984	1984
Adj Flow Rate, veh/h	187	172	101	91	196	155	52	961	56	134	1457	164
Peak Hour Factor	0.83	0.83	0.83	0.91	0.91	0.91	0.95	0.95	0.95	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	1	1	1
Cap, veh/h	213	336	285	114	232	197	68	1891	843	158	1903	212
Arrive On Green	0.11	0.17	0.17	0.06	0.12	0.12	0.04	0.51	0.51	0.17	1.00	1.00
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1860	3711	1655	1890	3419	382
Grp Volume(v), veh/h	187	172	101	91	196	155	52	961	56	134	798	823
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1860	1856	1655	1890	1885	1916
Q Serve(g_s), s	13.8	11.1	7.5	6.7	13.7	12.6	3.9	24.0	2.4	9.6	0.0	0.0
Cycle Q Clear(g_c), s	13.8	11.1	7.5	6.7	13.7	12.6	3.9	24.0	2.4	9.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	213	336	285	114	232	197	68	1891	843	158	1049	1066
V/C Ratio(X)	0.88	0.51	0.36	0.80	0.84	0.79	0.77	0.51	0.07	0.85	0.76	0.77
Avail Cap(c_a), veh/h	250	418	354	157	319	271	93	1891	843	229	1049	1066
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.1	52.8	51.3	64.9	60.5	60.1	66.9	22.7	17.4	57.4	0.0	0.0
Incr Delay (d2), s/veh	25.4	1.2	0.8	18.0	13.9	10.2	22.2	1.0	0.2	17.6	5.2	5.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	5.5	3.1	3.7	7.6	5.8	2.2	10.3	0.9	4.9	1.5	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.5	54.0	52.0	82.9	74.4	70.2	89.0	23.7	17.6	75.1	5.2	5.4
LnGrp LOS	F	D	D	F	E	E	F	C	B	E	A	A
Approach Vol, veh/h		460			442			1069			1755	
Approach Delay, s/veh		66.8			74.7			26.6			10.6	
Approach LOS		E			E			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.7	77.3	14.8	30.2	11.1	83.9	22.2	22.8
Change Period (Y+Rc), s	* 6	* 6	6.3	6.3	* 6	* 6	6.3	6.3
Max Green Setting (Gmax), s	* 13	* 57	11.7	29.7	* 7	* 67	18.7	22.7
Max Q Clear Time (g_c+I1), s	11.6	26.0	8.7	13.1	5.9	2.0	15.8	15.7
Green Ext Time (p_c), s	0.1	7.3	0.0	1.0	0.0	16.4	0.1	0.8

Intersection Summary	
HCM 6th Ctrl Delay	29.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	192	154	124	141	319	136	116	85	156	290	306	243
Average Queue (ft)	98	72	28	59	160	77	38	27	76	157	159	58
95th Queue (ft)	173	131	78	120	277	128	85	70	134	256	260	166
Link Distance (ft)		671	671			667	667			361	361	
Upstream Blk Time (%)											0	
Queuing Penalty (veh)											0	
Storage Bay Dist (ft)	500			130	500			150	500			170
Storage Blk Time (%)			0	1			0				8	
Queuing Penalty (veh)			0	1			0				10	

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	302	672	732	345
Average Queue (ft)	77	436	470	154
95th Queue (ft)	256	672	735	395
Link Distance (ft)		721	721	
Upstream Blk Time (%)		2	5	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)	500			270
Storage Blk Time (%)		5	28	
Queuing Penalty (veh)		3	32	

Intersection: 2019: M-150 (Rochester Road) & Alex's Driveway/Meijer/Lowes Driveway (PB)

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	12	35	125	35	32	130	106	26	57	125	141
Average Queue (ft)	0	6	46	7	5	34	35	2	16	35	60
95th Queue (ft)	6	27	105	25	22	93	91	14	46	97	137
Link Distance (ft)	202	202	347	347		466	466			378	378
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					250			190	250		
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3008: M-150 (Rochester Road) & WB M-59 Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	299	396	508	275	210	230	184	179
Average Queue (ft)	218	281	221	158	84	109	113	131
95th Queue (ft)	320	394	386	254	167	193	178	197
Link Distance (ft)			629		150	150	42	42
Upstream Blk Time (%)					1	3	21	26
Queuing Penalty (veh)					4	12	143	171
Storage Bay Dist (ft)	200	200		200				
Storage Blk Time (%)	2	28	10	2				
Queuing Penalty (veh)	10	119	77	14				

Intersection: 3021: M-150 (Rochester Road) & EB M-59 Off Ramp

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	LR	R	T	T	T	T
Maximum Queue (ft)	255	310	292	118	184	222	226
Average Queue (ft)	118	193	174	58	83	132	137
95th Queue (ft)	238	278	264	106	151	202	212
Link Distance (ft)			501	112	112	175	175
Upstream Blk Time (%)				0	3	1	2
Queuing Penalty (veh)				2	13	10	13
Storage Bay Dist (ft)	230	230					
Storage Blk Time (%)	0	3	3				
Queuing Penalty (veh)	0	4	11				

Intersection: 3108: WB M-59 On Ramp & M-150 (Rochester Road)

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	16	18	31	51	9
Average Queue (ft)	1	1	2	7	0
95th Queue (ft)	12	13	18	32	6
Link Distance (ft)	42	42	141	141	141
Upstream Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3121: EB M-59 On Ramp & M-150 (Rochester Road)

Movement	SB
Directions Served	R
Maximum Queue (ft)	24
Average Queue (ft)	1
95th Queue (ft)	10
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	50
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3208: M-150 (Rochester Road) & WB M-59 On Ramp

Movement	NB	SB
Directions Served	T	T
Maximum Queue (ft)	21	11
Average Queue (ft)	1	0
95th Queue (ft)	11	8
Link Distance (ft)	703	150
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 3221: M-150 (Rochester Road) & EB M-59 On Ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	7
Average Queue (ft)	0
95th Queue (ft)	5
Link Distance (ft)	241
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	L	T
Maximum Queue (ft)	286	198	104	155	280	160	105	377	444	152	198	470
Average Queue (ft)	136	104	38	78	141	44	44	190	238	15	106	262
95th Queue (ft)	255	185	78	154	248	102	93	311	383	64	173	409
Link Distance (ft)		759			1237			793	793			707
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		250	80		250	500			250	500	
Storage Blk Time (%)	0	0		13	33				7			0
Queuing Penalty (veh)	0	0		42	73				4			0

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

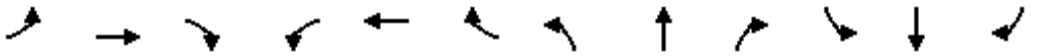
Movement	SB
Directions Served	TR
Maximum Queue (ft)	486
Average Queue (ft)	283
95th Queue (ft)	429
Link Distance (ft)	707
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9001: M-150 (Rochester Road) & Nawakwa Rd

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	R	L	R	L	TR
Maximum Queue (ft)	43	299	160	24	4	33	4
Average Queue (ft)	11	144	23	3	0	7	0
95th Queue (ft)	35	290	107	16	3	27	4
Link Distance (ft)	377	381			141		298
Upstream Blk Time (%)		2					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)			85	50		100	
Storage Blk Time (%)		64	0	0			
Queuing Penalty (veh)		9	0	0			

