ROWE PROFESSIONAL SERVICES COMPANY

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Memorandum

To: Mr. Michael Thompson

From: Michael J. Labadie, PE and Jill M. Bauer, PE, PTOE

Date: September 29, 2021

RE: Traffic Impact Study for Proposed Development Bebb Oak in Rochester Hills, Michigan

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ROWE Professional Services Company has completed a Traffic Impact Study (TIS) related to the mixed-use development located at 2800 South Rochester Road (M-150) in the City of Rochester Hills, MI. The current site plan (included in the materials attached to this report) shows 94 units of multifamily housing, 10,245 square-feet of retail, and 3,503 square-feet of fast-food restaurant with a drive-through with an anticipated opening date in 2022. This TIS was prepared to determine if any improvements would be necessary to mitigate traffic impacts to the adjacent road network. This report has been completed in accordance with the requirements specified by the Michigan Department of Transportation (MDOT), the Road Commission for Oakland County (RCOC), and the City of Rochester Hills.

TRAFFIC IMPACT STUDY

Traffic Counts

Turning movement counts (TMCs) were collected during the weekday AM (7 a.m. to 9 a.m.) and PM (4 p.m. to 6 p.m.) peak periods on June 10, 2021, and the Saturday peak period (11 a.m. to 1 p.m.) on June 12, 2021, at the intersections of:

- Rochester Road (M-150) & Barclay Circle/Wabash Road
- Rochester Road (M-150) & Auburn Road
- Rochester Road (M-150) & North Site Driveway
- Rochester Road (M-150) & South Site Driveway

Due to the impact of COVID-19, current traffic volume data is not representative of typical operations. Historical traffic data from the Southeast Michigan Council of Governments (SEMCOG) Transportation Data Management System (TDMS) website was compared to the TMCs completed in 2021 and an adjustment factor was determined for the AM and PM peak hour. This factor was used to adjust the completed TMCs to “Pre-COVID-19” levels. For the AM peak hour, a 40 percent adjustment factor was used. For the PM peak hour and Saturday peak hour, no adjustment factor was necessary.

All study intersections are shown in Figure 1 attached to this memorandum. All traffic counts used in this study are attached to this memorandum. The existing adjusted peak hour traffic volumes are shown in Figure 2 attached to this memorandum.

Background Traffic Scenario

Historical traffic data from the Southeast Michigan Council of Governments (SEMCOG) was referenced to determine the applicable growth rate for the existing traffic volumes for the project build-out year in 2022. Based on this review, a background growth rate of two (2) percent was utilized.

In addition, one background development was identified and included in the background traffic condition. Using the information and methodologies specified in the latest version of Trip Generation (Trip Generation Manual, 10th Edition, 2017) and data provided by the developer, ROWE forecast the weekday AM, PM, and Saturday peak hour trips. The results of the trip generation forecasts for the background developments are provided below in Table 1.

Table 1
Trip Generation for Background Developments

Land Use	Land Use Code	Units	AM Peak Hour			PM Peak Hour			Sat. Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
Chick-fil-A	-	4,978 SF	51	54	105	142	136	278	178	159	337
Shopping Center	820	5,000 SF	3	2	5	28	31	59	30	28	58
Total	**-**	**-**	**54**	**56**	**110**	**170**	**167**	**337**	**208**	**187**	**395**

These trips were distributed using the trip distribution developed from existing traffic volumes. The background traffic volumes are shown in Figure 3 attached to this memorandum.

Trip Generation

Using the information and methodologies specified in the latest version of Trip Generation (Trip Generation Manual, 10th Edition, 2017), ROWE forecast the weekday AM, PM, and Saturday peak hour trips associated with the proposed development. The results of the trip generation forecasts are provided below in Table 2.

Table 2
Trip Generation for Proposed Development

Land Use	Land Use Code	Units	AM Peak Hour			PM Peak Hour			Sat. Peak Hour			Week Day
			In	Out	Total	In	Out	Total	In	Out	Total	
Multifamily Housing (Mid-Rise)	221	94 DU	9	25	34	25	16	41	22	24	46	511
Retail – Shopping Center	820	10,245 SF	6	4	10	48	53	101	53	49	102	1277
Fast-Food with Drive Through Window	934	3,503 SF	72	69	141	59	55	114	98	94	192	1650
Total	**-**	**-**	**87**	**98**	**185**	**132**	**124**	**256**	**173**	**167**	**340**	**3,438**
Internal Capture Reductions: 6% AM (7% In, 6% Out) 48% PM (47% In, 50% Out) 48% Saturday (47% In, 50% Out)			6	5	11	62	62	124	81	84	165	-
Total External Trips			**81**	**93**	**174**	**70**	**62**	**132**	**92**	**83**	**175**	**3,438**
Pass-By Rates, LUC 820: 34% PM, 26% Saturday			0	0	0	16	18	34	14	13	27	-
Pass-By Rates, LUC 934: 49% AM, 50% PM, 50% Saturday			35	34	69	30	28	58	49	47	96	-
Total New Trips			**46**	**59**	**105**	**24**	**16**	**40**	**29**	**23**	**52**	**3,438**

In multi-use developments, not all the trips generated are from sources outside the boundaries of the development but are rather trips that are "internally captured" within the site. The methodology presented in the Trip Generation Handbook (Trip Generation Handbook, 3rd Edition, 2017) was followed to determine an appropriate internal capture rate for the proposed development. Internal capture rates for the Saturday peak hour were calculated using the PM peak hour formulas. The results of this analysis suggest a 6 percent (7 percent in, 6 percent out) AM peak hour, a 48 percent (47 percent in, 50 percent out) PM peak hour, and a 48 percent (47 percent in, 50 percent out) Saturday peak hour internal capture rate for the combination of land uses. With the inclusion of the internal capture reductions, the proposed development will generate 174 external trips during the AM peak hour (81 inbound and 93 outbound), 132 external trips during the PM peak hour (70 inbound and 62 outbound), and 175 external trips during the Saturday peak hour (92 inbound and 83 outbound).

Typically, when using the Shopping Center land use, these areas are not included in the internal capture calculations. However, on this site the Shopping Center land use is being used for an unknown retail in addition to the other specific uses. This is acceptable per the ITE Trip Generation Handbook, which states:
"*A **shopping center** could also be considered a mixed-use development because it typically includes uses other than general retail such as restaurants, banks, and office. However, because data have been collected directly for them as a-stand-alone developments, shopping centers are considered in Trip Generation Manual as a single land use. The associated trip generation data presented in the Manual already reflect the effects of internal capture and the mixed-use nature of the center. **Accordingly, internal capture rates are not applicable and should not be used to estimate trips for shopping centers if using statistics and data for Land Use Code 820.** However, if the shopping center is part of a larger mixed-use development or if it is planned to have outparcel development of a significantly different land use type, such as residential, the site could be considered a mixed-use development for the purpose of estimating site trip generation." (Section 6.3 Mixed-Use Development Classified as a Single Use, pg. 44-45)"*

The latter part of the statement quoted above mentions developments of significantly different land use types. This proposed development has significantly different land use types other than the shopping center like the multifamily housing, which justifies the inclusion of the shopping center area in the internal capture calculations.

Not all the traffic generated by the proposed development will be new traffic added onto the adjacent roadway network. As with most new commercial development, a significant amount of the site-generated traffic is considered "pass-by" traffic. Pass-by trips are trips already present on the adjacent roadway network, which are interrupted to visit the site. Pass-by trips are accounted for by reducing the number of forecast new trips to be added to the roadway network; however, actual driveway volumes are not reduced. Pass-by trips are normally expressed as a percentage of trips generated by the new development. These pass-by rates are published in the Trip Generation Handbook.

The Trip Generation Handbook suggests a 49 percent AM, 50 percent PM, and a 50 percent Saturday pass-by rate for the LUC 934 and a 34 percent PM and 26 percent Saturday pass-by rate for the LUC 820. Since no pass-by data has been published for LUC 934 for the Saturday peak hour, the PM pass-by trip for this LUC was used during the Saturday peak hour.

With the application of the pass-by trip factors, the site-generated trips can be classified as "pass-by" and "new" trips. The proposed development is expected to generate 174 total trips during the AM peak hour, 132 total trips during the PM peak hour, and 175 total trips during Saturday peak hour. However, only 105 of the AM peak hour trips, 40 of the PM peak hour trips, and 52 of the Saturday peak hour trips will be new traffic not currently using the adjacent street network, whose primary purpose is to visit the new development.

Pursuant to the request of MDOT, the City of Rochester Hills, and their consultants, a second trip generation table and subsequent LOS analyses were generated with the exclusion of internal capture trips and a hybrid trip generation method for the restaurant with drive-through use. The results of these analyses can be found attached to this memorandum.

Trip Distribution

The existing traffic volumes were used to develop a trip distribution model for the AM, PM, and Saturday peak hours for the new traffic that will be generated by the proposed development. Traffic volumes were calculated on each external node of the network. These numbers were converted into percentages for each peak hour. Table 3 provides the probable distribution based on the existing traffic patterns.

Table 3
Trip Distribution

Direction	Via	AM Peak Hour		PM Peak Hour		Sat. Peak Hour	
		To	From	To	From	To	From
North	Rochester Road (M-150)	24%	38%	32%	30%	32%	34%
South	Rochester Road (M-150)	42%	29%	32%	32%	33%	30%
East	Wabash Road/Barclay Circle	8%	6%	7%	9%	7%	7%
	Auburn Road	12%	13%	15%	12%	14%	13%
West	Wabash Road/Barclay Circle	1%	2%	2%	2%	2%	2%
	Auburn Road	13%	12%	12%	15%	13%	14%
Total		**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

The trip distribution for the site is shown in Figure 4 attached to this memorandum. The background traffic volumes were combined with the site generated traffic volumes to obtain the total future traffic volumes, which are shown in Figure 5 attached to this memorandum.

Level of Service Analysis

Level of service (LOS) analyses for existing, background, and total future (build) conditions for the AM, PM and Saturday peak hours were performed for the intersections of:

- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - Signalized Intersection
- Rochester Road (M-150) & Auburn Road
  - Signalized Intersection
- Rochester Road (M-150) & North Site Driveway
  - Unsignalized Intersection
  - Existing driveway approximately 1,250 feet north of Auburn Road
  - Driveway will operate as right-in/right-out
- Rochester Road (M-150) & South Site Driveway
  - Unsignalized Intersection
  - Existing driveway approximately 1,050 feet north of Auburn Road
  - Driveway approach will consist of one left turn only lane and one right turn only lane

According to the most recent (6th) edition of the Highway Capacity Manual (HCM), LOS is a qualitative measure describing operational conditions of a traffic stream or intersection. LOS ranges from A to F, with LOS A being the best and LOS D generally being considered acceptable. Table 4 presents the criteria for defining the various LOS for signalized and unsignalized intersections.

Table 4
LOS Criteria

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

Note: LOS D is considered acceptable in urban/suburban areas.

The results of the LOS analyses for the intersection listed above are summarized in Table 5 through Table 7. Full LOS output reports are attached to this memorandum.

Existing Conditions

The results of the LOS analysis for existing conditions reveals that several movements and approaches of the studied intersections operate at LOS D or better during the AM and PM peak hours, with the following exceptions:

- Rochester Road (M-150) & Auburn Road
  - LOS E
    - AM Peak Hour Movements: EBT, WBT, WBR
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBT, EBR, WBT, WBR, SBT
    - PM Peak Hour Approaches: EB, WB, SB
    - Saturday Peak Hour Movements: EBL, EBT, WBL, WBR, NBL, SBL
    - Saturday Peak Hour Approaches: EB, WB
  - LOS F
    - AM Peak Hour Movements: EBL, EBR, WBL, NBL, SBL
    - PM Peak Hour Movements: EBL, WBL, NBL, SBL
- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - LOS E
    - AM Peak Hour Movements: EBL, EBT/R, WBL, WBL/T, WBR, NBL, SBL
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBL, EBT/R, WBL, SBL
    - PM Peak Hour Approaches: EB, WB
    - Saturday Peak Hour Movements: NBL, NBR
  - LOS F
    - PM Peak Hour Movements: NBL

The operational results for existing conditions are presented in Table 5.

Table 5
LOS Analysis for Existing Conditions

Intersection	Control Type	Approach	AM Peak	PM Peak	Sat. Peak
Rochester Road (M-150) & Auburn Road	Signalized	Eastbound	E 75.8	E 71.3	E 58.7
		Westbound	E 72.7	E 70.1	E 57.6
		Northbound	C 27.0	B 17.8	D 42.3
		Southbound	C 21.4	E 69.1	C 22.6
		Overall	**D 37.0**	**D 52.0**	**D 39.8**
Rochester Road (M-150) & Wabash Road/Barclay Circle	Signalized	Eastbound	E 75.9	E 64.2	D 47.0
		Westbound	E 63.2	E 63.2	D 45.2
		Northbound	B 14.5	B 14.9	C 29.8
		Southbound	C 22.5	C 27.9	C 25.2
		Overall	**C 25.5**	**C 29.1**	**C 30.1**
Rochester Road (M-150) & North Site Driveway	Stop	Eastbound	A 0.0	C 22.0	D 30.1
	Free	Northbound	A 0.0	A 0.0	A 0.1
		Southbound	A 0.0	A 0.0	A 0.0
	TWSC	**Overall**	**A 0.0**	**A 0.2**	**A 0.5**
Rochester Road (M-150) & South Site Driveway	Stop	Eastbound	A 0.0	C 21.4	C 19.9
	Free	Northbound	A 0.0	A 0.0	A 0.1
		Southbound	A 0.0	A 0.0	A 0.0
	TWSC	**Overall**	**A 0.0**	**A 0.1**	**A 0.2**

XX.X Average seconds of delay per vehicle

Background Conditions

The results of the LOS analysis for background conditions reveals that several movements and approaches of the studied intersections would continue to operate at LOS D or better during the AM and PM peak hours, with the following exceptions:

- Rochester Road (M-150) & Auburn Road
  - LOS E
    - AM Peak Hour Movements: EBT, WBT, WBR
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBT, EBR, WBT, WBR, SBT
    - PM Peak Hour Approaches: EB, WB, SB
    - PM Peak Hour Overall Intersection
    - Saturday Peak Hour Movements: EBL, EBT, EBR, WBR, NBL, SBL
    - Saturday Peak Hour Approaches: EB, WB
  - LOS F
    - AM Peak Hour Movements: EBL, EBR, WBL, NBL, SBL
    - PM Peak Hour Movements: EBL, WBL, NBL, SBL
    - Saturday Peak Hour Movements: WBL
- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - LOS E
    - AM Peak Hour Movements: EBL, WBL, WBL/T, WBR, SBL
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBL, EBT/R, WBL, SBL
    - PM Peak Hour Approaches: EB, WB
    - Saturday Peak Hour Movements: NBL, NBR

- LOS F
  - AM Peak Hour Movements: EBT/R
  - PM Peak Hour Movements: NBL
  -

The operational results for background conditions are presented in Table 6.

Table 6
LOS Analysis for Background Conditions

Intersection	Control Type	Approach	AM Peak	PM Peak	Sat. Peak
Rochester Road (M-150) & Auburn Road	Signalized	Eastbound	E 76.5	E 72.0	E 61.2
		Westbound	E 72.3[1]	E 76.6	E 63.5
		Northbound	C 29.8	C 21.9	D 52.0
		Southbound	C 33.2	E 71.4	C 32.6
		Overall	**D 42.6**	**E 55.1**	**D 48.1**
Rochester Road (M-150) & Wabash Road/Barclay Circle	Signalized	Eastbound	E 77.6	E 64.6	D 47.2
		Westbound	E 63.2	E 63.5	D 45.5
		Northbound	B 15.1	B 15.3	C 29.6[1]
		Southbound	C 23.1	C 28.7	C 25.7
		Overall	**C 26.1**	**C 29.6**	**C 30.4**
Rochester Road (M-150) & North Site Driveway	Stop	Eastbound	A 0.0	C 23.2	D 31.0
	Free	Northbound	A 0.0	A 0.0	A 0.1
		Southbound	A 0.0	A 0.0	A 0.0
	TWSC	**Overall**	**A 0.0**	**A 0.2**	**A 0.5**
Rochester Road (M-150) & South Site Driveway	Stop	Eastbound	A 0.0	C 22.4	C 20.3
	Free	Northbound	A 0.0	A 0.0	A 0.1
		Southbound	A 0.0	A 0.0	A 0.0
	TWSC	**Overall**	**A 0.0**	**A 0.1**	**A 0.2**

XX.X Average seconds of delay per vehicle
[1]Delay decreases due to actuated signal

Future Conditions

The results of the LOS analysis for future conditions reveals that several movements and approaches of the studied intersections would continue to operate at LOS D or better during the AM and PM peak hours, with the following exceptions:

- Rochester Road (M-150) & Auburn Road
  - LOS E
    - AM Peak Hour Movements: EBT, WBT, WBR
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBT, EBR, WBT, WBR, SBT
    - PM Peak Hour Approaches: EB, WB, SB
    - PM Peak Hour Overall Intersection
    - Saturday Peak Hour Movements: EBL, EBT, EBR, WBR, NBL, SBL
    - Saturday Peak Hour Approaches: EB, WB
  - LOS F
    - AM Peak Hour Movements: EBL, EBR, WBL, NBL, SBL
    - PM Peak Hour Movements: EBL, WBL, NBL, SBL
    - Saturday Peak Hour Movements: WBL, NBT

- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - LOS E
    - AM Peak Hour Movements: EBL, WBL, WBL/T, WBR, NBL, SBL
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBL, EBT/R, WBL, WBT/R, WBR, SBL
    - PM Peak Hour Approaches: EB, WB
    - Saturday Peak Hour Movements: NBL
  - LOS F
    - AM Peak Hour Movements: EBT/R
    - PM Peak Hour Movements: NBL
- Rochester Road (M-150) & South Site Driveway
  - LOS E
    - PM Peak Hour Approaches: EB
  - LOS F
    - AM Peak Hour Movements: EBL
    - AM Peak Hour Approaches: EB
    - PM Peak Hour Movements: EBL
    - Saturday Peak Hour Movements: EBL
    - Saturday Peak Hour Approaches: EB

95th percentile queue lengths were reviewed at the site driveways. Queue lengths for left turning vehicles entering at the south site driveway do not exceed 77 feet (3 vehicles) in the AM peak hour, 63 feet (3 vehicles) in the PM peak hour, and 50 feet (2 vehicles) in the Saturday peak hour. Queue lengths for vehicles exiting via either site driveway will not exceed 98 feet (4 vehicles) in the AM peak hour, 75 feet (3 vehicles) in the PM peak hour, and 339 feet (14 vehicles) in the Saturday peak hour.

The following observations were made, and improvements were recommended, if applicable, at the following intersections due to future traffic conditions:

- Rochester Road (M-150) & Auburn Road
  - Southbound Rochester Road (M-150) operates at poor LOS due to the lack of progression caused by the split signal phasing at Rochester Road (M-150) & Wabash Road/Barclay Circle. It is understood that improvements are planned for this intersection which will result in the removal of this split phasing, cycle length optimization, and coordination with the Rochester Road (M-150) corridor and will improve intersection operations.
- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - This signal currently operates with split signal phasing for Wabash Road and Barclay Circle. It is understood that improvements are planned for this intersection which will result in the removal of this split phasing, cycle length optimization, and coordination with the Rochester Road (M-150) corridor and will improve intersection operations.

The operational results for future conditions are presented in Table 7.

Table 7
LOS Analysis for Future Conditions

Intersection	Control Type	Approach	AM Peak	PM Peak	Sat. Peak
Rochester Road (M-150) & Auburn Road	Signalized	Eastbound	E 76.9	E 72.2	E 61.1[1]
		Westbound	E 73.1	E 76.7	E 64.8
		Northbound	C 29.8	C 22.1	D 54.6
		Southbound	C 34.7	E 72.7	C 33.7
		Overall	**D 43.3**	**E 55.7**	**D 49.5**
Rochester Road (M-150) & Wabash Road/Barclay Circle	Signalized	Eastbound	E 79.5	E 64.6	D 47.2
		Westbound	E 63.3	E 63.4[1]	D 45.7
		Northbound	B 15.6	B 15.7	C 29.7
		Southbound	C 23.4	C 28.8	C 25.9
		Overall	**C 26.5**	**C 29.8**	**C 30.5**
Rochester Road (M-150) & North Site Driveway	Stop	Eastbound	C 21.2	C 17.3	C 19.3
	Free	Northbound	A 0.0	A 0.0	A 0.0
		Southbound	A 0.0	A 0.0	A 0.0
	TWSC	**Overall**	**A 0.2**	**A 0.1**	**A 0.2**
Rochester Road (M-150) & South Site Driveway	Stop	Eastbound	F 70.1	E 49.6	F 66.8
	Free	Northbound	A 0.7	A 0.4	A 0.5
		Southbound	A 0.0	A 0.0	A 0.0
	TWSC	**Overall**	**A 1.7**	**A 0.9**	**A 1.9**

XX.X Average seconds of delay per vehicle
[1]Delay decreases due to actuated signal

Future Conditions – With Improvements

The results of the LOS analysis for future conditions with the improvements listed previously reveals that several movements and approaches of the improved intersection would continue to operate at LOS D or better during the AM and PM peak hours, with the following exceptions:

- Rochester Road (M-150) & Auburn Road
  - LOS E
    - AM Peak Hour Movements: EBT, WBT, WBR
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBT, EBR, WBT, WBR
    - PM Peak Hour Approaches: EB, WB
    - Saturday Peak Hour Movements: EBL, EBT, EBR, WBR, NBL, SBL
    - Saturday Peak Hour Approaches: EB, WB
  - LOS F
    - AM Peak Hour Movements: EBL, EBR, WBL, NBL, SBL
    - PM Peak Hour Movements: EBL, WBL, NBL, SBL
    - Saturday Peak Hour Movements: WBL, NBT
- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - LOS E
    - AM Peak Hour Movements: WBL, SBL
    - PM Peak Hour Movements: WBL, SBL

95th percentile queue lengths were reviewed at the site driveways. Queue lengths for left turning vehicles entering at the south site driveway do not exceed 76 feet (3 vehicles) in the AM peak hour, 69 feet (3 vehicles) in the PM peak hour, and 44 feet (2 vehicles) in the Saturday peak hour. Queue lengths for vehicles exiting via either site driveway will not exceed 63 feet (3 vehicles) in the AM peak hour, 59 feet (2 vehicles) in the PM peak hour, and 101 feet (4 vehicles) in the Saturday peak hour.

The operational results for future conditions – with improvements are presented are presented in Table 8.

Table 8
LOS Analysis for Future Conditions – With Improvements

Intersection	Control Type	Approach	AM Peak	PM Peak	Sat. Peak
Rochester Road (M-150) & Auburn Road	Signalized	Eastbound	E 76.9	E 72.2	E 61.1
		Westbound	E 73.1	E 76.7	E 64.8
		Northbound	C 29.8	C 22.1	D 54.6
		Southbound	A 9.6	D 46.4	C 33.7
		Overall	**C 33.5**	**D 46.8**	**D 49.5**
Rochester Road (M-150) & Wabash Road/Barclay Circle	Signalized	Eastbound	D 44.8	D 42.5	C 32.9
		Westbound	D 54.6	D 54.6	D 39.1
		Northbound	A 2.6	C 28.0	D 37.0
		Southbound	D 52.3	D 46.5	D 48.7
		Overall	**C 34.5**	**D 39.9**	**D 42.4**

XX.X Average seconds of delay per vehicle

Adjacent Driveway Queuing

Video was collected during the AM, PM, and Saturday peak hours at the southern driveway of the Hampton Village Center & Serra Ford on Rochester Road (M-150) to review the number of vehicles currently queueing on Rochester Road (M-150). Review of the video showed that there was a maximum of three southbound vehicles waiting to turn left into the Hampton Village Center.

Turn Lane, Passing Lane, and Taper Warrants

An evaluation was performed in accordance with MDOT requirements to determine if right turn deceleration lanes are required at the site driveways. The results of the analysis indicated that a right turn taper is warranted at the south site driveway. All turn lane warrant charts are attached to this memorandum.

The results of the analysis are presented in Table 9.

Table 9
Turn Lane Warrants

Intersection	Movement	Result
Rochester Road (M-150) & North Site Driveway	SB RT	Existing Turn Lane
Rochester Road (M-150) & South Site Driveway	NB LT	Existing Two-Way Left Turn Lane
	SB RT	Taper Warranted

Conclusions and Recommendations for the Traffic Impact Study

The proposed project consists of 94 units of multifamily residential, 10,245 square feet of retail, and 3,503 square feet of fast-food restaurant with a drive-through with a build-out year of approximately 2022. The proposed development will have access to Rochester Road (M-150) via two existing driveways. The existing north driveway will be reconstructed to allow right-in/right-out operations only. The eastbound approach of the south site driveway will be widened to allow for a dedicated left turn lane and a dedicated right turn lane, which would replace the existing shared left/right turn lane.

The proposed development is forecast to generate 105 new trips during the AM peak hour (46 inbound and 59 outbound from the site), 40 new trips during the PM peak hour (24 inbound and 16 outbound from the site), and 52 new trips during Saturday peak hour (29 inbound and 23 outbound from the site).

An operational analysis was performed for existing, background, and total future (build) conditions for the intersections of:

- Rochester Road (M-150) & Wabash Road/Barclay Circle
- Rochester Road (M-150) & Auburn Road
- Rochester Road (M-150) & North Site Driveway
- Rochester Road (M-150) & South Site Driveway

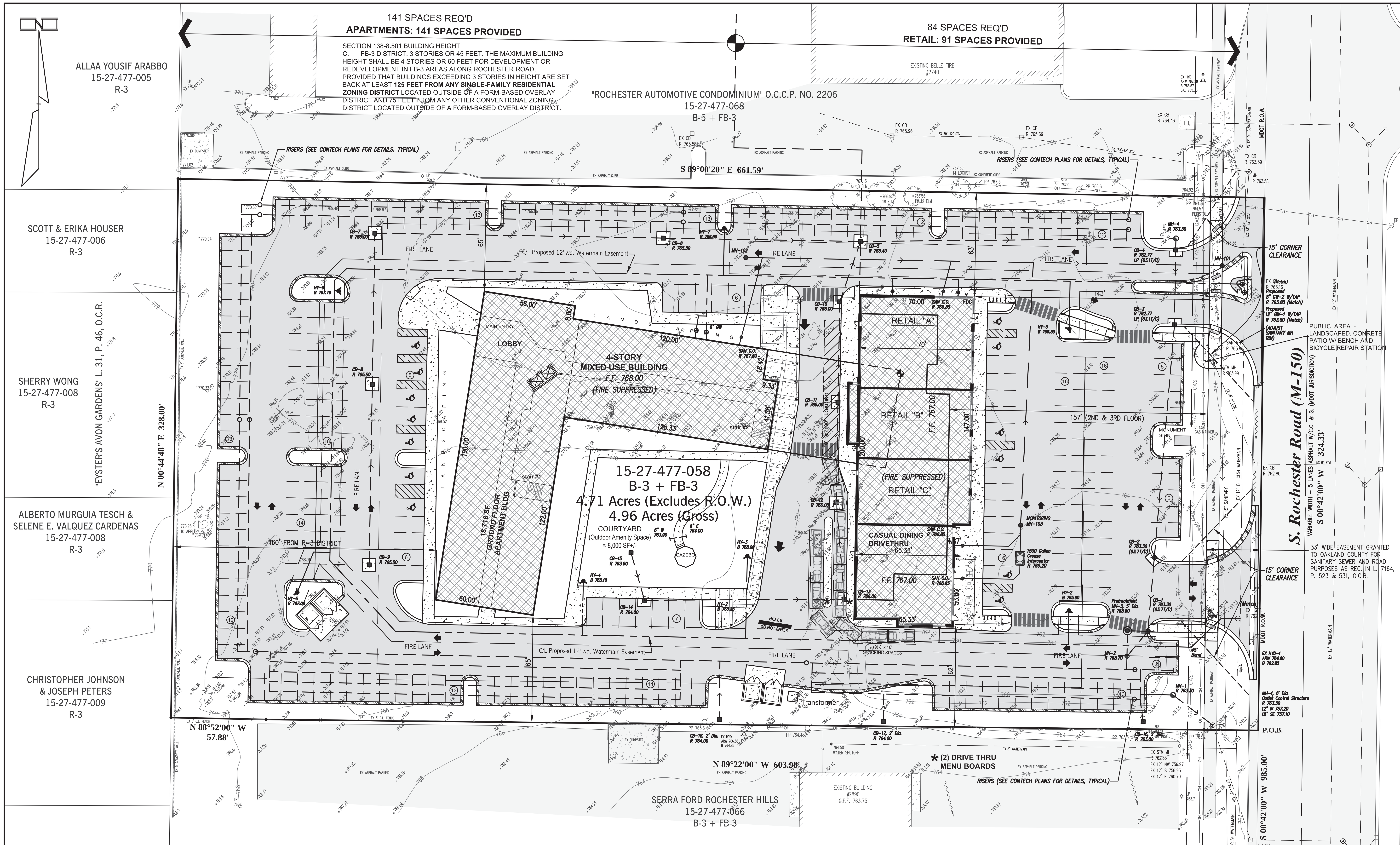
The operational analysis indicated that several movements and approaches of the study intersections would operate at acceptable levels during the AM, PM, and Saturday peak hours. While several movements and approaches operate at typically unacceptable levels in all of the studied peak hours, these are existing conditions and require analysis of the entire Rochester Road (M-150) corridor to optimize the signal cycle length, splits, and coordination, which it outside the scope of this study. The addition of traffic from the proposed development does not significantly impact the operations of the studied intersections.

The signal at the intersection of Rochester Road (M-150) & Wabash Road/Barclay Circle currently operates with split signal phasing for Wabash Road and Barclay Circle. Removal of this split phasing, cycle length optimization, and coordination with the Rochester Road (M-150) corridor will improve operations at this intersection, will improve progression and gaps in traffic along southbound Rochester Road (M-150) for vehicles exiting the site driveways and will improve operations for the southbound approach at the intersection of Rochester Road (M-150) & Auburn Road.

The results of the turn lane warrants reveal that a right turn taper is warranted at the South Site Driveway.

Attachments

SITE PLAN



PARKING CALCULATION:
PER CITY OF ROCHESTER HILLS, MI ZONING ORDINANCE
Section 138-8.600 - Flex Business Overlay Districts
A. Minimum Parking Required.
1. 1.5 parking spaces per residential dwelling unit.
2. 1 parking space per 400 square feet of nonresidential building space.

Section 138-11.204 Parking Requirements
Table 14. Minimum Parking Requirements
(RESTAURANT: 1 SPACE PER 2 PERSONS AT MAXIMUM OCCUPANCY)

APARTMENTS / RESIDENTIAL:
(94) APTMT. UNITS: X (1.5 per dwelling unit) = 141 SPACES

GENERAL RETAIL:
10,245 SF X (1 / 400 GROSS) = 26 SPACES

DRIVE-THRU:
(RESTAURANT: 1 SPACE PER 2 PERSONS AT MAXIMUM OCCUPANCY)
3,503 SF DRIVE THRU
x 55% KITCHEN = 1,927 SF
x 45% DINING = 1,576 SF

1,927 SF (1/200 GROSS) = 9.6 = 10 OCCUPANTS
1,576 SF (1/15 NET) = 105.1 = 106 OCCUPANTS

TOTAL OCCUPANCY = 116 OCCUPANTS

(1 PER 2 PERSONS AT MAX OCCUPANCY) = 126X (1 / 2) = 58 SPACES

PARKING TOTALS:

APARTMENT UNITS:	141 SPACES
(GENERAL RETAIL)	26 SPACES
(DRIVE THRU)	58 SPACES
TOTAL REQUIRED:	225 SPACES
TOTAL PROVIDED:	**232 SPACES**

BARRIER FREE PARKING:
TOTAL #OF SPACES: 201-300 SPACES
MINIMUM # REQUIRED: 5 + 2.33% of total parking provided in lot

TOTAL REQUIRED: 5 + (236 x 2.33%) = 9.45 = 11 SPACES
TOTAL PROVIDED: 13 SPACES

OUTDOOR AMENITY SPACE (2% REQUIRED)
TOTAL AREA = 4.71 ACRES = 205,168 SF
(205,168 SF)(2% REQUIRED) = 4,104 SF REQUIRED
COURTYARD/GAZEBO AREA = 8,000 SF+/- PROVIDED

General Notes:

1. DEVELOP/CONTRACTOR:
OYK ENGINEERING & CONSRUCTION
30700 TELEGRAPH ROAD, SUITE 2665
BINGHAM FARMS, MICHIGAN 48025
PHONE: (248) 656-7695
EMAIL: fhadid@oykconstruction.com
2. PROPERTY DESCRIPTION:
TAX ID NUMBER: 15-27-477-058
THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF OAKLAND, STATE OF MICHIGAN, AND IS DESCRIBED AS FOLLOWS:
LAND SITUATED IN THE STATE OF MICHIGAN, COUNTY OF OAKLAND, CITY OF ROCHESTER HILLS. LAND IN THE SOUTHEAST 1/4 OF SECTION 27, TOWN 3 NORTH, RANGE 11 EAST, CITY OF ROCHESTER HILLS, OAKLAND COUNTY MICHIGAN, DESCRIBED AS: COMMENCING AT THE SOUTHEAST SECTION CORNER; THENCE ALONG THE SECTION LINE, NORTH 00 DEGREES 42 MINUTES 00 SECONDS EAST, 985.00 FEET TO THE POINT OF BEGINNING; THENCE NORTH 89 DEGREES 22 MINUTES 00 SECONDS WEST, 603.90 FEET; THENCE NORTH 88 DEGREES 52 MINUTES 00 SECONDS WEST, 57.88 FEET TO THE EASTERLY LINE OF EYSTER'S AVON GARDENS SUBDIVISION, RECORDED IN LIBER 31, PAGE 46 OF PLATS, OAKLAND COUNTY RECORDS; THENCE ALONG THIS LINE, NORTH 00 DEGREES 44 MINUTES 48 SECONDS EAST, 328.00 FEET; THENCE SOUTH 89 DEGREES 00 MINUTES 20 SECONDS EAST, 661.59 FEET TO THE SECTION LINE; THENCE SOUTH 00 DEGREES 42 MINUTES 00 SECONDS WEST, 324.33 FEET TO THE POINT OF BEGINNING, EXCEPT THE EASTERLY 33 FEET FOR ROAD.
3. EXISTING ZONING: B-3 (SHOPPING CENTER BUSINESS DISTRICT) & FB-3 (FLEXIBLE BUSINESS OVERLAY)
4. SETBACKS:

SETBACKS:	REQUIRED	PROPOSED APARTMENT	PROPOSED RETAIL/RESTAURANT
FRONT (M-150)	75 FT	157 FT	143 FT (M-150 R.O.W.)
SIDES	25 FT	65' (SOUTH), 65' (NORTH)	62' (SOUTH), 63' (NORTH)
REAR	125 FT	160 FT	414 FT (WEST)

5. PROPOSED USE:
APARTMENT BUILDING – 94 UNITS, 108.048 SF
GENERAL RETAIL BUILDING – 10,245 SF
DRIVE-THRU RESTAURANT – 3,503 SF
6. PARKING CALCULATION: SEE THIS SHEET.
7. PROPOSED INTERNAL PARKING LOT DRIVES: DRIVE WIDTH = 24' MINIMUM & 30' AROUND BUILDING (FIRE LANE).
8. WATER SUPPLY: PROPOSED 8" WATER SERVICE CONNECTING TO MUNICIPAL SYSTEM W/12' WIDE EASEMENT.
9. SEWAGE DISPOSAL: CONNECTION TO EXISTING 15" MUNICIPAL SANITARY SEWERS W/20' WIDE EASEMENT.
10. STORM DRAINAGE: PROPOSED STORM SEWER CONNECTING TO PROPOSED UNDERGROUND DETENTION BASIN BEFORE OUTLETTING INTO THE MDOT (M-150) STORM SYSTEM.
11. PROPOSED UTILITIES: UNDERGROUND GAS, ELECTRIC, PHONE & CABLE.
12. PERMITS REQUIRED:
a) CITY OF ROCHESTER HILLS PLANNING COMMISSION/TOWNSHIP BOARD – SITE PLAN APPROVAL.
b) MDOT: M-150 (ROCHESTER ROAD) PERMIT.
c) OAKLAND COUNTY WATER RESOURCE COMMISSION – SOIL EROSION PERMIT
d) MICHIGAN E.G.L.E. – NPDES 'NOTICE OF COVERAGE' PERMIT (IF REQUIRED).
e) MICHIGAN E.G.L.E. – ACT 451 SANITARY SEWER PERMIT
f) MICHIGAN E.G.L.E. – WATER MAIN PERMIT
13. SIGNAGE: PROPOSED GROUND SIGN ALONG ROCHESTER ROAD PER CITY REQUIREMENTS.
14. ALL WALKS SHALL BE CONCRETE WALKS.
15. DUMPSTERS: LOCATED AS SHOWN, SCREENED IN ACCORDANCE W/MUNICIPAL STANDARDS.
16. LIGHTING: SEPARATE PHOTOMETRIC PLAN TO BE SUBMITTED BY OTHERS.
17. LANDSCAPING: SEE SEPARATE LANDSCAPE PLAN.
18. NO HAZARDOUS MATERIALS WILL BE STORED ON-SITE.

Notes:

1. UPDATED "NO STOPPING STANDING OR PARKING FIRE LANE" SIGNS MUST BE PROVIDED THROUGHTOUT THE SITE.

2. ALL ACCESSIBLE PARKING SPACES SHALL BE IDENTIFIED BY SIGNS PER ICCA117.1-2009, SECTION 502.7.

3. M.D.O.T. R.O.W. USE PERMIT IS REQUIRED.

4. CITY OF ROCHESTER HILLS R.O.W. PERMIT IS REQUIRED.

5. O.C.W.R.C. SOIL EROSION PERMIT IS REQUIRED.

6. ALL PROPOSED SIGNS MEET SECTION 138-8.603 AND CHAPTER 134 OF THE CITY CODE OF ORDINANCES AND WILL BE APPROVED UNDER A SEPARATE PERMIT ISSUED BY THE BUILDING DEPARTMENT.