Zone Summary

Zone wide Queuing Penalty: 779



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	424	127	207	238	116	122	1404	199	156	1186	150
Future Volume (veh/h)	261	424	127	207	238	116	122	1404	199	156	1186	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	281	456	137	238	274	133	134	1543	219	177	1348	170
Peak Hour Factor	0.93	0.93	0.93	0.87	0.87	0.87	0.91	0.91	0.91	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	262	684	305	235	630	281	154	1600	714	154	1600	714
Arrive On Green	0.14	0.18	0.18	0.12	0.17	0.17	0.16	0.85	0.85	0.08	0.42	0.42
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	281	456	137	238	274	133	134	1543	219	177	1348	170
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	19.4	15.8	10.2	17.4	9.1	10.0	9.7	47.8	3.7	11.4	44.9	9.1
Cycle Q Clear(g_c), s	19.4	15.8	10.2	17.4	9.1	10.0	9.7	47.8	3.7	11.4	44.9	9.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	684	305	235	630	281	154	1600	714	154	1600	714
V/C Ratio(X)	1.07	0.67	0.45	1.01	0.43	0.47	0.87	0.96	0.31	1.15	0.84	0.24
Avail Cap(c_a), veh/h	262	684	305	235	630	281	154	1600	714	154	1600	714
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.3	53.4	51.1	61.3	52.4	52.7	57.9	9.7	6.4	64.3	36.1	25.8
Incr Delay (d2), s/veh	76.3	5.1	4.7	62.2	2.2	5.6	38.0	15.5	1.1	118.6	5.6	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.6	7.8	4.6	12.3	4.5	4.6	5.8	7.7	1.3	10.4	20.7	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	136.6	58.4	55.8	123.5	54.5	58.3	95.9	25.2	7.5	182.9	41.7	26.6
LnGrp LOS	F	E	E	F	D	E	F	C	A	F	D	C
Approach Vol, veh/h		874			645			1896			1695	
Approach Delay, s/veh		83.2			80.8			28.2			54.9	
Approach LOS		F			F			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	66.0	26.0	30.0	18.0	66.0	24.0	32.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 11	* 59	* 19	* 23	* 11	* 59	* 17	* 25
Max Q Clear Time (g_c+I1), s	13.4	49.8	21.4	12.0	11.7	46.9	19.4	17.8
Green Ext Time (p_c), s	0.0	6.8	0.0	1.6	0.0	7.3	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	53.1
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	8	122	0	58	7	1623	120	35	1467	7
Future Volume (veh/h)	4	0	8	122	0	58	7	1623	120	35	1467	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	5	0	11	142	0	67	7	1708	126	38	1577	8
Peak Hour Factor	0.75	0.75	0.75	0.86	0.86	0.86	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	169	0	208	217	0	206	308	2976	1327	253	3036	15
Arrive On Green	0.12	0.00	0.12	0.12	0.00	0.12	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1355	0	1695	1415	0	1682	325	3770	1682	255	3847	20
Grp Volume(v), veh/h	5	0	11	142	0	67	7	1708	126	38	773	812
Grp Sat Flow(s),veh/h/ln	1355	0	1695	1415	0	1682	325	1885	1682	255	1885	1981
Q Serve(g_s), s	0.5	0.0	0.8	13.8	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.6	0.0	0.8	14.6	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	169	0	208	217	0	206	308	2976	1327	253	1488	1564
V/C Ratio(X)	0.03	0.00	0.05	0.65	0.00	0.32	0.02	0.57	0.09	0.15	0.52	0.52
Avail Cap(c_a), veh/h	283	0	351	336	0	348	308	2976	1327	253	1488	1564
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.6	0.0	54.2	60.7	0.0	56.1	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.1	3.3	0.0	0.9	0.1	0.8	0.1	1.3	1.3	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.4	5.2	0.0	2.2	0.0	0.3	0.1	0.1	0.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.7	0.0	54.3	64.0	0.0	57.0	0.1	0.8	0.1	1.3	1.3	1.2
LnGrp LOS	E	A	D	E	A	E	A	A	A	A	A	A
Approach Vol, veh/h		16			209			1841			1623	
Approach Delay, s/veh		55.7			61.7			0.8			1.3	
Approach LOS		E			E			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	116.8	23.2	116.8	23.2
Change Period (Y+Rc), s	* 6.3	6.0	* 6.3	6.0
Max Green Setting (Gmax), s	* 99	29.0	* 99	29.0
Max Q Clear Time (g_c+I1), s	2.0	7.6	2.0	16.6
Green Ext Time (p_c), s	23.0	0.0	18.5	0.6

Intersection Summary	
HCM 6th Ctrl Delay	4.7
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	393	431	1537	0	0	1292
Future Volume (veh/h)	393	431	1537	0	0	1292
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	2000	2000	1984	0	0	1984
Adj Flow Rate, veh/h	418	459	1618	0	0	1360
Peak Hour Factor	0.94	0.94	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	1	0	0	1
Cap, veh/h	686	553	2742	0	0	2742
Arrive On Green	0.19	0.19	0.73	0.00	0.00	1.00
Sat Flow, veh/h	3695	2983	3969	0	0	3969
Grp Volume(v), veh/h	418	459	1618	0	0	1360
Grp Sat Flow(s),veh/h/ln	1848	1492	1885	0	0	1885
Q Serve(g_s), s	14.5	20.7	28.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.5	20.7	28.7	0.0	0.0	0.0
Prop In Lane	1.00	1.00		0.00	0.00	
Lane Grp Cap(c), veh/h	686	553	2742	0	0	2742
V/C Ratio(X)	0.61	0.83	0.59	0.00	0.00	0.50
Avail Cap(c_a), veh/h	1003	810	2742	0	0	2742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	52.4	54.9	9.1	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.9	4.8	0.9	0.0	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	8.2	10.0	0.0	0.0	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	53.2	59.7	10.1	0.0	0.0	0.6
LnGrp LOS	D	E	B	A	A	A
Approach Vol, veh/h	877		1618			1360
Approach Delay, s/veh	56.6		10.1			0.6
Approach LOS	E		B			A

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	108.0			108.0	32.0
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 90			* 90	38.0
Max Q Clear Time (g_c+I1), s	30.7			2.0	22.7
Green Ext Time (p_c), s	17.7			13.1	3.2

Intersection Summary	
HCM 6th Ctrl Delay	17.3
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBT] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	447	446	0	1378	1283	0
Future Volume (veh/h)	447	446	0	1378	1283	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1786	1786	0	1800	1786	0
Adj Flow Rate, veh/h	665	338	0	1466	1426	0
Peak Hour Factor	0.88	0.88	0.94	0.94	0.90	0.90
Percent Heavy Veh, %	1	1	0	0	1	0
Cap, veh/h	837	372	0	2280	2262	0
Arrive On Green	0.25	0.25	0.00	1.00	0.67	0.00
Sat Flow, veh/h	3402	1514	0	3600	3572	0
Grp Volume(v), veh/h	665	338	0	1466	1426	0
Grp Sat Flow(s),veh/h/ln	1701	1514	0	1710	1697	0
Q Serve(g_s), s	25.6	30.3	0.0	0.0	33.8	0.0
Cycle Q Clear(g_c), s	25.6	30.3	0.0	0.0	33.8	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	837	372	0	2280	2262	0
V/C Ratio(X)	0.79	0.91	0.00	0.64	0.63	0.00
Avail Cap(c_a), veh/h	923	411	0	2280	2262	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.5	51.2	0.0	0.0	13.4	0.0
Incr Delay (d2), s/veh	4.4	22.3	0.0	1.4	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	13.9	0.0	0.4	11.7	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	53.9	73.5	0.0	1.4	14.8	0.0
LnGrp LOS	D	E	A	A	B	A
Approach Vol, veh/h	1003			1466	1426	
Approach Delay, s/veh	60.5			1.4	14.8	
Approach LOS	E			A	B	

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	99.5			99.5	40.5
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 90			* 90	38.0
Max Q Clear Time (g_c+I1), s	2.0			35.8	32.3
Green Ext Time (p_c), s	15.1			13.7	2.1

Intersection Summary	
HCM 6th Ctrl Delay	21.5
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	288	97	106	155	152	73	1396	129	168	1318	156
Future Volume (veh/h)	261	288	97	106	155	152	73	1396	129	168	1318	156
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	2000	2000	2000	1984	1984	1984
Adj Flow Rate, veh/h	287	316	107	123	180	177	79	1517	140	189	1481	175
Peak Hour Factor	0.91	0.91	0.91	0.86	0.86	0.86	0.92	0.92	0.92	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	0	0	0	0	0	0	1	1	1
Cap, veh/h	293	395	335	148	243	206	101	1701	759	189	1681	197
Arrive On Green	0.16	0.20	0.20	0.08	0.12	0.12	0.05	0.45	0.45	0.20	0.99	0.99
Sat Flow, veh/h	1890	1984	1682	1905	2000	1695	1905	3800	1695	1890	3400	398
Grp Volume(v), veh/h	287	316	107	123	180	177	79	1517	140	189	815	841
Grp Sat Flow(s),veh/h/ln	1890	1984	1682	1905	2000	1695	1905	1900	1695	1890	1885	1913
Q Serve(g_s), s	21.2	21.2	7.6	8.9	12.2	14.3	5.7	51.4	7.0	14.0	4.9	5.7
Cycle Q Clear(g_c), s	21.2	21.2	7.6	8.9	12.2	14.3	5.7	51.4	7.0	14.0	4.9	5.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	293	395	335	148	243	206	101	1701	759	189	932	946
V/C Ratio(X)	0.98	0.80	0.32	0.83	0.74	0.86	0.78	0.89	0.18	1.00	0.87	0.89
Avail Cap(c_a), veh/h	293	435	369	173	310	263	190	1701	759	189	932	946
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.9	53.4	48.0	63.7	59.3	60.3	65.5	35.6	23.3	56.0	0.4	0.4
Incr Delay (d2), s/veh	46.9	9.4	0.5	24.9	6.8	19.7	12.2	7.6	0.5	65.5	11.2	12.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.7	11.4	3.2	5.3	6.5	7.2	3.1	24.4	2.8	9.2	3.2	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	105.8	62.8	48.5	88.5	66.1	80.0	77.6	43.1	23.8	121.5	11.6	12.7
LnGrp LOS	F	E	D	F	E	F	E	D	C	F	B	B
Approach Vol, veh/h		710			480			1736			1845	
Approach Delay, s/veh		78.0			77.0			43.1			23.4	
Approach LOS		E			E			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.0	68.7	17.2	34.2	13.4	75.2	28.0	23.3
Change Period (Y+Rc), s	* 6	* 6	6.3	6.3	* 6	* 6	6.3	6.3
Max Green Setting (Gmax), s	* 14	* 58	12.7	30.7	* 14	* 58	21.7	21.7
Max Q Clear Time (g_c+I1), s	16.3	53.4	10.9	23.2	7.7	7.7	23.2	16.3
Green Ext Time (p_c), s	0.0	3.6	0.0	1.2	0.1	16.4	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	44.1
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	53.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	0	19	17	0	26	36	1871	61	12	1633	13
Future Vol, veh/h	6	0	19	17	0	26	36	1871	61	12	1633	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	85	50	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	77	77	77	95	95	95	93	93	93
Heavy Vehicles, %	0	0	0	2	2	2	1	1	1	1	1	1
Mvmt Flow	9	0	28	22	0	34	38	1969	64	13	1756	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2850	3898	885	2949	-	985	1770	0	0	2033	0	0
Stage 1	1789	1789	-	2045	-	-	-	-	-	-	-	-
Stage 2	1061	2109	-	904	-	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.54	-	6.94	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.52	-	3.32	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	*~ 5	*0	*421	*~ 2	0	*308	*629	-	-	*464	-	-
Stage 1	*397	*347	-	*291	0	-	-	-	-	-	-	-
Stage 2	*292	*256	-	*395	0	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1		1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*~ 4	*0	*421	*~ 2	-	*308	*629	-	-	*464	-	-
Mov Cap-2 Maneuver	*~ 4	*0	-	*~ 2	-	-	-	-	-	-	-	-
Stage 1	*373	*338	-	*273	-	-	-	-	-	-	-	-
Stage 2	*245	*241	-	*358	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	1071.5	$ 3099.1	0.2	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 629	-	-	16	2	308	* 464	-	-
HCM Lane V/C Ratio	0.06	-	-	2.264	11.039	0.11	0.028	-	-
HCM Control Delay (s)	11.1	-	-	$ 1071.5	$ 7811.2	18.1	13	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	5.2	4.4	0.4	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	546	537	426	180	408	266	178	167	362	439	446	245
Average Queue (ft)	365	282	193	84	239	106	76	78	153	341	360	166
95th Queue (ft)	631	630	460	168	418	216	157	148	310	470	490	307
Link Distance (ft)		671	671			667	667			363	363	
Upstream Blk Time (%)		13	0						0	11	17	
Queuing Penalty (veh)		0	0						0	93	144	
Storage Bay Dist (ft)	500			130	500			150	500			170
Storage Blk Time (%)	18	0	13	4	2	0	1	2	0	11	42	1
Queuing Penalty (veh)	39	0	17	8	2	0	1	2	0	13	83	8

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	413	554	595	345
Average Queue (ft)	194	300	326	113
95th Queue (ft)	369	469	508	302
Link Distance (ft)		721	721	
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	500			270
Storage Blk Time (%)	0	1	14	
Queuing Penalty (veh)	1	1	22	

Intersection: 2019: M-150 (Rochester Road) & Alex's Driveway/Meijer/Lowes Driveway (PB)

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	34	31	193	98	31	150	150	40	96	110	132
Average Queue (ft)	4	5	94	33	4	59	67	11	32	38	62
95th Queue (ft)	20	23	160	72	21	119	128	32	74	88	116
Link Distance (ft)	202	202	347	347		466	466			378	378
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					250			190	250		
Storage Blk Time (%)							0				
Queuing Penalty (veh)							0				

Intersection: 3008: M-150 (Rochester Road) & WB M-59 Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	283	376	482	334	244	258	192	190
Average Queue (ft)	142	213	220	182	164	197	145	166
95th Queue (ft)	263	318	371	290	244	269	211	207
Link Distance (ft)			629		150	150	42	42
Upstream Blk Time (%)			0		8	13	25	28
Queuing Penalty (veh)			0		60	99	163	182
Storage Bay Dist (ft)	200	200		200				
Storage Blk Time (%)	0	11	17	5				
Queuing Penalty (veh)	2	48	103	34				

Intersection: 3021: M-150 (Rochester Road) & EB M-59 Off Ramp

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	LR	R	T	T	T	T
Maximum Queue (ft)	319	410	516	228	249	287	293
Average Queue (ft)	227	313	313	135	168	184	193
95th Queue (ft)	340	428	487	203	241	263	275
Link Distance (ft)			501	112	112	175	175
Upstream Blk Time (%)			2	14	20	7	8
Queuing Penalty (veh)			0	97	141	45	53
Storage Bay Dist (ft)	230	230					
Storage Blk Time (%)	1	27	25				
Queuing Penalty (veh)	2	60	167				

Intersection: 3108: WB M-59 On Ramp & M-150 (Rochester Road)

Movement	NB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	38	157	174	16
Average Queue (ft)	2	28	50	1
95th Queue (ft)	17	101	138	12
Link Distance (ft)	42	141	141	141
Upstream Blk Time (%)	0	0	1	
Queuing Penalty (veh)	1	2	6	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3121: EB M-59 On Ramp & M-150 (Rochester Road)

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	12	20	39
Average Queue (ft)	0	1	5
95th Queue (ft)	6	9	26
Link Distance (ft)	703	703	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)		0	0
Queuing Penalty (veh)		0	0

Intersection: 3208: M-150 (Rochester Road) & WB M-59 On Ramp

Movement	NB	NB	SB
Directions Served	T	T	T
Maximum Queue (ft)	55	72	11
Average Queue (ft)	3	10	0
95th Queue (ft)	24	41	8
Link Distance (ft)	703	703	150
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)		1	
Queuing Penalty (veh)		3	

Intersection: 3221: M-150 (Rochester Road) & EB M-59 On Ramp

Movement	NB	SB	SB
Directions Served	T	T	T
Maximum Queue (ft)	13	20	30
Average Queue (ft)	1	2	4
95th Queue (ft)	7	21	35
Link Distance (ft)	241	112	112
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	L	T
Maximum Queue (ft)	461	412	233	154	271	195	481	736	785	325	446	663
Average Queue (ft)	256	208	51	87	124	68	121	483	551	166	225	404
95th Queue (ft)	418	352	145	156	218	137	398	762	817	412	474	733
Link Distance (ft)		759			1237			793	793			707
Upstream Blk Time (%)								3	7			5
Queuing Penalty (veh)								0	0			45
Storage Bay Dist (ft)	500		250	80		250	500			250	500	
Storage Blk Time (%)	1	6		22	26		0	8	40			10
Queuing Penalty (veh)	4	20		67	69		3	6	52			18

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	SB
Directions Served	TR
Maximum Queue (ft)	674
Average Queue (ft)	420
95th Queue (ft)	742
Link Distance (ft)	707
Upstream Blk Time (%)	6
Queuing Penalty (veh)	53
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9001: M-150 (Rochester Road) & Nawakwa Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	165	207	138	49	39	11	4	42	9	21
Average Queue (ft)	46	113	22	16	2	0	0	11	0	1
95th Queue (ft)	138	282	89	39	19	8	5	34	7	8
Link Distance (ft)	377	381			141	141	141		298	298
Upstream Blk Time (%)		0								
Queuing Penalty (veh)		0								
Storage Bay Dist (ft)			85	50				100		
Storage Blk Time (%)		56	0	1	0					
Queuing Penalty (veh)		15	0	7	0					

Zone Summary

Zone wide Queuing Penalty: 2064

Appendix 5

Trip Generation Calculations

Trip Generation - Weekday Summary

ITE Code	ITE Rate Description	Unit	Amount	AM Ingress	AM Egress	AM Total	PM Ingress	PM Egress	PM Total	Weekday Ingress	Weekday Egress	Weekday Total
ITE 934	Fast-Food Restaurant with Drive-Through Window	SFT	1243	28	27	55	21	20	41	291	290	581
ITE 945	Convenience Store/Gas Station (GFA 5.5-10k)	Fueling Positions	8	126	127	253	108	107	215	1383	1383	2766
			Total Trips	154	154	308	129	127	256	1674	1673	3347
			Pass-by LUC 934 (50% AM; 55% PM)	14	14	28	12	11	23	-	-	-
			Pass-by LUC 945 (60% AM; 56% PM)	76	76	152	60	60	120	-	-	-
			Total Pass-by	*90*	*90*	*180*	*72*	*71*	*143*			
			Total New Trips	**64**	**64**	**128**	**57**	**56**	**113**	**1674**	**1673**	**3347**