LEGEND

EXISTING		PROPOSED
	STORM SEWER	
	SANITARY SEWER	
	WATERMAIN	
GAS	GAS MAIN	GAS
	ELEC. TELE. CABLE	
	STORM MANHOLE	
	CATCH BASIN	
	INLET	
	REARYARD CATCH BASIN	
	END SECTION	
	SANITARY MANHOLE	
	GATE VALVE AND WELL	
	HYDRANT	
770	CONTOURS	(70)
	MATCH ELEVATION	(M)
	TOP OF CURB	T/C
	TOP OF SIDEWALK	T/S
	TOP OF PAVEMENT	T/P
	TOP OF CONCRETE	TC
	STANDARD CURB	
	REVERSE CURB	
	DOWNSPOUT	D.S.
	ROOF DRAIN	R.D.

STATE OF MICHIGAN — PATRICK COLIN McWILLIAMS — LICENSE NO. 6201031658 — LICENSED PROFESSIONAL ENGINEER

City File #21-008, Section 27

Not to be Used as Construction Drawings

DATE	ISSUE
3-19-2021	REVISED PER ARCHITECT
5-12-2021	REVISED PER CITY (4-15-2021)
6-30-2021	REVISED PER CITY (6-29-2021)
8-13-2021	ADDED HYDRANTS FOR FIRE DEPT. (8-13-2021)
9-14-2021	REVISED ENTRANCE APPROACHES PER CLIENT (9-8-2021)

Developer/Contractor
OYK ENGINEERING & CONSTRUCTION
30700 TELEGRAPH ROAD, SUITE 2665
BINGHAM FARMS, MICHIGAN 48025
(248) 656-7695 FRED HADID

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KIEFT ENGINEERING

KIEFT ENGINEERING, INC.
PROFESSIONAL ENGINEERS AND PROFESSIONAL SURVEYORS
5852 SOUTH MAIN STREET, SUITE 1, CLARKSTON, MICHIGAN 48346
PHONE (248) 625-5251 www.kiefteng.com FAX (248) 625-7110

DATE 3-17-2021 | CKD. BY | DATE
DRAWN GF
DESIGN PCM
SECTION 27 | T- 3 -N. R- 11 -E.

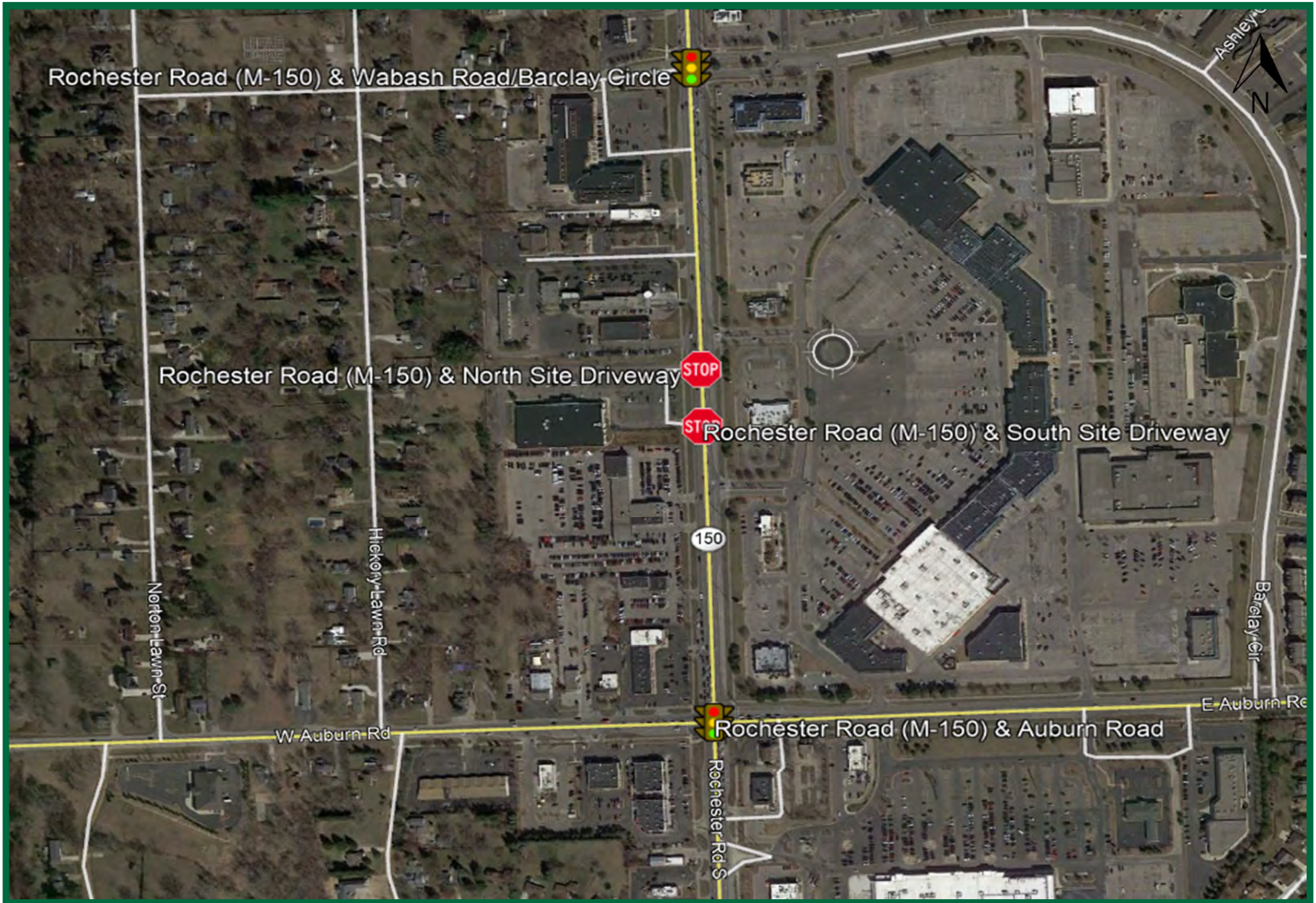
72 HOURS (3 WORKING DAYS) BEFORE YOU DIG CALL MISS DIG 800-482-7171 (TOLL FREE)

Overall Site Plan
"BEBB OAK MEADOWS" MIXED USE DEVELOPMENT
PART OF THE SE 1/4 OF SECTION 27, T3N, R11E,
CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN

SCALE 1" = 30'
SHEET 3 OF 9
KE 2021.053

G:\2021\053\dwg\Bebb Oak Site Plan.dwg, 9/13/2021 12:02:51 PM, AutoCAD PDF (High Quality Print).pc3

REPORT FIGURES

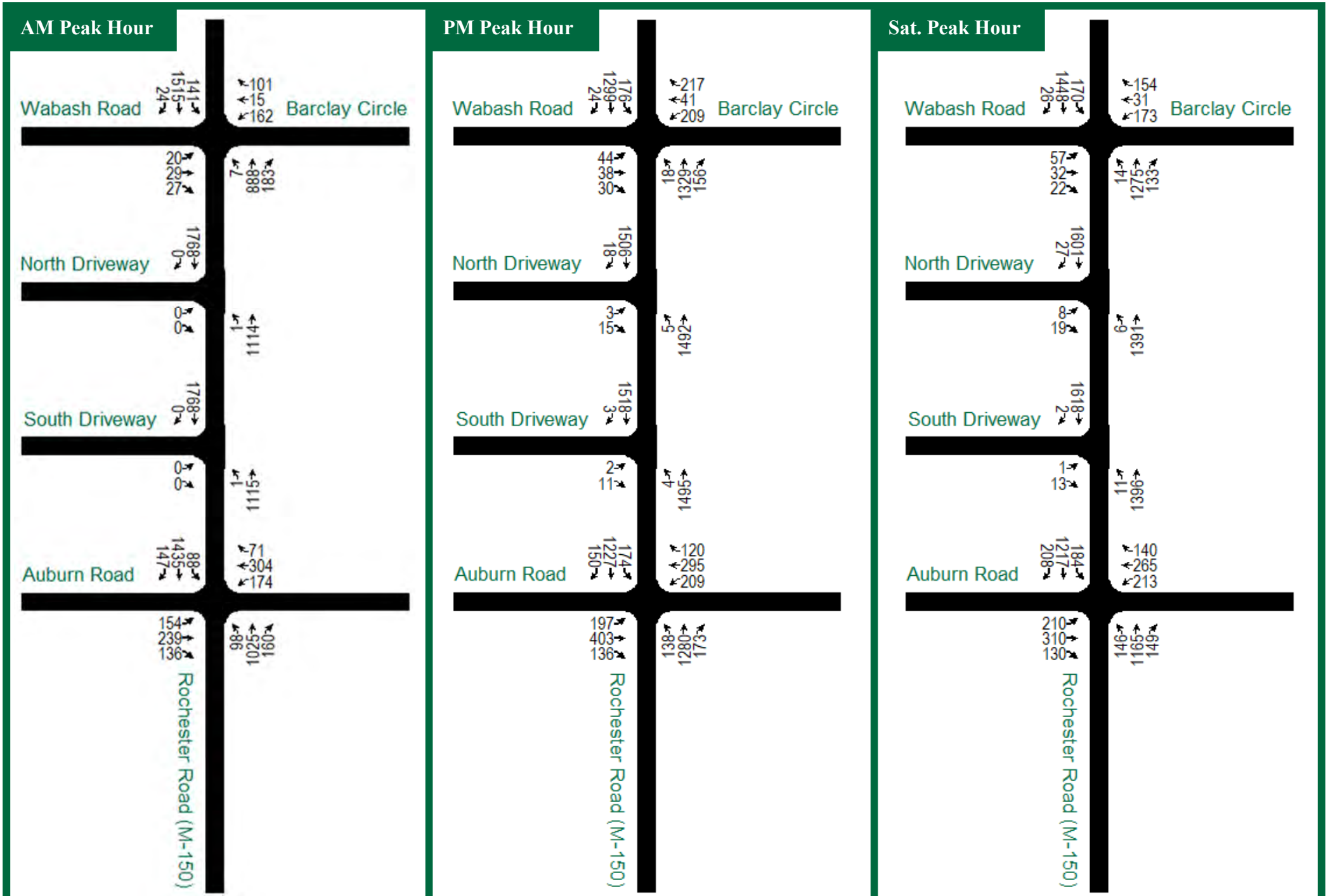


ROWE PROFESSIONAL SERVICES COMPANY

Large Firm Resources. Personal Attention.

Site Location
Bebb Oak TIS
Figure 1

Not to scale – for illustrative purposes only

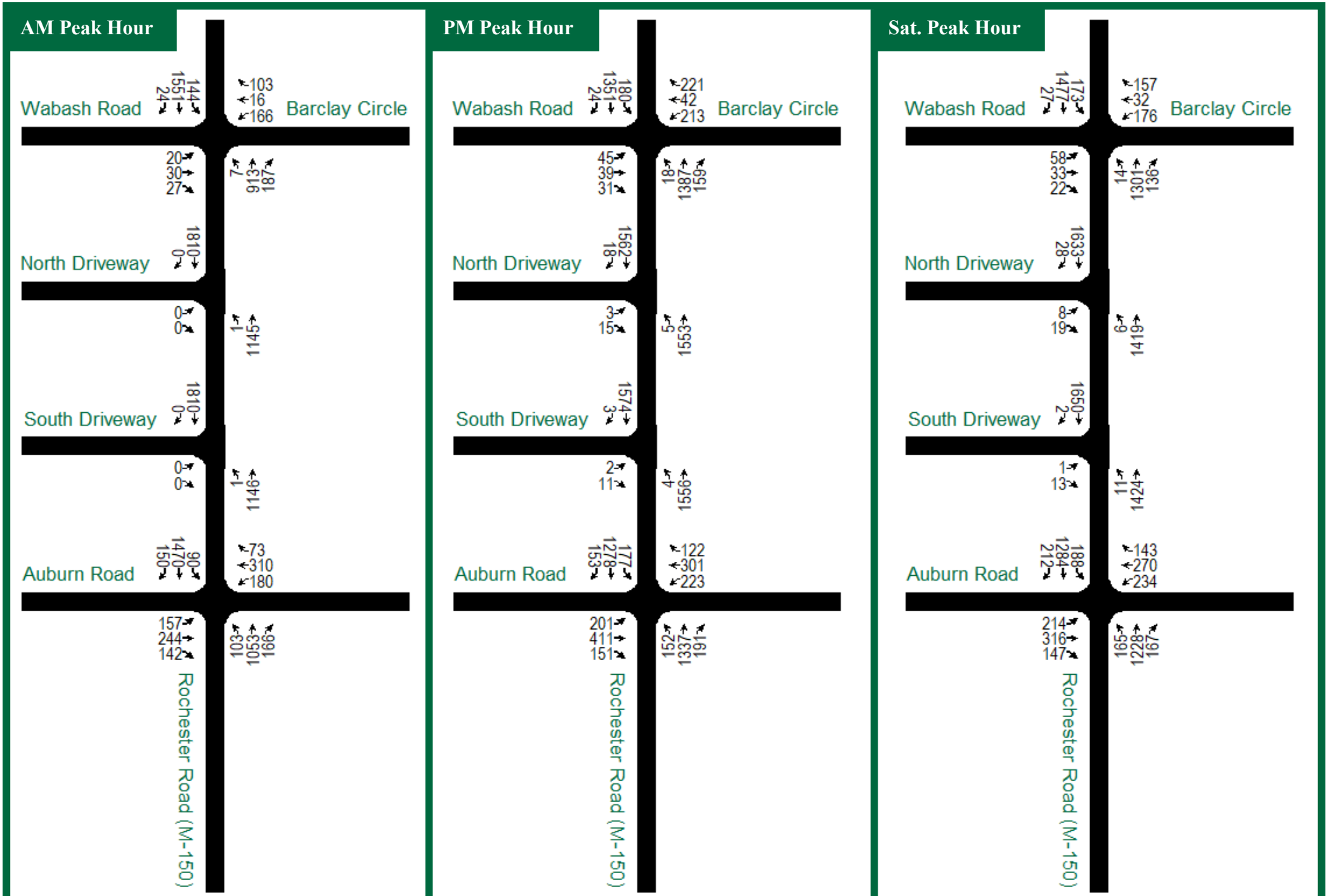


ROWE PROFESSIONAL SERVICES COMPANY

Large Firm Resources. Personal Attention.

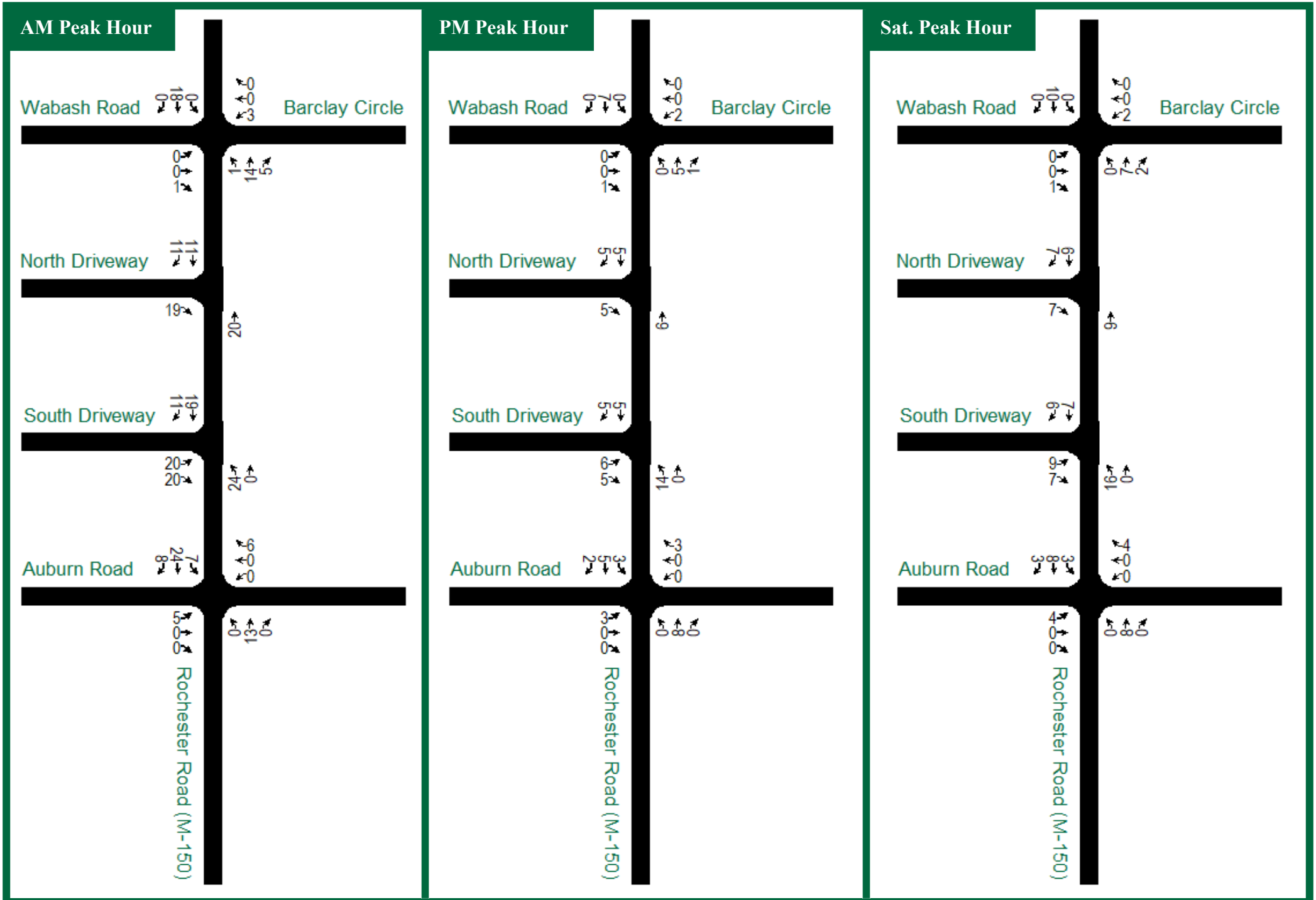
2021 Existing Conditions Volumes
Bebb Oak TIS
Figure 2

Not to scale – for illustrative purposes only



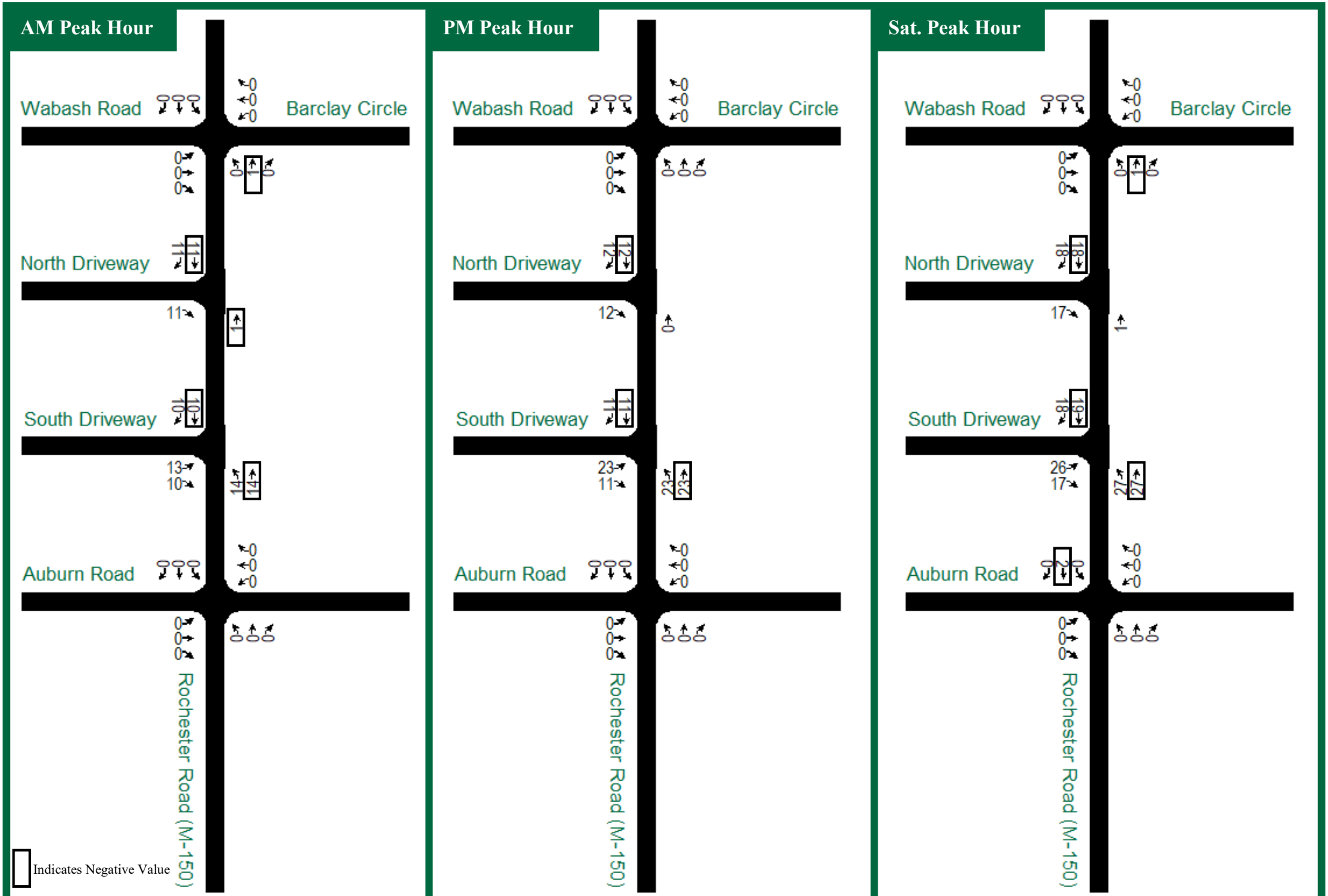
ROWE PROFESSIONAL SERVICES COMPANY
Large Firm Resources. Personal Attention.

2022 Background Conditions Volumes
Bebb Oak TIS
Figure 3
Not to scale – for illustrative purposes only



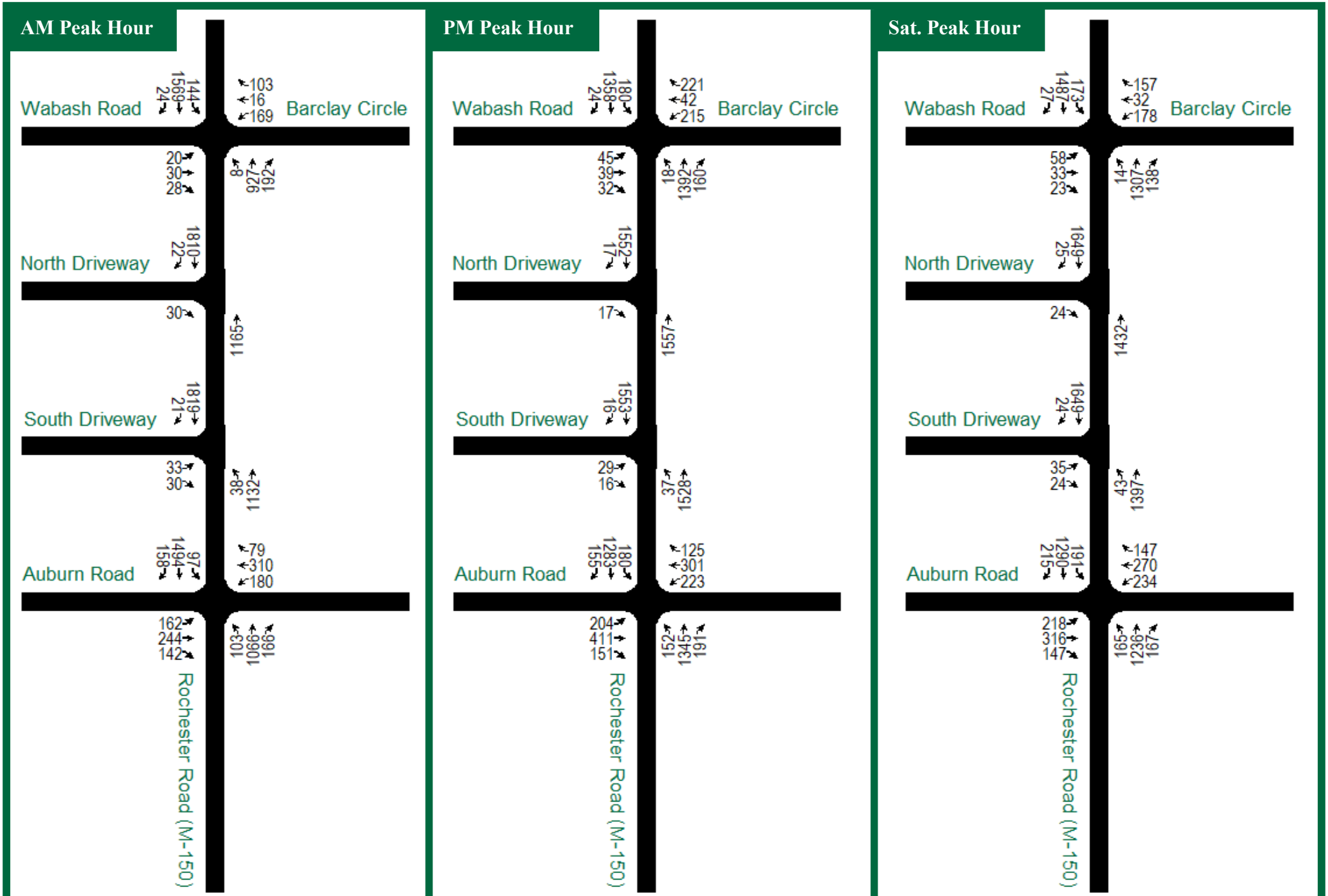
ROWE PROFESSIONAL SERVICES COMPANY
Large Firm Resources. Personal Attention.

Trip Generation Volumes
Bebb Oak TIS
Figure 4
Not to scale – for illustrative purposes only



ROWE PROFESSIONAL SERVICES COMPANY
Large Firm Resources. Personal Attention.

Pass-By Volumes
Bebb Oak TIS
Figure 5
Not to scale – for illustrative purposes only



ROWE PROFESSIONAL SERVICES COMPANY

Large Firm Resources. Personal Attention.

2022 Future Conditions Volumes
Bebb Oak TIS
Figure 6

Not to scale – for illustrative purposes only

TRAFFIC COUNTS

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#1 - Rochester & Auburn	AM Peak 06/10/21		PHF	0.89			0.94			0.80			0.95						
			% Heavy	4%			3%			3%			2%						
		2021	Existing	**110**	**171**	**97**	**124**	**217**	**51**	**70**	**732**	**114**	**63**	**1025**	**105**	**2**	**8**	**5**	**4**
		2021	Existing Adj.	154	239	136	174	304	71	98	1025	160	88	1435	147	3	11	7	6
		2022	Background	157	244	139	177	310	73	100	1045	163	90	1464	150	3	11	7	6
			Bckgrd. Dev. A			3	3			3	8	3		6					
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**157**	**244**	**142**	**180**	**310**	**73**	**103**	**1053**	**166**	**90**	**1470**	**150**	**3**	**11**	**7**	**6**
			Site Generated	5					6		13		7	24	8				
			Pass By																
			Total Site Gen	5	0	0	0	0	6	0	13	0	7	24	8	0	0	0	0
			Total Future	**162**	**244**	**142**	**180**	**310**	**79**	**103**	**1066**	**166**	**97**	**1494**	**158**	**3**	**11**	**7**	**6**

Count Date: 6/10/2021
Count Year: 2021
Existing Adj. Year: 2021

Existing Adjustment Rate: 140.0%
Growth Rate: 2.0%
Buildout Year: 2022
Scenario: AM Peak

Bckgrd. Dev. A: Chick-Fil-A
Bckgrd. Dev. B:
Bckgrd. Dev. C:

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#2 - Rochester & Barclay / Wasbash	AM Peak 06/10/21		PHF	0.60			0.80			0.85			0.92						
			% Heavy	2%			1%			3%			3%						
		2021	Existing	**14**	**21**	**19**	**116**	**11**	**72**	**5**	**634**	**131**	**101**	**1082**	**17**	**5**	**56**	**51**	**1**
		2021	Existing Adj.	20	29	27	162	15	101	7	888	183	141	1515	24	7	78	71	1
		2022	Background	20	30	27	166	16	103	7	905	187	144	1545	24	7	80	73	1
			Bckgrd. Dev. A								8			6					
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**20**	**30**	**27**	**166**	**16**	**103**	**7**	**913**	**187**	**144**	**1551**	**24**	**7**	**80**	**73**	**1**
			Site Generated			1	3			1	14	5		18					
			Pass By																
			Total Site Gen	0	0	1	3	0	0	1	14	5	0	18	0	0	0	0	0
			Total Future	**20**	**30**	**28**	**169**	**16**	**103**	**8**	**927**	**192**	**144**	**1569**	**24**	**7**	**80**	**73**	**1**

Intersection	Time period	Year	Movement	EBL	EBR	NBL	NBT	SBT	SBR	EBRR	NBRR	SBRR
#3 - Rochester & North Site Driveway	AM Peak 06/10/21		PHF	0.00		0.84		0.94				
			% Heavy	0%		4%		2%				
		2021	Existing	**0**	**0**	**1**	**796**	**1245**	**0**			
		2021	Existing Adj.	0	0	1	1114	1743	0	0	0	0
		2022	Background	0	0	1	1137	1778	0	0	0	0
			Bckgrd. Dev. A				8	6				
			Bckgrd. Dev. B									
			Bckgrd. Dev. C									
			Total Background	**0**	**0**	**1**	**1145**	**1784**	**0**	**0**	**0**	**0**
			Site Generated		19	-1	20	11	11			
			Pass By		11			-11	11			
			Total Site Gen	0	30	-1	20	0	22	0	0	0
			Total Future	**0**	**30**	**0**	**1165**	**1810**	**22**	**0**	**0**	**0**

Intersection	Time period	Year	Movement	EBL	EBR	NBL	NBT	SBT	SBR	EBRR	NBRR	SBRR
#4 - Rochester & South Site Driveway	AM Peak 06/10/21		PHF	0.00		0.84		0.93				
			% Heavy	0%		4%		2%				
		2021	Existing	**0**	**0**	**1**	**795**	**1263**	**0**			
		2021	Existing Adj.	0	0	1	1113	1768	0	0	0	0
		2022	Background	0	0	1	1135	1804	0	0	0	0
			Bckgrd. Dev. A				8	6				
			Bckgrd. Dev. B									
			Bckgrd. Dev. C									
			Total Background	**0**	**0**	**1**	**1143**	**1810**	**0**	**0**	**0**	**0**
			Site Generated	20	20	23	-1	19	11			
			Pass By	6	10	7	-7	-10	10			
			Total Site Gen	26	30	30	-8	9	21	0	0	0
			Total Future	**26**	**30**	**31**	**1139**	**1819**	**21**	**0**	**0**	**0**

Count Date: 6/10/2021
Count Year: 2021

Growth Rate: 2.0%
Buildout Year: 2022
Scenario: PM Peak

Bckgrd. Dev. A: Chick-Fil-A
Bckgrd. Dev. B:
Bckgrd. Dev. C:

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#1 - Rochester & Auburn	PM Peak 06/10/21		PHF	0.91			0.81			0.94			0.93						
			% Heavy	1%			1%			1%			1%						
		2021	Existing	**197**	**403**	**136**	**209**	**295**	**120**	**138**	**1280**	**173**	**174**	**1227**	**150**	**2**	**6**	**6**	**3**
		2022	Background	201	411	139	213	301	122	141	1306	176	177	1252	153	2	6	6	3
			Bckgrd. Dev. A			12	10			11	31	15		26					
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**201**	**411**	**151**	**223**	**301**	**122**	**152**	**1337**	**191**	**177**	**1278**	**153**	**2**	**6**	**6**	**3**
			Site Generated	3	0	0	0	0	3	0	8	0	3	5	2				
			Pass By																
			Total Site Gen	3	0	0	0	0	3	0	8	0	3	5	2	0	0	0	0
			Total Future	**204**	**411**	**151**	**223**	**301**	**125**	**152**	**1345**	**191**	**180**	**1283**	**155**	**2**	**6**	**6**	**3**

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#2 - Rochester & Barclay / Wasbash	PM Peak 06/10/21		PHF	0.68			0.85			0.95			0.93						
			% Heavy	1%			0%			1%			1%						
		2021	Existing	**44**	**38**	**30**	**209**	**41**	**217**	**18**	**1329**	**156**	**176**	**1299**	**24**	**13**	**94**	**56**	**2**
		2022	Background	45	39	31	213	42	221	18	1356	159	180	1325	24	13	96	57	2
			Bckgrd. Dev. A								31			26					
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**45**	**39**	**31**	**213**	**42**	**221**	**18**	**1387**	**159**	**180**	**1351**	**24**	**13**	**96**	**57**	**2**
			Site Generated			1	2				5	1		7					
			Pass By	0	0	0	0	0	0	0	0	0	0	0	0				
			Total Site Gen	0	0	1	2	0	0	0	5	1	0	7	0	0	0	0	0
			Total Future	**45**	**39**	**32**	**215**	**42**	**221**	**18**	**1392**	**160**	**180**	**1358**	**24**	**13**	**96**	**57**	**2**

Intersection	Time period	Year	Movement	EBL	EBR	NBL	NBT	SBT	SBR	EBRR	NBRR	SBRR
#3 - Rochester & North Site Driveway	PM Peak 06/10/21		PHF	0.92		0.95		0.92				
			% Heavy	0%		1%		1%				
		2021	Existing	**3**	**15**	**5**	**1492**	**1506**	**18**			
		2022	Background	3	15	5	1522	1536	18	0	0	0
			Bckgrd. Dev. A				31	26				
			Bckgrd. Dev. B									
			Bckgrd. Dev. C									
			Total Background	**3**	**15**	**5**	**1553**	**1562**	**18**	**0**	**0**	**0**
			Site Generated		5	7	6	5	5			
			Rem Ex Site Trips	-3	-15	-5	-2	-3	-18			
			Pass By		12			-12	12			
			Total Site Gen	-3	2	2	4	-10	-1	0	0	0
			Total Future	**0**	**17**	**7**	**1557**	**1552**	**17**	**0**	**0**	**0**

Intersection	Time period	Year	Movement	EBL	EBR	NBL	NBT	SBT	SBR	EBRR	NBRR	SBRR
#4 - Rochester & South Site Driveway	PM Peak 06/10/21		PHF	0.81		0.95		0.94				
			% Heavy	8%		1%		1%				
		2021	Existing	**2**	**11**	**4**	**1495**	**1518**	**3**			
		2022	Background	2	11	4	1525	1548	3	0	0	0
			Bckgrd. Dev. A				31	26				
			Bckgrd. Dev. B									
			Bckgrd. Dev. C									
			Total Background	**2**	**11**	**4**	**1556**	**1574**	**3**	**0**	**0**	**0**
			Site Generated	6	5	14		5	5			
			Rem Ex Site Trips	-2	-11	-4	-5	-15	-3			
			Pass By	23	11	23	-23	-11	11			
			Total Site Gen	27	5	33	-28	-21	13	0	0	0
			Total Future	**29**	**16**	**37**	**1528**	**1553**	**16**	**0**	**0**	**0**

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#1 - Rochester & Auburn	Weekend Peak 06/12/21		PHF		0.92			0.91			0.91			0.95					
			% Heavy		1%			1%			1%			1%					
		2021	Existing	**210**	**310**	**130**	**213**	**265**	**140**	**146**	**1165**	**149**	**184**	**1217**	**208**	**9**	**5**	**1**	**3**
		2022	Background	214	316	133	217	270	143	149	1188	152	188	1241	212	9	5	1	3
			Bckgrd. Dev. A			14	17			16	40	15		43					
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**214**	**316**	**147**	**234**	**270**	**143**	**165**	**1228**	**167**	**188**	**1284**	**212**	**9**	**5**	**1**	**3**
			Site Generated	4					4		8		3	8	3				
			Pass By																
			Total Site Gen	4	0	0	0	0	4	0	8	0	3	8	3	0	0	0	0
			Total Future	**218**	**316**	**147**	**234**	**270**	**147**	**165**	**1236**	**167**	**191**	**1292**	**215**	**9**	**5**	**1**	**3**

Count Date: 6/12/2021
Count Year: 2021

Growth Rate: 2.0%
Buildout Year: 2022
Scenario: Weekend Peak

Bckgrd. Dev. A: Chick-Fil-A
Bckgrd. Dev. B:
Bckgrd. Dev. C:

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#2 - Rochester & Barclay / Wasbash	Weekend Peak 06/12/21		PHF		0.84			0.78			0.93			0.95					
			% Heavy		1%			0%			1%			1%					
		2021	Existing	**57**	**32**	**22**	**173**	**31**	**154**	**14**	**1275**	**133**	**170**	**1448**	**26**	**3**	**80**	**52**	**1**
		2022	Background	58	33	22	176	32	157	14	1301	136	173	1477	27	3	82	53	1
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**58**	**33**	**22**	**176**	**32**	**157**	**14**	**1301**	**136**	**173**	**1477**	**27**	**3**	**82**	**53**	**1**
			Site Generated			1	2				7	2		10					
			Pass By																
			Total Site Gen	0	0	1	2	0	0	0	7	2	0	10	0	0	0	0	0
			Total Future	**58**	**33**	**23**	**178**	**32**	**157**	**14**	**1308**	**138**	**173**	**1487**	**27**	**3**	**82**	**53**	**1**

Intersection	Time period	Year	Movement	EBL	EBR	NBL	NBT	SBT	SBR	EBRR	NBRR	SBRR
#3 - Rochester & North Site Driveway	Weekend Peak 06/12/21		PHF	0.60		0.95		0.93				
			% Heavy	0%		1%		1%				
		2021	Existing	**8**	**19**	**6**	**1391**	**1601**	**27**			
		2022	Background	8	19	6	1419	1633	28	0	0	0
			Bckgrd. Dev. A									
			Bckgrd. Dev. B									
			Bckgrd. Dev. C									
			Total Background	**8**	**19**	**6**	**1419**	**1633**	**28**	**0**	**0**	**0**
			Site Generated		7		9	6	7			
			Rem Ex Site Trips	-8	-19	-6	5	28	-28			
			Pass By		18			-18	18			
			Total Site Gen	-8	6	-6	14	16	-3	0	0	0
			Total Future	**0**	**25**	**0**	**1433**	**1649**	**25**	**0**	**0**	**0**