ITE Trip Generation Rates - Weekday

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 945	**Convenience Store/Gas Station (GFA 5.5-10k)**	**Fueling Positions**	**8**					
AM	No Equation		253	-	31.6	29	60%	Use Average Rate
PM	No Equation		215	-	26.9	29	56%	Use Average Rate
Weekday	No Equation		2766	-	345.75	1	-	Use Average Rate

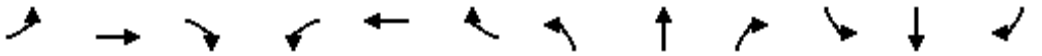
	AM Ingress	AM Egress	AM Total	PM Ingress	PM Egress	PM Total	Weekday Ingress	Weekday Egress	Weekday Total
Directional Distribution	50%	50%	100%	50%	50%	100%	50%	50%	100%
Volume Distribution	**126**	**127**	**253**	**108**	**107**	**215**	**1383**	**1383**	**2766**

ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*# of Studies*	*Pass-by*	Notes
ITE 934	**Fast-Food Restaurant with Drive-Through Window**	**SFT**	**1243**					
AM	No equation		55	-	44.61	96	50%	Use Average Rate
PM	No equation		41	-	33.03	190	55%	Use Average Rate
WD	No equation		581	-	467.48	71		Use Average Rate

	AM Ingress	AM Egress	AM Total	PM Ingress	PM Egress	PM Total	WD Ingress	WD Egress	WD Total
Directional Distribution	51%	49%	100%	52%	48%	100%	50%	50%	100%
Volume Distribution	**28**	**27**	**55**	**21**	**20**	**41**	**291**	**290**	**581**

Appendix 6

Future LOS Output Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	158	98	180	177	43	82	882	121	68	1473	115
Future Volume (veh/h)	114	158	98	180	177	43	82	882	121	68	1473	115
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2064	1984	1984	1953	1953	1953	1938	1938	1938	1969	1969	1969
Adj Flow Rate, veh/h	125	174	108	202	199	48	91	980	134	72	1551	121
Peak Hour Factor	0.91	0.91	0.91	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	3	3	3	4	4	4	2	2	2
Cap, veh/h	146	657	293	205	779	348	113	1759	785	93	1743	777
Arrive On Green	0.07	0.17	0.17	0.11	0.21	0.21	0.08	0.64	0.64	0.05	0.47	0.47
Sat Flow, veh/h	1966	3770	1682	1860	3711	1655	1845	3681	1642	1875	3741	1668
Grp Volume(v), veh/h	125	174	108	202	199	48	91	980	134	72	1551	121
Grp Sat Flow(s),veh/h/ln	1966	1885	1682	1860	1856	1655	1845	1841	1642	1875	1870	1668
Q Serve(g_s), s	8.8	5.6	7.9	15.2	6.3	3.3	6.8	21.0	4.7	5.3	53.0	5.8
Cycle Q Clear(g_c), s	8.8	5.6	7.9	15.2	6.3	3.3	6.8	21.0	4.7	5.3	53.0	5.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	146	657	293	205	779	348	113	1759	785	93	1743	777
V/C Ratio(X)	0.86	0.26	0.37	0.99	0.26	0.14	0.81	0.56	0.17	0.78	0.89	0.16
Avail Cap(c_a), veh/h	146	657	293	205	779	348	150	1759	785	153	1743	777
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.1	50.0	51.0	62.2	46.2	45.0	63.5	17.2	14.2	65.8	34.1	21.5
Incr Delay (d2), s/veh	36.4	1.0	3.5	59.1	0.8	0.8	20.4	1.3	0.5	13.1	7.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	2.7	3.6	10.4	3.0	1.4	3.7	7.3	1.7	2.8	24.3	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	100.4	51.0	54.5	121.3	47.0	45.8	83.9	18.4	14.6	78.8	41.4	22.0
LnGrp LOS	F	D	D	F	D	D	F	B	B	E	D	C
Approach Vol, veh/h		407			449			1205			1744	
Approach Delay, s/veh		67.1			80.3			23.0			41.6	
Approach LOS		E			F			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.5	73.5	17.0	36.0	15.2	71.8	22.0	31.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 11	* 62	* 10	* 29	* 11	* 62	* 15	* 24
Max Q Clear Time (g_c+I1), s	7.3	23.0	10.8	8.3	8.8	55.0	17.2	9.9
Green Ext Time (p_c), s	0.0	7.9	0.0	1.2	0.0	5.4	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	43.0
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	7	49	1	9	6	1135	31	28	1700	5
Future Volume (veh/h)	1	0	7	49	1	9	6	1135	31	28	1700	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	1922	1922	1922	1938	1938	1938	1969	1969	1969
Adj Flow Rate, veh/h	1	0	10	69	1	13	7	1261	34	29	1789	5
Peak Hour Factor	0.67	0.67	0.67	0.71	0.71	0.71	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	5	5	5	4	4	4	2	2	2
Cap, veh/h	139	0	118	139	8	106	270	3102	1384	410	3224	9
Arrive On Green	0.07	0.00	0.07	0.07	0.07	0.07	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1422	0	1695	1371	118	1529	259	3681	1642	426	3827	11
Grp Volume(v), veh/h	1	0	10	69	0	14	7	1261	34	29	874	920
Grp Sat Flow(s),veh/h/ln	1422	0	1695	1371	0	1647	259	1841	1642	426	1870	1967
Q Serve(g_s), s	0.1	0.0	0.8	6.9	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.2	0.0	0.8	7.7	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.93	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	139	0	118	139	0	115	270	3102	1384	410	1576	1657
V/C Ratio(X)	0.01	0.00	0.08	0.50	0.00	0.12	0.03	0.41	0.02	0.07	0.55	0.56
Avail Cap(c_a), veh/h	264	0	266	259	0	259	270	3102	1384	410	1576	1657
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.7	0.0	61.0	64.6	0.0	61.1	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.3	2.7	0.0	0.5	0.2	0.4	0.0	0.3	1.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	2.6	0.0	0.5	0.0	0.2	0.0	0.0	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.7	0.0	61.3	67.3	0.0	61.6	0.2	0.4	0.0	0.3	1.4	1.3
LnGrp LOS	E	A	E	E	A	E	A	A	A	A	A	A
Approach Vol, veh/h		11			83			1302			1823	
Approach Delay, s/veh		61.3			66.3			0.4			1.4	
Approach LOS		E			E			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	124.3	15.7	124.3	15.7
Change Period (Y+Rc), s	* 6.3	6.0	* 6.3	6.0
Max Green Setting (Gmax), s	* 1.1E2	22.0	* 1.1E2	22.0
Max Q Clear Time (g_c+I1), s	2.0	3.2	2.0	9.7
Green Ext Time (p_c), s	12.1	0.0	23.1	0.2

Intersection Summary	
HCM 6th Ctrl Delay	2.8
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	14.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	23	51	0	14	32	1240	30	13	1763	23
Future Vol, veh/h	4	0	23	51	0	14	32	1240	30	13	1763	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	85	-	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	81	81	81	89	89	89	91	91	91
Heavy Vehicles, %	0	0	0	2	2	2	4	4	4	2	2	2
Mvmt Flow	5	0	31	63	0	17	36	1393	34	14	1937	25

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2747	3477	981	2462	-	697	1962	0	0	1427	0	0
Stage 1	1978	1978	-	1465	-	-	-	-	-	-	-	-
Stage 2	769	1499	-	997	-	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.54	-	6.94	4.18	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.52	-	3.32	2.24	-	-	2.22	-	-
Pot Cap-1 Maneuver	*8	*0	*354	*~ 40	0	*573	*523	-	-	840	-	-
Stage 1	*334	*293	-	*475	0	-	-	-	-	-	-	-
Stage 2	*543	*406	-	*332	0	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1		1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*7	*0	*354	*~ 34	-	*573	*523	-	-	840	-	-
Mov Cap-2 Maneuver	*7	*0	-	*~ 34	-	-	-	-	-	-	-	-
Stage 1	*311	*288	-	*443	-	-	-	-	-	-	-	-
Stage 2	*490	*378	-	*298	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	243.2	$ 517.3	0.3	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 523	-	-	42	34	573	840	-	-
HCM Lane V/C Ratio	0.069	-	-	0.857	1.852	0.03	0.017	-	-
HCM Control Delay (s)	12.4	-	-	243.2	$ 656.1	11.5	9.4	-	-
HCM Lane LOS	B	-	-	F	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	3.3	7	0.1	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	573	430	852	0	0	1369
Future Volume (veh/h)	573	430	852	0	0	1369
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1969	1969	1938	0	0	1969
Adj Flow Rate, veh/h	630	473	936	0	0	1441
Peak Hour Factor	0.91	0.91	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	2	2	4	0	0	2
Cap, veh/h	766	618	2586	0	0	2627
Arrive On Green	0.21	0.21	0.70	0.00	0.00	0.47
Sat Flow, veh/h	3638	2937	3875	0	0	3938
Grp Volume(v), veh/h	630	473	936	0	0	1441
Grp Sat Flow(s),veh/h/ln	1819	1468	1841	0	0	1870
Q Serve(g_s), s	23.2	21.2	14.2	0.0	0.0	38.5
Cycle Q Clear(g_c), s	23.2	21.2	14.2	0.0	0.0	38.5
Prop In Lane	1.00	1.00		0.00	0.00	
Lane Grp Cap(c), veh/h	766	618	2586	0	0	2627
V/C Ratio(X)	0.82	0.77	0.36	0.00	0.00	0.55
Avail Cap(c_a), veh/h	1091	881	2586	0	0	2627
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	0.67
Upstream Filter(I)	1.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	52.8	52.0	8.3	0.0	0.0	21.2
Incr Delay (d2), s/veh	3.5	2.5	0.4	0.0	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	8.1	5.0	0.0	0.0	17.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	56.3	54.5	8.7	0.0	0.0	22.0
LnGrp LOS	E	D	A	A	A	C
Approach Vol, veh/h	1103		936			1441
Approach Delay, s/veh	55.5		8.7			22.0
Approach LOS	E		A			C

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	104.5			104.5	35.5
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 86			* 86	42.0
Max Q Clear Time (g_c+I1), s	16.2			40.5	25.2
Green Ext Time (p_c), s	7.1			13.6	4.3

Intersection Summary	
HCM 6th Ctrl Delay	29.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBT] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	264	243	0	886	1533	0
Future Volume (veh/h)	264	243	0	886	1533	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1744	1744	0	1758	1786	0
Adj Flow Rate, veh/h	355	180	0	1007	1614	0
Peak Hour Factor	0.94	0.94	0.88	0.88	0.95	0.95
Percent Heavy Veh, %	4	4	0	3	1	0
Cap, veh/h	479	213	0	2567	2608	0
Arrive On Green	0.14	0.14	0.00	1.00	0.77	0.00
Sat Flow, veh/h	3322	1478	0	3516	3572	0
Grp Volume(v), veh/h	355	180	0	1007	1614	0
Grp Sat Flow(s),veh/h/ln	1661	1478	0	1670	1697	0
Q Serve(g_s), s	14.3	16.6	0.0	0.0	29.4	0.0
Cycle Q Clear(g_c), s	14.3	16.6	0.0	0.0	29.4	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	479	213	0	2567	2608	0
V/C Ratio(X)	0.74	0.84	0.00	0.39	0.62	0.00
Avail Cap(c_a), veh/h	712	317	0	2567	2608	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.4	58.4	0.0	0.0	7.1	0.0
Incr Delay (d2), s/veh	2.3	12.6	0.0	0.5	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	7.0	0.0	0.2	8.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	59.7	71.0	0.0	0.5	8.3	0.0
LnGrp LOS	E	E	A	A	A	A
Approach Vol, veh/h	535			1007	1614	
Approach Delay, s/veh	63.5			0.5	8.3	
Approach LOS	E			A	A	

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	113.8			113.8	26.2
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 98			* 98	30.0
Max Q Clear Time (g_c+I1), s	2.0			31.4	18.6
Green Ext Time (p_c), s	7.9			17.9	1.6

Intersection Summary		
HCM 6th Ctrl Delay	15.1	
HCM 6th LOS	B	

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	143	84	83	178	142	49	918	53	126	1366	153
Future Volume (veh/h)	156	143	84	83	178	142	49	918	53	126	1366	153
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1953	1953	1953	1984	1984	1984
Adj Flow Rate, veh/h	188	172	101	91	196	156	52	966	56	137	1485	166
Peak Hour Factor	0.83	0.83	0.83	0.91	0.91	0.91	0.95	0.95	0.95	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	1	1	1
Cap, veh/h	214	337	285	114	232	197	68	1883	840	161	1903	211
Arrive On Green	0.11	0.17	0.17	0.06	0.12	0.12	0.04	0.51	0.51	0.17	1.00	1.00
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1860	3711	1655	1890	3422	379
Grp Volume(v), veh/h	188	172	101	91	196	156	52	966	56	137	812	839
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1860	1856	1655	1890	1885	1916
Q Serve(g_s), s	13.8	11.1	7.5	6.7	13.7	12.7	3.9	24.3	2.4	9.8	0.0	0.0
Cycle Q Clear(g_c), s	13.8	11.1	7.5	6.7	13.7	12.7	3.9	24.3	2.4	9.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	214	337	285	114	232	197	68	1883	840	161	1048	1066
V/C Ratio(X)	0.88	0.51	0.35	0.80	0.84	0.79	0.77	0.51	0.07	0.85	0.77	0.79
Avail Cap(c_a), veh/h	250	418	354	157	319	271	93	1883	840	229	1048	1066
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.1	52.7	51.2	64.9	60.5	60.1	66.9	23.0	17.6	57.2	0.0	0.0
Incr Delay (d2), s/veh	25.6	1.2	0.7	18.0	13.9	10.6	22.2	1.0	0.2	18.5	5.6	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	5.5	3.1	3.7	7.6	5.9	2.2	10.4	0.9	5.1	1.6	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.7	53.9	51.9	82.9	74.4	70.7	89.0	24.0	17.7	75.7	5.6	5.9
LnGrp LOS	F	D	D	F	E	E	F	C	B	E	A	A
Approach Vol, veh/h		461			443			1074			1788	
Approach Delay, s/veh		66.8			74.8			26.8			11.1	
Approach LOS		E			E			C			B	

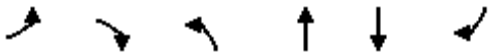
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.9	77.0	14.8	30.2	11.1	83.8	22.2	22.8
Change Period (Y+Rc), s	* 6	* 6	6.3	6.3	* 6	* 6	6.3	6.3
Max Green Setting (Gmax), s	* 13	* 57	11.7	29.7	* 7	* 67	18.7	22.7
Max Q Clear Time (g_c+I1), s	11.8	26.3	8.7	13.1	5.9	2.0	15.8	15.7
Green Ext Time (p_c), s	0.1	7.4	0.0	1.0	0.0	17.1	0.1	0.8

Intersection Summary	
HCM 6th Ctrl Delay	29.9
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	114	8	1274	1726	111
Future Volume (Veh/h)	28	114	8	1274	1726	111
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.89	0.89	0.91	0.91
Hourly flow rate (vph)	30	124	9	1431	1897	122
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				286	1005	
pX, platoon unblocked	0.89	0.89	0.89			
vC, conflicting volume	2334	693	2019			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2064	219	1710			
tC, single (s)	6.8	6.9	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	26	82	97			
cM capacity (veh/h)	41	698	319			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	30	124	213	409	409	409	759	759	501
Volume Left	30	0	9	0	0	0	0	0	0
Volume Right	0	124	0	0	0	0	0	0	122
cSH	41	698	319	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.74	0.18	0.03	0.24	0.24	0.24	0.45	0.45	0.29
Queue Length 95th (ft)	69	16	2	0	0	0	0	0	0
Control Delay (s)	215.1	11.3	1.2	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	B	A						
Approach Delay (s)	51.0		0.2				0.0		
Approach LOS	F								

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	47.4%	ICU Level of Service		A
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	4.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	15	0	35	20	0	12
Future Vol, veh/h	15	0	35	20	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	92	92	92	92
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	20	0	38	22	0	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	20	0	118	20
Stage 1	-	-	-	-	20	-
Stage 2	-	-	-	-	98	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1596	-	878	1058
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	926	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1596	-	857	1058
Mov Cap-2 Maneuver	-	-	-	-	857	-
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	904	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.7	8.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1058	-	-	1596	-
HCM Lane V/C Ratio	0.012	-	-	0.024	-
HCM Control Delay (s)	8.4	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	189	179	127	138	296	147	118	89	160	284	310	244
Average Queue (ft)	95	81	38	57	157	77	39	28	68	161	165	53
95th Queue (ft)	169	147	100	115	272	136	93	67	130	253	256	144
Link Distance (ft)		671	671			667	667			361	361	
Upstream Blk Time (%)										0	0	
Queuing Penalty (veh)										0	0	
Storage Bay Dist (ft)	500			130	500			150	500			170
Storage Blk Time (%)			0	1			0			0	8	
Queuing Penalty (veh)			0	1			0			0	10	