Intersection	Time period	Year	Movement	EBL	EBR	NBL	NBT	SBT	SBR	EBRR	NBRR	SBRR
#4 - Rochester & South Site Driveway	Weekend Peak 06/12/21		PHF	0.70		0.94		0.94				
			% Heavy	0%		1%		1%				
		2021	Existing	**1**	**13**	**11**	**1396**	**1618**	**2**			
		2022	Background	1	13	11	1424	1650	2	0	0	0
			Bckgrd. Dev. A									
			Bckgrd. Dev. B									
			Bckgrd. Dev. C									
			Total Background	**1**	**13**	**11**	**1424**	**1650**	**2**	**0**	**0**	**0**
			Site Generated	9	7	16		7	6			
			Rem Ex Site Trips	-1	-13	-11		11	-2			
			Pass By	27	18	27	-27	-18	18			
			Total Site Gen	35	12	32	-27	0	22	0	0	0
			Total Future	**36**	**25**	**43**	**1397**	**1650**	**24**	**0**	**0**	**0**

Rochester Road (M-150) & Auburn Road - Weekday										
	SB		NB		EB		WB		All	
Time	2/11/2020	6/10/2021	2/11/2020	6/10/2021	2/11/2020	6/10/2021	2/11/2020	6/10/2021	2/11/2020	6/10/2021
0:00-1:00	110		140		80		67		397	
1:00-2:00	53		138		54		46		291	
2:00-3:00	45		91		36		21		193	
3:00-4:00	50		101		43		23		217	
4:00-5:00	176		134		124		76		510	
5:00-6:00	600		327		433		200		1560	
6:00-7:00	1324		705		836		481		3346	
7:00-8:00	1710	1151	929	865	1010	273	741	318	4390	2607
8:00-9:00	1525	1193	1156	916	676	378	720	392	4077	2879
9:00-10:00	1468		1,103		670		633		3874	
10:00-11:00	1338		1,087		808		670		3903	
11:00-12:00	1,157		1,205		892		769		4023	
12:00-13:00	1,235		1,377		826		797		4235	
13:00-14:00	1,158		1,304		732		774		3968	
14:00-15:00	1,147		1,414		734		778		4073	
15:00-16:00	1,187		1,476		690		780		4133	
16:00-17:00	1,169	1530	1,602	1568	649	691	751	587	4171	4376
17:00-18:00	1,139	1493	1,637	1553	692	754	800	618	4268	4418
18:00-19:00	1,242		1,492		909		789		4432	
19:00-20:00	975		1,335		661		620		3591	
20:00-21:00	845		1,024		606		546		3021	
21:00-22:00	707		789		436		414		2346	
22:00-23:00	404		526		293		232		1455	
23:00-24:00	289		307		205		152		953	
AM Peak	27.83%		26.20%		78.84%		83.67%		41.61%	
PM Peak	-23.71%		2.17%		-8.22%		29.45%		-0.08%	

Rochester Road (M-150) & Auburn Road - Saturday										
	SB		NB		EB		WB		All	
Time	2/8/2020	6/12/2021	2/8/2020	6/12/2021	2/8/2020	6/12/2021	2/8/2020	6/12/2021	2/8/2020	6/12/2021
0:00-1:00	399		359		262		216		1236	
1:00-2:00	212		208		110		105		635	
2:00-3:00	136		191		84		69		480	
3:00-4:00	103		131		54		39		327	
4:00-5:00	138		127		71		63		399	
5:00-6:00	276		220		130		76		702	
6:00-7:00	452		316		198		179		1145	
7:00-8:00	465		446		261		241		1413	
8:00-9:00	604		744		593		413		2354	
9:00-10:00	834		1,016		644		562		3056	
10:00-11:00	995		1,190		790		584		3559	
11:00-12:00	1,284	1601	1,332	1379	747	618	729	593	4092	4191
12:00-13:00	1,371	1547	1,403	1460	682	680	788	620	4244	4307
13:00-14:00	1,326		1,527		708		764		4325	
14:00-15:00	1,282		1,420		833		884		4419	
15:00-16:00	1,343		1,441		955		891		4630	
16:00-17:00	1,327		1,402		662		848		4239	
17:00-18:00	1,212		1,265		745		851		4073	
18:00-19:00	1,330		1,299		730		800		4159	
19:00-20:00	1,042		1,260		628		678		3608	
20:00-21:00	879		1,075		620		572		3146	
21:00-22:00	701		827		482		453		2463	
22:00-23:00	596		780		390		334		2100	
23:00-24:00	391		549		384		220		1544	
Midday Peak	-19.80%		-3.90%		0.29%		27.10%		-1.46%	

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

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

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

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

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

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

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

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

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

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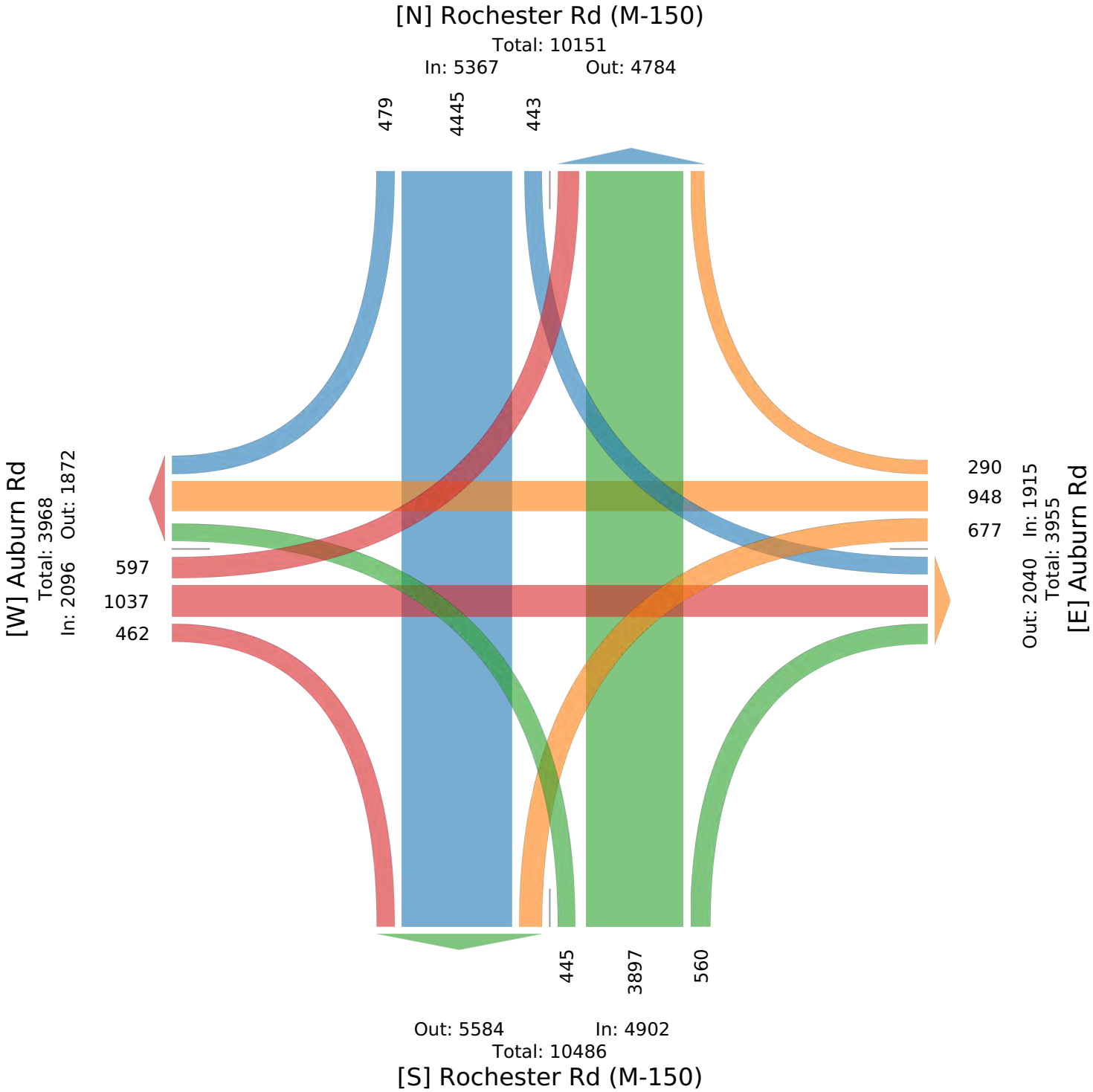
Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845016, Location: 42.636136, -83.131734

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



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

Thu Jun 10, 2021
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845016, Location: 42.636136, -83.131734

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

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

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

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

Thu Jun 10, 2021
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845016, Location: 42.636136, -83.131734

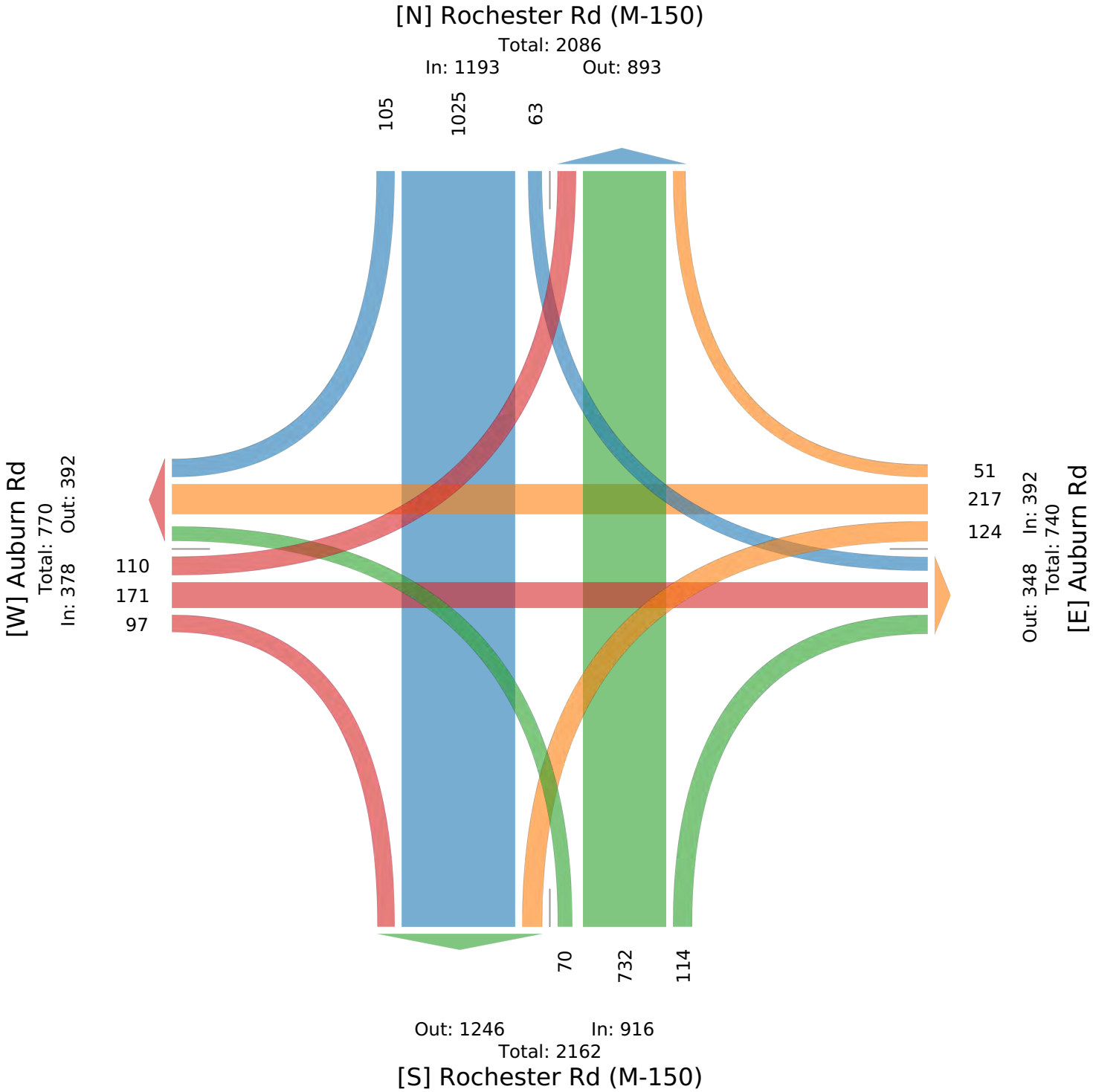
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

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

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

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

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



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

Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845016, Location: 42.636136, -83.131734

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

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

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

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

Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845016, Location: 42.636136, -83.131734

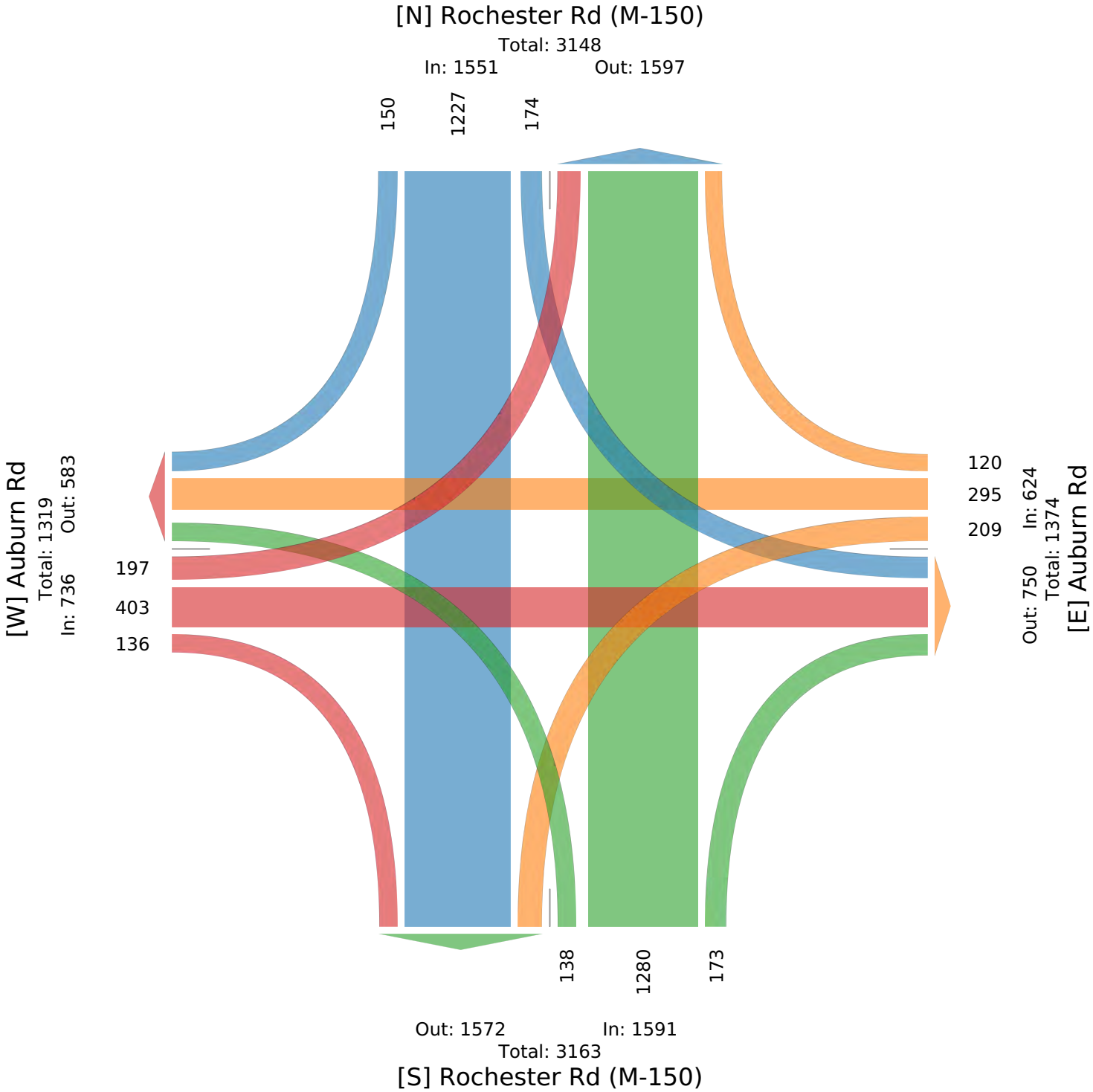
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

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

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

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

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



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

Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845022, Location: 42.636136, -83.131734

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

Leg	Auburn Rd						Auburn Rd					
Direction	Eastbound						Westbound					
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**
2021-06-12 11:00AM	57	82	28	0	1	**168**	53	50	32	0	1	**136**
11:15AM	50	57	30	0	1	**138**	53	52	33	0	0	**138**
11:30AM	62	56	27	0	0	**145**	57	69	25	0	2	**153**
11:45AM	60	81	23	0	3	**167**	55	69	41	0	1	**166**
Hourly Total	229	276	108	0	5	**618**	218	240	131	0	4	**593**
12:00PM	52	66	34	0	1	**153**	46	59	31	0	2	**138**
12:15PM	46	96	31	0	4	**177**	54	79	35	0	1	**169**
12:30PM	52	67	33	0	1	**153**	58	58	28	0	1	**145**
12:45PM	65	79	52	0	1	**197**	64	68	36	0	0	**168**
Hourly Total	215	308	150	0	7	**680**	222	264	130	0	4	**620**
Total	444	584	258	0	12	**1298**	440	504	261	0	8	**1213**
% Approach	34.2%	45.0%	19.9%	0%	0.9%	**-**	36.3%	41.5%	21.5%	0%	0.7%	**-**
% Total	5.2%	6.8%	3.0%	0%	0.1%	**15.2%**	5.2%	5.9%	3.1%	0%	0.1%	**14.2%**
Lights	443	582	256	0	12	**1293**	436	502	259	0	8	**1205**
% Lights	99.8%	99.7%	99.2%	0%	100%	**99.6%**	99.1%	99.6%	99.2%	0%	100%	**99.3%**
Articulated Trucks	0	0	0	0	0	**0**	1	0	0	0	0	**1**
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	0.2%	0%	0%	0%	0%	**0.1%**
Buses and Single-Unit Trucks	1	2	2	0	0	**5**	3	2	2	0	0	**7**
% Buses and Single-Unit Trucks	0.2%	0.3%	0.8%	0%	0%	**0.4%**	0.7%	0.4%	0.8%	0%	0%	**0.6%**

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

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

Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845022, Location: 42.636136, -83.131734

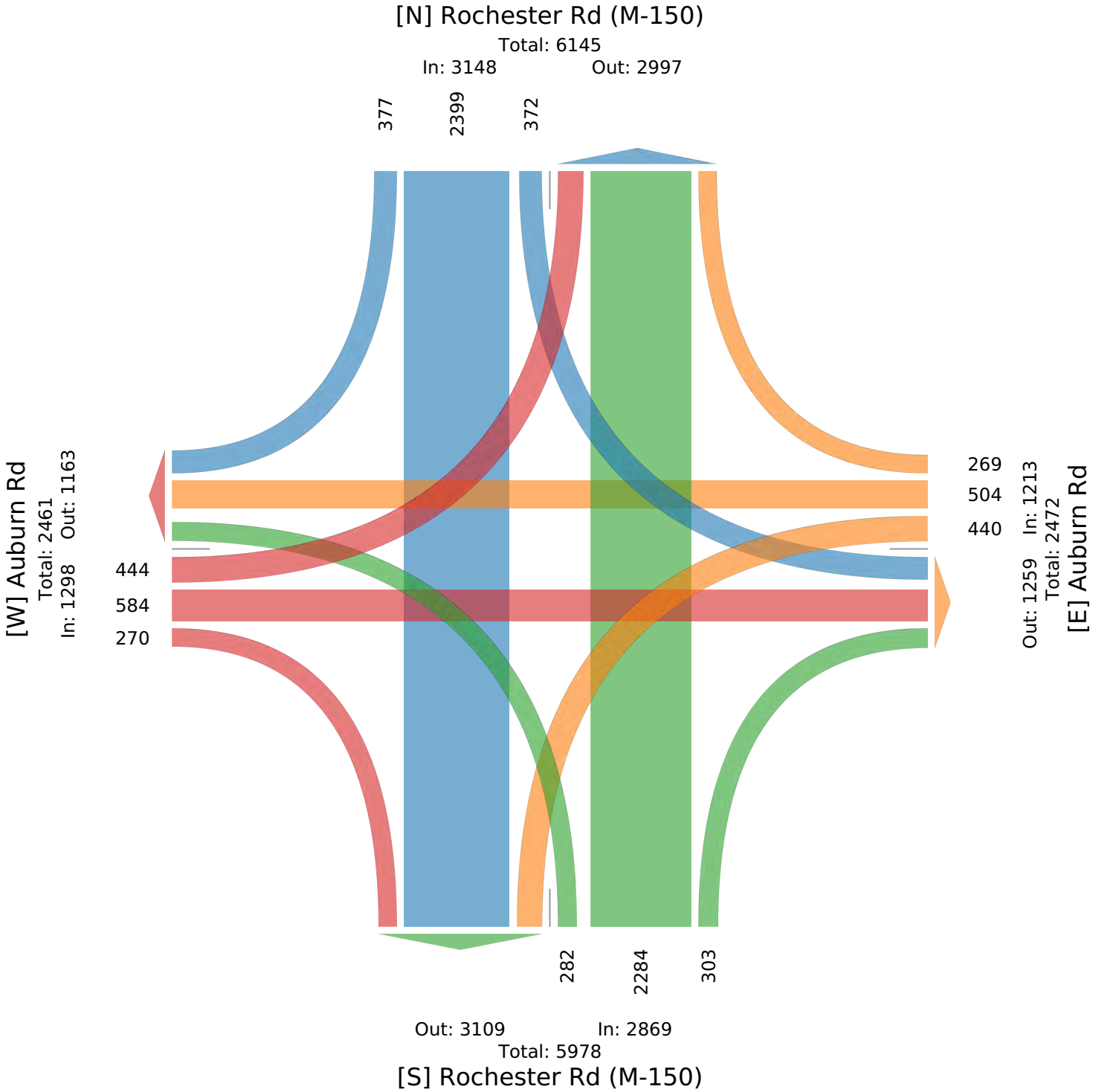
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Rochester Rd (M-150)						Rochester Rd (M-150)						
Direction	Northbound						Southbound						
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**	**Int**
2021-06-12 11:00AM	25	252	33	0	2	**312**	48	289	39	0	4	**380**	**996**
11:15AM	32	300	31	0	0	**363**	47	299	46	0	5	**397**	**1036**
11:30AM	35	299	44	0	3	**381**	44	318	40	0	0	**402**	**1081**
11:45AM	36	247	40	0	0	**323**	45	322	54	0	1	**422**	**1078**
Hourly Total	128	1098	148	0	5	**1379**	184	1228	179	0	10	**1601**	**4191**
12:00PM	31	330	38	0	1	**400**	43	299	50	0	0	**392**	**1083**
12:15PM	45	275	28	0	0	**348**	57	275	51	0	2	**385**	**1079**
12:30PM	34	313	42	0	0	**389**	39	321	50	0	0	**410**	**1097**
12:45PM	44	268	41	0	0	**353**	49	276	35	0	0	**360**	**1078**
Hourly Total	154	1186	149	0	1	**1490**	188	1171	186	0	2	**1547**	**4337**
Total	282	2284	297	0	6	**2869**	372	2399	365	0	12	**3148**	**8528**
% Approach	9.8%	79.6%	10.4%	0%	0.2%	**-**	11.8%	76.2%	11.6%	0%	0.4%	**-**	-
% Total	3.3%	26.8%	3.5%	0%	0.1%	**33.6%**	4.4%	28.1%	4.3%	0%	0.1%	**36.9%**	-
Lights	277	2263	295	0	6	**2841**	371	2371	363	0	12	**3117**	8456
% Lights	98.2%	99.1%	99.3%	0%	100%	**99.0%**	99.7%	98.8%	99.5%	0%	100%	**99.0%**	99.2%
Articulated Trucks	1	7	1	0	0	**9**	0	11	0	0	0	**11**	21
% Articulated Trucks	0.4%	0.3%	0.3%	0%	0%	**0.3%**	0%	0.5%	0%	0%	0%	**0.3%**	0.2%
Buses and Single-Unit Trucks	4	14	1	0	0	**19**	1	17	2	0	0	**20**	51
% Buses and Single-Unit Trucks	1.4%	0.6%	0.3%	0%	0%	**0.7%**	0.3%	0.7%	0.5%	0%	0%	**0.6%**	0.6%

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

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845022, Location: 42.636136, -83.131734

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



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

Sat Jun 12, 2021
Midday Peak (WKND) (11:45 AM - 12:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845022, Location: 42.636136, -83.131734

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

Leg	Auburn Rd						Auburn Rd					
Direction	Eastbound						Westbound					
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**
2021-06-12 11:45AM	60	81	23	0	3	**167**	55	69	41	0	1	**166**
12:00PM	52	66	34	0	1	**153**	46	59	31	0	2	**138**
12:15PM	46	96	31	0	4	**177**	54	79	35	0	1	**169**
12:30PM	52	67	33	0	1	**153**	58	58	28	0	1	**145**
Total	210	310	121	0	9	**650**	213	265	135	0	5	**618**
% Approach	32.3%	47.7%	18.6%	0%	1.4%	**-**	34.5%	42.9%	21.8%	0%	0.8%	**-**
% Total	4.8%	7.1%	2.8%	0%	0.2%	**15.0%**	4.9%	6.1%	3.1%	0%	0.1%	**14.2%**
PHF	0.875	0.807	0.890	-	0.563	**0.918**	0.918	0.839	0.823	-	0.625	**0.914**
Lights	210	309	119	0	9	**647**	212	264	134	0	5	**615**
% Lights	100%	99.7%	98.3%	0%	100%	**99.5%**	99.5%	99.6%	99.3%	0%	100%	**99.5%**
Articulated Trucks	0	0	0	0	0	**0**	1	0	0	0	0	**1**
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	0.5%	0%	0%	0%	0%	**0.2%**
Buses and Single-Unit Trucks	0	1	2	0	0	**3**	0	1	1	0	0	**2**
% Buses and Single-Unit Trucks	0%	0.3%	1.7%	0%	0%	**0.5%**	0%	0.4%	0.7%	0%	0%	**0.3%**

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

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

Sat Jun 12, 2021
Midday Peak (WKND) (11:45 AM - 12:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845022, Location: 42.636136, -83.131734

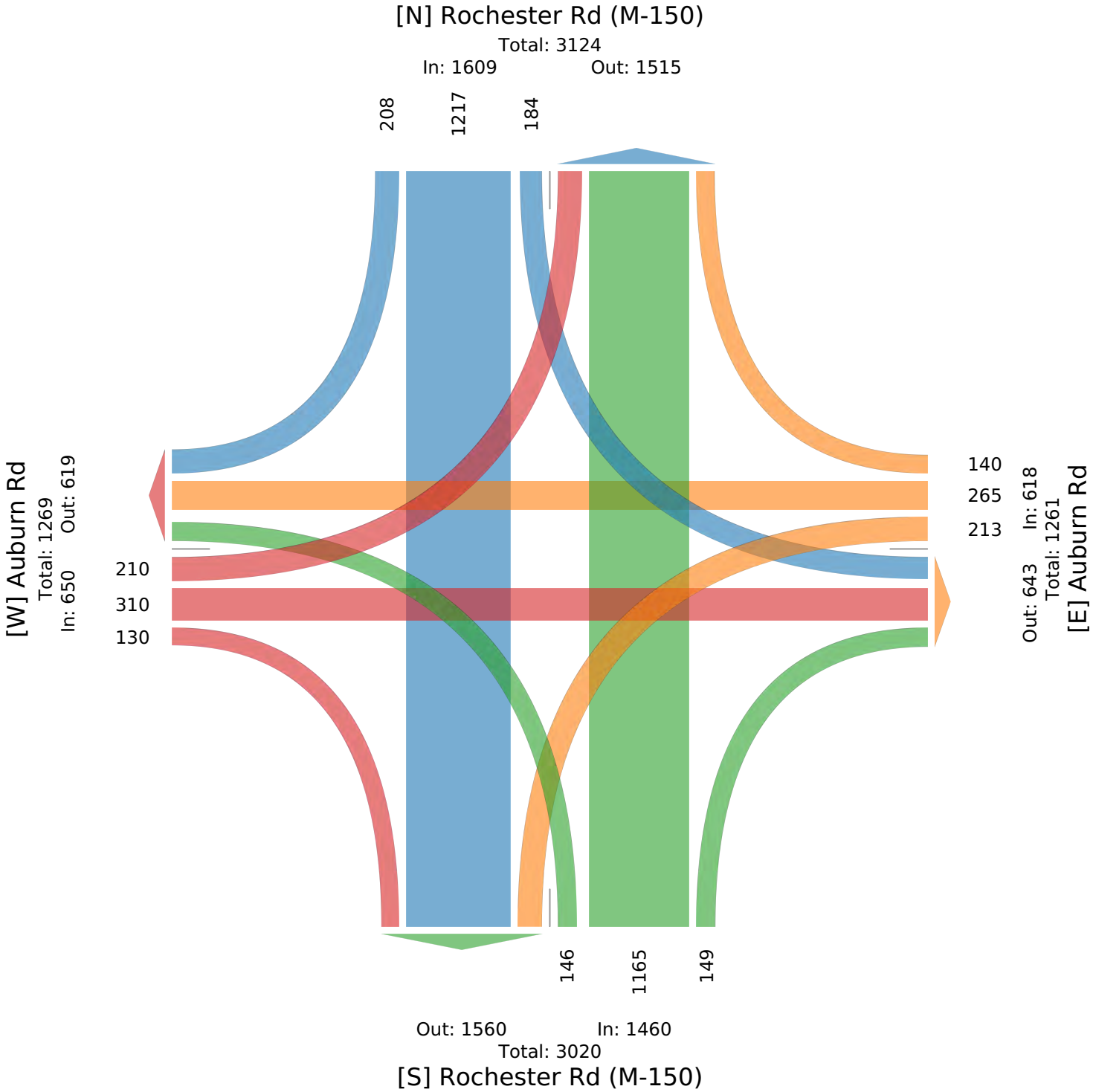
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Rochester Rd (M-150)						Rochester Rd (M-150)						
Direction	Northbound						Southbound						
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**	**Int**
2021-06-12 11:45AM	36	247	40	0	0	**323**	45	322	54	0	1	**422**	**1078**
12:00PM	31	330	38	0	1	**400**	43	299	50	0	0	**392**	**1083**
12:15PM	45	275	28	0	0	**348**	57	275	51	0	2	**385**	**1079**
12:30PM	34	313	42	0	0	**389**	39	321	50	0	0	**410**	**1097**
Total	146	1165	148	0	1	**1460**	184	1217	205	0	3	**1609**	**4337**
% Approach	10.0%	79.8%	10.1%	0%	0.1%	**-**	11.4%	75.6%	12.7%	0%	0.2%	**-**	-
% Total	3.4%	26.9%	3.4%	0%	0%	**33.7%**	4.2%	28.1%	4.7%	0%	0.1%	**37.1%**	-
PHF	0.811	0.883	0.881	-	0.250	**0.913**	0.807	0.945	0.949	-	0.375	**0.953**	0.988
Lights	143	1157	147	0	1	**1448**	183	1203	203	0	3	**1592**	4302
% Lights	97.9%	99.3%	99.3%	0%	100%	**99.2%**	99.5%	98.8%	99.0%	0%	100%	**98.9%**	99.2%
Articulated Trucks	1	1	0	0	0	**2**	0	7	0	0	0	**7**	10
% Articulated Trucks	0.7%	0.1%	0%	0%	0%	**0.1%**	0%	0.6%	0%	0%	0%	**0.4%**	0.2%
Buses and Single-Unit Trucks	2	7	1	0	0	**10**	1	7	2	0	0	**10**	25
% Buses and Single-Unit Trucks	1.4%	0.6%	0.7%	0%	0%	**0.7%**	0.5%	0.6%	1.0%	0%	0%	**0.6%**	0.6%

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

Rochester Rd (M-150) and Auburn Rd (Include ... - TMC
Sat Jun 12, 2021
Midday Peak (WKND) (11:45 AM - 12:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845022, Location: 42.636136, -83.131734

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



Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

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

Leg	Barclay Cir/Wabash Rd						Barclay Cir/Wabash Rd					
Direction	Eastbound						Westbound					
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**
2021-06-10 7:00AM	1	2	2	0	2	**7**	18	0	3	0	2	**23**
7:15AM	1	2	1	0	1	**5**	13	3	1	0	6	**23**
7:30AM	3	1	4	0	3	**11**	24	2	1	0	7	**34**
7:45AM	1	6	2	0	1	**10**	17	4	2	0	7	**30**
Hourly Total	6	11	9	0	7	**33**	72	9	7	0	22	**110**
8:00AM	2	5	1	1	0	**9**	30	5	1	0	12	**48**
8:15AM	2	4	5	0	1	**12**	28	2	8	0	8	**46**
8:30AM	2	3	4	0	1	**10**	35	3	6	0	18	**62**
8:45AM	8	9	4	0	3	**24**	23	1	1	0	18	**43**
Hourly Total	14	21	14	1	5	**55**	116	11	16	0	56	**199**
4:00PM	12	17	4	0	2	**35**	52	11	47	0	20	**130**
4:15PM	11	8	1	0	4	**24**	47	6	51	0	16	**120**
4:30PM	10	7	5	0	0	**22**	45	10	25	0	29	**109**
4:45PM	9	15	9	0	8	**41**	59	12	42	0	25	**138**
Hourly Total	42	47	19	0	14	**122**	203	39	165	0	90	**497**
5:00PM	13	8	3	0	1	**25**	54	11	37	0	24	**126**
5:15PM	8	12	4	0	2	**26**	55	10	23	0	28	**116**
5:30PM	14	3	1	0	2	**20**	41	8	21	0	17	**87**
5:45PM	12	16	5	0	1	**34**	51	4	31	0	14	**100**
Hourly Total	47	39	13	0	6	**105**	201	33	112	0	83	**429**
Total	109	118	55	1	32	**315**	592	92	300	0	251	**1235**
% Approach	34.6%	37.5%	17.5%	0.3%	10.2%	**-**	47.9%	7.4%	24.3%	0%	20.3%	**-**
% Total	1.0%	1.1%	0.5%	0%	0.3%	**2.8%**	5.3%	0.8%	2.7%	0%	2.2%	**11.0%**
Lights	107	117	55	1	31	**311**	587	90	298	0	250	**1225**
% Lights	98.2%	99.2%	100%	100%	96.9%	**98.7%**	99.2%	97.8%	99.3%	0%	99.6%	**99.2%**
Articulated Trucks	2	0	0	0	0	**2**	0	0	0	0	0	**0**
% Articulated Trucks	1.8%	0%	0%	0%	0%	**0.6%**	0%	0%	0%	0%	0%	**0%**
Buses and Single-Unit Trucks	0	1	0	0	1	**2**	5	2	2	0	1	**10**
% Buses and Single-Unit Trucks	0%	0.8%	0%	0%	3.1%	**0.6%**	0.8%	2.2%	0.7%	0%	0.4%	**0.8%**

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

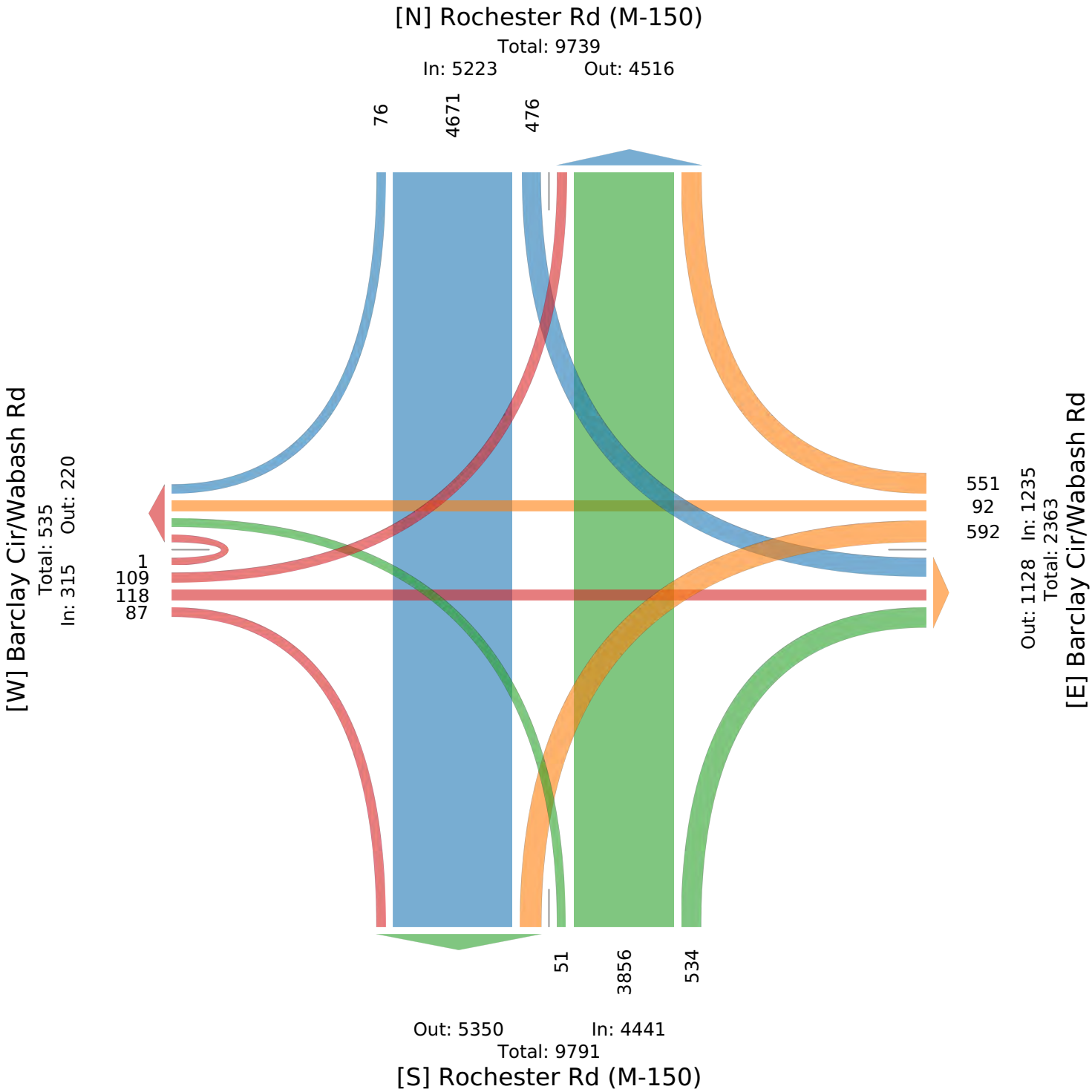
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Rochester Rd (M-150)						Rochester Rd (M-150)						
Direction	Northbound						Southbound						
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**	**Int**
2021-06-10 7:00AM	1	130	10	0	2	**143**	4	224	3	0	0	**231**	**404**
7:15AM	0	136	10	0	7	**153**	5	272	0	0	0	**277**	**458**
7:30AM	1	149	17	0	8	**175**	13	304	3	0	0	**320**	**540**
7:45AM	1	188	27	0	12	**228**	22	294	2	0	0	**318**	**586**
Hourly Total	3	603	64	0	29	**699**	44	1094	8	0	0	**1146**	**1988**
8:00AM	1	127	16	0	10	**154**	25	283	4	0	0	**312**	**523**
8:15AM	1	151	18	0	11	**181**	15	264	5	0	0	**284**	**523**
8:30AM	1	173	23	0	12	**209**	20	252	3	0	1	**276**	**557**
8:45AM	2	183	23	0	18	**226**	41	283	4	0	0	**328**	**621**
Hourly Total	5	634	80	0	51	**770**	101	1082	16	0	1	**1200**	**2224**
4:00PM	7	332	32	0	13	**384**	26	307	8	0	0	**341**	**890**
4:15PM	6	305	19	0	14	**344**	47	324	7	0	0	**378**	**866**
4:30PM	8	323	19	0	13	**363**	44	301	7	0	0	**352**	**846**
4:45PM	2	335	28	0	19	**384**	45	294	2	0	1	**342**	**905**
Hourly Total	23	1295	98	0	59	**1475**	162	1226	24	0	1	**1413**	**3507**
5:00PM	6	343	24	0	17	**390**	35	364	6	0	0	**405**	**946**
5:15PM	7	310	12	0	10	**339**	48	294	11	0	0	**353**	**834**
5:30PM	3	341	36	0	10	**390**	48	347	3	0	1	**399**	**896**
5:45PM	4	330	27	0	17	**378**	38	264	5	0	0	**307**	**819**
Hourly Total	20	1324	99	0	54	**1497**	169	1269	25	0	1	**1464**	**3495**
Total	51	3856	341	0	193	**4441**	476	4671	73	0	3	**5223**	**11214**
% Approach	1.1%	86.8%	7.7%	0%	4.3%	**-**	9.1%	89.4%	1.4%	0%	0.1%	**-**	-
% Total	0.5%	34.4%	3.0%	0%	1.7%	**39.6%**	4.2%	41.7%	0.7%	0%	0%	**46.6%**	-
Lights	49	3775	340	0	192	**4356**	474	4588	73	0	3	**5138**	11030
% Lights	96.1%	97.9%	99.7%	0%	99.5%	**98.1%**	99.6%	98.2%	100%	0%	100%	**98.4%**	98.4%
Articulated Trucks	2	30	0	0	1	**33**	1	24	0	0	0	**25**	60
% Articulated Trucks	3.9%	0.8%	0%	0%	0.5%	**0.7%**	0.2%	0.5%	0%	0%	0%	**0.5%**	0.5%
Buses and Single-Unit Trucks	0	51	1	0	0	**52**	1	59	0	0	0	**60**	124
% Buses and Single-Unit Trucks	0%	1.3%	0.3%	0%	0%	**1.2%**	0.2%	1.3%	0%	0%	0%	**1.1%**	1.1%

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC
Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

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



Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Thu Jun 10, 2021
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

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

Leg	Barclay Cir/Wabash Rd						Barclay Cir/Wabash Rd					
Direction	Eastbound						Westbound					
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**
2021-06-10 8:00AM	2	5	1	1	0	**9**	30	5	1	0	12	**48**
8:15AM	2	4	5	0	1	**12**	28	2	8	0	8	**46**
8:30AM	2	3	4	0	1	**10**	35	3	6	0	18	**62**
8:45AM	8	9	4	0	3	**24**	23	1	1	0	18	**43**
Total	14	21	14	1	5	**55**	116	11	16	0	56	**199**
% Approach	25.5%	38.2%	25.5%	1.8%	9.1%	**-**	58.3%	5.5%	8.0%	0%	28.1%	**-**
% Total	0.6%	0.9%	0.6%	0%	0.2%	**2.5%**	5.2%	0.5%	0.7%	0%	2.5%	**8.9%**
PHF	0.438	0.583	0.700	0.250	0.417	**0.573**	0.829	0.550	0.500	-	0.778	**0.802**
Lights	13	21	14	1	5	**54**	116	11	16	0	55	**198**
% Lights	92.9%	100%	100%	100%	100%	**98.2%**	100%	100%	100%	0%	98.2%	**99.5%**
Articulated Trucks	1	0	0	0	0	**1**	0	0	0	0	0	**0**
% Articulated Trucks	7.1%	0%	0%	0%	0%	**1.8%**	0%	0%	0%	0%	0%	**0%**
Buses and Single-Unit Trucks	0	0	0	0	0	**0**	0	0	0	0	1	**1**
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	1.8%	**0.5%**

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Thu Jun 10, 2021
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

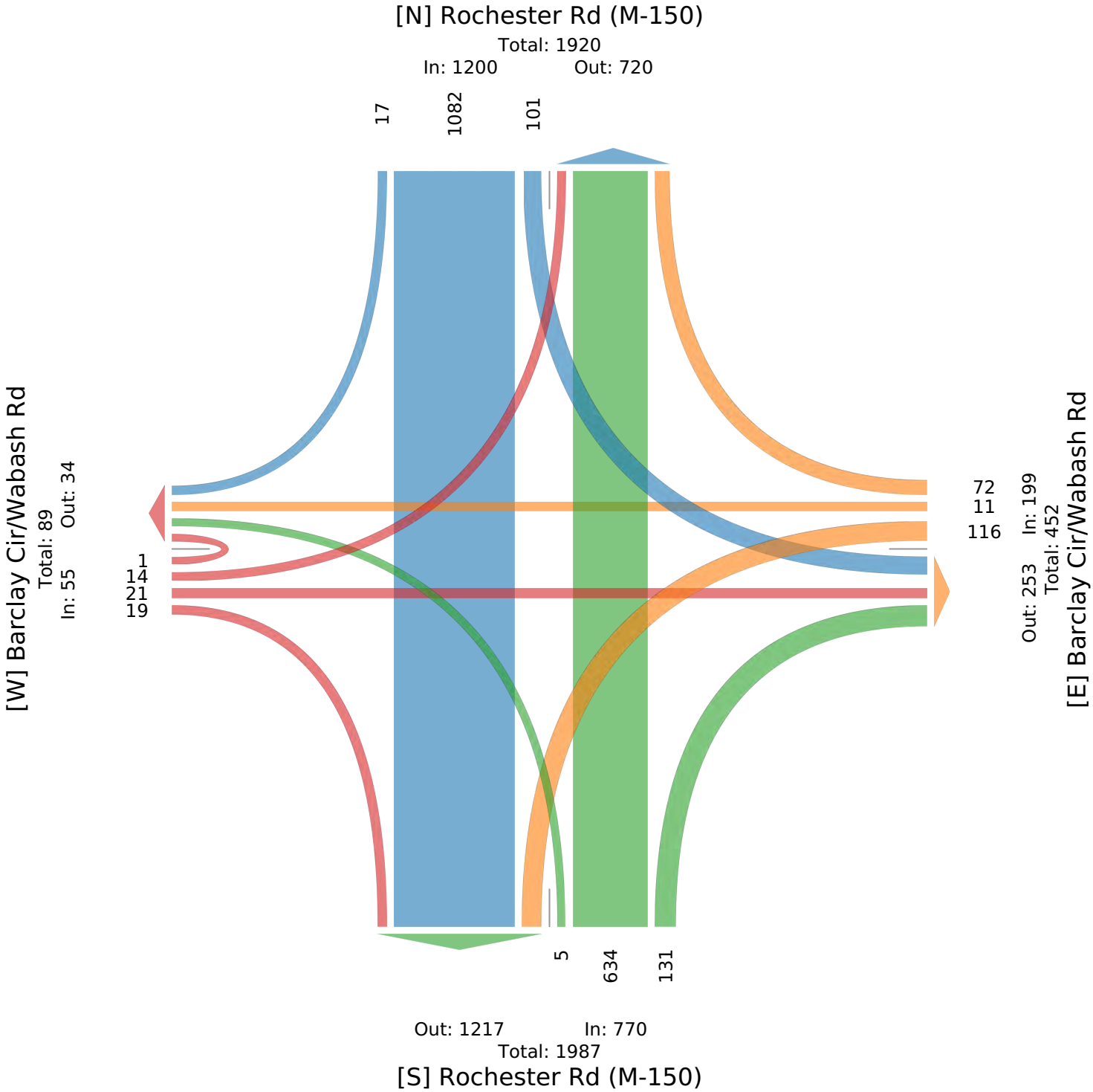
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Rochester Rd (M-150)						Rochester Rd (M-150)						
Direction	Northbound						Southbound						
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**	**Int**
2021-06-10 8:00AM	1	127	16	0	10	**154**	25	283	4	0	0	**312**	**523**
8:15AM	1	151	18	0	11	**181**	15	264	5	0	0	**284**	**523**
8:30AM	1	173	23	0	12	**209**	20	252	3	0	1	**276**	**557**
8:45AM	2	183	23	0	18	**226**	41	283	4	0	0	**328**	**621**
Total	5	634	80	0	51	**770**	101	1082	16	0	1	**1200**	**2224**
% Approach	0.6%	82.3%	10.4%	0%	6.6%	**-**	8.4%	90.2%	1.3%	0%	0.1%	**-**	-
% Total	0.2%	28.5%	3.6%	0%	2.3%	**34.6%**	4.5%	48.7%	0.7%	0%	0%	**54.0%**	-
PHF	0.625	0.866	0.870	-	0.708	**0.852**	0.616	0.956	0.800	-	0.250	**0.915**	0.895
Lights	5	614	79	0	50	**748**	100	1052	16	0	1	**1169**	2169
% Lights	100%	96.8%	98.8%	0%	98.0%	**97.1%**	99.0%	97.2%	100%	0%	100%	**97.4%**	97.5%
Articulated Trucks	0	6	0	0	1	**7**	1	9	0	0	0	**10**	18
% Articulated Trucks	0%	0.9%	0%	0%	2.0%	**0.9%**	1.0%	0.8%	0%	0%	0%	**0.8%**	0.8%
Buses and Single-Unit Trucks	0	14	1	0	0	**15**	0	21	0	0	0	**21**	37
% Buses and Single-Unit Trucks	0%	2.2%	1.3%	0%	0%	**1.9%**	0%	1.9%	0%	0%	0%	**1.8%**	1.7%

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC
Thu Jun 10, 2021
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

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



Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

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

Leg	Barclay Cir/Wabash Rd						Barclay Cir/Wabash Rd					
Direction	Eastbound						Westbound					
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**
2021-06-10 4:45PM	9	15	9	0	8	**41**	59	12	42	0	25	**138**
5:00PM	13	8	3	0	1	**25**	54	11	37	0	24	**126**
5:15PM	8	12	4	0	2	**26**	55	10	23	0	28	**116**
5:30PM	14	3	1	0	2	**20**	41	8	21	0	17	**87**
Total	44	38	17	0	13	**112**	209	41	123	0	94	**467**
% Approach	39.3%	33.9%	15.2%	0%	11.6%	**-**	44.8%	8.8%	26.3%	0%	20.1%	**-**
% Total	1.2%	1.1%	0.5%	0%	0.4%	**3.1%**	5.8%	1.1%	3.4%	0%	2.6%	**13.0%**
PHF	0.786	0.633	0.472	-	0.406	**0.683**	0.886	0.854	0.732	-	0.839	**0.846**
Lights	44	38	17	0	12	**111**	208	40	123	0	94	**465**
% Lights	100%	100%	100%	0%	92.3%	**99.1%**	99.5%	97.6%	100%	0%	100%	**99.6%**
Articulated Trucks	0	0	0	0	0	**0**	0	0	0	0	0	**0**
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	**0%**
Buses and Single-Unit Trucks	0	0	0	0	1	**1**	1	1	0	0	0	**2**
% Buses and Single-Unit Trucks	0%	0%	0%	0%	7.7%	**0.9%**	0.5%	2.4%	0%	0%	0%	**0.4%**

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

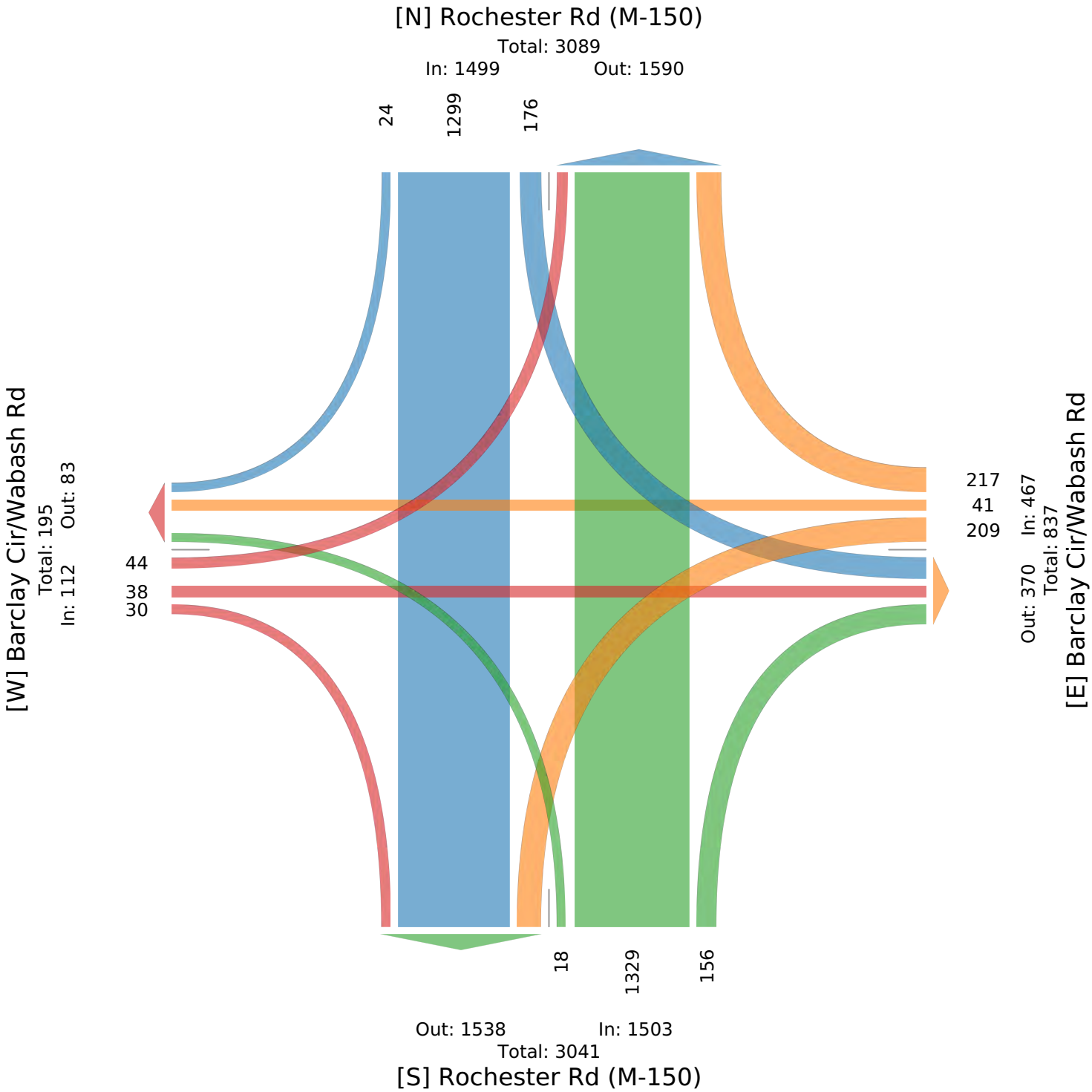
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Rochester Rd (M-150)						Rochester Rd (M-150)						
Direction	Northbound						Southbound						
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**	**Int**
2021-06-10 4:45PM	2	335	28	0	19	**384**	45	294	2	0	1	**342**	**905**
5:00PM	6	343	24	0	17	**390**	35	364	6	0	0	**405**	**946**
5:15PM	7	310	12	0	10	**339**	48	294	11	0	0	**353**	**834**
5:30PM	3	341	36	0	10	**390**	48	347	3	0	1	**399**	**896**
Total	18	1329	100	0	56	**1503**	176	1299	22	0	2	**1499**	**3581**
% Approach	1.2%	88.4%	6.7%	0%	3.7%	**-**	11.7%	86.7%	1.5%	0%	0.1%	**-**	-
% Total	0.5%	37.1%	2.8%	0%	1.6%	**42.0%**	4.9%	36.3%	0.6%	0%	0.1%	**41.9%**	-
PHF	0.643	0.969	0.694	-	0.737	**0.963**	0.917	0.892	0.500	-	0.500	**0.925**	0.946
Lights	18	1319	100	0	56	**1493**	176	1288	22	0	2	**1488**	3557
% Lights	100%	99.2%	100%	0%	100%	**99.3%**	100%	99.2%	100%	0%	100%	**99.3%**	99.3%
Articulated Trucks	0	3	0	0	0	**3**	0	5	0	0	0	**5**	8
% Articulated Trucks	0%	0.2%	0%	0%	0%	**0.2%**	0%	0.4%	0%	0%	0%	**0.3%**	0.2%
Buses and Single-Unit Trucks	0	7	0	0	0	**7**	0	6	0	0	0	**6**	16
% Buses and Single-Unit Trucks	0%	0.5%	0%	0%	0%	**0.5%**	0%	0.5%	0%	0%	0%	**0.4%**	0.4%

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC
Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845017, Location: 42.642556, -83.132047

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



Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845023, Location: 42.642556, -83.132047

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

Leg	Barclay Cir/Wabash Rd						Barclay Cir/Wabash Rd					
Direction	Eastbound						Westbound					
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**
2021-06-12 11:00AM	20	9	11	0	1	**41**	32	7	18	0	22	**79**
11:15AM	13	10	8	0	1	**32**	44	12	9	0	20	**85**
11:30AM	13	11	4	0	0	**28**	36	4	13	0	21	**74**
11:45AM	17	7	7	0	2	**33**	57	7	27	0	24	**115**
Hourly Total	63	37	30	0	4	**134**	169	30	67	0	87	**353**
12:00PM	14	4	0	0	0	**18**	36	8	25	0	15	**84**
12:15PM	7	13	8	0	3	**31**	42	9	17	0	19	**87**
12:30PM	9	7	7	0	3	**26**	40	8	20	0	20	**88**
12:45PM	14	15	3	0	3	**35**	41	13	22	0	32	**108**
Hourly Total	44	39	18	0	9	**110**	159	38	84	0	86	**367**
Total	107	76	48	0	13	**244**	328	68	151	0	173	**720**
% Approach	43.9%	31.1%	19.7%	0%	5.3%	**-**	45.6%	9.4%	21.0%	0%	24.0%	**-**
% Total	1.5%	1.1%	0.7%	0%	0.2%	**3.5%**	4.7%	1.0%	2.2%	0%	2.5%	**10.4%**
Lights	106	76	47	0	13	**242**	324	68	150	0	173	**715**
% Lights	99.1%	100%	97.9%	0%	100%	**99.2%**	98.8%	100%	99.3%	0%	100%	**99.3%**
Articulated Trucks	0	0	0	0	0	**0**	3	0	0	0	0	**3**
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	0.9%	0%	0%	0%	0%	**0.4%**
Buses and Single-Unit Trucks	1	0	1	0	0	**2**	1	0	1	0	0	**2**
% Buses and Single-Unit Trucks	0.9%	0%	2.1%	0%	0%	**0.8%**	0.3%	0%	0.7%	0%	0%	**0.3%**

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845023, Location: 42.642556, -83.132047

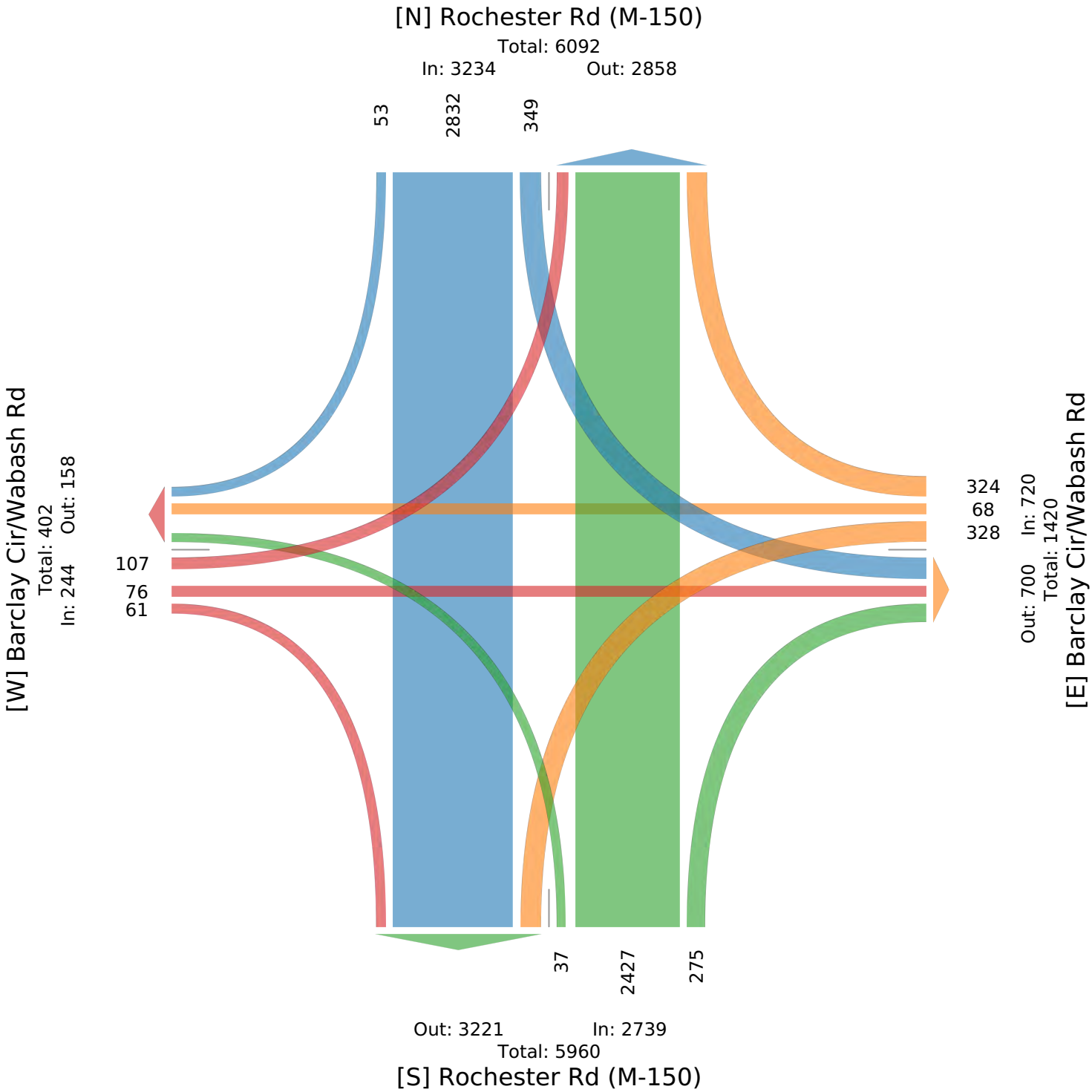
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Rochester Rd (M-150)						Rochester Rd (M-150)						
Direction	Northbound						Southbound						
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**	**Int**
2021-06-12 11:00AM	6	266	15	0	9	**296**	41	350	4	0	0	**395**	**811**
11:15AM	4	311	16	0	11	**342**	46	383	6	0	0	**435**	**894**
11:30AM	4	312	20	0	14	**350**	35	360	5	0	0	**400**	**852**
11:45AM	2	311	21	0	15	**349**	47	372	10	0	0	**429**	**926**
Hourly Total	16	1200	72	0	49	**1337**	169	1465	25	0	0	**1659**	**3483**
12:00PM	4	341	24	0	12	**381**	42	333	4	0	1	**380**	**863**
12:15PM	9	264	17	0	12	**302**	49	364	10	0	2	**425**	**845**
12:30PM	4	329	28	0	18	**379**	40	358	4	0	0	**402**	**895**
12:45PM	4	293	24	0	19	**340**	49	312	7	0	0	**368**	**851**
Hourly Total	21	1227	93	0	61	**1402**	180	1367	25	0	3	**1575**	**3454**
Total	37	2427	165	0	110	**2739**	349	2832	50	0	3	**3234**	**6937**
% Approach	1.4%	88.6%	6.0%	0%	4.0%	**-**	10.8%	87.6%	1.5%	0%	0.1%	**-**	-
% Total	0.5%	35.0%	2.4%	0%	1.6%	**39.5%**	5.0%	40.8%	0.7%	0%	0%	**46.6%**	-
Lights	37	2408	164	0	108	**2717**	348	2809	50	0	3	**3210**	6884
% Lights	100%	99.2%	99.4%	0%	98.2%	**99.2%**	99.7%	99.2%	100%	0%	100%	**99.3%**	99.2%
Articulated Trucks	0	7	0	0	1	**8**	1	8	0	0	0	**9**	20
% Articulated Trucks	0%	0.3%	0%	0%	0.9%	**0.3%**	0.3%	0.3%	0%	0%	0%	**0.3%**	0.3%
Buses and Single-Unit Trucks	0	12	1	0	1	**14**	0	15	0	0	0	**15**	33
% Buses and Single-Unit Trucks	0%	0.5%	0.6%	0%	0.9%	**0.5%**	0%	0.5%	0%	0%	0%	**0.5%**	0.5%

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC
Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845023, Location: 42.642556, -83.132047

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



Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Sat Jun 12, 2021
Midday Peak (WKND) (11:15 AM - 12:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845023, Location: 42.642556, -83.132047

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

Leg	Barclay Cir/Wabash Rd						Barclay Cir/Wabash Rd					
Direction	Eastbound						Westbound					
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**
2021-06-12 11:15AM	13	10	8	0	1	**32**	44	12	9	0	20	**85**
11:30AM	13	11	4	0	0	**28**	36	4	13	0	21	**74**
11:45AM	17	7	7	0	2	**33**	57	7	27	0	24	**115**
12:00PM	14	4	0	0	0	**18**	36	8	25	0	15	**84**
Total	57	32	19	0	3	**111**	173	31	74	0	80	**358**
% Approach	51.4%	28.8%	17.1%	0%	2.7%	**-**	48.3%	8.7%	20.7%	0%	22.3%	**-**
% Total	1.6%	0.9%	0.5%	0%	0.1%	**3.1%**	4.9%	0.9%	2.1%	0%	2.3%	**10.1%**
PHF	0.838	0.727	0.594	-	0.375	**0.841**	0.759	0.646	0.685	-	0.833	**0.778**
Lights	56	32	19	0	3	**110**	172	31	74	0	80	**357**
% Lights	98.2%	100%	100%	0%	100%	**99.1%**	99.4%	100%	100%	0%	100%	**99.7%**
Articulated Trucks	0	0	0	0	0	**0**	1	0	0	0	0	**1**
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	0.6%	0%	0%	0%	0%	**0.3%**
Buses and Single-Unit Trucks	1	0	0	0	0	**1**	0	0	0	0	0	**0**
% Buses and Single-Unit Trucks	1.8%	0%	0%	0%	0%	**0.9%**	0%	0%	0%	0%	0%	**0%**

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC

Sat Jun 12, 2021
Midday Peak (WKND) (11:15 AM - 12:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845023, Location: 42.642556, -83.132047

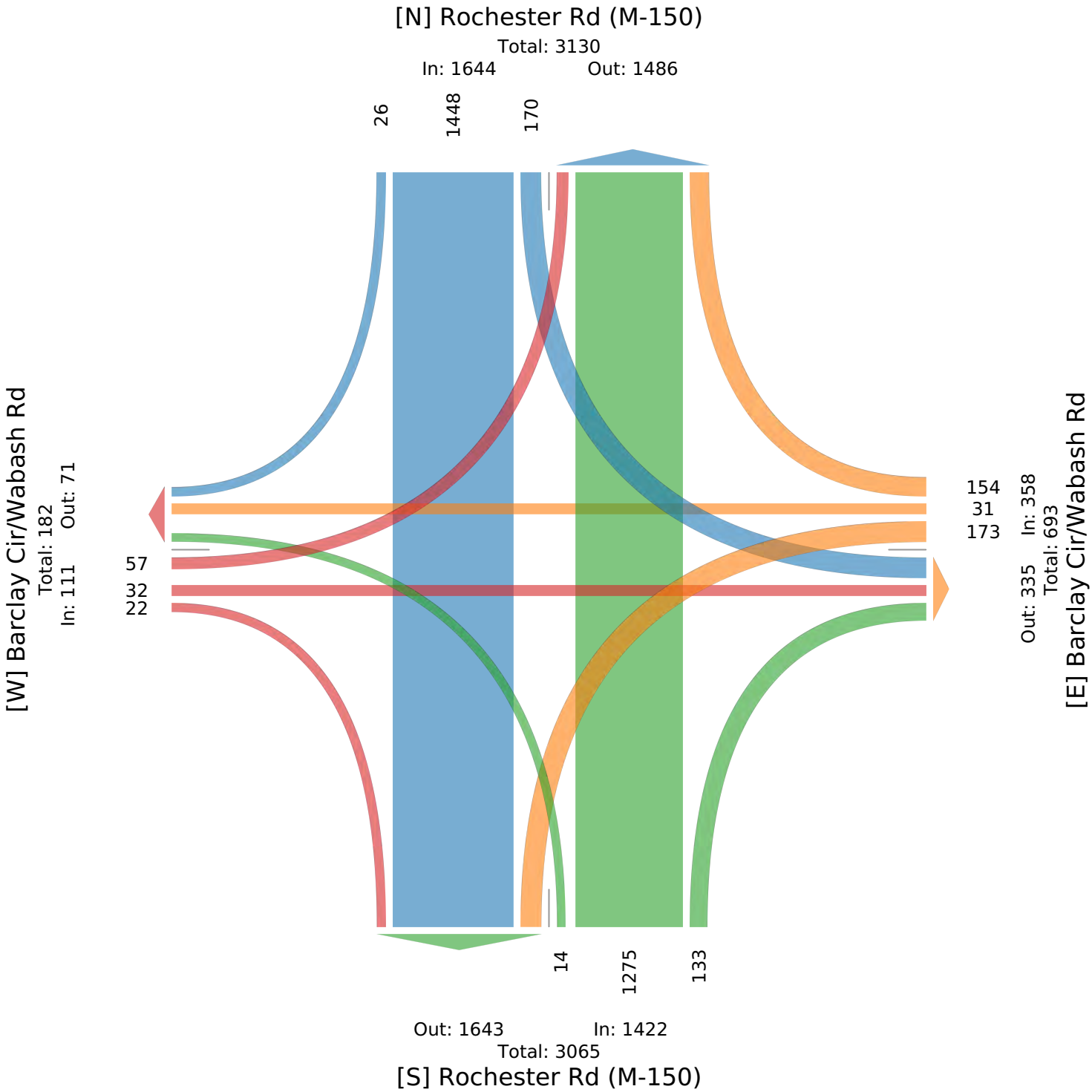
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Rochester Rd (M-150)						Rochester Rd (M-150)						
Direction	Northbound						Southbound						
Time	L	T	R	U	RR	**App**	L	T	R	U	RR	**App**	**Int**
2021-06-12 11:15AM	4	311	16	0	11	**342**	46	383	6	0	0	**435**	**894**
11:30AM	4	312	20	0	14	**350**	35	360	5	0	0	**400**	**852**
11:45AM	2	311	21	0	15	**349**	47	372	10	0	0	**429**	**926**
12:00PM	4	341	24	0	12	**381**	42	333	4	0	1	**380**	**863**
Total	14	1275	81	0	52	**1422**	170	1448	25	0	1	**1644**	**3535**
% Approach	1.0%	89.7%	5.7%	0%	3.7%	**-**	10.3%	88.1%	1.5%	0%	0.1%	**-**	-
% Total	0.4%	36.1%	2.3%	0%	1.5%	**40.2%**	4.8%	41.0%	0.7%	0%	0%	**46.5%**	-
PHF	0.875	0.935	0.844	-	0.867	**0.933**	0.904	0.945	0.625	-	0.250	**0.945**	0.954
Lights	14	1265	80	0	50	**1409**	169	1433	25	0	1	**1628**	3504
% Lights	100%	99.2%	98.8%	0%	96.2%	**99.1%**	99.4%	99.0%	100%	0%	100%	**99.0%**	99.1%
Articulated Trucks	0	3	0	0	1	**4**	1	6	0	0	0	**7**	12
% Articulated Trucks	0%	0.2%	0%	0%	1.9%	**0.3%**	0.6%	0.4%	0%	0%	0%	**0.4%**	0.3%
Buses and Single-Unit Trucks	0	7	1	0	1	**9**	0	9	0	0	0	**9**	19
% Buses and Single-Unit Trucks	0%	0.5%	1.2%	0%	1.9%	**0.6%**	0%	0.6%	0%	0%	0%	**0.5%**	0.5%

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

Rochester Rd (M-150) and Barclay Cir/Wabash ... - TMC
Sat Jun 12, 2021
Midday Peak (WKND) (11:15 AM - 12:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845023, Location: 42.642556, -83.132047

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



Rochester Rd (M-150) and North Site Driveway - TMC

Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845018, Location: 42.639604, -83.131923

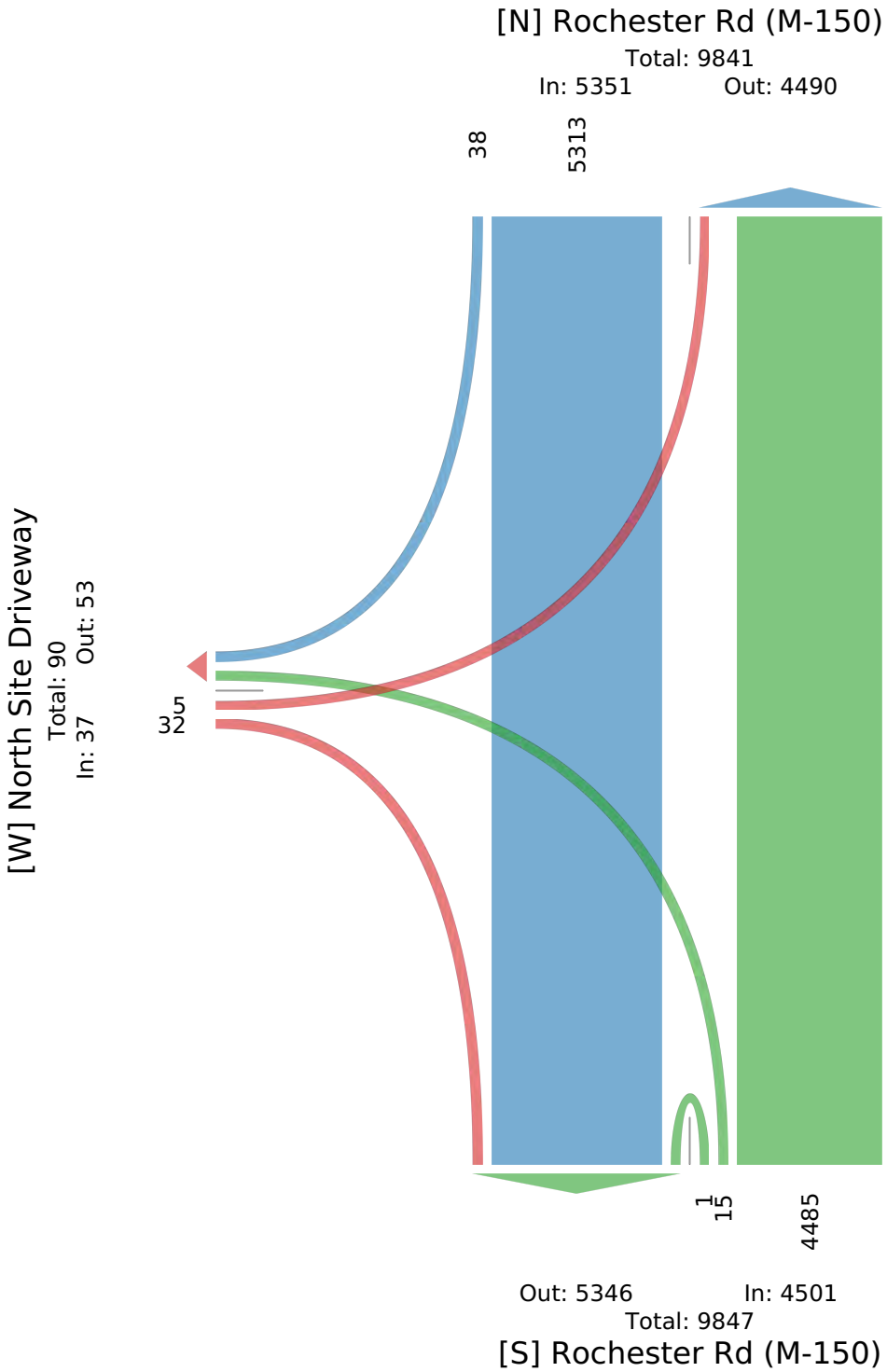
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	North Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-10 7:00AM	0	0	0	**0**	0	159	0	**159**	233	0	0	**233**	**392**
7:15AM	0	0	0	**0**	1	157	0	**158**	287	2	0	**289**	**447**
7:30AM	0	0	0	**0**	1	193	0	**194**	331	0	0	**331**	**525**
7:45AM	0	0	0	**0**	0	236	0	**236**	308	0	0	**308**	**544**
Hourly Total	0	0	0	**0**	2	745	0	**747**	1159	2	0	**1161**	**1908**
8:00AM	0	0	0	**0**	0	164	0	**164**	321	0	0	**321**	**485**
8:15AM	0	0	0	**0**	0	203	0	**203**	285	0	0	**285**	**488**
8:30AM	0	0	0	**0**	0	216	0	**216**	297	0	0	**297**	**513**
8:45AM	0	0	0	**0**	1	239	0	**240**	301	4	0	**305**	**545**
Hourly Total	0	0	0	**0**	1	822	0	**823**	1204	4	0	**1208**	**2031**
4:00PM	0	3	0	**3**	3	371	0	**374**	383	8	0	**391**	**768**
4:15PM	0	7	0	**7**	1	318	0	**319**	372	0	0	**372**	**698**
4:30PM	1	5	0	**6**	3	361	0	**364**	364	6	0	**370**	**740**
4:45PM	0	4	0	**4**	0	382	0	**382**	366	5	0	**371**	**757**
Hourly Total	1	19	0	**20**	7	1432	0	**1439**	1485	19	0	**1504**	**2963**
5:00PM	1	3	0	**4**	2	367	0	**369**	413	3	0	**416**	**789**
5:15PM	0	2	0	**2**	3	363	1	**367**	369	7	0	**376**	**745**
5:30PM	2	6	0	**8**	0	380	0	**380**	358	3	0	**361**	**749**
5:45PM	1	2	0	**3**	0	376	0	**376**	325	0	0	**325**	**704**
Hourly Total	4	13	0	**17**	5	1486	1	**1492**	1465	13	0	**1478**	**2987**
Total	5	32	0	**37**	15	4485	1	**4501**	5313	38	0	**5351**	**9889**
% Approach	13.5%	86.5%	0%	**-**	0.3%	99.6%	0%	**-**	99.3%	0.7%	0%	**-**	-
% Total	0.1%	0.3%	0%	**0.4%**	0.2%	45.4%	0%	**45.5%**	53.7%	0.4%	0%	**54.1%**	-
Lights	5	32	0	**37**	14	4400	1	**4415**	5221	38	0	**5259**	9711
% Lights	100%	100%	0%	**100%**	93.3%	98.1%	100%	**98.1%**	98.3%	100%	0%	**98.3%**	98.2%
Articulated Trucks	0	0	0	**0**	0	35	0	**35**	22	0	0	**22**	57
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.8%	0%	**0.8%**	0.4%	0%	0%	**0.4%**	0.6%
Buses and Single-Unit Trucks	0	0	0	**0**	1	50	0	**51**	70	0	0	**70**	121
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	6.7%	1.1%	0%	**1.1%**	1.3%	0%	0%	**1.3%**	1.2%