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	330	690	731	345
Average Queue (ft)	83	434	497	146
95th Queue (ft)	262	658	739	382
Link Distance (ft)		721	721	
Upstream Blk Time (%)		0	3	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)	500			270
Storage Blk Time (%)		5	31	
Queuing Penalty (veh)		3	36	

Intersection: 2019: M-150 (Rochester Road) & Alex's Driveway/Meijer/Lowes Driveway (PB)

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	12	40	116	36	37	100	125	15	50	136	164
Average Queue (ft)	1	9	43	6	6	31	33	1	16	37	70
95th Queue (ft)	7	32	94	25	25	80	90	9	43	99	152
Link Distance (ft)	202	202	347	347		466	466			378	378
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					250			190	250		
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3008: M-150 (Rochester Road) & WB M-59 Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	300	400	596	302	197	226	184	202
Average Queue (ft)	210	276	228	167	92	117	110	160
95th Queue (ft)	319	392	425	273	165	194	182	215
Link Distance (ft)			629		150	150	42	42
Upstream Blk Time (%)			1		1	3	22	29
Queuing Penalty (veh)			0		6	14	153	201
Storage Bay Dist (ft)	200	200		200				
Storage Blk Time (%)	2	26	14	5				
Queuing Penalty (veh)	11	114	109	43				

Intersection: 3021: M-150 (Rochester Road) & EB M-59 Off Ramp

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	LR	R	T	T	T	T
Maximum Queue (ft)	254	305	281	123	160	222	250
Average Queue (ft)	111	193	161	62	80	140	153
95th Queue (ft)	243	273	243	116	142	209	233
Link Distance (ft)			501	112	112	175	175
Upstream Blk Time (%)				1	2	2	3
Queuing Penalty (veh)				4	10	14	23
Storage Bay Dist (ft)	230	230					
Storage Blk Time (%)	0	4	2				
Queuing Penalty (veh)	0	4	8				

Intersection: 3108: WB M-59 On Ramp & M-150 (Rochester Road)

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	42	10	69	117	103
Average Queue (ft)	2	0	7	41	23
95th Queue (ft)	20	7	37	99	73
Link Distance (ft)	42	42	42	42	42
Upstream Blk Time (%)	0	0	1	8	4
Queuing Penalty (veh)	2	0	4	49	23
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3121: EB M-59 On Ramp & M-150 (Rochester Road)

Movement	SB
Directions Served	R
Maximum Queue (ft)	23
Average Queue (ft)	1
95th Queue (ft)	13
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	50
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3208: M-150 (Rochester Road) & WB M-59 On Ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	20
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	703
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3221: M-150 (Rochester Road) & EB M-59 On Ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	L	T
Maximum Queue (ft)	296	210	114	154	303	126	108	330	393	163	195	438
Average Queue (ft)	139	101	39	79	146	41	43	182	228	21	108	267
95th Queue (ft)	243	182	83	153	254	87	91	293	354	85	181	404
Link Distance (ft)		759			1237			793	793			707
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		250	80		250	500			250	500	
Storage Blk Time (%)		0		12	36				5			0
Queuing Penalty (veh)		0		37	80				3			0

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	SB
Directions Served	TR
Maximum Queue (ft)	445
Average Queue (ft)	285
95th Queue (ft)	412
Link Distance (ft)	707
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9001: M-150 (Rochester Road) & Nawakwa Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	LTR	L	R	L	T	T	R	L	TR
Maximum Queue (ft)	30	374	160	68	25	17	8	36	11
Average Queue (ft)	20	228	24	21	2	1	0	7	1
95th Queue (ft)	42	456	109	54	12	7	4	26	9
Link Distance (ft)	18	380		29	29	29	29		295
Upstream Blk Time (%)	18	27		12	0	0	0		
Queuing Penalty (veh)	5	0		38	0	0	0		
Storage Bay Dist (ft)			85					100	
Storage Blk Time (%)		76							
Queuing Penalty (veh)		11							

Intersection: 9002: M-150 (Rochester Road) & Site Driveway

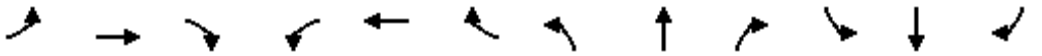
Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	L	R	LT	T	T	T	TR
Maximum Queue (ft)	136	149	32	78	3	30	23
Average Queue (ft)	43	59	8	4	0	2	2
95th Queue (ft)	106	111	29	41	2	15	13
Link Distance (ft)	164	164		42	29	29	29
Upstream Blk Time (%)	1	0	2	1		0	0
Queuing Penalty (veh)	0	0	0	4		1	0
Storage Bay Dist (ft)			100				
Storage Blk Time (%)			2	1			
Queuing Penalty (veh)			5	3			

Intersection: 9003: Site Driveway & Nawakwa Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	35	18	42
Average Queue (ft)	3	1	11
95th Queue (ft)	19	9	36
Link Distance (ft)	261	18	276
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 1030



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	424	130	212	238	116	122	1407	199	156	1215	150
Future Volume (veh/h)	261	424	130	212	238	116	122	1407	199	156	1215	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	281	456	140	244	274	133	134	1546	219	177	1381	170
Peak Hour Factor	0.93	0.93	0.93	0.87	0.87	0.87	0.91	0.91	0.91	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	248	684	305	221	630	281	154	1627	726	154	1627	726
Arrive On Green	0.13	0.18	0.18	0.12	0.17	0.17	0.16	0.86	0.86	0.08	0.43	0.43
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	281	456	140	244	274	133	134	1546	219	177	1381	170
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	18.4	15.8	10.4	16.4	9.1	10.0	9.7	43.8	3.4	11.4	46.0	9.0
Cycle Q Clear(g_c), s	18.4	15.8	10.4	16.4	9.1	10.0	9.7	43.8	3.4	11.4	46.0	9.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	248	684	305	221	630	281	154	1627	726	154	1627	726
V/C Ratio(X)	1.13	0.67	0.46	1.10	0.43	0.47	0.87	0.95	0.30	1.15	0.85	0.23
Avail Cap(c_a), veh/h	248	684	305	221	630	281	154	1627	726	154	1627	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.8	53.4	51.2	61.8	52.4	52.7	57.9	8.5	5.7	64.3	35.7	25.2
Incr Delay (d2), s/veh	97.1	5.1	4.9	90.5	2.2	5.6	38.0	13.3	1.1	118.6	5.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.3	7.8	4.7	13.3	4.5	4.6	5.8	6.8	1.2	10.4	21.2	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	157.9	58.4	56.1	152.3	54.5	58.3	95.9	21.8	6.8	182.9	41.4	25.9
LnGrp LOS	F	E	E	F	D	E	F	C	A	F	D	C
Approach Vol, veh/h		877			651			1899			1728	
Approach Delay, s/veh		89.9			92.0			25.3			54.4	
Approach LOS		F			F			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	67.0	25.0	30.0	18.0	67.0	23.0	32.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 11	* 60	* 18	* 23	* 11	* 60	* 16	* 25
Max Q Clear Time (g_c+I1), s	13.4	45.8	20.4	12.0	11.7	48.0	18.4	17.8
Green Ext Time (p_c), s	0.0	9.3	0.0	1.6	0.0	7.4	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	54.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	8	125	0	58	7	1626	120	35	1504	7
Future Volume (veh/h)	4	0	8	125	0	58	7	1626	120	35	1504	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	5	0	11	145	0	67	7	1712	126	38	1617	8
Peak Hour Factor	0.75	0.75	0.75	0.86	0.86	0.86	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	171	0	212	220	0	210	298	2968	1324	252	3029	15
Arrive On Green	0.12	0.00	0.12	0.12	0.00	0.12	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1355	0	1695	1415	0	1682	313	3770	1682	254	3847	19
Grp Volume(v), veh/h	5	0	11	145	0	67	7	1712	126	38	792	833
Grp Sat Flow(s),veh/h/ln	1355	0	1695	1415	0	1682	313	1885	1682	254	1885	1981
Q Serve(g_s), s	0.5	0.0	0.8	14.1	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.6	0.0	0.8	14.9	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	171	0	212	220	0	210	298	2968	1324	252	1484	1560
V/C Ratio(X)	0.03	0.00	0.05	0.66	0.00	0.32	0.02	0.58	0.10	0.15	0.53	0.53
Avail Cap(c_a), veh/h	283	0	351	336	0	348	298	2968	1324	252	1484	1560
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.4	0.0	54.0	60.5	0.0	55.8	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.1	3.3	0.0	0.9	0.1	0.8	0.1	1.3	1.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.4	5.3	0.0	2.2	0.0	0.3	0.1	0.1	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.4	0.0	54.1	63.9	0.0	56.7	0.1	0.8	0.1	1.3	1.4	1.3
LnGrp LOS	E	A	D	E	A	E	A	A	A	A	A	A
Approach Vol, veh/h		16			212			1845			1663	
Approach Delay, s/veh		55.4			61.6			0.8			1.3	
Approach LOS		E			E			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	116.5	23.5	116.5	23.5
Change Period (Y+Rc), s	* 6.3	6.0	* 6.3	6.0
Max Green Setting (Gmax), s	* 99	29.0	* 99	29.0
Max Q Clear Time (g_c+I1), s	2.0	7.6	2.0	16.9
Green Ext Time (p_c), s	23.1	0.0	19.6	0.6

Intersection Summary	
HCM 6th Ctrl Delay	4.7
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	115.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	0	30	17	0	26	49	1874	61	12	1662	24
Future Vol, veh/h	6	0	30	17	0	26	49	1874	61	12	1662	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	85	-	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	77	77	77	95	95	95	93	93	93
Heavy Vehicles, %	0	0	0	2	2	2	1	1	1	1	1	1
Mvmt Flow	9	0	43	22	0	34	52	1973	64	13	1787	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2917	3967	907	2997	-	987	1813	0	0	2037	0	0
Stage 1	1826	1826	-	2077	-	-	-	-	-	-	-	-
Stage 2	1091	2141	-	920	-	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.54	-	6.94	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.52	-	3.32	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	*~ 3	*0	*399	*~ 1	0	*308	*596	-	-	*464	-	-
Stage 1	*376	*329	-	*291	0	-	-	-	-	-	-	-
Stage 2	*292	*256	-	*374	0	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1		1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*~ 2	*0	*399	*~ 1	-	*308	*596	-	-	*464	-	-
Mov Cap-2 Maneuver	*~ 2	*0	-	*~ 1	-	-	-	-	-	-	-	-
Stage 1	*343	*320	-	*265	-	-	-	-	-	-	-	-
Stage 2	*238	*234	-	*324	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	2132.7	$ 6328.7	0.3	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 596	-	-	12	1	308	* 464	-	-
HCM Lane V/C Ratio	0.087	-	-	4.348	22.078	0.11	0.028	-	-
HCM Control Delay (s)	11.6	-	-	$ 2132	$ 6715	980.2	18.1	13	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	-	7.6	4.5	0.4	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	393	433	1546	0	0	1332
Future Volume (veh/h)	393	433	1546	0	0	1332
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	2000	2000	1984	0	0	1984
Adj Flow Rate, veh/h	418	461	1627	0	0	1402
Peak Hour Factor	0.94	0.94	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	1	0	0	1
Cap, veh/h	688	555	2740	0	0	2740
Arrive On Green	0.19	0.19	0.73	0.00	0.00	1.00
Sat Flow, veh/h	3695	2983	3969	0	0	3969
Grp Volume(v), veh/h	418	461	1627	0	0	1402
Grp Sat Flow(s),veh/h/ln	1848	1492	1885	0	0	1885
Q Serve(g_s), s	14.5	20.8	29.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.5	20.8	29.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00		0.00	0.00	
Lane Grp Cap(c), veh/h	688	555	2740	0	0	2740
V/C Ratio(X)	0.61	0.83	0.59	0.00	0.00	0.51
Avail Cap(c_a), veh/h	1003	810	2740	0	0	2740
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	52.3	54.8	9.2	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.9	4.8	1.0	0.0	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	8.3	10.1	0.0	0.0	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	53.1	59.7	10.2	0.0	0.0	0.7
LnGrp LOS	D	E	B	A	A	A
Approach Vol, veh/h	879		1627			1402
Approach Delay, s/veh	56.6		10.2			0.7
Approach LOS	E		B			A

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	107.9			107.9	32.1
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 90			* 90	38.0
Max Q Clear Time (g_c+I1), s	31.0			2.0	22.8
Green Ext Time (p_c), s	17.8			13.9	3.2

Intersection Summary	
HCM 6th Ctrl Delay	17.2
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBT] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	449	446	0	1385	1313	0
Future Volume (veh/h)	449	446	0	1385	1313	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1786	1786	0	1800	1786	0
Adj Flow Rate, veh/h	667	339	0	1473	1459	0
Peak Hour Factor	0.88	0.88	0.94	0.94	0.90	0.90
Percent Heavy Veh, %	1	1	0	0	1	0
Cap, veh/h	839	373	0	2278	2261	0
Arrive On Green	0.25	0.25	0.00	1.00	0.67	0.00
Sat Flow, veh/h	3402	1514	0	3600	3572	0
Grp Volume(v), veh/h	667	339	0	1473	1459	0
Grp Sat Flow(s),veh/h/ln	1701	1514	0	1710	1697	0
Q Serve(g_s), s	25.7	30.4	0.0	0.0	35.2	0.0
Cycle Q Clear(g_c), s	25.7	30.4	0.0	0.0	35.2	0.0
Prop In Lane	1.00	1.00	0.00			0.00
Lane Grp Cap(c), veh/h	839	373	0	2278	2261	0
V/C Ratio(X)	0.79	0.91	0.00	0.65	0.65	0.00
Avail Cap(c_a), veh/h	923	411	0	2278	2261	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.4	51.2	0.0	0.0	13.7	0.0
Incr Delay (d2), s/veh	4.5	22.4	0.0	1.4	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.6	14.0	0.0	0.5	12.2	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	53.9	73.6	0.0	1.4	15.1	0.0
LnGrp LOS	D	E	A	A	B	A
Approach Vol, veh/h	1006			1473	1459	
Approach Delay, s/veh	60.5			1.4	15.1	
Approach LOS	E			A	B	

Timer - Assigned Phs	2			6	8
Phs Duration (G+Y+Rc), s	99.5			99.5	40.5
Change Period (Y+Rc), s	* 6.2			* 6.2	6.0
Max Green Setting (Gmax), s	* 90			* 90	38.0
Max Q Clear Time (g_c+I1), s	2.0			37.2	32.4
Green Ext Time (p_c), s	15.3			14.2	2.1

Intersection Summary		
HCM 6th Ctrl Delay	21.6	
HCM 6th LOS	C	

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	288	97	106	155	153	73	1401	129	171	1342	159
Future Volume (veh/h)	262	288	97	106	155	153	73	1401	129	171	1342	159
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	2000	2000	2000	1984	1984	1984
Adj Flow Rate, veh/h	288	316	107	123	180	178	79	1523	140	192	1508	179
Peak Hour Factor	0.91	0.91	0.91	0.86	0.86	0.86	0.92	0.92	0.92	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	0	0	0	0	0	0	1	1	1
Cap, veh/h	293	396	336	148	244	207	101	1699	758	189	1679	197
Arrive On Green	0.16	0.20	0.20	0.08	0.12	0.12	0.05	0.45	0.45	0.20	0.99	0.99
Sat Flow, veh/h	1890	1984	1682	1905	2000	1695	1905	3800	1695	1890	3399	399
Grp Volume(v), veh/h	288	316	107	123	180	178	79	1523	140	192	829	858
Grp Sat Flow(s),veh/h/ln	1890	1984	1682	1905	2000	1695	1905	1900	1695	1890	1885	1913
Q Serve(g_s), s	21.3	21.2	7.6	8.9	12.2	14.4	5.7	51.8	7.0	14.0	6.2	7.4
Cycle Q Clear(g_c), s	21.3	21.2	7.6	8.9	12.2	14.4	5.7	51.8	7.0	14.0	6.2	7.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	293	396	336	148	244	207	101	1699	758	189	931	945
V/C Ratio(X)	0.98	0.80	0.32	0.83	0.74	0.86	0.78	0.90	0.18	1.02	0.89	0.91
Avail Cap(c_a), veh/h	293	435	369	173	310	263	190	1699	758	189	931	945
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.0	53.3	47.9	63.7	59.3	60.3	65.5	35.7	23.3	56.0	0.5	0.5
Incr Delay (d2), s/veh	47.8	9.3	0.5	24.9	6.7	20.0	12.2	7.9	0.5	69.7	12.5	14.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.8	11.4	3.2	5.3	6.5	7.2	3.1	24.7	2.9	9.4	3.6	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	106.8	62.6	48.4	88.5	65.9	80.2	77.6	43.6	23.9	125.7	13.0	14.5
LnGrp LOS	F	E	D	F	E	F	E	D	C	F	B	B
Approach Vol, veh/h		711			481			1742			1879	
Approach Delay, s/veh		78.4			77.0			43.5			25.2	
Approach LOS		E			E			D			C	