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

Rochester Rd (M-150) and North Site Driveway - TMC
Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845018, Location: 42.639604, -83.131923

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



Rochester Rd (M-150) and North Site Driveway - TMC

Thu Jun 10, 2021
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845018, Location: 42.639604, -83.131923

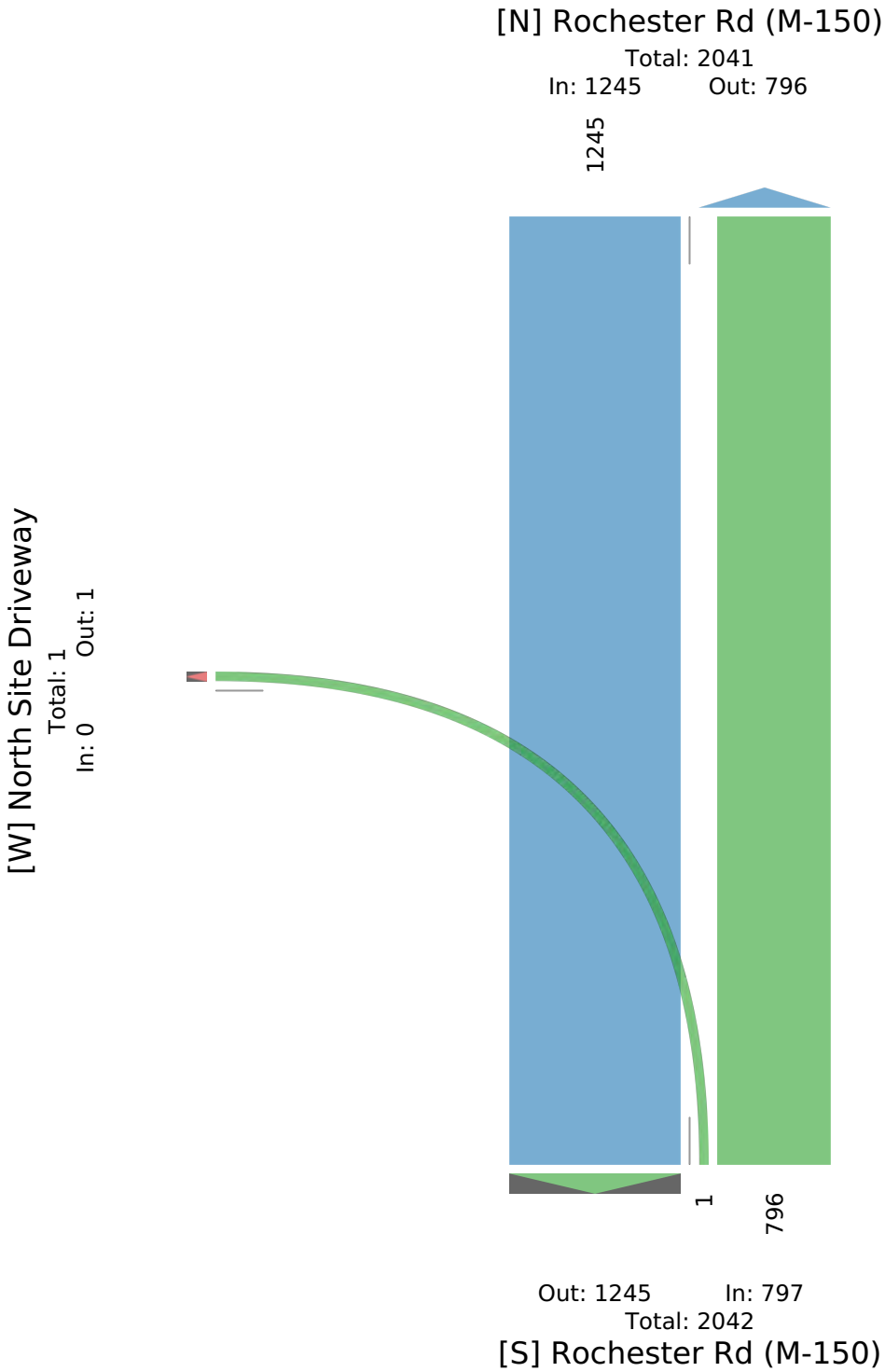
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	North Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-10 7:30AM	0	0	0	**0**	1	193	0	**194**	331	0	0	**331**	**525**
7:45AM	0	0	0	**0**	0	236	0	**236**	308	0	0	**308**	**544**
8:00AM	0	0	0	**0**	0	164	0	**164**	321	0	0	**321**	**485**
8:15AM	0	0	0	**0**	0	203	0	**203**	285	0	0	**285**	**488**
Total	0	0	0	**0**	1	796	0	**797**	1245	0	0	**1245**	**2042**
% Approach	0%	0%	0%	**-**	0.1%	99.9%	0%	**-**	100%	0%	0%	**-**	-
% Total	0%	0%	0%	**0%**	0%	39.0%	0%	**39.0%**	61.0%	0%	0%	**61.0%**	-
PHF	-	-	-	**-**	0.250	0.843	-	**0.844**	0.940	-	-	**0.940**	0.938
Lights	0	0	0	**0**	1	765	0	**766**	1220	0	0	**1220**	1986
% Lights	0%	0%	0%	**-**	100%	96.1%	0%	**96.1%**	98.0%	0%	0%	**98.0%**	97.3%
Articulated Trucks	0	0	0	**0**	0	11	0	**11**	9	0	0	**9**	20
% Articulated Trucks	0%	0%	0%	**-**	0%	1.4%	0%	**1.4%**	0.7%	0%	0%	**0.7%**	1.0%
Buses and Single-Unit Trucks	0	0	0	**0**	0	20	0	**20**	16	0	0	**16**	36
% Buses and Single-Unit Trucks	0%	0%	0%	**-**	0%	2.5%	0%	**2.5%**	1.3%	0%	0%	**1.3%**	1.8%

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

Rochester Rd (M-150) and North Site Driveway - TMC
Thu Jun 10, 2021
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845018, Location: 42.639604, -83.131923

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



Rochester Rd (M-150) and North Site Driveway - TMC

Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845018, Location: 42.639604, -83.131923

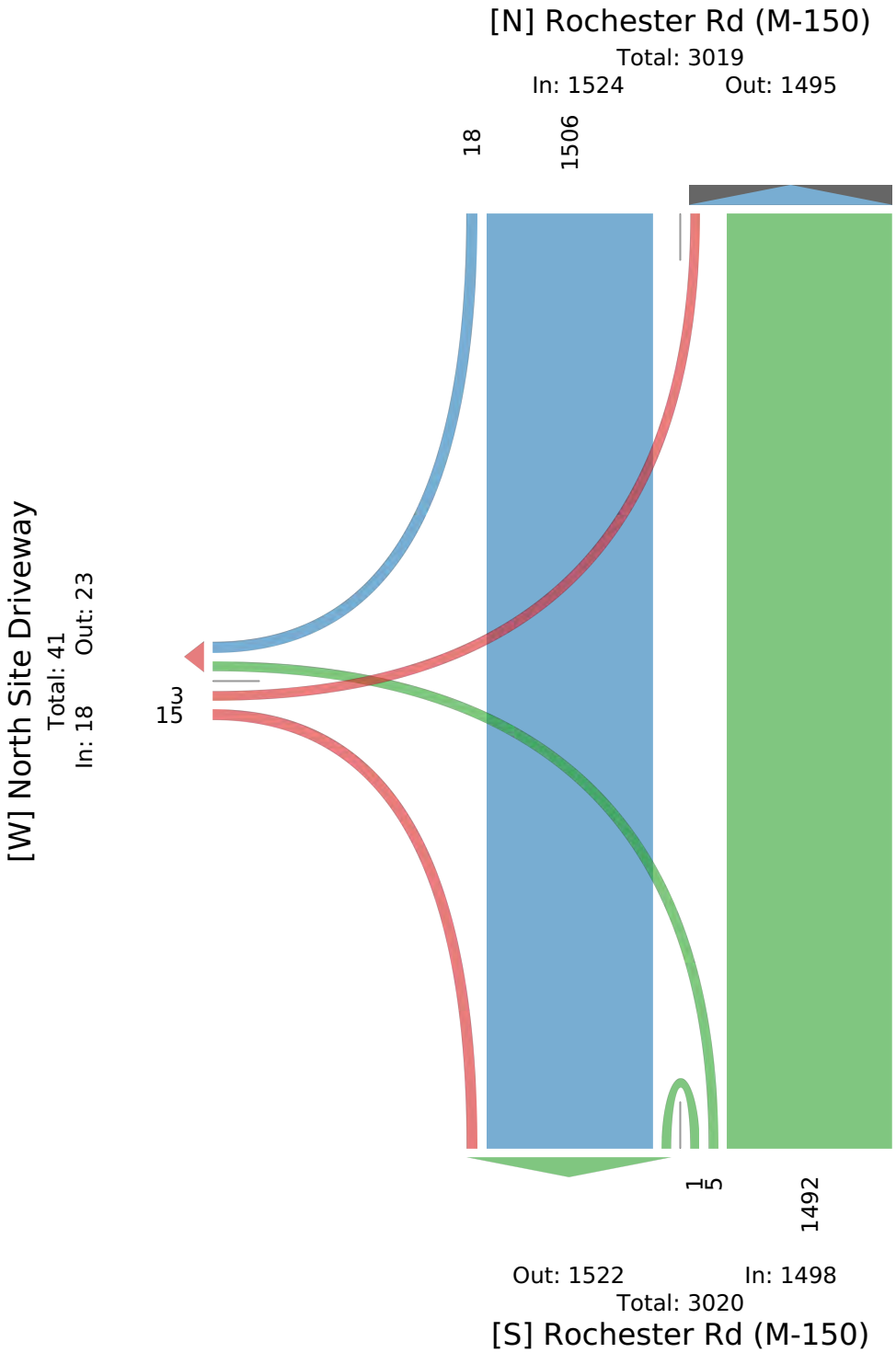
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	North Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-10 4:45PM	0	4	0	**4**	0	382	0	**382**	366	5	0	**371**	**757**
5:00PM	1	3	0	**4**	2	367	0	**369**	413	3	0	**416**	**789**
5:15PM	0	2	0	**2**	3	363	1	**367**	369	7	0	**376**	**745**
5:30PM	2	6	0	**8**	0	380	0	**380**	358	3	0	**361**	**749**
Total	3	15	0	**18**	5	1492	1	**1498**	1506	18	0	**1524**	**3040**
% Approach	16.7%	83.3%	0%	**-**	0.3%	99.6%	0.1%	**-**	98.8%	1.2%	0%	**-**	-
% Total	0.1%	0.5%	0%	**0.6%**	0.2%	49.1%	0%	**49.3%**	49.5%	0.6%	0%	**50.1%**	-
PHF	0.375	0.625	-	**0.563**	0.417	0.976	0.250	**0.980**	0.912	0.643	-	**0.916**	0.963
Lights	3	15	0	**18**	4	1482	1	**1487**	1490	18	0	**1508**	3013
% Lights	100%	100%	0%	**100%**	80.0%	99.3%	100%	**99.3%**	98.9%	100%	0%	**99.0%**	99.1%
Articulated Trucks	0	0	0	**0**	0	4	0	**4**	4	0	0	**4**	8
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.3%	0%	**0.3%**	0.3%	0%	0%	**0.3%**	0.3%
Buses and Single-Unit Trucks	0	0	0	**0**	1	6	0	**7**	12	0	0	**12**	19
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	20.0%	0.4%	0%	**0.5%**	0.8%	0%	0%	**0.8%**	0.6%

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

Rochester Rd (M-150) and North Site Driveway - TMC
Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845018, Location: 42.639604, -83.131923

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



Rochester Rd (M-150) and North Site Driveway - TMC

Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845024, Location: 42.639604, -83.131923

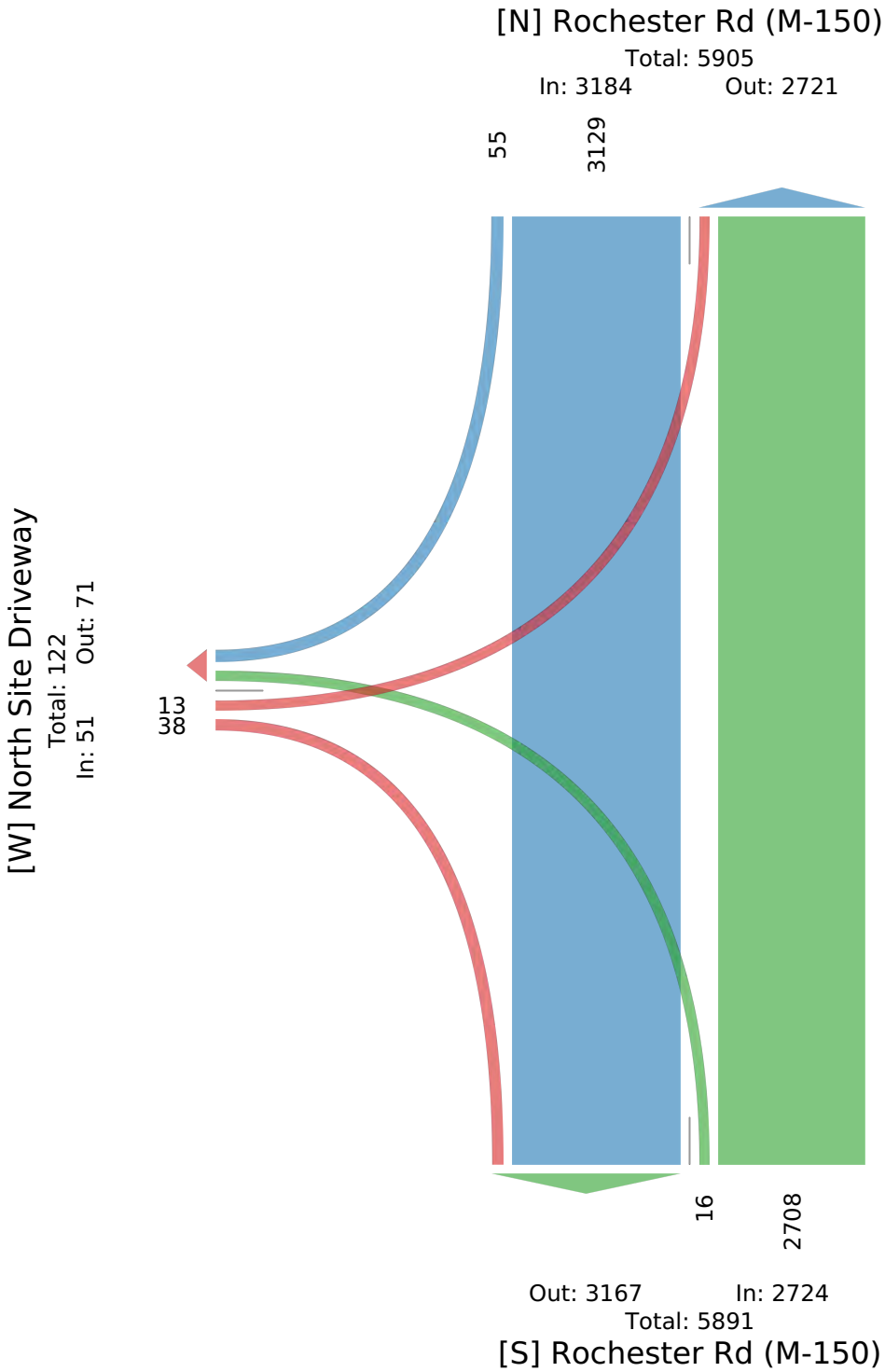
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	North Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-12 11:00AM	2	3	0	**5**	2	312	0	**314**	389	5	0	**394**	**713**
11:15AM	1	3	0	**4**	2	326	0	**328**	415	6	0	**421**	**753**
11:30AM	3	10	0	**13**	2	367	0	**369**	386	7	0	**393**	**775**
11:45AM	3	3	0	**6**	1	332	0	**333**	422	9	0	**431**	**770**
Hourly Total	9	19	0	**28**	7	1337	0	**1344**	1612	27	0	**1639**	**3011**
12:00PM	1	3	0	**4**	1	365	0	**366**	361	5	0	**366**	**736**
12:15PM	0	5	0	**5**	1	312	0	**313**	414	8	0	**422**	**740**
12:30PM	3	4	0	**7**	3	355	0	**358**	389	7	0	**396**	**761**
12:45PM	0	7	0	**7**	4	339	0	**343**	353	8	0	**361**	**711**
Hourly Total	4	19	0	**23**	9	1371	0	**1380**	1517	28	0	**1545**	**2948**
Total	13	38	0	**51**	16	2708	0	**2724**	3129	55	0	**3184**	**5959**
% Approach	25.5%	74.5%	0%	**-**	0.6%	99.4%	0%	**-**	98.3%	1.7%	0%	**-**	-
% Total	0.2%	0.6%	0%	**0.9%**	0.3%	45.4%	0%	**45.7%**	52.5%	0.9%	0%	**53.4%**	-
Lights	13	38	0	**51**	16	2685	0	**2701**	3100	55	0	**3155**	5907
% Lights	100%	100%	0%	**100%**	100%	99.2%	0%	**99.2%**	99.1%	100%	0%	**99.1%**	99.1%
Articulated Trucks	0	0	0	**0**	0	9	0	**9**	11	0	0	**11**	20
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.3%	0%	**0.3%**	0.4%	0%	0%	**0.3%**	0.3%
Buses and Single-Unit Trucks	0	0	0	**0**	0	14	0	**14**	18	0	0	**18**	32
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	0%	0.5%	0%	**0.5%**	0.6%	0%	0%	**0.6%**	0.5%

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

Rochester Rd (M-150) and North Site Driveway - TMC
Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845024, Location: 42.639604, -83.131923

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



Rochester Rd (M-150) and North Site Driveway - TMC

Sat Jun 12, 2021
Midday Peak (WKND) (11:15 AM - 12:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845024, Location: 42.639604, -83.131923

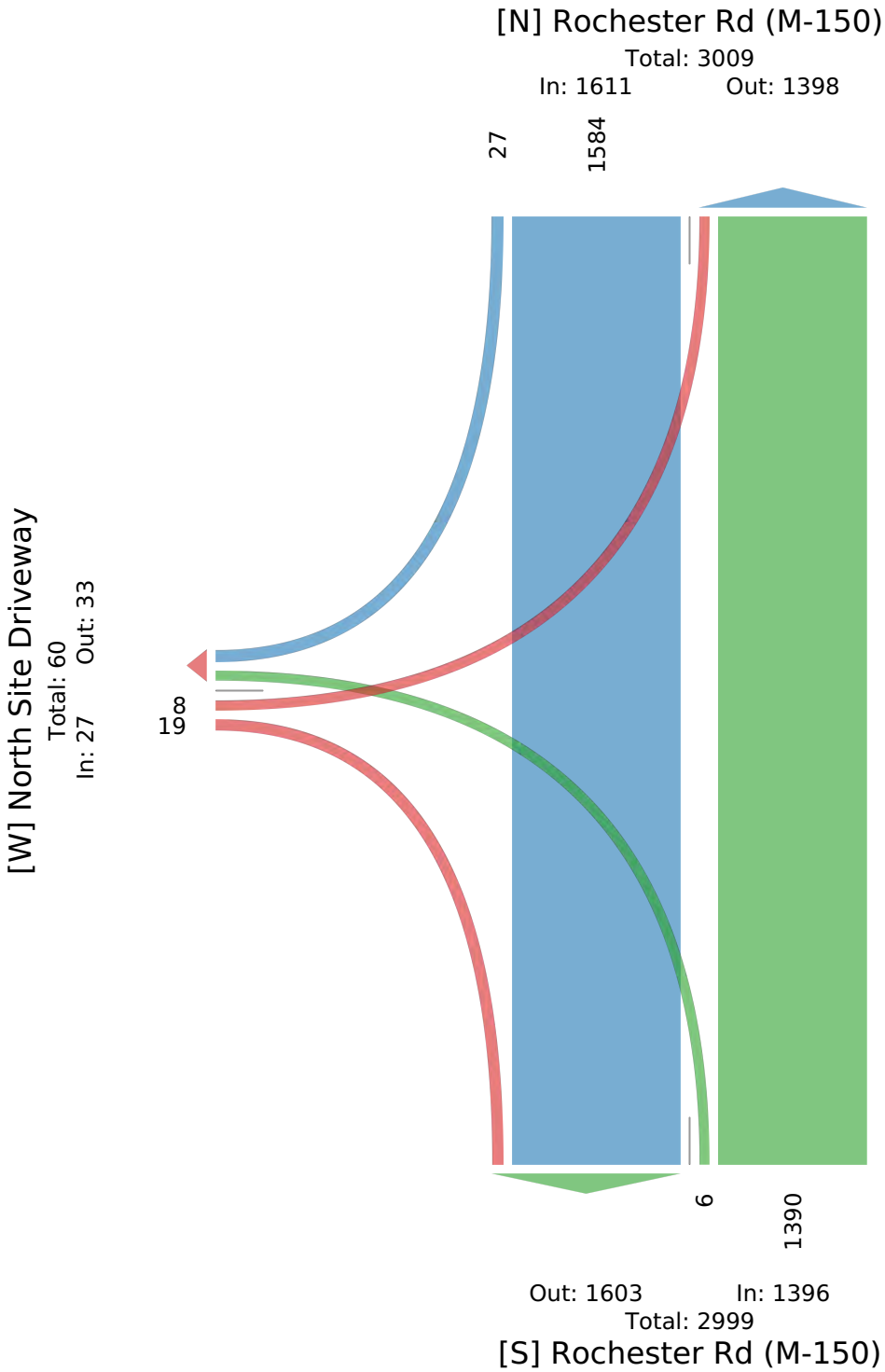
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	North Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-12 11:15AM	1	3	0	**4**	2	326	0	**328**	415	6	0	**421**	**753**
11:30AM	3	10	0	**13**	2	367	0	**369**	386	7	0	**393**	**775**
11:45AM	3	3	0	**6**	1	332	0	**333**	422	9	0	**431**	**770**
12:00PM	1	3	0	**4**	1	365	0	**366**	361	5	0	**366**	**736**
Total	8	19	0	**27**	6	1390	0	**1396**	1584	27	0	**1611**	**3034**
% Approach	29.6%	70.4%	0%	**-**	0.4%	99.6%	0%	**-**	98.3%	1.7%	0%	**-**	-
% Total	0.3%	0.6%	0%	**0.9%**	0.2%	45.8%	0%	**46.0%**	52.2%	0.9%	0%	**53.1%**	-
PHF	0.667	0.475	-	**0.519**	0.750	0.947	-	**0.946**	0.938	0.750	-	**0.934**	0.979
Lights	8	19	0	**27**	6	1378	0	**1384**	1568	27	0	**1595**	3006
% Lights	100%	100%	0%	**100%**	100%	99.1%	0%	**99.1%**	99.0%	100%	0%	**99.0%**	99.1%
Articulated Trucks	0	0	0	**0**	0	4	0	**4**	7	0	0	**7**	11
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.3%	0%	**0.3%**	0.4%	0%	0%	**0.4%**	0.4%
Buses and Single-Unit Trucks	0	0	0	**0**	0	8	0	**8**	9	0	0	**9**	17
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	0%	0.6%	0%	**0.6%**	0.6%	0%	0%	**0.6%**	0.6%

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

Rochester Rd (M-150) and North Site Driveway - TMC
Sat Jun 12, 2021
Midday Peak (WKND) (11:15 AM - 12:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845024, Location: 42.639604, -83.131923

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



Rochester Rd (M-150) and South Site Driveway - TMC

Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845019, Location: 42.639068, -83.131896

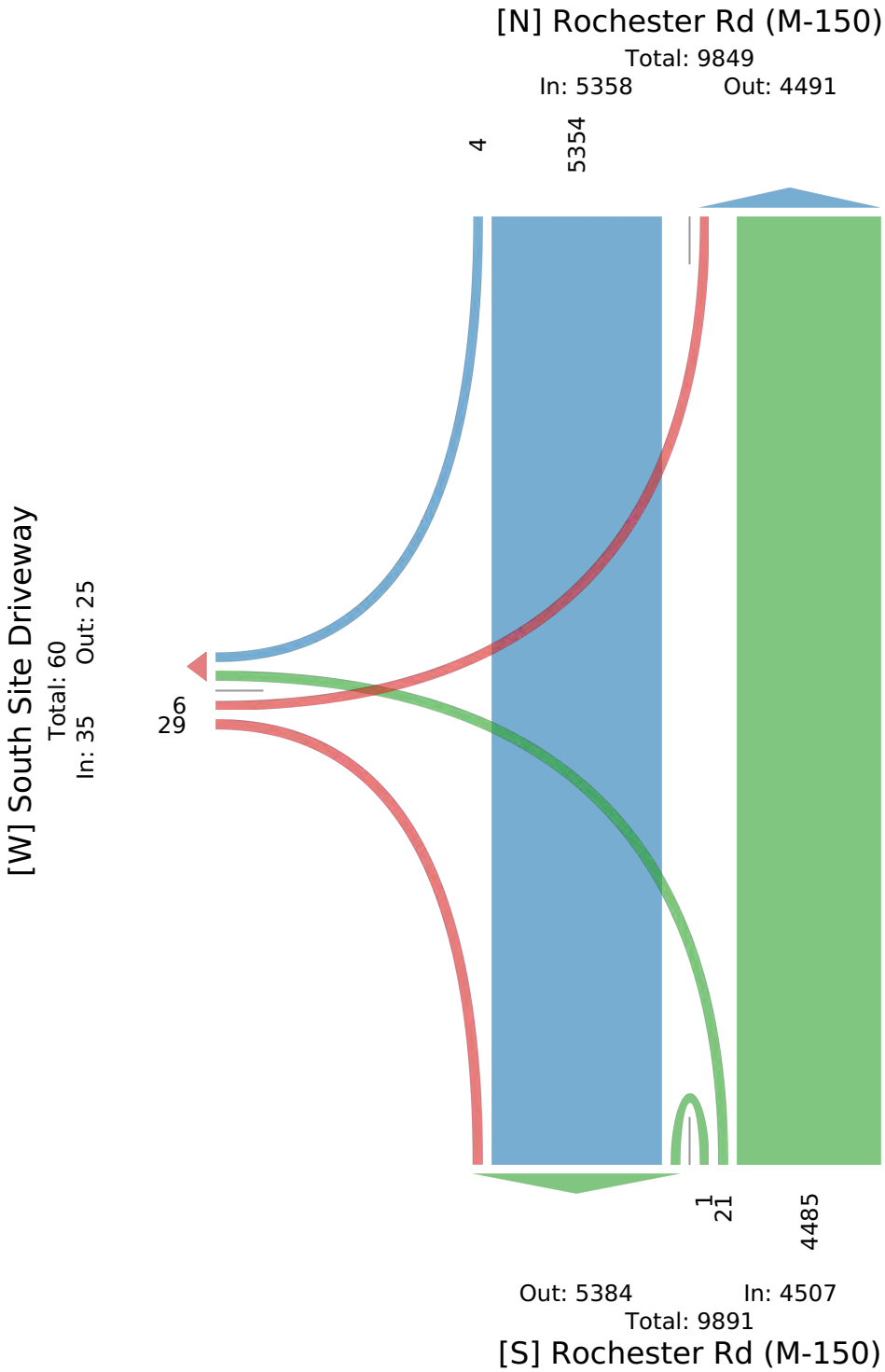
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-10 7:00AM	0	0	0	**0**	0	157	0	**157**	237	0	0	**237**	**394**
7:15AM	0	1	0	**1**	0	158	0	**158**	288	0	0	**288**	**447**
7:30AM	0	0	0	**0**	0	192	0	**192**	339	0	0	**339**	**531**
7:45AM	0	0	0	**0**	1	236	0	**237**	316	0	0	**316**	**553**
Hourly Total	0	1	0	**1**	1	743	0	**744**	1180	0	0	**1180**	**1925**
8:00AM	0	0	0	**0**	0	166	0	**166**	317	0	0	**317**	**483**
8:15AM	0	0	0	**0**	0	201	0	**201**	291	0	0	**291**	**492**
8:30AM	0	1	0	**1**	1	217	0	**218**	296	0	0	**296**	**515**
8:45AM	0	2	0	**2**	0	242	0	**242**	300	0	0	**300**	**544**
Hourly Total	0	3	0	**3**	1	826	0	**827**	1204	0	0	**1204**	**2034**
4:00PM	0	6	0	**6**	8	373	0	**381**	384	0	0	**384**	**771**
4:15PM	1	5	0	**6**	3	325	0	**328**	372	1	0	**373**	**707**
4:30PM	1	0	0	**1**	4	361	0	**365**	374	0	0	**374**	**740**
4:45PM	1	3	0	**4**	2	388	0	**390**	369	1	0	**370**	**764**
Hourly Total	3	14	0	**17**	17	1447	0	**1464**	1499	2	0	**1501**	**2982**
5:00PM	0	1	0	**1**	0	366	0	**366**	400	0	0	**400**	**767**
5:15PM	0	4	0	**4**	0	359	1	**360**	374	1	0	**375**	**739**
5:30PM	1	3	0	**4**	2	382	0	**384**	363	1	0	**364**	**752**
5:45PM	2	3	0	**5**	0	362	0	**362**	334	0	0	**334**	**701**
Hourly Total	3	11	0	**14**	2	1469	1	**1472**	1471	2	0	**1473**	**2959**
Total	6	29	0	**35**	21	4485	1	**4507**	5354	4	0	**5358**	**9900**
% Approach	17.1%	82.9%	0%	**-**	0.5%	99.5%	0%	**-**	99.9%	0.1%	0%	**-**	-
% Total	0.1%	0.3%	0%	**0.4%**	0.2%	45.3%	0%	**45.5%**	54.1%	0%	0%	**54.1%**	-
Lights	6	28	0	**34**	21	4399	1	**4421**	5254	4	0	**5258**	9713
% Lights	100%	96.6%	0%	**97.1%**	100%	98.1%	100%	**98.1%**	98.1%	100%	0%	**98.1%**	98.1%
Articulated Trucks	0	0	0	**0**	0	35	0	**35**	22	0	0	**22**	57
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.8%	0%	**0.8%**	0.4%	0%	0%	**0.4%**	0.6%
Buses and Single-Unit Trucks	0	1	0	**1**	0	51	0	**51**	78	0	0	**78**	130
% Buses and Single-Unit Trucks	0%	3.4%	0%	**2.9%**	0%	1.1%	0%	**1.1%**	1.5%	0%	0%	**1.5%**	1.3%

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

Rochester Rd (M-150) and South Site Driveway - TMC
Thu Jun 10, 2021
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845019, Location: 42.639068, -83.131896

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



Rochester Rd (M-150) and South Site Driveway - TMC

Thu Jun 10, 2021
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845019, Location: 42.639068, -83.131896

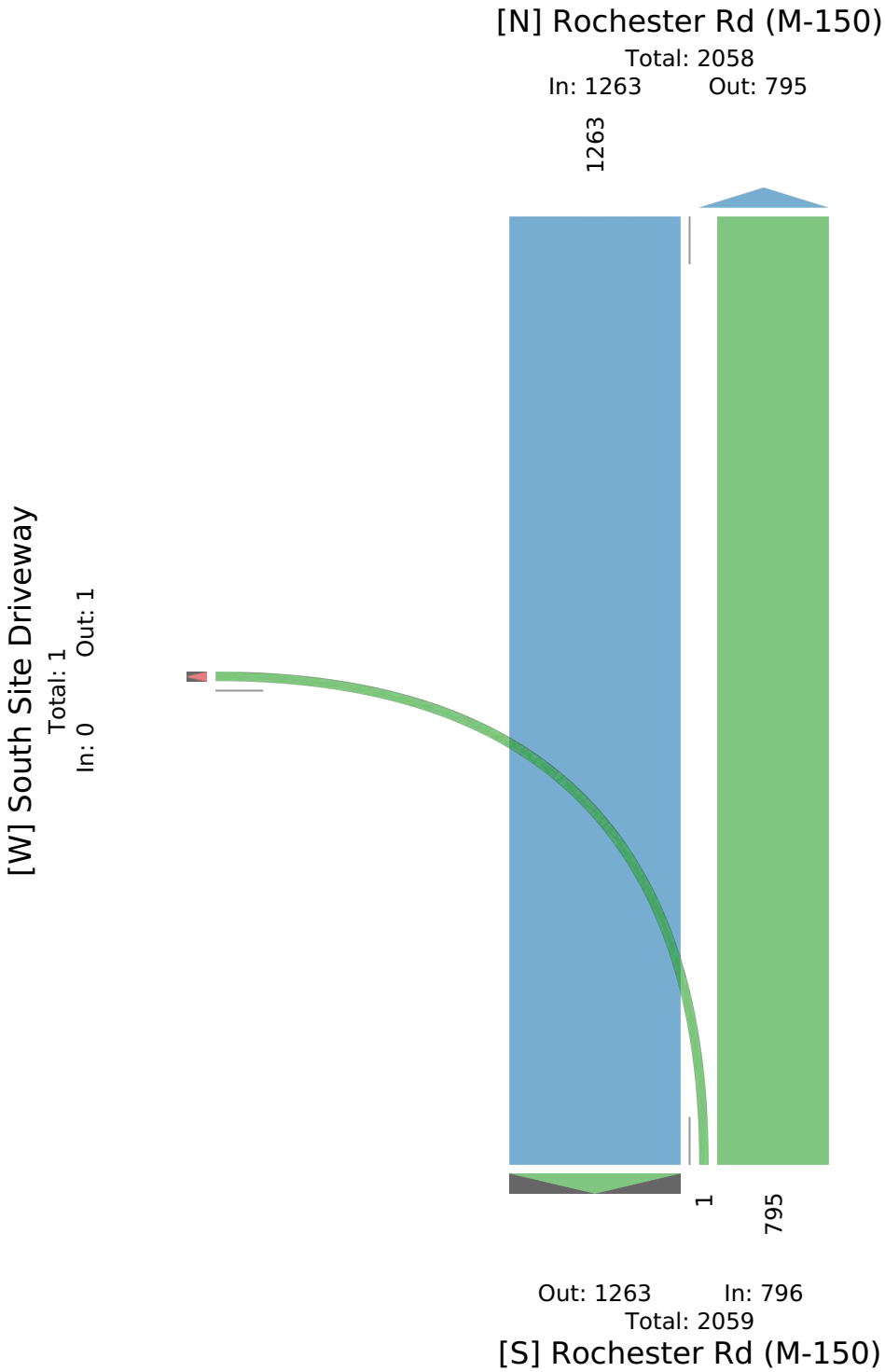
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-10 7:30AM	0	0	0	**0**	0	192	0	**192**	339	0	0	**339**	**531**
7:45AM	0	0	0	**0**	1	236	0	**237**	316	0	0	**316**	**553**
8:00AM	0	0	0	**0**	0	166	0	**166**	317	0	0	**317**	**483**
8:15AM	0	0	0	**0**	0	201	0	**201**	291	0	0	**291**	**492**
Total	0	0	0	**0**	1	795	0	**796**	1263	0	0	**1263**	**2059**
% Approach	0%	0%	0%	**-**	0.1%	99.9%	0%	**-**	100%	0%	0%	**-**	-
% Total	0%	0%	0%	**0%**	0%	38.6%	0%	**38.7%**	61.3%	0%	0%	**61.3%**	-
PHF	-	-	-	**-**	0.250	0.842	-	**0.840**	0.931	-	-	**0.931**	0.931
Lights	0	0	0	**0**	1	765	0	**766**	1235	0	0	**1235**	2001
% Lights	0%	0%	0%	**-**	100%	96.2%	0%	**96.2%**	97.8%	0%	0%	**97.8%**	97.2%
Articulated Trucks	0	0	0	**0**	0	12	0	**12**	8	0	0	**8**	20
% Articulated Trucks	0%	0%	0%	**-**	0%	1.5%	0%	**1.5%**	0.6%	0%	0%	**0.6%**	1.0%
Buses and Single-Unit Trucks	0	0	0	**0**	0	18	0	**18**	20	0	0	**20**	38
% Buses and Single-Unit Trucks	0%	0%	0%	**-**	0%	2.3%	0%	**2.3%**	1.6%	0%	0%	**1.6%**	1.8%

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

Rochester Rd (M-150) and South Site Driveway - TMC
Thu Jun 10, 2021
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845019, Location: 42.639068, -83.131896

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



Rochester Rd (M-150) and South Site Driveway - TMC

Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845019, Location: 42.639068, -83.131896