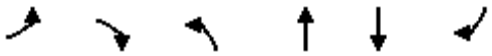
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.0	68.6	17.2	34.2	13.4	75.1	28.0	23.4
Change Period (Y+Rc), s	* 6	* 6	6.3	6.3	* 6	* 6	6.3	6.3
Max Green Setting (Gmax), s	* 14	* 58	12.7	30.7	* 14	* 58	21.7	21.7
Max Q Clear Time (g_c+I1), s	16.3	53.8	10.9	23.2	7.7	9.4	23.3	16.4
Green Ext Time (p_c), s	0.0	3.3	0.0	1.2	0.1	16.9	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	44.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	106	5	1974	1615	94
Future Volume (Veh/h)	10	106	5	1974	1615	94
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.95	0.95	0.93	0.93
Hourly flow rate (vph)	11	115	5	2078	1737	101
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				286	1005	
pX, platoon unblocked	0.87	0.87	0.87			
vC, conflicting volume	2317	630	1838			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1996	60	1446			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	76	87	99			
cM capacity (veh/h)	45	866	409			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	11	115	302	594	594	594	695	695	448
Volume Left	11	0	5	0	0	0	0	0	0
Volume Right	0	115	0	0	0	0	0	0	101
cSH	45	866	409	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.24	0.13	0.01	0.35	0.35	0.35	0.41	0.41	0.26
Queue Length 95th (ft)	20	11	1	0	0	0	0	0	0
Control Delay (s)	108.6	9.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	A	A						
Approach Delay (s)	18.4		0.1				0.0		
Approach LOS	C								

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	44.5%	ICU Level of Service		A
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	25	0	24	49	0	11
Future Vol, veh/h	25	0	24	49	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	92	92	92	92
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	36	0	26	53	0	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	36	0	141	36
Stage 1	-	-	-	-	36	-
Stage 2	-	-	-	-	105	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1575	-	852	1037
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	919	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1575	-	838	1037
Mov Cap-2 Maneuver	-	-	-	-	838	-
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	903	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1037	-	-	1575	-
HCM Lane V/C Ratio	0.012	-	-	0.017	-
HCM Control Delay (s)	8.5	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	527	581	424	180	399	326	327	200	316	440	435	245
Average Queue (ft)	422	332	229	97	275	168	110	85	130	308	337	165
95th Queue (ft)	652	723	534	180	502	469	344	154	290	442	469	312
Link Distance (ft)		671	671			667	667			363	363	
Upstream Blk Time (%)		16	0			6	0		0	5	11	
Queuing Penalty (veh)		0	0			0	0		0	44	94	
Storage Bay Dist (ft)	500			130	500			150	500			170
Storage Blk Time (%)	28	0	16	4	10	0	2	1	0	5	37	1
Queuing Penalty (veh)	60	0	21	9	12	0	3	1	0	6	75	9

Intersection: 1001: M-150 (Rochester Road) (PB) & Auburn Road (PB)

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	311	578	628	345
Average Queue (ft)	207	317	344	108
95th Queue (ft)	445	557	574	288
Link Distance (ft)		721	721	
Upstream Blk Time (%)		4	1	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)	500			270
Storage Blk Time (%)	8	0	14	
Queuing Penalty (veh)	53	1	22	

Intersection: 2019: M-150 (Rochester Road) & Alex's Driveway/Meijer/Lowes Driveway (PB)

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	34	35	204	85	42	142	148	40	75	108	124
Average Queue (ft)	4	6	100	31	6	60	69	12	25	41	65
95th Queue (ft)	21	26	175	64	25	122	134	35	58	86	113
Link Distance (ft)	202	202	347	347		466	466			378	378
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					250			190	250		
Storage Blk Time (%)							0				
Queuing Penalty (veh)							0				

Intersection: 3008: M-150 (Rochester Road) & WB M-59 Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	276	333	379	309	244	240	186	184
Average Queue (ft)	145	207	211	176	160	189	137	167
95th Queue (ft)	266	323	347	284	239	259	212	212
Link Distance (ft)			629		150	150	42	42
Upstream Blk Time (%)					7	12	24	27
Queuing Penalty (veh)					55	92	161	183
Storage Bay Dist (ft)	200	200		200				
Storage Blk Time (%)	0	12	15	7				
Queuing Penalty (veh)	2	51	96	42				

Intersection: 3021: M-150 (Rochester Road) & EB M-59 Off Ramp

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	L	LR	R	T	T	T	T
Maximum Queue (ft)	319	409	516	223	253	288	278
Average Queue (ft)	216	298	288	135	166	193	196
95th Queue (ft)	325	403	456	215	251	287	284
Link Distance (ft)			501	112	112	175	175
Upstream Blk Time (%)			2	14	20	10	12
Queuing Penalty (veh)			0	101	137	67	77
Storage Bay Dist (ft)	230	230					
Storage Blk Time (%)	1	25	23				
Queuing Penalty (veh)	3	57	162				

Intersection: 3108: WB M-59 On Ramp & M-150 (Rochester Road)

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	3	8	122	127	91
Average Queue (ft)	0	0	26	58	24
95th Queue (ft)	2	6	91	126	70
Link Distance (ft)	42	42	42	42	42
Upstream Blk Time (%)		0	5	10	3
Queuing Penalty (veh)		0	27	58	17
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3121: EB M-59 On Ramp & M-150 (Rochester Road)

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	28	32	42
Average Queue (ft)	5	6	5
95th Queue (ft)	40	46	24
Link Distance (ft)	703	703	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)		1	0
Queuing Penalty (veh)		5	0

Intersection: 3208: M-150 (Rochester Road) & WB M-59 On Ramp

Movement	NB	NB	SB
Directions Served	T	T	T
Maximum Queue (ft)	51	82	10
Average Queue (ft)	4	9	0
95th Queue (ft)	26	45	7
Link Distance (ft)	703	703	150
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)		1	
Queuing Penalty (veh)		3	

Intersection: 3221: M-150 (Rochester Road) & EB M-59 On Ramp

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (ft)	6	20	79	89
Average Queue (ft)	0	1	17	16
95th Queue (ft)	4	8	103	96
Link Distance (ft)	241	241	112	112
Upstream Blk Time (%)			2	2
Queuing Penalty (veh)			17	19
Storage Bay Dist (ft)				
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	T	R	L	T
Maximum Queue (ft)	381	368	242	154	252	130	573	786	795	325	574	724
Average Queue (ft)	236	210	47	91	122	59	123	483	530	156	248	452
95th Queue (ft)	365	319	127	156	227	113	395	811	835	397	538	800
Link Distance (ft)		759			1237			793	793			707
Upstream Blk Time (%)								3	10			9
Queuing Penalty (veh)								0	0			80
Storage Bay Dist (ft)	500		250	80		250	500			250	500	
Storage Blk Time (%)		6		26	28		0	10	37		4	12
Queuing Penalty (veh)		22		81	74		0	8	48		29	21

Intersection: 4587: M-150 (Rochester Road) (PB) & South Blvd (PB)

Movement	SB
Directions Served	TR
Maximum Queue (ft)	730
Average Queue (ft)	463
95th Queue (ft)	796
Link Distance (ft)	707
Upstream Blk Time (%)	9
Queuing Penalty (veh)	80
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9001: M-150 (Rochester Road) & Nawakwa Rd

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	LTR	L	R	L	T	T	R	L	TR
Maximum Queue (ft)	34	331	160	100	23	6	4	52	8
Average Queue (ft)	20	196	36	33	1	0	0	11	0
95th Queue (ft)	36	419	133	81	12	3	3	37	5
Link Distance (ft)	18	380		29	29	29	29		295
Upstream Blk Time (%)	63	24		20	0	0	0		
Queuing Penalty (veh)	23	0		103	0	0	0		
Storage Bay Dist (ft)			85					100	
Storage Blk Time (%)		76	0						
Queuing Penalty (veh)		20	0						

Intersection: 9002: M-150 (Rochester Road) & Site Driveway

Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	L	R	LT	T	T	T	TR
Maximum Queue (ft)	47	121	33	10	42	72	37
Average Queue (ft)	11	49	6	0	2	7	3
95th Queue (ft)	37	92	25	7	17	39	21
Link Distance (ft)	164	164		42	29	29	29
Upstream Blk Time (%)		0	1	0	0	1	0
Queuing Penalty (veh)		0	0	0	2	7	2
Storage Bay Dist (ft)			100				
Storage Blk Time (%)			1	0			
Queuing Penalty (veh)			3	0			

Intersection: 9003: Site Driveway & Nawakwa Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	153	12	136
Average Queue (ft)	71	0	61
95th Queue (ft)	212	6	162
Link Distance (ft)	261	18	276
Upstream Blk Time (%)	11	0	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 2445