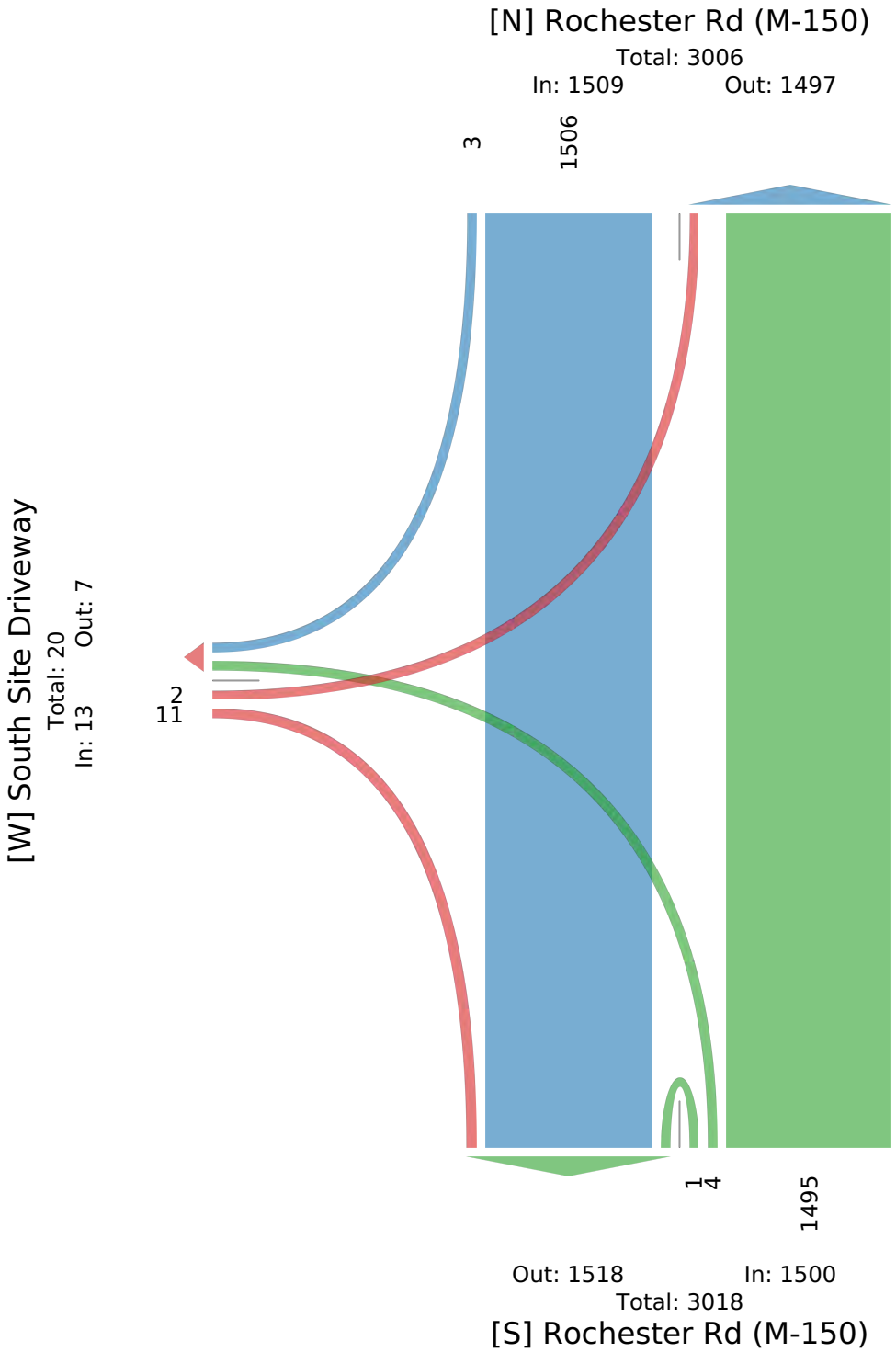
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-10 4:45PM	1	3	0	**4**	2	388	0	**390**	369	1	0	**370**	**764**
5:00PM	0	1	0	**1**	0	366	0	**366**	400	0	0	**400**	**767**
5:15PM	0	4	0	**4**	0	359	1	**360**	374	1	0	**375**	**739**
5:30PM	1	3	0	**4**	2	382	0	**384**	363	1	0	**364**	**752**
Total	2	11	0	**13**	4	1495	1	**1500**	1506	3	0	**1509**	**3022**
% Approach	15.4%	84.6%	0%	**-**	0.3%	99.7%	0.1%	**-**	99.8%	0.2%	0%	**-**	-
% Total	0.1%	0.4%	0%	**0.4%**	0.1%	49.5%	0%	**49.6%**	49.8%	0.1%	0%	**49.9%**	-
PHF	0.500	0.688	-	**0.813**	0.500	0.963	0.250	**0.962**	0.941	0.750	-	**0.943**	0.985
Lights	2	10	0	**12**	4	1484	1	**1489**	1490	3	0	**1493**	2994
% Lights	100%	90.9%	0%	**92.3%**	100%	99.3%	100%	**99.3%**	98.9%	100%	0%	**98.9%**	99.1%
Articulated Trucks	0	0	0	**0**	0	4	0	**4**	4	0	0	**4**	8
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.3%	0%	**0.3%**	0.3%	0%	0%	**0.3%**	0.3%
Buses and Single-Unit Trucks	0	1	0	**1**	0	7	0	**7**	12	0	0	**12**	20
% Buses and Single-Unit Trucks	0%	9.1%	0%	**7.7%**	0%	0.5%	0%	**0.5%**	0.8%	0%	0%	**0.8%**	0.7%

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

Rochester Rd (M-150) and South Site Driveway - TMC
Thu Jun 10, 2021
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845019, Location: 42.639068, -83.131896

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



Rochester Rd (M-150) and South Site Driveway - TMC

Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845025, Location: 42.639068, -83.131896

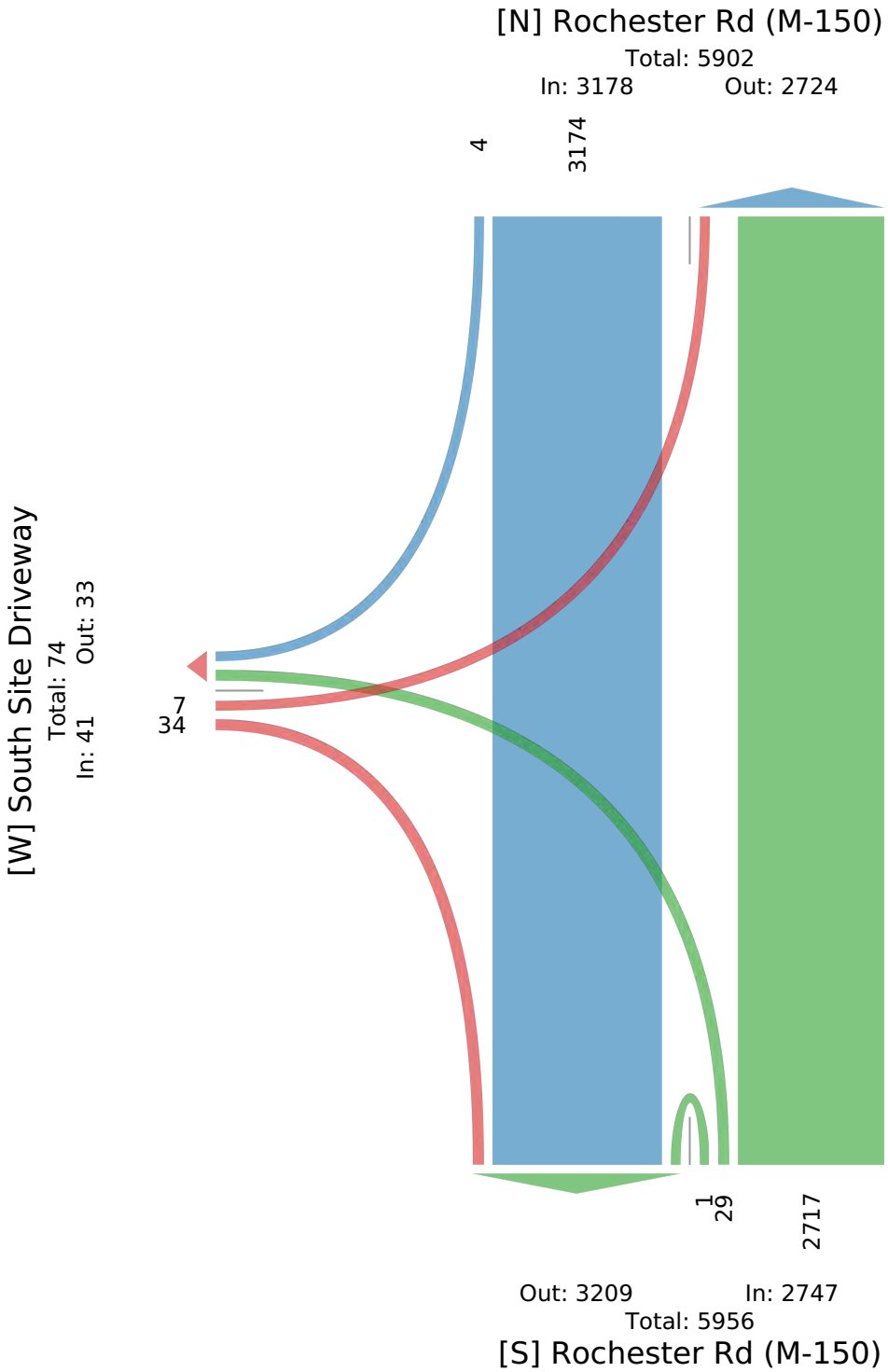
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-12 11:00AM	2	4	0	**6**	5	308	0	**313**	405	1	0	**406**	**725**
11:15AM	0	1	0	**1**	3	333	1	**337**	427	1	0	**428**	**766**
11:30AM	0	5	0	**5**	6	367	0	**373**	402	0	0	**402**	**780**
11:45AM	1	3	0	**4**	0	330	0	**330**	431	1	0	**432**	**766**
Hourly Total	3	13	0	**16**	14	1338	1	**1353**	1665	3	0	**1668**	**3037**
12:00PM	0	4	0	**4**	2	366	0	**368**	358	0	0	**358**	**730**
12:15PM	1	6	0	**7**	7	310	0	**317**	410	0	0	**410**	**734**
12:30PM	1	6	0	**7**	0	363	0	**363**	386	1	0	**387**	**757**
12:45PM	2	5	0	**7**	6	340	0	**346**	355	0	0	**355**	**708**
Hourly Total	4	21	0	**25**	15	1379	0	**1394**	1509	1	0	**1510**	**2929**
Total	7	34	0	**41**	29	2717	1	**2747**	3174	4	0	**3178**	**5966**
% Approach	17.1%	82.9%	0%	**-**	1.1%	98.9%	0%	**-**	99.9%	0.1%	0%	**-**	-
% Total	0.1%	0.6%	0%	**0.7%**	0.5%	45.5%	0%	**46.0%**	53.2%	0.1%	0%	**53.3%**	-
Lights	7	34	0	**41**	29	2694	1	**2724**	3144	4	0	**3148**	5913
% Lights	100%	100%	0%	**100%**	100%	99.2%	100%	**99.2%**	99.1%	100%	0%	**99.1%**	99.1%
Articulated Trucks	0	0	0	**0**	0	9	0	**9**	10	0	0	**10**	19
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.3%	0%	**0.3%**	0.3%	0%	0%	**0.3%**	0.3%
Buses and Single-Unit Trucks	0	0	0	**0**	0	14	0	**14**	20	0	0	**20**	34
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	0%	0.5%	0%	**0.5%**	0.6%	0%	0%	**0.6%**	0.6%

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

Rochester Rd (M-150) and South Site Driveway - TMC
Sat Jun 12, 2021
Full Length (11 AM-1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845025, Location: 42.639068, -83.131896

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



Rochester Rd (M-150) and South Site Driveway - TMC

Sat Jun 12, 2021
Midday Peak (WKND) (11:15 AM - 12:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845025, Location: 42.639068, -83.131896

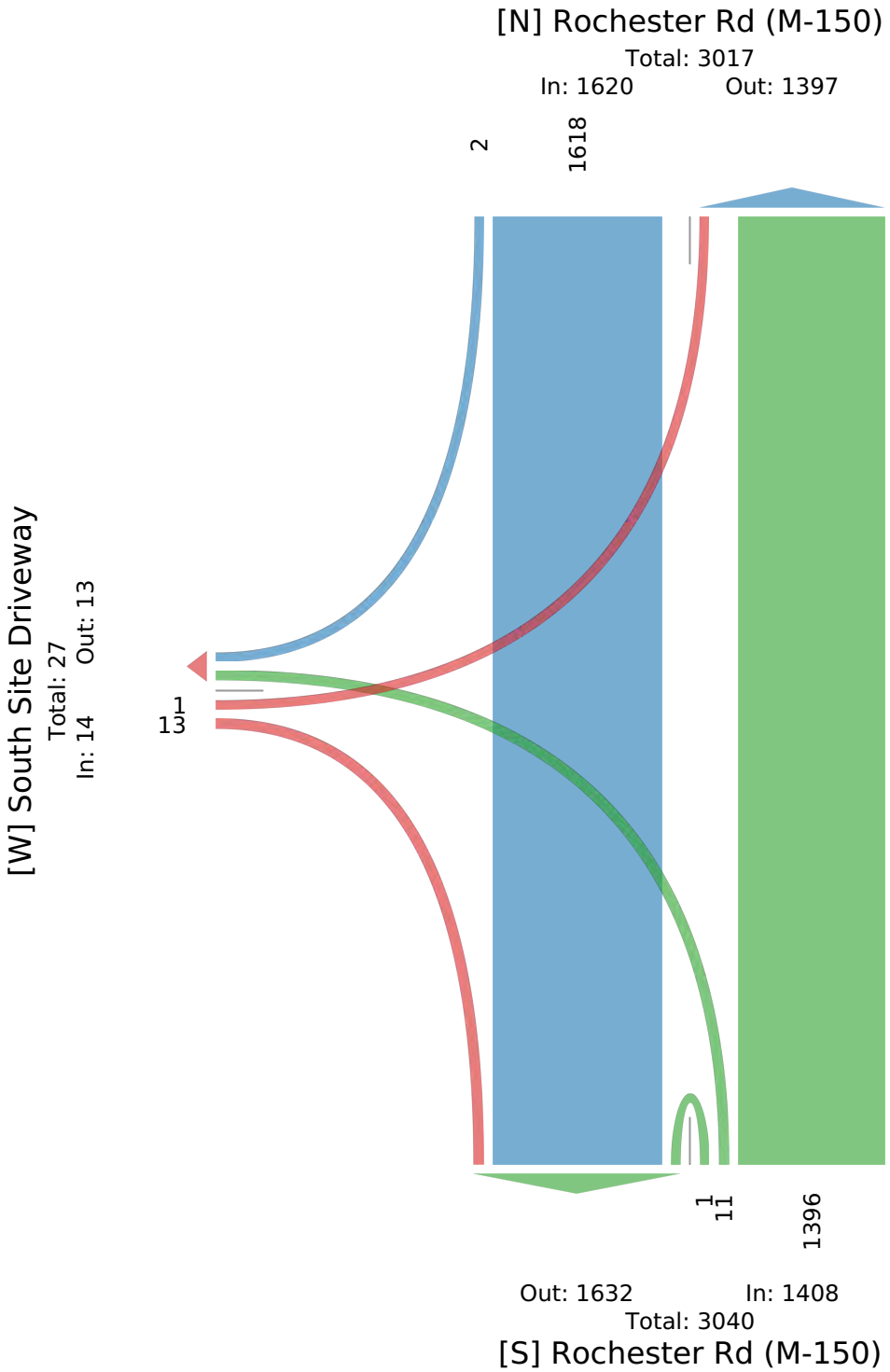
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	South Site Driveway				Rochester Rd (M-150)				Rochester Rd (M-150)				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2021-06-12 11:15AM	0	1	0	**1**	3	333	1	**337**	427	1	0	**428**	**766**
11:30AM	0	5	0	**5**	6	367	0	**373**	402	0	0	**402**	**780**
11:45AM	1	3	0	**4**	0	330	0	**330**	431	1	0	**432**	**766**
12:00PM	0	4	0	**4**	2	366	0	**368**	358	0	0	**358**	**730**
Total	1	13	0	**14**	11	1396	1	**1408**	1618	2	0	**1620**	**3042**
% Approach	7.1%	92.9%	0%	**-**	0.8%	99.1%	0.1%	**-**	99.9%	0.1%	0%	**-**	-
% Total	0%	0.4%	0%	**0.5%**	0.4%	45.9%	0%	**46.3%**	53.2%	0.1%	0%	**53.3%**	-
PHF	0.250	0.650	-	**0.700**	0.458	0.951	0.250	**0.944**	0.939	0.500	-	**0.938**	0.975
Lights	1	13	0	**14**	11	1384	1	**1396**	1601	2	0	**1603**	3013
% Lights	100%	100%	0%	**100%**	100%	99.1%	100%	**99.1%**	98.9%	100%	0%	**99.0%**	99.0%
Articulated Trucks	0	0	0	**0**	0	4	0	**4**	7	0	0	**7**	11
% Articulated Trucks	0%	0%	0%	**0%**	0%	0.3%	0%	**0.3%**	0.4%	0%	0%	**0.4%**	0.4%
Buses and Single-Unit Trucks	0	0	0	**0**	0	8	0	**8**	10	0	0	**10**	18
% Buses and Single-Unit Trucks	0%	0%	0%	**0%**	0%	0.6%	0%	**0.6%**	0.6%	0%	0%	**0.6%**	0.6%

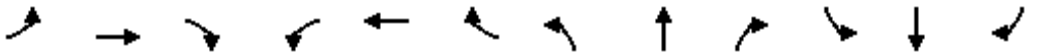
*L: Left, R: Right, T: Thru, U: U-Turn

Rochester Rd (M-150) and South Site Driveway - TMC
Sat Jun 12, 2021
Midday Peak (WKND) (11:15 AM - 12:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 845025, Location: 42.639068, -83.131896

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



LOS OUTPUT REPORTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	154	239	136	174	304	71	98	1025	160	88	1435	147
Future Volume (veh/h)	154	239	136	174	304	71	98	1025	160	88	1435	147
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	1953	1953	1953	1953	1953	1953	1953	1953	1953	1969	1969	1969
Adj Flow Rate, veh/h	173	269	150	185	323	64	122	1281	191	93	1511	149
Peak Hour Factor	0.89	0.89	0.89	0.94	0.94	0.94	0.80	0.80	0.80	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	2	2	2
Cap, veh/h	199	394	176	211	418	186	112	1974	880	113	1990	887
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.08	0.71	0.71	0.08	0.71	0.71
Sat Flow, veh/h	1860	3711	1655	1860	3711	1655	1860	3711	1655	1875	3741	1668
Grp Volume(v), veh/h	173	269	150	185	323	64	122	1281	191	93	1511	149
Grp Sat Flow(s),veh/h/ln	1860	1856	1655	1860	1856	1655	1860	1856	1655	1875	1870	1668
Q Serve(g_s), s	12.8	9.8	12.5	13.7	11.8	5.0	8.4	26.1	5.6	6.8	35.8	4.2
Cycle Q Clear(g_c), s	12.8	9.8	12.5	13.7	11.8	5.0	8.4	26.1	5.6	6.8	35.8	4.2
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	199	394	176	211	418	186	112	1974	880	113	1990	887
V/C Ratio(X)	0.87	0.68	0.85	0.88	0.77	0.34	1.09	0.65	0.22	0.83	0.76	0.17
Avail Cap(c_a), veh/h	258	435	194	258	435	194	112	1974	880	113	1990	887
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.33	1.33	1.33
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	61.5	60.3	61.5	61.1	60.4	57.4	64.4	13.4	10.4	63.7	14.8	10.2
Incr Delay (d2), s/veh	21.3	3.8	27.2	23.8	8.1	1.1	112.4	1.7	0.6	37.5	2.8	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	7.1	4.7	6.4	7.7	5.9	2.1	7.3	8.0	2.0	4.3	11.1	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.9	64.1	88.7	84.9	68.5	58.4	176.9	15.1	11.0	101.2	17.6	10.6
LnGrp LOS	F	E	F	F	E	E	F	B	B	F	B	B
Approach Vol, veh/h		592			572			1594			1753	
Approach Delay, s/veh		75.8			72.7			27.0			21.4	
Approach LOS		E			E			C			C	

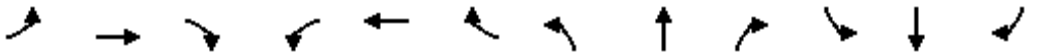
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	81.1	21.6	22.4	15.0	81.1	22.5	21.5
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 8.4	* 69	* 19	* 16	* 8.4	* 69	* 19	* 16
Max Q Clear Time (g_c+I1), s	8.8	28.1	14.8	13.8	10.4	37.8	15.7	14.5
Green Ext Time (p_c), s	0.0	12.1	0.2	0.5	0.0	13.8	0.2	0.4

Intersection Summary	
HCM 6th Ctrl Delay	37.0
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 (vph)	20	29	27	162	15	101	7	888	183	141	1515	24
Future Volume (vph)	20	29	27	162	15	101	7	888	183	141	1515	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1863	1818		1787	1806	1683	1845	3689	1650	1845	3681	
Flt Permitted	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1863	1818		1787	1806	1683	1845	3689	1650	1845	3681	
Peak-hour factor, PHF	0.60	0.60	0.60	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	33	48	45	202	19	126	8	1045	215	153	1647	26
RTOR Reduction (vph)	0	25	0	0	0	113	0	0	69	0	0	0
Lane Group Flow (vph)	33	68	0	110	112	13	8	1045	146	153	1673	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	8.0	8.0		14.1	14.1	14.1	1.5	74.8	74.8	16.6	89.9	
Effective Green, g (s)	8.0	8.0		14.1	14.1	14.1	1.5	74.8	74.8	16.6	89.9	
Actuated g/C Ratio	0.06	0.06		0.10	0.10	0.10	0.01	0.53	0.53	0.12	0.64	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	106	103		179	181	169	19	1970	881	218	2363	
v/s Ratio Prot	0.02	c0.04		0.06	c0.06		0.00	0.28		c0.08	c0.45	
v/s Ratio Perm						0.01			0.09			
v/c Ratio	0.31	0.66		0.61	0.62	0.08	0.42	0.53	0.17	0.70	0.71	
Uniform Delay, d1	63.4	64.7		60.3	60.4	57.0	68.8	21.2	16.7	59.3	16.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.94	0.68	0.53	1.00	1.00	
Incremental Delay, d2	1.7	15.0		6.1	6.2	0.2	12.2	0.9	0.3	9.8	1.8	
Delay (s)	65.0	79.7		66.5	66.5	57.2	76.9	15.2	9.2	69.1	18.3	
Level of Service	E	E		E	E	E	E	B	A	E	B	
Approach Delay (s)		75.9			63.2			14.5			22.5	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	1	1114	1768	0
Future Vol, veh/h	0	0	1	1114	1768	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	84	84	94	94
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	0	1	1326	1881	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2546	941	1881	0	-	0
Stage 1	1881	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.18	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.24	-	-	-
Pot Cap-1 Maneuver	23	268	307	-	-	-
Stage 1	108	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	23	268	307	-	-	-
Mov Cap-2 Maneuver	86	-	-	-	-	-
Stage 1	108	-	-	-	-	-
Stage 2	478	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	307	-	-	-	-
HCM Lane V/C Ratio	0.004	-	-	-	-
HCM Control Delay (s)	16.8	-	0	-	-
HCM Lane LOS	C	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	1	1115	1768	0
Future Vol, veh/h	0	0	1	1115	1768	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	84	84	93	93
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	0	1	1327	1901	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2567	951	1901	0	-	0
Stage 1	1901	-	-	-	-	-
Stage 2	666	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.18	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.24	-	-	-
Pot Cap-1 Maneuver	22	264	301	-	-	-
Stage 1	106	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	22	264	301	-	-	-
Mov Cap-2 Maneuver	85	-	-	-	-	-
Stage 1	106	-	-	-	-	-
Stage 2	478	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	301	-	-	-	-
HCM Lane V/C Ratio	0.004	-	-	-	-
HCM Control Delay (s)	17	-	0	-	-
HCM Lane LOS	C	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection: 1: M-150 & Auburn /Auburn

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	262	207	165	261	237	198	78	219	346	361	200
Average Queue (ft)	119	121	77	58	143	140	104	27	115	188	182	59
95th Queue (ft)	183	209	160	116	233	215	188	59	215	308	308	181
Link Distance (ft)		792	792			597	597			378	378	
Upstream Blk Time (%)										0	0	
Queuing Penalty (veh)										2	1	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	22	17	1	1			2		11	10	8	0
Queuing Penalty (veh)	26	27	2	1			1		60	10	14	0

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	214	488	507	328
Average Queue (ft)	109	278	285	48
95th Queue (ft)	213	428	440	187
Link Distance (ft)		490	490	
Upstream Blk Time (%)		1	1	
Queuing Penalty (veh)		4	7	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	2	27	14	
Queuing Penalty (veh)	16	23	20	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	57	165	165	140	57	34	307	307	204	194	467	437
Average Queue (ft)	19	47	96	47	22	4	147	153	49	117	223	187
95th Queue (ft)	50	110	157	120	46	19	258	262	132	197	409	355
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											1	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0		0			6	7		3	8	
Queuing Penalty (veh)		0		0			0	14		20	12	

Intersection: 3: M-150 & North Driveway

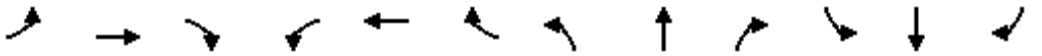
Movement	NB
Directions Served	L
Maximum Queue (ft)	11
Average Queue (ft)	1
95th Queue (ft)	6
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	50
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-150 & South Driveway

Movement	NB
Directions Served	L
Maximum Queue (ft)	11
Average Queue (ft)	1
95th Queue (ft)	9
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	50
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 263



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	197	403	136	209	295	120	138	1280	173	174	1227	150
Future Volume (veh/h)	197	403	136	209	295	120	138	1280	173	174	1227	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	216	443	147	258	364	141	147	1362	178	187	1319	155
Peak Hour Factor	0.91	0.91	0.91	0.81	0.81	0.81	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	242	525	234	275	592	264	167	1651	736	167	1651	736
Arrive On Green	0.13	0.14	0.14	0.15	0.16	0.16	0.18	0.88	0.88	0.03	0.14	0.14
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	216	443	147	258	364	141	147	1362	178	187	1319	155
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	15.8	16.0	11.5	18.9	12.6	10.8	10.6	22.6	2.3	12.4	47.4	11.4
Cycle Q Clear(g_c), s	15.8	16.0	11.5	18.9	12.6	10.8	10.6	22.6	2.3	12.4	47.4	11.4
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	242	525	234	275	592	264	167	1651	736	167	1651	736
V/C Ratio(X)	0.89	0.84	0.63	0.94	0.61	0.53	0.88	0.82	0.24	1.12	0.80	0.21
Avail Cap(c_a), veh/h	275	630	281	275	630	281	167	1651	736	167	1651	736
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
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	60.1	58.8	56.8	59.2	55.0	54.3	56.9	6.3	5.0	68.0	53.9	38.5
Incr Delay (d2), s/veh	26.6	8.8	3.2	37.6	1.6	1.7	37.3	4.8	0.8	104.5	4.1	0.7
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	9.1	8.1	5.0	11.7	6.0	4.6	6.3	4.1	0.9	11.1	24.8	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.8	67.6	60.0	96.8	56.7	56.0	94.2	11.1	5.8	172.4	58.1	39.2
LnGrp LOS	F	E	E	F	E	E	F	B	A	F	E	D
Approach Vol, veh/h		806			763			1687			1661	
Approach Delay, s/veh		71.3			70.1			17.8			69.2	
Approach LOS		E			E			B			E	

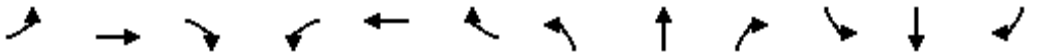
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	67.9	24.5	28.6	19.0	67.9	27.0	26.1
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 57	* 20	* 23	* 12	* 57	* 20	* 23
Max Q Clear Time (g_c+I1), s	14.4	24.6	17.8	14.6	12.6	49.4	20.9	18.0
Green Ext Time (p_c), s	0.0	12.2	0.1	1.7	0.0	5.1	0.0	1.5

Intersection Summary	
HCM 6th Ctrl Delay	52.0
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 (vph)	44	38	30	209	41	217	18	1329	156	176	1299	24
Future Volume (vph)	44	38	30	209	41	217	18	1329	156	176	1299	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1850		1805	1838	1700	1881	3762	1683	1881	3752	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1850		1805	1838	1700	1881	3762	1683	1881	3752	
Peak-hour factor, PHF	0.68	0.68	0.68	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	65	56	44	246	48	255	19	1399	164	189	1397	26
RTOR Reduction (vph)	0	21	0	0	0	225	0	0	67	0	1	0
Lane Group Flow (vph)	65	79	0	145	149	30	19	1399	97	189	1422	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	11.4	11.4		16.2	16.2	16.2	4.7	68.3	68.3	17.6	81.2	
Effective Green, g (s)	11.4	11.4		16.2	16.2	16.2	4.7	68.3	68.3	17.6	81.2	
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.03	0.49	0.49	0.13	0.58	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	153	150		208	212	196	63	1835	821	236	2176	
v/s Ratio Prot	0.03	c0.04		0.08	c0.08		0.01	c0.37		c0.10	0.38	
v/s Ratio Perm						0.02			0.06			
v/c Ratio	0.42	0.53		0.70	0.70	0.15	0.30	0.76	0.12	0.80	0.65	
Uniform Delay, d1	61.2	61.7		59.5	59.6	55.7	66.0	29.2	19.5	59.5	19.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.26	0.46	0.13	1.00	1.00	
Incremental Delay, d2	1.9	3.3		9.7	10.1	0.4	1.6	1.8	0.2	17.5	1.5	
Delay (s)	63.1	65.0		69.3	69.7	56.1	84.8	15.4	2.7	77.0	21.4	
Level of Service	E	E		E	E	E	F	B	A	E	C	
Approach Delay (s)		64.2			63.2			14.9			27.9	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	15	5	1492	1506	18
Future Vol, veh/h	3	15	5	1492	1506	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	95	95	92	92
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	5	25	5	1571	1637	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2433	819	1657	0	-	0
Stage 1	1637	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	27	323	390	-	-	-
Stage 1	147	-	-	-	-	-
Stage 2	410	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	27	323	390	-	-	-
Mov Cap-2 Maneuver	107	-	-	-	-	-
Stage 1	145	-	-	-	-	-
Stage 2	410	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	390	-	242	-	-
HCM Lane V/C Ratio	0.013	-	0.124	-	-
HCM Control Delay (s)	14.4	-	22	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	11	4	1495	1518	3
Future Vol, veh/h	2	11	4	1495	1518	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	95	95	94	94
Heavy Vehicles, %	8	8	1	1	1	1
Mvmt Flow	2	14	4	1574	1615	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2412	809	1618	0	-	0
Stage 1	1617	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Critical Hdwy	6.96	7.06	4.12	-	-	-
Critical Hdwy Stg 1	5.96	-	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-	-
Follow-up Hdwy	3.58	3.38	2.21	-	-	-
Pot Cap-1 Maneuver	25	311	403	-	-	-
Stage 1	139	-	-	-	-	-
Stage 2	390	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	25	311	403	-	-	-
Mov Cap-2 Maneuver	102	-	-	-	-	-
Stage 1	138	-	-	-	-	-
Stage 2	390	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	403	-	236	-	-
HCM Lane V/C Ratio	0.01	-	0.068	-	-
HCM Control Delay (s)	14	-	21.4	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection: 1: M-150 & Auburn /Auburn

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)	309	355	269	172	319	237	207	114	310	400	402	200
Average Queue (ft)	168	175	135	59	176	130	94	43	154	305	310	103
95th Queue (ft)	285	289	226	132	295	205	177	88	292	426	437	245
Link Distance (ft)		792	792			597	597			378	378	
Upstream Blk Time (%)										5	5	
Queuing Penalty (veh)										39	43	
Storage Bay Dist (ft)	250			135	430			155	250			175
Storage Blk Time (%)	4	1	10	0			2	0	0	21	37	0
Queuing Penalty (veh)	8	1	14	0			2	0	0	30	63	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	394	546	539	385
Average Queue (ft)	231	387	391	122
95th Queue (ft)	403	538	536	376
Link Distance (ft)		490	490	
Upstream Blk Time (%)		2	2	
Queuing Penalty (veh)		17	19	
Storage Bay Dist (ft)	350			260
Storage Blk Time (%)	1	15	30	
Queuing Penalty (veh)	4	26	46	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	127	134	177	209	216	115	301	278	211	195	456	432
Average Queue (ft)	44	53	112	75	86	14	183	181	42	153	263	211
95th Queue (ft)	93	105	175	160	173	61	287	274	126	225	446	383
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											3	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)				0	1		18	18		10	11	
Queuing Penalty (veh)				1	2		3	28		69	20	

Intersection: 3: M-150 & North Driveway

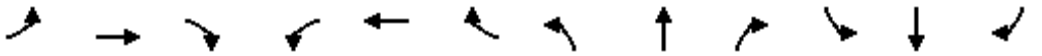
Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	32	38
Average Queue (ft)	10	4
95th Queue (ft)	30	22
Link Distance (ft)	374	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		2

Intersection: 4: M-150 & South Driveway

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	47	29
Average Queue (ft)	11	3
95th Queue (ft)	38	17
Link Distance (ft)	264	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Zone Summary

Zone wide Queuing Penalty: 438



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	310	130	213	265	140	146	1165	149	184	1217	208
Future Volume (veh/h)	210	310	130	213	265	140	146	1165	149	184	1217	208
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	228	337	131	234	291	149	160	1280	163	194	1281	216
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	262	412	184	267	423	189	194	1384	617	224	1443	644
Arrive On Green	0.14	0.11	0.11	0.14	0.11	0.11	0.10	0.37	0.37	0.24	0.77	0.77
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	228	337	131	234	291	149	160	1280	163	194	1281	216
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	11.8	8.7	7.5	12.1	7.4	8.6	8.3	32.5	6.8	9.9	24.9	4.1
Cycle Q Clear(g_c), s	11.8	8.7	7.5	12.1	7.4	8.6	8.3	32.5	6.8	9.9	24.9	4.1
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	412	184	267	423	189	194	1384	617	224	1443	644
V/C Ratio(X)	0.87	0.82	0.71	0.87	0.69	0.79	0.83	0.93	0.26	0.87	0.89	0.34
Avail Cap(c_a), veh/h	272	430	192	272	430	192	234	1384	617	234	1443	644
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	42.2	43.6	43.0	42.1	42.7	43.3	44.0	30.3	22.2	37.4	10.1	7.7
Incr Delay (d2), s/veh	24.3	11.5	11.3	25.3	4.5	19.4	18.0	11.9	1.0	26.6	8.4	1.4
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	7.0	4.5	3.5	7.3	3.6	4.4	4.7	15.7	2.7	5.5	5.4	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.5	55.0	54.3	67.4	47.2	62.7	62.0	42.2	23.2	64.0	18.6	9.1
LnGrp LOS	E	E	D	E	D	E	E	D	C	E	B	A
Approach Vol, veh/h		696			674			1603			1691	
Approach Delay, s/veh		58.7			57.6			42.3			22.6	
Approach LOS		E			E			D			C	

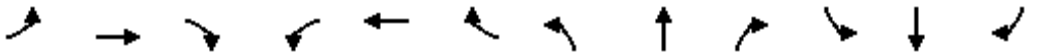
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.4	43.3	20.5	17.8	16.9	44.9	20.8	17.5
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 35	* 14	* 11	* 12	* 35	* 14	* 11
Max Q Clear Time (g_c+I1), s	11.9	34.5	13.8	10.6	10.3	26.9	14.1	10.7
Green Ext Time (p_c), s	0.0	0.7	0.0	0.2	0.1	5.4	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	39.8
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 (vph)	57	32	22	173	31	154	14	1275	133	170	1448	26
Future Volume (vph)	57	32	22	173	31	154	14	1275	133	170	1448	26
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1860		1805	1836	1700	1881	3762	1683	1881	3753	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1860		1805	1836	1700	1881	3762	1683	1881	3753	
Peak-hour factor, PHF	0.84	0.84	0.84	0.78	0.78	0.78	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	68	38	26	222	40	197	15	1371	143	179	1524	27
RTOR Reduction (vph)	0	24	0	0	0	175	0	0	85	0	1	0
Lane Group Flow (vph)	68	40	0	131	131	22	15	1371	58	179	1550	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	7.0	7.0		11.3	11.3	11.3	2.9	40.8	40.8	14.4	52.3	
Effective Green, g (s)	7.0	7.0		11.3	11.3	11.3	2.9	40.8	40.8	14.4	52.3	
Actuated g/C Ratio	0.07	0.07		0.11	0.11	0.11	0.03	0.41	0.41	0.14	0.52	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	131	130		203	207	192	54	1534	686	270	1962	
v/s Ratio Prot	c0.04	0.02		c0.07	0.07		0.01	c0.36		c0.10	c0.41	
v/s Ratio Perm						0.01			0.03			
v/c Ratio	0.52	0.31		0.65	0.63	0.12	0.28	0.89	0.09	0.66	0.79	
Uniform Delay, d1	44.9	44.2		42.4	42.4	39.9	47.5	27.6	18.2	40.5	19.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.20	0.78	3.38	1.00	1.00	
Incremental Delay, d2	3.4	1.3		6.9	6.2	0.3	1.5	4.7	0.1	6.0	3.3	
Delay (s)	48.3	45.5		49.3	48.6	40.1	58.7	26.2	61.4	46.5	22.7	
Level of Service	D	D		D	D	D	E	C	E	D	C	
Approach Delay (s)		47.0			45.2			29.8			25.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	19	6	1391	1601	27
Future Vol, veh/h	8	19	6	1391	1601	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	95	95	93	93
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	13	32	6	1464	1722	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2466	861	1751	0	-	0
Stage 1	1722	-	-	-	-	-
Stage 2	744	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	26	303	358	-	-	-
Stage 1	132	-	-	-	-	-
Stage 2	436	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	26	303	358	-	-	-
Mov Cap-2 Maneuver	99	-	-	-	-	-
Stage 1	130	-	-	-	-	-
Stage 2	436	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30.1	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	358	-	188	-	-
HCM Lane V/C Ratio	0.018	-	0.239	-	-
HCM Control Delay (s)	15.2	-	30.1	-	-
HCM Lane LOS	C	-	D	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	13	11	1396	1618	2
Future Vol, veh/h	1	13	11	1396	1618	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	94	94	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	1	19	12	1485	1721	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2489	862	1723	0	-	0
Stage 1	1722	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	25	302	367	-	-	-
Stage 1	132	-	-	-	-	-
Stage 2	424	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	24	302	367	-	-	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	128	-	-	-	-	-
Stage 2	424	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.9	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	367	-	262	-	-
HCM Lane V/C Ratio	0.032	-	0.076	-	-
HCM Control Delay (s)	15.1	-	19.9	-	-
HCM Lane LOS	C	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection: 1: M-150 & Auburn /Auburn

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	273	214	150	255	180	153	102	220	406	411	200
Average Queue (ft)	124	138	87	48	142	100	62	43	148	320	314	136
95th Queue (ft)	196	234	168	105	231	162	128	85	264	446	445	273
Link Distance (ft)		792	792			597	597			381	381	
Upstream Blk Time (%)										9	9	
Queuing Penalty (veh)										67	65	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	23	19	2				0		1	38	36	0
Queuing Penalty (veh)	36	39	3				0		5	55	54	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	214	461	460	321
Average Queue (ft)	158	265	265	72
95th Queue (ft)	250	459	458	262
Link Distance (ft)		490	490	
Upstream Blk Time (%)		2	2	
Queuing Penalty (veh)		18	19	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	8	19	11	
Queuing Penalty (veh)	48	36	23	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	120	116	174	138	132	114	366	372	251	195	447	410
Average Queue (ft)	49	38	85	47	52	13	167	179	41	129	237	205
95th Queue (ft)	96	83	150	108	106	67	301	310	152	217	389	352
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											1	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)							7	8		2	13	
Queuing Penalty (veh)							1	11		15	22	

Intersection: 3: M-150 & North Driveway

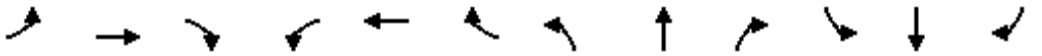
Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	61	31
Average Queue (ft)	14	3
95th Queue (ft)	43	18
Link Distance (ft)	374	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 4: M-150 & South Driveway

Movement	EB	NB	SB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	43	37	20	23
Average Queue (ft)	12	7	1	2
95th Queue (ft)	38	27	15	20
Link Distance (ft)	264		140	140
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Zone Summary

Zone wide Queuing Penalty: 520



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	157	244	142	180	310	73	103	1053	166	90	1470	150
Future Volume (veh/h)	157	244	142	180	310	73	103	1053	166	90	1470	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	1953	1953	1953	1953	1953	1953	1953	1953	1953	1969	1969	1969
Adj Flow Rate, veh/h	176	274	157	191	330	66	129	1316	199	95	1547	152
Peak Hour Factor	0.89	0.89	0.89	0.94	0.94	0.94	0.80	0.80	0.80	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	2	2	2
Cap, veh/h	202	407	182	217	436	195	112	1949	869	113	1965	876
Arrive On Green	0.11	0.11	0.11	0.12	0.12	0.12	0.08	0.70	0.70	0.06	0.53	0.53
Sat Flow, veh/h	1860	3711	1655	1860	3711	1655	1860	3711	1655	1875	3741	1668
Grp Volume(v), veh/h	176	274	157	191	330	66	129	1316	199	95	1547	152
Grp Sat Flow(s),veh/h/ln	1860	1856	1655	1860	1856	1655	1860	1856	1655	1875	1870	1668
Q Serve(g_s), s	13.0	9.9	13.1	14.2	12.1	5.1	8.4	28.3	6.0	7.0	46.9	6.7
Cycle Q Clear(g_c), s	13.0	9.9	13.1	14.2	12.1	5.1	8.4	28.3	6.0	7.0	46.9	6.7
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	202	407	182	217	436	195	112	1949	869	113	1965	876
V/C Ratio(X)	0.87	0.67	0.86	0.88	0.76	0.34	1.16	0.68	0.23	0.84	0.79	0.17
Avail Cap(c_a), veh/h	258	435	194	258	436	195	112	1949	869	113	1965	876
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	61.4	59.9	61.3	60.9	59.8	56.8	64.4	14.3	10.9	65.2	26.9	17.4
Incr Delay (d2), s/veh	22.0	3.7	29.8	25.0	7.4	1.0	133.1	1.9	0.6	41.3	3.3	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	7.2	4.8	6.9	8.1	6.0	2.2	7.9	8.8	2.2	4.6	20.3	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.4	63.6	91.1	85.9	67.3	57.8	197.5	16.2	11.5	106.5	30.2	17.8
LnGrp LOS	F	E	F	F	E	E	F	B	B	F	C	B
Approach Vol, veh/h		607			587			1644			1794	
Approach Delay, s/veh		76.5			72.3			29.8			33.2	
Approach LOS		E			E			C			C	

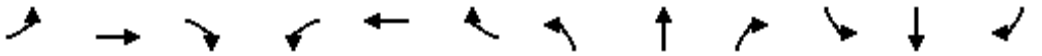
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	80.1	21.8	23.1	15.0	80.1	22.9	22.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 8.4	* 69	* 19	* 16	* 8.4	* 69	* 19	* 16
Max Q Clear Time (g_c+I1), s	9.0	30.3	15.0	14.1	10.4	48.9	16.2	15.1
Green Ext Time (p_c), s	0.0	12.4	0.2	0.5	0.0	11.4	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	42.6
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 (vph)	20	30	27	166	16	103	7	913	187	144	1551	24
Future Volume (vph)	20	30	27	166	16	103	7	913	187	144	1551	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1863	1821		1787	1807	1683	1845	3689	1650	1845	3681	
Flt Permitted	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1863	1821		1787	1807	1683	1845	3689	1650	1845	3681	
Peak-hour factor, PHF	0.60	0.60	0.60	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	33	50	45	208	20	129	8	1074	220	157	1686	26
RTOR Reduction (vph)	0	24	0	0	0	116	0	0	69	0	0	0
Lane Group Flow (vph)	33	71	0	114	114	13	8	1074	151	157	1712	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	8.0	8.0		14.3	14.3	14.3	1.5	74.4	74.4	16.8	89.7	
Effective Green, g (s)	8.0	8.0		14.3	14.3	14.3	1.5	74.4	74.4	16.8	89.7	
Actuated g/C Ratio	0.06	0.06		0.10	0.10	0.10	0.01	0.53	0.53	0.12	0.64	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	106	104		182	184	171	19	1960	876	221	2358	
v/s Ratio Prot	0.02	c0.04		c0.06	0.06		0.00	0.29		c0.09	c0.47	
v/s Ratio Perm						0.01			0.09			
v/c Ratio	0.31	0.69		0.63	0.62	0.08	0.42	0.55	0.17	0.71	0.73	
Uniform Delay, d1	63.4	64.8		60.3	60.2	56.9	68.8	21.7	16.9	59.3	16.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.94	0.68	0.57	1.00	1.00	
Incremental Delay, d2	1.7	17.2		6.6	6.1	0.2	12.0	0.9	0.4	10.3	2.0	
Delay (s)	65.0	82.0		66.9	66.3	57.1	76.7	15.7	10.0	69.5	18.9	
Level of Service	E	F		E	E	E	E	B	A	E	B	
Approach Delay (s)		77.6			63.2			15.1			23.1	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	1	1145	1810	0
Future Vol, veh/h	0	0	1	1145	1810	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	84	84	94	94
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	0	1	1363	1926	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2610	963	1926	0	-	0
Stage 1	1926	-	-	-	-	-
Stage 2	684	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.18	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.24	-	-	-
Pot Cap-1 Maneuver	20	259	295	-	-	-
Stage 1	102	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	20	259	295	-	-	-
Mov Cap-2 Maneuver	82	-	-	-	-	-
Stage 1	102	-	-	-	-	-
Stage 2	468	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	295	-	-	-	-
HCM Lane V/C Ratio	0.004	-	-	-	-
HCM Control Delay (s)	17.3	-	0	-	-
HCM Lane LOS	C	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	1	1146	1810	0
Future Vol, veh/h	0	0	1	1146	1810	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	84	84	93	93
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	0	1	1364	1946	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2630	973	1946	0	-	0
Stage 1	1946	-	-	-	-	-
Stage 2	684	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.18	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.24	-	-	-
Pot Cap-1 Maneuver	20	255	289	-	-	-
Stage 1	100	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	20	255	289	-	-	-
Mov Cap-2 Maneuver	80	-	-	-	-	-
Stage 1	100	-	-	-	-	-
Stage 2	468	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	289	-	-	-	-
HCM Lane V/C Ratio	0.004	-	-	-	-
HCM Control Delay (s)	17.5	-	0	-	-
HCM Lane LOS	C	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection: 1: M-150 & Auburn /Auburn

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	270	236	159	322	283	201	81	220	383	406	200
Average Queue (ft)	129	144	86	67	152	142	105	27	136	228	224	74
95th Queue (ft)	205	247	187	133	277	225	183	60	246	398	403	208
Link Distance (ft)		792	792			597	597			378	378	
Upstream Blk Time (%)										11	3	
Queuing Penalty (veh)										71	20	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	25	18	2	1	1		1		26	10	12	0
Queuing Penalty (veh)	30	28	2	1	1		1		143	11	20	0

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	214	552	551	385
Average Queue (ft)	113	336	340	98
95th Queue (ft)	213	539	552	331
Link Distance (ft)		490	490	
Upstream Blk Time (%)		4	5	
Queuing Penalty (veh)		33	38	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	2	29	19	
Queuing Penalty (veh)	13	26	29	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	73	143	180	148	88	110	306	299	214	195	471	440
Average Queue (ft)	19	46	97	43	27	7	155	163	50	131	238	203
95th Queue (ft)	55	108	157	109	62	51	265	270	127	209	445	392
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											2	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0		0			7	8		5	10	
Queuing Penalty (veh)		0		0			0	16		36	15	

Intersection: 3: M-150 & North Driveway

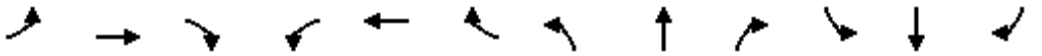
Movement	NB
Directions Served	L
Maximum Queue (ft)	11
Average Queue (ft)	1
95th Queue (ft)	9
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	50
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-150 & South Driveway

Movement	NB	SB
Directions Served	L	TR
Maximum Queue (ft)	15	10
Average Queue (ft)	1	0
95th Queue (ft)	8	7
Link Distance (ft)		140
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 537



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	201	411	151	223	301	122	152	1337	191	177	1278	153
Future Volume (veh/h)	201	411	151	223	301	122	152	1337	191	177	1278	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	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	221	452	164	275	372	144	162	1422	197	190	1374	162
Peak Hour Factor	0.91	0.91	0.91	0.81	0.81	0.81	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	246	534	238	275	591	264	167	1642	733	167	1642	733
Arrive On Green	0.13	0.14	0.14	0.15	0.16	0.16	0.18	0.87	0.87	0.03	0.14	0.14
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	221	452	164	275	372	144	162	1422	197	190	1374	162
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	16.1	16.4	13.0	20.4	12.9	11.1	11.9	27.7	2.8	12.4	49.7	11.9
Cycle Q Clear(g_c), s	16.1	16.4	13.0	20.4	12.9	11.1	11.9	27.7	2.8	12.4	49.7	11.9
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	246	534	238	275	591	264	167	1642	733	167	1642	733
V/C Ratio(X)	0.90	0.85	0.69	1.00	0.63	0.55	0.97	0.87	0.27	1.14	0.84	0.22
Avail Cap(c_a), veh/h	275	630	281	275	630	281	167	1642	733	167	1642	733
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
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	59.9	58.6	57.2	59.8	55.2	54.4	57.4	6.9	5.3	68.0	55.1	38.9
Incr Delay (d2), s/veh	27.5	9.2	5.6	53.8	1.8	1.9	59.8	6.4	0.9	110.5	5.2	0.7
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	9.4	8.3	5.7	13.7	6.2	4.7	7.8	4.7	1.0	11.4	26.2	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	87.5	67.8	62.8	113.6	57.0	56.3	117.2	13.3	6.2	178.4	60.3	39.6
LnGrp LOS	F	E	E	F	E	E	F	B	A	F	E	D
Approach Vol, veh/h		837			791			1781			1726	
Approach Delay, s/veh		72.0			76.6			21.9			71.4	
Approach LOS		E			E			C			E	

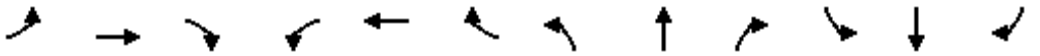
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	67.6	24.9	28.6	19.0	67.6	27.0	26.4
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 57	* 20	* 23	* 12	* 57	* 20	* 23
Max Q Clear Time (g_c+I1), s	14.4	29.7	18.1	14.9	13.9	51.7	22.4	18.4
Green Ext Time (p_c), s	0.0	12.2	0.1	1.7	0.0	4.0	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	55.1
HCM 6th LOS	E

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 (vph)	45	39	31	213	42	221	18	1387	159	180	1351	24
Future Volume (vph)	45	39	31	213	42	221	18	1387	159	180	1351	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1848		1805	1838	1700	1881	3762	1683	1881	3752	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1848		1805	1838	1700	1881	3762	1683	1881	3752	
Peak-hour factor, PHF	0.68	0.68	0.68	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	66	57	46	251	49	260	19	1460	167	194	1453	26
RTOR Reduction (vph)	0	21	0	0	0	230	0	0	67	0	1	0
Lane Group Flow (vph)	66	82	0	148	152	30	19	1460	100	194	1478	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	11.5	11.5		16.3	16.3	16.3	4.7	67.9	67.9	17.8	81.0	
Effective Green, g (s)	11.5	11.5		16.3	16.3	16.3	4.7	67.9	67.9	17.8	81.0	
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.03	0.49	0.49	0.13	0.58	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	154	151		210	213	197	63	1824	816	239	2170	
v/s Ratio Prot	0.04	c0.04		0.08	c0.08		0.01	c0.39		c0.10	0.39	
v/s Ratio Perm						0.02			0.06			
v/c Ratio	0.43	0.54		0.70	0.71	0.15	0.30	0.80	0.12	0.81	0.68	
Uniform Delay, d1	61.1	61.7		59.5	59.6	55.6	66.0	30.3	19.7	59.5	20.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.26	0.45	0.12	1.00	1.00	
Incremental Delay, d2	1.9	3.9		10.3	10.8	0.4	1.5	2.1	0.2	18.5	1.8	
Delay (s)	63.0	65.7		69.8	70.4	56.0	84.9	15.9	2.5	78.0	22.3	
Level of Service	E	E		E	E	E	F	B	A	E	C	
Approach Delay (s)		64.6			63.5			15.3			28.7	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	15	5	1553	1562	18
Future Vol, veh/h	3	15	5	1553	1562	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	95	95	92	92
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	5	25	5	1635	1698	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2526	849	1718	0	-	0
Stage 1	1698	-	-	-	-	-
Stage 2	828	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	23	308	369	-	-	-
Stage 1	136	-	-	-	-	-
Stage 2	394	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	23	308	369	-	-	-
Mov Cap-2 Maneuver	99	-	-	-	-	-
Stage 1	134	-	-	-	-	-
Stage 2	394	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	369	-	228	-	-
HCM Lane V/C Ratio	0.014	-	0.132	-	-
HCM Control Delay (s)	14.9	-	23.2	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	11	4	1556	1574	3
Future Vol, veh/h	2	11	4	1556	1574	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	95	95	94	94
Heavy Vehicles, %	8	8	1	1	1	1
Mvmt Flow	2	14	4	1638	1674	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2503	839	1677	0	-	0
Stage 1	1676	-	-	-	-	-
Stage 2	827	-	-	-	-	-
Critical Hdwy	6.96	7.06	4.12	-	-	-
Critical Hdwy Stg 1	5.96	-	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-	-
Follow-up Hdwy	3.58	3.38	2.21	-	-	-
Pot Cap-1 Maneuver	22	297	383	-	-	-
Stage 1	129	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	22	297	383	-	-	-
Mov Cap-2 Maneuver	94	-	-	-	-	-
Stage 1	128	-	-	-	-	-
Stage 2	375	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	383	-	223	-	-
HCM Lane V/C Ratio	0.011	-	0.072	-	-
HCM Control Delay (s)	14.5	-	22.4	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection: 1: M-150 & Auburn /Auburn

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)	267	292	264	185	371	208	196	129	310	403	406	200
Average Queue (ft)	156	176	144	74	202	122	86	53	214	340	347	119
95th Queue (ft)	246	259	228	156	349	182	163	105	355	451	456	261
Link Distance (ft)		792	792			597	597			378	378	
Upstream Blk Time (%)										16	17	
Queuing Penalty (veh)										136	146	
Storage Bay Dist (ft)	250			135	430			155	250			175
Storage Blk Time (%)	1	1	11	1	0		1	0	4	32	42	0
Queuing Penalty (veh)	3	2	16	3	1		2	0	28	49	81	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	395	569	574	385
Average Queue (ft)	292	453	451	186
95th Queue (ft)	473	589	585	474
Link Distance (ft)		490	490	
Upstream Blk Time (%)		9	6	
Queuing Penalty (veh)		76	52	
Storage Bay Dist (ft)	350			260
Storage Blk Time (%)	9	22	35	
Queuing Penalty (veh)	60	39	54	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	116	168	222	198	206	119	327	336	290	195	460	456
Average Queue (ft)	45	57	121	93	94	18	209	211	47	155	297	243
95th Queue (ft)	95	123	199	180	173	73	307	311	135	230	483	413
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											3	1
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0		0	1		24	24		12	13	
Queuing Penalty (veh)		0		1	1		4	39		80	24	

Intersection: 3: M-150 & North Driveway

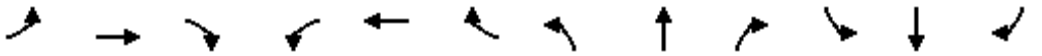
Movement	EB	NB	SB
Directions Served	LR	L	R
Maximum Queue (ft)	36	38	4
Average Queue (ft)	10	4	0
95th Queue (ft)	30	21	3
Link Distance (ft)	374		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	100
Storage Blk Time (%)		0	
Queuing Penalty (veh)		1	

Intersection: 4: M-150 & South Driveway

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (ft)	47	30	4
Average Queue (ft)	12	3	0
95th Queue (ft)	39	17	3
Link Distance (ft)	264		140
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Zone Summary

Zone wide Queuing Penalty: 898



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	214	316	147	234	270	143	165	1228	167	188	1284	212
Future Volume (veh/h)	214	316	147	234	270	143	165	1228	167	188	1284	212
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	233	343	150	257	297	152	181	1349	183	198	1352	220
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	267	416	186	272	428	191	215	1362	608	227	1387	619
Arrive On Green	0.14	0.11	0.11	0.14	0.11	0.11	0.11	0.36	0.36	0.24	0.74	0.74
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	233	343	150	257	297	152	181	1349	183	198	1352	220
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	12.1	8.9	8.7	13.5	7.6	8.8	9.4	35.6	7.8	10.1	33.5	4.7
Cycle Q Clear(g_c), s	12.1	8.9	8.7	13.5	7.6	8.8	9.4	35.6	7.8	10.1	33.5	4.7
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	267	416	186	272	428	191	215	1362	608	227	1387	619
V/C Ratio(X)	0.87	0.82	0.81	0.94	0.69	0.80	0.84	0.99	0.30	0.87	0.97	0.36
Avail Cap(c_a), veh/h	272	430	192	272	430	192	234	1362	608	234	1387	619
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	42.1	43.5	43.4	42.4	42.7	43.2	43.4	31.8	22.9	37.2	12.8	9.0
Incr Delay (d2), s/veh	25.2	12.0	21.5	39.7	4.8	20.5	22.1	22.2	1.3	27.4	18.8	1.6
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	7.2	4.6	4.6	9.0	3.7	4.6	5.5	18.9	3.1	5.6	8.2	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.3	55.5	64.9	82.1	47.4	63.7	65.5	54.0	24.2	64.6	31.5	10.6
LnGrp LOS	E	E	E	F	D	E	E	D	C	E	C	B
Approach Vol, veh/h		726			706			1713			1770	
Approach Delay, s/veh		61.2			63.5			52.0			32.6	
Approach LOS		E			E			D			C	

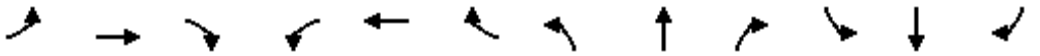
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.6	42.7	20.7	17.9	18.0	43.4	21.0	17.6
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 35	* 14	* 11	* 12	* 35	* 14	* 11
Max Q Clear Time (g_c+I1), s	12.1	37.6	14.1	10.8	11.4	35.5	15.5	10.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	48.1
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 (vph)	58	33	22	176	32	157	14	1301	136	173	1477	27
Future Volume (vph)	58	33	22	176	32	157	14	1301	136	173	1477	27
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1861		1805	1836	1700	1881	3762	1683	1881	3752	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1861		1805	1836	1700	1881	3762	1683	1881	3752	
Peak-hour factor, PHF	0.84	0.84	0.84	0.78	0.78	0.78	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	69	39	26	226	41	201	15	1399	146	182	1555	28
RTOR Reduction (vph)	0	24	0	0	0	178	0	0	87	0	1	0
Lane Group Flow (vph)	69	41	0	133	134	23	15	1399	59	182	1582	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	7.0	7.0		11.3	11.3	11.3	2.9	40.7	40.7	14.5	52.3	
Effective Green, g (s)	7.0	7.0		11.3	11.3	11.3	2.9	40.7	40.7	14.5	52.3	
Actuated g/C Ratio	0.07	0.07		0.11	0.11	0.11	0.03	0.41	0.41	0.14	0.52	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	131	130		203	207	192	54	1531	684	272	1962	
v/s Ratio Prot	c0.04	0.02		c0.07	0.07		0.01	c0.37		c0.10	c0.42	
v/s Ratio Perm						0.01			0.04			
v/c Ratio	0.53	0.31		0.66	0.65	0.12	0.28	0.91	0.09	0.67	0.81	
Uniform Delay, d1	44.9	44.2		42.5	42.4	39.9	47.5	28.0	18.2	40.5	19.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.21	0.77	3.19	1.00	1.00	
Incremental Delay, d2	3.8	1.4		7.4	6.8	0.3	1.2	4.9	0.1	6.1	3.7	
Delay (s)	48.7	45.6		49.9	49.2	40.1	58.6	26.3	58.2	46.6	23.3	
Level of Service	D	D		D	D	D	E	C	E	D	C	
Approach Delay (s)		47.2			45.5			29.6			25.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	19	6	1419	1633	28
Future Vol, veh/h	8	19	6	1419	1633	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	95	95	93	93
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	13	32	6	1494	1756	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2515	878	1786	0	-	0
Stage 1	1756	-	-	-	-	-
Stage 2	759	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	24	295	347	-	-	-
Stage 1	127	-	-	-	-	-
Stage 2	428	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	24	295	347	-	-	-
Mov Cap-2 Maneuver	96	-	-	-	-	-
Stage 1	125	-	-	-	-	-
Stage 2	428	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	31	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	347	-	183	-	-
HCM Lane V/C Ratio	0.018	-	0.246	-	-
HCM Control Delay (s)	15.6	-	31	-	-
HCM Lane LOS	C	-	D	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	13	11	1424	1650	2
Future Vol, veh/h	1	13	11	1424	1650	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	94	94	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	1	19	12	1515	1755	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2538	879	1757	0	-	0
Stage 1	1756	-	-	-	-	-
Stage 2	782	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	23	295	356	-	-	-
Stage 1	127	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	22	295	356	-	-	-
Mov Cap-2 Maneuver	94	-	-	-	-	-
Stage 1	123	-	-	-	-	-
Stage 2	417	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.3	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	356	-	256	-	-
HCM Lane V/C Ratio	0.033	-	0.078	-	-
HCM Control Delay (s)	15.5	-	20.3	-	-
HCM Lane LOS	C	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Intersection: 1: M-150 & Auburn /Auburn

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	268	196	119	302	174	147	119	220	316	332	200
Average Queue (ft)	131	141	85	49	169	92	63	49	169	285	291	154
95th Queue (ft)	203	240	176	94	272	155	125	93	270	338	337	278
Link Distance (ft)		792	792			597	597			287	287	
Upstream Blk Time (%)										24	25	
Queuing Penalty (veh)										185	198	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	26	15	1	0			0	0	8	43	44	0
Queuing Penalty (veh)	41	31	2	0			0	0	51	72	74	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	215	592	588	385
Average Queue (ft)	183	414	418	202
95th Queue (ft)	264	646	653	493
Link Distance (ft)		490	490	
Upstream Blk Time (%)		14	15	
Queuing Penalty (veh)		116	125	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	12	42	35	0
Queuing Penalty (veh)	77	78	73	0

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	100	88	158	134	115	76	313	332	245	195	443	379
Average Queue (ft)	46	44	81	41	45	10	152	164	33	134	249	212
95th Queue (ft)	89	84	139	95	93	45	254	269	110	216	406	334
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											1	
Queuing Penalty (veh)											0	
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)				0			4	5		2	14	
Queuing Penalty (veh)				0			1	7		15	24	

Intersection: 3: M-150 & North Driveway

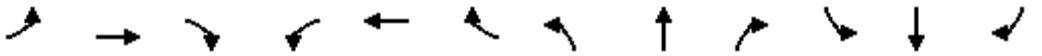
Movement	EB	NB	SB	SB
Directions Served	LR	L	T	T
Maximum Queue (ft)	82	33	80	87
Average Queue (ft)	20	4	4	4
95th Queue (ft)	64	21	65	68
Link Distance (ft)	374		417	417
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			0	1
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		1
Queuing Penalty (veh)		2		0

Intersection: 4: M-150 & South Driveway

Movement	EB	NB	SB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	57	30	39	33
Average Queue (ft)	13	7	4	4
95th Queue (ft)	42	26	36	41
Link Distance (ft)	264		140	140
Upstream Blk Time (%)			0	1
Queuing Penalty (veh)			3	5
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Zone Summary

Zone wide Queuing Penalty: 1181



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	162	244	142	180	310	79	103	1066	166	97	1494	158
Future Volume (veh/h)	162	244	142	180	310	79	103	1066	166	97	1494	158
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	1953	1953	1953	1953	1953	1953	1953	1953	1953	1969	1969	1969
Adj Flow Rate, veh/h	182	274	157	191	330	72	129	1332	199	102	1573	160
Peak Hour Factor	0.89	0.89	0.89	0.94	0.94	0.94	0.80	0.80	0.80	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	2	2	2
Cap, veh/h	208	407	182	217	425	189	112	1949	869	113	1965	876
Arrive On Green	0.11	0.11	0.11	0.12	0.11	0.11	0.08	0.70	0.70	0.06	0.53	0.53
Sat Flow, veh/h	1860	3711	1655	1860	3711	1655	1860	3711	1655	1875	3741	1668
Grp Volume(v), veh/h	182	274	157	191	330	72	129	1332	199	102	1573	160
Grp Sat Flow(s),veh/h/ln	1860	1856	1655	1860	1856	1655	1860	1856	1655	1875	1870	1668
Q Serve(g_s), s	13.5	9.9	13.1	14.2	12.1	5.6	8.4	29.0	6.0	7.6	48.2	7.0
Cycle Q Clear(g_c), s	13.5	9.9	13.1	14.2	12.1	5.6	8.4	29.0	6.0	7.6	48.2	7.0
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	208	407	182	217	425	189	112	1949	869	113	1965	876
V/C Ratio(X)	0.88	0.67	0.86	0.88	0.78	0.38	1.16	0.68	0.23	0.91	0.80	0.18
Avail Cap(c_a), veh/h	258	435	194	258	435	194	112	1949	869	113	1965	876
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	61.2	59.9	61.3	60.9	60.3	57.4	64.4	14.4	10.9	65.4	27.2	17.4
Incr Delay (d2), s/veh	23.2	3.7	29.8	25.0	8.5	1.3	133.1	2.0	0.6	56.5	3.5	0.5
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	7.5	4.8	6.9	8.1	6.1	2.4	7.9	9.0	2.2	5.3	20.9	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	84.4	63.6	91.1	85.9	68.8	58.7	197.5	16.3	11.5	122.0	30.8	17.9
LnGrp LOS	F	E	F	F	E	E	F	B	B	F	C	B
Approach Vol, veh/h		613			593			1660			1835	
Approach Delay, s/veh		76.9			73.1			29.8			34.7	
Approach LOS		E			E			C			C	

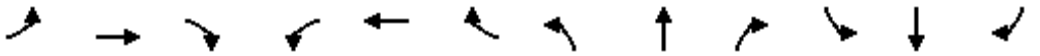
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	80.1	22.2	22.6	15.0	80.1	22.9	22.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 8.4	* 69	* 19	* 16	* 8.4	* 69	* 19	* 16
Max Q Clear Time (g_c+I1), s	9.6	31.0	15.5	14.1	10.4	50.2	16.2	15.1
Green Ext Time (p_c), s	0.0	12.6	0.2	0.5	0.0	11.2	0.1	0.3

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 (vph)	20	30	28	169	16	103	8	927	192	144	1569	24
Future Volume (vph)	20	30	28	169	16	103	8	927	192	144	1569	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1863	1818		1787	1807	1683	1845	3689	1650	1845	3681	
Flt Permitted	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1863	1818		1787	1807	1683	1845	3689	1650	1845	3681	
Peak-hour factor, PHF	0.60	0.60	0.60	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	33	50	47	211	20	129	9	1091	226	157	1705	26
RTOR Reduction (vph)	0	25	0	0	0	116	0	0	70	0	0	0
Lane Group Flow (vph)	33	72	0	116	115	13	9	1091	156	157	1731	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	8.0	8.0		14.4	14.4	14.4	1.5	74.3	74.3	16.8	89.6	
Effective Green, g (s)	8.0	8.0		14.4	14.4	14.4	1.5	74.3	74.3	16.8	89.6	
Actuated g/C Ratio	0.06	0.06		0.10	0.10	0.10	0.01	0.53	0.53	0.12	0.64	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	106	103		183	185	173	19	1957	875	221	2355	
v/s Ratio Prot	0.02	c0.04		c0.06	0.06		0.00	0.30		c0.09	c0.47	
v/s Ratio Perm						0.01			0.09			
v/c Ratio	0.31	0.70		0.63	0.62	0.08	0.47	0.56	0.18	0.71	0.73	
Uniform Delay, d1	63.4	64.8		60.3	60.2	56.8	68.9	21.9	17.0	59.3	17.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.93	0.69	0.60	1.00	1.00	
Incremental Delay, d2	1.7	19.6		7.0	6.3	0.2	14.7	1.0	0.4	10.3	2.1	
Delay (s)	65.0	84.4		67.3	66.5	57.0	78.9	16.1	10.6	69.5	19.2	
Level of Service	E	F		E	E	E	E	B	B	E	B	
Approach Delay (s)		79.5			63.3			15.6			23.4	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	30	0	1165	1810	22
Future Vol, veh/h	0	30	0	1165	1810	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	84	84	93	93
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	33	0	1387	1946	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	973	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	255	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	255	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	255	-	-
HCM Lane V/C Ratio	-	0.128	-	-
HCM Control Delay (s)	-	21.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	33	30	38	1132	1819	21
Future Vol, veh/h	33	30	38	1132	1819	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	84	84	93	93
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	36	33	45	1348	1956	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2732	990	1979	0	-	0
Stage 1	1968	-	-	-	-	-
Stage 2	764	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.18	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.24	-	-	-
Pot Cap-1 Maneuver	~ 17	249	281	-	-	-
Stage 1	97	-	-	-	-	-
Stage 2	426	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 14	249	281	-	-	-
Mov Cap-2 Maneuver	65	-	-	-	-	-
Stage 1	81	-	-	-	-	-
Stage 2	426	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	70.1	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	281	-	65	249	-	-
HCM Lane V/C Ratio	0.161	-	0.552	0.131	-	-
HCM Control Delay (s)	20.3	-	114.2	21.6	-	-
HCM Lane LOS	C	-	F	C	-	-
HCM 95th %tile Q(veh)	0.6	-	2.3	0.4	-	-

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

Intersection: 1: M-150 & Auburn /Auburn

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	311	262	160	268	236	217	87	219	384	390	200
Average Queue (ft)	128	136	88	62	152	141	107	30	119	194	191	63
95th Queue (ft)	200	238	186	125	246	209	187	65	206	320	325	187
Link Distance (ft)		792	792			596	596			378	378	
Upstream Blk Time (%)										0	0	
Queuing Penalty (veh)										2	2	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	26	19	2	1			2		9	12	8	0
Queuing Penalty (veh)	32	32	2	2			2		49	13	15	0

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	214	562	562	385
Average Queue (ft)	124	341	346	108
95th Queue (ft)	237	536	543	357
Link Distance (ft)		490	490	
Upstream Blk Time (%)		3	3	
Queuing Penalty (veh)		25	31	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	7	30	21	
Queuing Penalty (veh)	50	29	33	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	82	156	160	141	80	33	353	359	256	194	453	450
Average Queue (ft)	22	47	96	53	26	3	170	173	52	123	226	197
95th Queue (ft)	60	113	153	123	57	18	288	290	135	210	414	386
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											1	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0					8	9		5	8	
Queuing Penalty (veh)		0					1	19		41	11	

Intersection: 3: M-150 & North Driveway

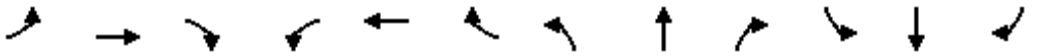
Movement	EB
Directions Served	R
Maximum Queue (ft)	43
Average Queue (ft)	16
95th Queue (ft)	38
Link Distance (ft)	249
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	107	74	107	5	16
Average Queue (ft)	39	26	33	0	1
95th Queue (ft)	98	57	77	3	8
Link Distance (ft)	226	226		134	134
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 393



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	204	411	151	223	301	125	152	1345	191	180	1283	155
Future Volume (veh/h)	204	411	151	223	301	125	152	1345	191	180	1283	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	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	224	452	164	275	372	147	162	1431	197	194	1380	164
Peak Hour Factor	0.91	0.91	0.91	0.81	0.81	0.81	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	249	534	238	275	586	261	167	1642	733	167	1642	733
Arrive On Green	0.13	0.14	0.14	0.15	0.16	0.16	0.18	0.87	0.87	0.03	0.14	0.14
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	224	452	164	275	372	147	162	1431	197	194	1380	164
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	16.3	16.4	13.0	20.4	12.9	11.3	11.9	28.4	2.8	12.4	49.9	12.1
Cycle Q Clear(g_c), s	16.3	16.4	13.0	20.4	12.9	11.3	11.9	28.4	2.8	12.4	49.9	12.1
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	249	534	238	275	586	261	167	1642	733	167	1642	733
V/C Ratio(X)	0.90	0.85	0.69	1.00	0.64	0.56	0.97	0.87	0.27	1.16	0.84	0.22
Avail Cap(c_a), veh/h	275	630	281	275	630	281	167	1642	733	167	1642	733
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
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	59.8	58.6	57.2	59.8	55.4	54.7	57.4	6.9	5.3	68.0	55.2	39.0
Incr Delay (d2), s/veh	28.0	9.2	5.6	53.8	1.9	2.2	59.8	6.7	0.9	118.8	5.4	0.7
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	9.6	8.3	5.7	13.7	6.2	4.8	7.8	4.8	1.0	11.7	26.4	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	87.9	67.8	62.8	113.6	57.3	56.9	117.2	13.6	6.2	186.7	60.6	39.7
LnGrp LOS	F	E	E	F	E	E	F	B	A	F	E	D
Approach Vol, veh/h		840			794			1790			1738	
Approach Delay, s/veh		72.2			76.7			22.1			72.7	
Approach LOS		E			E			C			E	

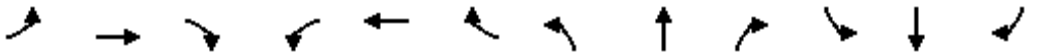
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	67.6	25.1	28.3	19.0	67.6	27.0	26.4
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 57	* 20	* 23	* 12	* 57	* 20	* 23
Max Q Clear Time (g_c+I1), s	14.4	30.4	18.3	14.9	13.9	51.9	22.4	18.4
Green Ext Time (p_c), s	0.0	12.2	0.1	1.7	0.0	3.9	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	55.7
HCM 6th LOS	E

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 (vph)	45	39	32	215	42	221	18	1392	160	180	1358	24
Future Volume (vph)	45	39	32	215	42	221	18	1392	160	180	1358	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1846		1805	1838	1700	1881	3762	1683	1881	3753	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1846		1805	1838	1700	1881	3762	1683	1881	3753	
Peak-hour factor, PHF	0.68	0.68	0.68	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	66	57	47	253	49	260	19	1465	168	194	1460	26
RTOR Reduction (vph)	0	22	0	0	0	230	0	0	68	0	1	0
Lane Group Flow (vph)	66	82	0	149	153	30	19	1465	100	194	1485	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	11.5	11.5		16.4	16.4	16.4	4.7	67.8	67.8	17.8	80.9	
Effective Green, g (s)	11.5	11.5		16.4	16.4	16.4	4.7	67.8	67.8	17.8	80.9	
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.03	0.48	0.48	0.13	0.58	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	154	151		211	215	199	63	1821	815	239	2168	
v/s Ratio Prot	0.04	c0.04		0.08	c0.08		0.01	c0.39		c0.10	c0.40	
v/s Ratio Perm						0.02			0.06			
v/c Ratio	0.43	0.54		0.71	0.71	0.15	0.30	0.80	0.12	0.81	0.69	
Uniform Delay, d1	61.1	61.7		59.5	59.5	55.6	66.0	30.5	19.8	59.5	20.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.25	0.46	0.13	1.00	1.00	
Incremental Delay, d2	1.9	3.9		10.3	10.6	0.4	1.5	2.2	0.2	18.5	1.8	
Delay (s)	63.0	65.7		69.8	70.1	55.9	84.2	16.4	2.7	78.0	22.4	
Level of Service	E	E		E	E	E	F	B	A	E	C	
Approach Delay (s)		64.6			63.4			15.7			28.8	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	17	0	1557	1552	17
Future Vol, veh/h	0	17	0	1557	1552	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	95	95	92	92
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	0	18	0	1639	1687	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	844	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	311	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	311	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	311	-	-
HCM Lane V/C Ratio	-	0.059	-	-
HCM Control Delay (s)	-	17.3	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	16	37	1528	1553	16
Future Vol, veh/h	29	16	37	1528	1553	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	17	40	1661	1688	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2608	853	1705	0	-	0
Stage 1	1697	-	-	-	-	-
Stage 2	911	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 20	302	369	-	-	-
Stage 1	134	-	-	-	-	-
Stage 2	352	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 18	302	369	-	-	-
Mov Cap-2 Maneuver	88	-	-	-	-	-
Stage 1	120	-	-	-	-	-
Stage 2	352	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	49.6	0.4	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	369	-	88	302	-	-
HCM Lane V/C Ratio	0.109	-	0.358	0.058	-	-
HCM Control Delay (s)	15.9	-	67.2	17.6	-	-
HCM Lane LOS	C	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	1.4	0.2	-	-

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

Intersection: 1: M-150 & Auburn /Auburn

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)	287	299	252	174	364	225	183	139	310	412	408	200
Average Queue (ft)	167	176	139	64	219	127	96	47	216	360	357	119
95th Queue (ft)	259	261	218	140	379	195	169	101	363	453	449	262
Link Distance (ft)		792	792			596	596			378	378	
Upstream Blk Time (%)										22	20	
Queuing Penalty (veh)										190	173	
Storage Bay Dist (ft)	250			135	430			155	250			175
Storage Blk Time (%)	1	1	10	1	1		1	0	11	36	45	0
Queuing Penalty (veh)	2	2	15	2	1		2	0	73	55	86	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	395	576	562	385
Average Queue (ft)	262	428	436	153
95th Queue (ft)	453	569	576	432
Link Distance (ft)		490	490	
Upstream Blk Time (%)		6	6	
Queuing Penalty (veh)		52	51	
Storage Bay Dist (ft)	350			260
Storage Blk Time (%)	7	19	35	
Queuing Penalty (veh)	48	35	54	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	117	155	207	181	201	115	325	314	209	195	460	441
Average Queue (ft)	46	57	120	85	85	19	206	207	45	154	288	236
95th Queue (ft)	91	118	184	167	154	82	288	290	127	231	454	386
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											3	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0		0	1		22	24		12	13	
Queuing Penalty (veh)		0		1	1		4	38		84	24	

Intersection: 3: M-150 & North Driveway

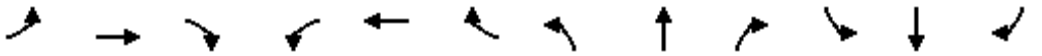
Movement	EB
Directions Served	R
Maximum Queue (ft)	26
Average Queue (ft)	10
95th Queue (ft)	28
Link Distance (ft)	249
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	96	48	80	16	17
Average Queue (ft)	30	15	26	1	1
95th Queue (ft)	75	42	63	11	9
Link Distance (ft)	237	237		140	140
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 994



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	218	316	147	234	270	147	165	1236	167	191	1290	215
Future Volume (veh/h)	218	316	147	234	270	147	165	1236	167	191	1290	215
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	237	343	150	257	297	157	181	1358	183	201	1358	223
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	270	419	187	272	423	189	215	1354	604	230	1385	618
Arrive On Green	0.14	0.11	0.11	0.14	0.11	0.11	0.11	0.36	0.36	0.24	0.73	0.73
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	237	343	150	257	297	157	181	1358	183	201	1358	223
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	12.3	8.9	8.7	13.5	7.6	9.1	9.4	35.9	7.8	10.2	34.2	4.8
Cycle Q Clear(g_c), s	12.3	8.9	8.7	13.5	7.6	9.1	9.4	35.9	7.8	10.2	34.2	4.8
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	270	419	187	272	423	189	215	1354	604	230	1385	618
V/C Ratio(X)	0.88	0.82	0.80	0.94	0.70	0.83	0.84	1.00	0.30	0.87	0.98	0.36
Avail Cap(c_a), veh/h	272	430	192	272	430	192	234	1354	604	234	1385	618
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	42.0	43.5	43.4	42.4	42.8	43.5	43.4	32.0	23.0	37.1	12.9	9.0
Incr Delay (d2), s/veh	25.8	11.6	21.0	39.7	5.0	25.5	22.1	25.2	1.3	28.0	20.0	1.6
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	7.4	4.6	4.5	9.0	3.7	4.9	5.5	19.5	3.1	5.7	8.5	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.8	55.1	64.3	82.1	47.8	68.9	65.5	57.2	24.3	65.1	32.9	10.7
LnGrp LOS	E	E	E	F	D	E	E	F	C	E	C	B
Approach Vol, veh/h		730			711			1722			1782	
Approach Delay, s/veh		61.1			64.8			54.6			33.7	
Approach LOS		E			E			D			C	

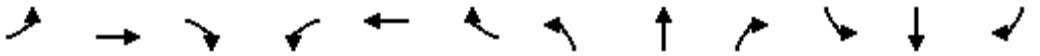
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.8	42.5	20.9	17.8	18.0	43.3	21.0	17.7
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 35	* 14	* 11	* 12	* 35	* 14	* 11
Max Q Clear Time (g_c+I1), s	12.2	37.9	14.3	11.1	11.4	36.2	15.5	10.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	49.5
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 (vph)	58	33	23	178	32	157	14	1307	138	173	1487	27
Future Volume (vph)	58	33	23	178	32	157	14	1307	138	173	1487	27
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1859		1805	1836	1700	1881	3762	1683	1881	3752	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1859		1805	1836	1700	1881	3762	1683	1881	3752	
Peak-hour factor, PHF	0.84	0.84	0.84	0.78	0.78	0.78	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	69	39	27	228	41	201	15	1405	148	182	1565	28
RTOR Reduction (vph)	0	25	0	0	0	178	0	0	88	0	1	0
Lane Group Flow (vph)	69	41	0	135	134	23	15	1405	60	182	1592	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	7.0	7.0		11.3	11.3	11.3	2.9	40.7	40.7	14.5	52.3	
Effective Green, g (s)	7.0	7.0		11.3	11.3	11.3	2.9	40.7	40.7	14.5	52.3	
Actuated g/C Ratio	0.07	0.07		0.11	0.11	0.11	0.03	0.41	0.41	0.14	0.52	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	131	130		203	207	192	54	1531	684	272	1962	
v/s Ratio Prot	c0.04	0.02		c0.07	0.07		0.01	c0.37		c0.10	c0.42	
v/s Ratio Perm						0.01			0.04			
v/c Ratio	0.53	0.31		0.67	0.65	0.12	0.28	0.92	0.09	0.67	0.81	
Uniform Delay, d1	44.9	44.2		42.5	42.4	39.9	47.5	28.1	18.2	40.5	19.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.19	0.77	2.88	1.00	1.00	
Incremental Delay, d2	3.8	1.4		8.0	6.8	0.3	1.3	5.4	0.1	6.1	3.8	
Delay (s)	48.7	45.6		50.5	49.2	40.1	57.9	27.0	52.7	46.6	23.5	
Level of Service	D	D		D	D	D	E	C	D	D	C	
Approach Delay (s)		47.2			45.7			29.7			25.9	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	24	0	1432	1649	25
Future Vol, veh/h	0	24	0	1432	1649	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	95	95	93	93
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	0	40	0	1507	1773	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	887	1800	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.9	4.12	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	0	291	343	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	291	343	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	343	-	291	-	-
HCM Lane V/C Ratio	-	-	0.137	-	-
HCM Control Delay (s)	0	-	19.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	24	43	1397	1649	24
Future Vol, veh/h	35	24	43	1397	1649	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	94	94	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	50	34	46	1486	1754	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2602	890	1780	0	-	0
Stage 1	1767	-	-	-	-	-
Stage 2	835	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	~ 21	290	349	-	-	-
Stage 1	125	-	-	-	-	-
Stage 2	391	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 18	290	349	-	-	-
Mov Cap-2 Maneuver	83	-	-	-	-	-
Stage 1	109	-	-	-	-	-
Stage 2	391	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	66.8	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	349	-	83	290	-	-
HCM Lane V/C Ratio	0.131	-	0.602	0.118	-	-
HCM Control Delay (s)	16.9	-	99.5	19.1	-	-
HCM Lane LOS	C	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	2.7	0.4	-	-

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

Intersection: 1: M-150 & Auburn /Auburn

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	291	225	162	295	182	158	118	220	335	338	200
Average Queue (ft)	131	143	89	54	154	106	73	48	174	298	301	147
95th Queue (ft)	200	239	174	114	256	168	142	90	273	363	368	274
Link Distance (ft)		792	792			597	597			306	306	
Upstream Blk Time (%)										22	23	
Queuing Penalty (veh)										176	185	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	24	19	3	0			0	0	9	44	44	0
Queuing Penalty (veh)	38	43	5	0			0	0	52	73	74	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	215	575	576	385
Average Queue (ft)	174	423	429	199
95th Queue (ft)	264	679	677	490
Link Distance (ft)		490	490	
Upstream Blk Time (%)		21	22	
Queuing Penalty (veh)		184	189	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	11	40	36	0
Queuing Penalty (veh)	72	78	77	1

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	114	104	153	133	114	46	320	323	290	195	468	397
Average Queue (ft)	47	40	81	48	47	9	163	173	41	133	256	224
95th Queue (ft)	94	82	141	106	96	31	268	278	143	217	426	385
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											1	1
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)							5	7		2	14	
Queuing Penalty (veh)							1	9		18	25	

Intersection: 3: M-150 & North Driveway

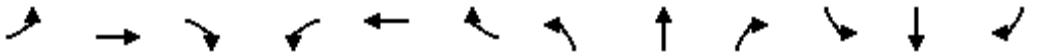
Movement	EB	SB	SB	SB
Directions Served	R	T	T	R
Maximum Queue (ft)	84	95	96	40
Average Queue (ft)	23	28	29	1
95th Queue (ft)	73	152	157	29
Link Distance (ft)	374	422	422	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				100
Storage Blk Time (%)			4	
Queuing Penalty (veh)			1	

Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	TR
Maximum Queue (ft)	262	236	56	33	77	90
Average Queue (ft)	192	87	20	1	23	24
95th Queue (ft)	339	268	50	17	107	111
Link Distance (ft)	264	264		437	134	134
Upstream Blk Time (%)	44	18			2	3
Queuing Penalty (veh)	0	0			18	22
Storage Bay Dist (ft)			50			
Storage Blk Time (%)			4			
Queuing Penalty (veh)			30			

Zone Summary

Zone wide Queuing Penalty: 1374



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	162	244	142	180	310	79	103	1066	166	97	1494	158
Future Volume (veh/h)	162	244	142	180	310	79	103	1066	166	97	1494	158
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	1953	1953	1953	1953	1953	1953	1953	1953	1953	1969	1969	1969
Adj Flow Rate, veh/h	182	274	157	191	330	72	129	1332	199	102	1573	160
Peak Hour Factor	0.89	0.89	0.89	0.94	0.94	0.94	0.80	0.80	0.80	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	2	2	2
Cap, veh/h	208	407	182	217	425	189	112	1949	869	113	1965	876
Arrive On Green	0.11	0.11	0.11	0.12	0.11	0.11	0.08	0.70	0.70	0.12	1.00	1.00
Sat Flow, veh/h	1860	3711	1655	1860	3711	1655	1860	3711	1655	1875	3741	1668
Grp Volume(v), veh/h	182	274	157	191	330	72	129	1332	199	102	1573	160
Grp Sat Flow(s),veh/h/ln	1860	1856	1655	1860	1856	1655	1860	1856	1655	1875	1870	1668
Q Serve(g_s), s	13.5	9.9	13.1	14.2	12.1	5.6	8.4	29.0	6.0	7.5	0.0	0.0
Cycle Q Clear(g_c), s	13.5	9.9	13.1	14.2	12.1	5.6	8.4	29.0	6.0	7.5	0.0	0.0
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	208	407	182	217	425	189	112	1949	869	113	1965	876
V/C Ratio(X)	0.88	0.67	0.86	0.88	0.78	0.38	1.16	0.68	0.23	0.91	0.80	0.18
Avail Cap(c_a), veh/h	258	435	194	258	435	194	112	1949	869	113	1965	876
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	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	59.9	61.3	60.9	60.3	57.4	64.4	14.4	10.9	61.2	0.0	0.0
Incr Delay (d2), s/veh	23.2	3.7	29.8	25.0	8.5	1.3	133.1	2.0	0.6	56.5	3.5	0.5
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	7.5	4.8	6.9	8.1	6.1	2.4	7.9	9.0	2.2	5.1	1.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	84.4	63.6	91.1	85.9	68.8	58.7	197.5	16.3	11.5	117.8	3.5	0.5
LnGrp LOS	F	E	F	F	E	E	F	B	B	F	A	A
Approach Vol, veh/h		613			593			1660			1835	
Approach Delay, s/veh		76.9			73.1			29.8			9.6	
Approach LOS		E			E			C			A	

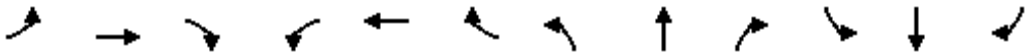
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	80.1	22.2	22.6	15.0	80.1	22.9	22.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 8.4	* 69	* 19	* 16	* 8.4	* 69	* 19	* 16
Max Q Clear Time (g_c+I1), s	9.5	31.0	15.5	14.1	10.4	2.0	16.2	15.1
Green Ext Time (p_c), s	0.0	12.6	0.2	0.5	0.0	18.4	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	33.5
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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	30	28	169	16	103	8	927	192	144	1569	24
Future Volume (veh/h)	20	30	28	169	16	103	8	927	192	144	1569	24
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	1984	1984	1984	1953	1953	1953	1953	1953	1953
Adj Flow Rate, veh/h	33	50	47	211	20	129	9	1091	226	157	1705	26
Peak Hour Factor	0.60	0.60	0.60	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	3	3	3
Cap, veh/h	318	208	196	286	443	375	270	1810	807	270	1825	28
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.29	0.98	0.98	0.14	0.49	0.49
Sat Flow, veh/h	1239	933	877	1309	1984	1682	1860	3711	1655	1860	3742	57
Grp Volume(v), veh/h	33	0	97	211	20	129	9	1091	226	157	844	887
Grp Sat Flow(s),veh/h/ln	1239	0	1811	1309	1984	1682	1860	1856	1655	1860	1856	1943
Q Serve(g_s), s	3.0	0.0	6.2	22.1	1.1	9.0	0.5	2.5	0.6	11.0	59.9	60.2
Cycle Q Clear(g_c), s	4.1	0.0	6.2	28.2	1.1	9.0	0.5	2.5	0.6	11.0	59.9	60.2
Prop In Lane	1.00		0.48	1.00		1.00	1.00		1.00	1.00		0.03
Lane Grp Cap(c), veh/h	318	0	404	286	443	375	270	1810	807	270	905	948
V/C Ratio(X)	0.10	0.00	0.24	0.74	0.05	0.34	0.03	0.60	0.28	0.58	0.93	0.94
Avail Cap(c_a), veh/h	424	0	559	398	612	519	270	1810	807	270	905	948
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	0.00	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	44.3	0.0	44.6	56.2	42.7	45.8	42.7	0.9	0.9	55.9	33.7	33.8
Incr Delay (d2), s/veh	0.1	0.0	0.3	4.5	0.0	0.5	0.2	1.5	0.9	8.9	17.5	17.3
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	1.0	0.0	2.9	7.6	0.6	3.9	0.2	0.8	0.4	5.7	29.4	30.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.4	0.0	45.0	60.8	42.7	46.3	42.9	2.4	1.8	64.8	51.2	51.1
LnGrp LOS	D	A	D	E	D	D	D	A	A	E	D	D
Approach Vol, veh/h		130			360			1326			1888	
Approach Delay, s/veh		44.8			54.6			2.6			52.3	
Approach LOS		D			D			A			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	27.0	75.0		38.0	27.0	75.0		38.0				
Change Period (Y+Rc), s	6.7	6.7		* 6.8	6.7	6.7		* 6.8				
Max Green Setting (Gmax), s	20.3	56.3		* 43	20.3	56.3		* 43				
Max Q Clear Time (g_c+I1), s	13.0	4.5		30.2	2.5	62.2		8.2				
Green Ext Time (p_c), s	0.2	10.0		1.0	0.0	0.0		0.7				

Intersection Summary	
HCM 6th Ctrl Delay	34.5
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: 1: M-150 & Auburn /Auburn

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	283	236	151	263	242	208	84	220	384	397	200
Average Queue (ft)	127	142	88	61	154	138	105	28	137	235	229	65
95th Queue (ft)	201	244	188	120	232	204	177	61	242	398	401	190
Link Distance (ft)		792	792			596	596			378	378	
Upstream Blk Time (%)										7	2	
Queuing Penalty (veh)										45	15	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	26	19	1	1			1		23	12	13	0
Queuing Penalty (veh)	32	30	2	1			1		125	13	22	0

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	214	487	480	385
Average Queue (ft)	123	356	357	86
95th Queue (ft)	235	453	453	296
Link Distance (ft)		490	490	
Upstream Blk Time (%)		0	0	
Queuing Penalty (veh)		3	2	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	3	32	28	
Queuing Penalty (veh)	25	31	44	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	81	125	262	49	81	142	422	450	295	195	501	487
Average Queue (ft)	23	39	122	11	25	9	274	286	120	137	464	461
95th Queue (ft)	61	90	212	35	56	68	394	411	304	229	482	477
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											56	56
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0					31	32		6	53	
Queuing Penalty (veh)		0					3	62		49	77	

Intersection: 3: M-150 & North Driveway

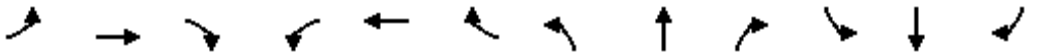
Movement	EB
Directions Served	R
Maximum Queue (ft)	47
Average Queue (ft)	13
95th Queue (ft)	37
Link Distance (ft)	249
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	79	65	86	10	8
Average Queue (ft)	28	25	33	0	0
95th Queue (ft)	63	54	76	7	4
Link Distance (ft)	226	226		134	134
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			200		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 582



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	204	411	151	223	301	125	152	1345	191	180	1283	155
Future Volume (veh/h)	204	411	151	223	301	125	152	1345	191	180	1283	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	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	224	452	164	275	372	147	162	1431	197	194	1380	164
Peak Hour Factor	0.91	0.91	0.91	0.81	0.81	0.81	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	249	534	238	275	586	261	167	1642	733	167	1642	733
Arrive On Green	0.13	0.14	0.14	0.15	0.16	0.16	0.18	0.87	0.87	0.12	0.58	0.58
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	224	452	164	275	372	147	162	1431	197	194	1380	164
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	16.3	16.4	13.0	20.4	12.9	11.3	11.9	28.4	2.8	12.4	42.0	6.6
Cycle Q Clear(g_c), s	16.3	16.4	13.0	20.4	12.9	11.3	11.9	28.4	2.8	12.4	42.0	6.6
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	249	534	238	275	586	261	167	1642	733	167	1642	733
V/C Ratio(X)	0.90	0.85	0.69	1.00	0.64	0.56	0.97	0.87	0.27	1.16	0.84	0.22
Avail Cap(c_a), veh/h	275	630	281	275	630	281	167	1642	733	167	1642	733
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.33	1.33	1.33
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	59.8	58.6	57.2	59.8	55.4	54.7	57.4	6.9	5.3	61.8	25.5	18.0
Incr Delay (d2), s/veh	28.0	9.2	5.6	53.8	1.9	2.2	59.8	6.7	0.9	118.8	5.4	0.7
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	9.6	8.3	5.7	13.7	6.2	4.8	7.8	4.8	1.0	11.1	16.5	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	87.9	67.8	62.8	113.6	57.3	56.9	117.2	13.6	6.2	180.5	30.8	18.7
LnGrp LOS	F	E	E	F	E	E	F	B	A	F	C	B
Approach Vol, veh/h		840			794			1790			1738	
Approach Delay, s/veh		72.2			76.7			22.1			46.4	
Approach LOS		E			E			C			D	

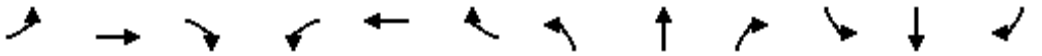
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	67.6	25.1	28.3	19.0	67.6	27.0	26.4
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 57	* 20	* 23	* 12	* 57	* 20	* 23
Max Q Clear Time (g_c+I1), s	14.4	30.4	18.3	14.9	13.9	44.0	22.4	18.4
Green Ext Time (p_c), s	0.0	12.2	0.1	1.7	0.0	7.8	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	46.8
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)	45	39	32	215	42	221	18	1392	160	180	1358	24
Future Volume (veh/h)	45	39	32	215	42	221	18	1392	160	180	1358	24
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	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	66	57	47	253	49	260	19	1465	168	194	1460	26
Peak Hour Factor	0.68	0.68	0.68	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	305	255	210	325	507	430	274	1723	769	274	1732	31
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.19	0.61	0.61	0.14	0.46	0.46
Sat Flow, veh/h	1079	1006	829	1311	2000	1695	1890	3770	1682	1890	3790	67
Grp Volume(v), veh/h	66	0	104	253	49	260	19	1465	168	194	726	760
Grp Sat Flow(s),veh/h/ln	1079	0	1835	1311	2000	1695	1890	1885	1682	1890	1885	1972
Q Serve(g_s), s	7.0	0.0	6.3	26.5	2.6	18.9	1.2	44.1	6.3	13.7	47.6	47.7
Cycle Q Clear(g_c), s	9.6	0.0	6.3	32.8	2.6	18.9	1.2	44.1	6.3	13.7	47.6	47.7
Prop In Lane	1.00		0.45	1.00		1.00	1.00		1.00	1.00		0.03
Lane Grp Cap(c), veh/h	305	0	466	325	507	430	274	1723	769	274	862	901
V/C Ratio(X)	0.22	0.00	0.22	0.78	0.10	0.60	0.07	0.85	0.22	0.71	0.84	0.84
Avail Cap(c_a), veh/h	326	0	501	350	546	462	274	1723	769	274	862	901
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	0.00	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	43.6	0.0	41.3	54.3	40.0	46.1	48.8	23.6	16.1	57.0	33.6	33.6
Incr Delay (d2), s/veh	0.4	0.0	0.2	10.0	0.1	2.0	0.5	5.5	0.7	14.4	9.8	9.5
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	1.9	0.0	2.9	9.6	1.3	8.3	0.6	16.8	2.4	7.5	22.8	23.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.0	0.0	41.6	64.3	40.0	48.0	49.3	29.0	16.8	71.4	43.3	43.1
LnGrp LOS	D	A	D	E	D	D	D	C	B	E	D	D
Approach Vol, veh/h		170			562			1652			1680	
Approach Delay, s/veh		42.5			54.6			28.0			46.5	
Approach LOS		D			D			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	27.0	70.7		42.3	27.0	70.7		42.3				
Change Period (Y+Rc), s	6.7	6.7		* 6.8	6.7	6.7		* 6.8				
Max Green Setting (Gmax), s	20.3	61.3		* 38	20.3	61.3		* 38				
Max Q Clear Time (g_c+I1), s	15.7	46.1		34.8	3.2	49.7		11.6				
Green Ext Time (p_c), s	0.2	8.9		0.7	0.0	6.8		0.9				

Intersection Summary												
HCM 6th Ctrl Delay			39.9									
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.

Intersection: 1: M-150 & Auburn /Auburn

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)	303	274	229	180	364	298	192	130	310	397	413	200
Average Queue (ft)	173	169	135	70	205	129	91	49	205	346	351	122
95th Queue (ft)	280	257	215	155	363	249	170	102	359	453	456	263
Link Distance (ft)		792	792			596	596			378	378	
Upstream Blk Time (%)						0				19	19	
Queuing Penalty (veh)						0				161	164	
Storage Bay Dist (ft)	250			135	430			155	250			175
Storage Blk Time (%)	3	0	9	0	1	0	1	0	3	35	43	0
Queuing Penalty (veh)	7	0	14	0	2	0	2	0	21	53	82	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	395	562	553	385
Average Queue (ft)	325	460	464	194
95th Queue (ft)	480	584	574	482
Link Distance (ft)		490	490	
Upstream Blk Time (%)		8	7	
Queuing Penalty (veh)		68	60	
Storage Bay Dist (ft)	350			260
Storage Blk Time (%)	15	24	39	
Queuing Penalty (veh)	98	43	60	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	111	145	339	133	174	159	570	572	295	195	467	464
Average Queue (ft)	44	49	160	28	82	20	442	458	188	166	433	404
95th Queue (ft)	93	108	268	86	150	102	559	571	398	235	516	522
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)			0				2	3			22	11
Queuing Penalty (veh)			0				17	26			0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0		0	1		40	42		11	37	
Queuing Penalty (veh)		0		1	0		7	67		77	67	

Intersection: 3: M-150 & North Driveway

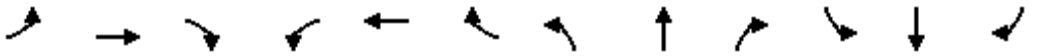
Movement	EB
Directions Served	R
Maximum Queue (ft)	30
Average Queue (ft)	9
95th Queue (ft)	28
Link Distance (ft)	249
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	67	52	77	4
Average Queue (ft)	24	15	30	0
95th Queue (ft)	59	43	69	3
Link Distance (ft)	237	237		140
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			200	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 1100



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	218	316	147	234	270	147	165	1236	167	191	1290	215
Future Volume (veh/h)	218	316	147	234	270	147	165	1236	167	191	1290	215
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	237	343	150	257	297	157	181	1358	183	201	1358	223
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	270	419	187	272	423	189	215	1354	604	230	1385	618
Arrive On Green	0.14	0.11	0.11	0.14	0.11	0.11	0.11	0.36	0.36	0.24	0.73	0.73
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	237	343	150	257	297	157	181	1358	183	201	1358	223
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	12.3	8.9	8.7	13.5	7.6	9.1	9.4	35.9	7.8	10.2	34.2	4.8
Cycle Q Clear(g_c), s	12.3	8.9	8.7	13.5	7.6	9.1	9.4	35.9	7.8	10.2	34.2	4.8
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	270	419	187	272	423	189	215	1354	604	230	1385	618
V/C Ratio(X)	0.88	0.82	0.80	0.94	0.70	0.83	0.84	1.00	0.30	0.87	0.98	0.36
Avail Cap(c_a), veh/h	272	430	192	272	430	192	234	1354	604	234	1385	618
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	42.0	43.5	43.4	42.4	42.8	43.5	43.4	32.0	23.0	37.1	12.9	9.0
Incr Delay (d2), s/veh	25.8	11.6	21.0	39.7	5.0	25.5	22.1	25.2	1.3	28.0	20.0	1.6
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	7.4	4.6	4.5	9.0	3.7	4.9	5.5	19.5	3.1	5.7	8.5	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.8	55.1	64.3	82.1	47.8	68.9	65.5	57.2	24.3	65.1	32.9	10.7
LnGrp LOS	E	E	E	F	D	E	E	F	C	E	C	B
Approach Vol, veh/h		730			711			1722			1782	
Approach Delay, s/veh		61.1			64.8			54.6			33.7	
Approach LOS		E			E			D			C	

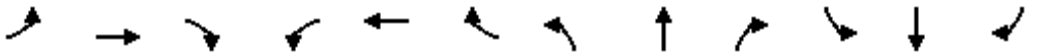
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.8	42.5	20.9	17.8	18.0	43.3	21.0	17.7
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 35	* 14	* 11	* 12	* 35	* 14	* 11
Max Q Clear Time (g_c+I1), s	12.2	37.9	14.3	11.1	11.4	36.2	15.5	10.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	49.5
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)	58	33	23	178	32	157	14	1307	138	173	1487	27
Future Volume (veh/h)	58	33	23	178	32	157	14	1307	138	173	1487	27
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	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	69	39	27	228	41	201	15	1405	148	182	1565	28
Peak Hour Factor	0.84	0.84	0.84	0.78	0.78	0.78	0.93	0.93	0.93	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	306	240	166	331	440	373	270	1640	731	270	1648	29
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.10	0.29	0.29	0.14	0.43	0.43
Sat Flow, veh/h	1147	1092	756	1357	2000	1695	1890	3770	1682	1890	3790	68
Grp Volume(v), veh/h	69	0	66	228	41	201	15	1405	148	182	778	815
Grp Sat Flow(s),veh/h/ln	1147	0	1848	1357	2000	1695	1890	1885	1682	1890	1885	1972
Q Serve(g_s), s	5.1	0.0	2.9	16.3	1.6	10.5	0.7	35.2	6.6	9.1	39.7	39.8
Cycle Q Clear(g_c), s	6.7	0.0	2.9	19.2	1.6	10.5	0.7	35.2	6.6	9.1	39.7	39.8
Prop In Lane	1.00		0.41	1.00		1.00	1.00		1.00	1.00		0.03
Lane Grp Cap(c), veh/h	306	0	407	331	440	373	270	1640	731	270	820	858
V/C Ratio(X)	0.23	0.00	0.16	0.69	0.09	0.54	0.06	0.86	0.20	0.67	0.95	0.95
Avail Cap(c_a), veh/h	354	0	484	388	524	444	270	1640	731	270	820	858
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	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	33.7	0.0	31.5	39.3	31.1	34.5	39.1	32.5	22.4	40.6	27.2	27.2
Incr Delay (d2), s/veh	0.4	0.0	0.2	4.1	0.1	1.2	0.4	6.0	0.6	12.6	21.1	20.8
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	1.5	0.0	1.3	5.7	0.8	4.5	0.3	17.4	2.6	5.0	20.6	21.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.1	0.0	31.7	43.4	31.1	35.7	39.5	38.5	23.0	53.3	48.3	48.1
LnGrp LOS	C	A	C	D	C	D	D	D	C	D	D	D
Approach Vol, veh/h		135			470			1568			1775	
Approach Delay, s/veh		32.9			39.1			37.0			48.7	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.0	50.2		28.8	21.0	50.2		28.8				
Change Period (Y+Rc), s	6.7	6.7		* 6.8	6.7	6.7		* 6.8				
Max Green Setting (Gmax), s	14.3	39.3		* 26	14.3	39.3		* 26				
Max Q Clear Time (g_c+I1), s	11.1	37.2		21.2	2.7	41.8		8.7				
Green Ext Time (p_c), s	0.1	1.6		0.8	0.0	0.0		0.5				

Intersection Summary	
HCM 6th Ctrl Delay	42.4
HCM 6th LOS	D

Notes

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

Intersection: 1: M-150 & Auburn /Auburn

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	327	240	123	292	216	158	112	220	338	342	200
Average Queue (ft)	130	139	91	49	165	104	74	52	169	303	305	151
95th Queue (ft)	200	264	211	98	286	185	140	96	267	354	358	276
Link Distance (ft)		792	792			597	597			306	306	
Upstream Blk Time (%)										26	26	
Queuing Penalty (veh)										202	208	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	26	13	1	0	0		0		7	47	46	0
Queuing Penalty (veh)	40	29	1	0	0		0		42	77	78	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	215	379	396	260
Average Queue (ft)	163	257	256	60
95th Queue (ft)	251	368	365	186
Link Distance (ft)		490	490	
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	6	37	13	
Queuing Penalty (veh)	41	70	29	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	98	102	245	70	135	70	320	315	152	195	483	481
Average Queue (ft)	41	38	105	17	52	8	192	203	34	160	461	460
95th Queue (ft)	82	81	203	47	110	52	286	288	111	250	470	467
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)			0								58	55
Queuing Penalty (veh)			0								0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)					0		8	10		2	56	
Queuing Penalty (veh)					0		1	14		17	97	

Intersection: 3: M-150 & North Driveway

Movement	EB
Directions Served	R
Maximum Queue (ft)	56
Average Queue (ft)	14
95th Queue (ft)	40
Link Distance (ft)	374
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: M-150 & South Driveway

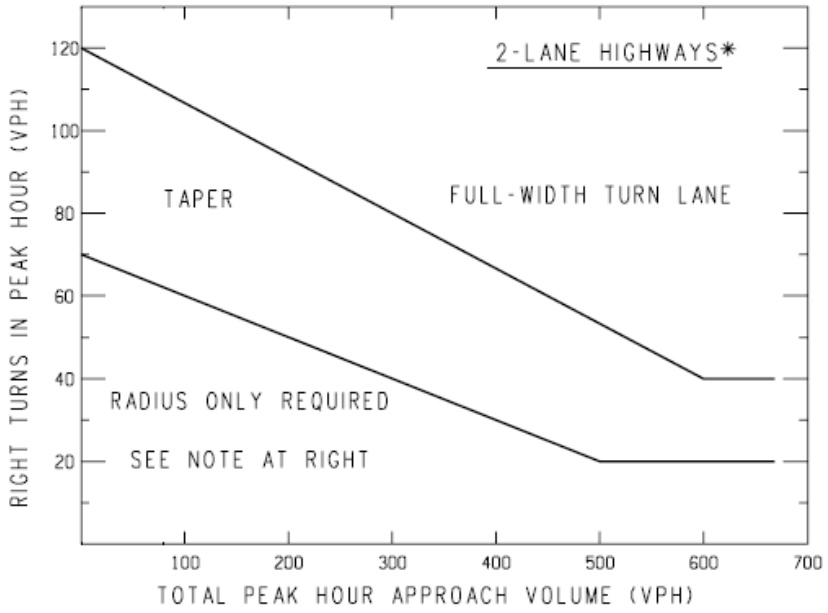
Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	TR
Maximum Queue (ft)	120	53	52	43	6	13
Average Queue (ft)	46	20	17	1	0	0
95th Queue (ft)	101	48	44	19	4	6
Link Distance (ft)	264	264		437	134	134
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			50			
Storage Blk Time (%)			1	0		
Queuing Penalty (veh)			5	0		

Zone Summary

Zone wide Queuing Penalty: 953

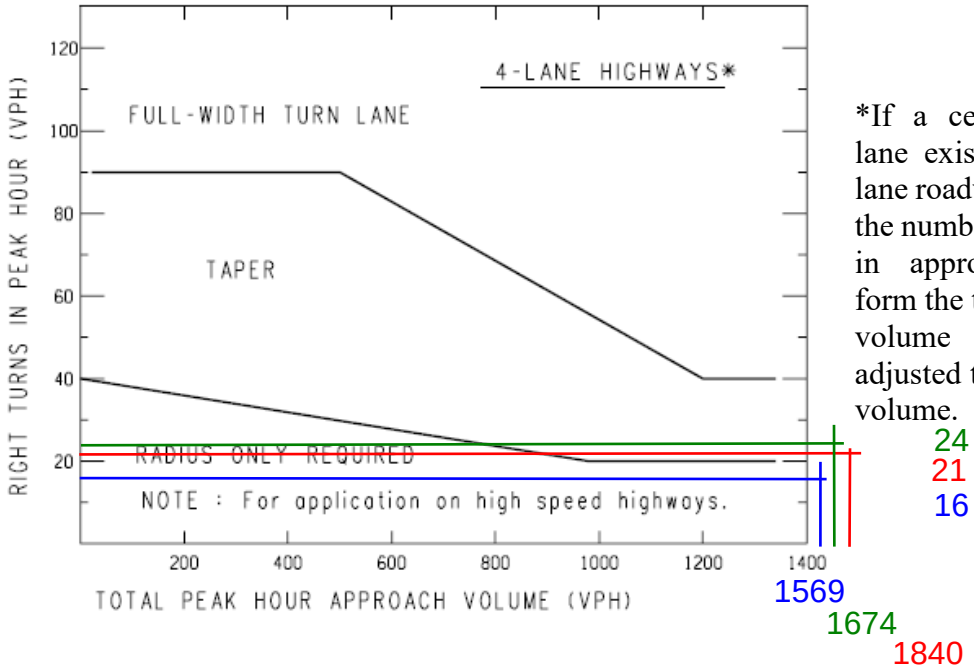
TURN LANE WARRANTS

South Driveway:
AM Peak Hour
PM Peak Hour
Saturday Peak Hour



NOTE: For posted speeds at or under 45 mph, peak hour right turns greater than 40 vph, and total peak hour approach less than 300 vph, adjust right turn volumes.

Adjust peak hour
Right turns = Peak hour Right turns – 20



*If a center left-turn lane exists (ie 3 or 5 lane roadway), subtract the number of left turns in approach volume form the total approach volume to get an adjusted total approach volume.

Sample Problem: The Design Speed is 55 mph. The Peak Hour Approach Volume is 300 vph. The Number of Right Turns in the Peak Hous is 100 vph. Determine if a right turn lane is recommended.

Solution: Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus, a right-turn lane may be recommended.

TIS ADDENDUM

ROWE PROFESSIONAL SERVICES COMPANY

Large Firm Resources. Personal Attention. sm

September 29, 2021

Mr. Michael Thompson
Stucky Vitale Architects
27172 Woodward Avenue
Royal Oak, MI 48067

RE: Addendum to the Traffic Impact Study for Proposed Bebb Oak Development in Rochester Hills, MI

Dear Mr. Thompson:

ROWE Professional Services Company completed a Traffic Impact Study (TIS) related to a proposed mixed-use development located at 2800 South Rochester Road (M-150) in the City of Rochester Hills, MI. Comments received from the Michigan Department of Transportation (MDOT), the City of Rochester Hills, and their consultants have requested additional analyses to be included with the previously completed TIS. The following items/comments have been addressed:

- Trip Generation should be revised, and the revised trip generation should not include internal capture trips
    - As described in the TIS, internal capture can be included in mixed-use developments similar to this proposed site. However, this analysis removed the internal capture at the request of the reviewing agencies.
- The revised future scenario should model a single, full access driveway
    - The analyses in this addendum included a single, full access driveway. The TIS included two driveways – one with full movements, one with right in/right out operations
- Include Non-motorized considerations
    - Non-motorized trip generation and impacts are discussed in this addendum

Trip Generation

Using the information and methodologies specified in the latest version of Trip Generation (Trip Generation Manual, 10th Edition, 2017), ROWE forecast the weekday AM and PM peak hour trips associated with the proposed development. At the request of the reviewing agencies and their consultants, the trip generation for the proposed "Restaurant with Drive Through" was calculated using a mix of two land uses. The proposed site will operate like a Fast Casual restaurant with Drive Through. The latest version of Trip Generation does not have a land use for a Fast Casual Restaurant with Drive Through. The land use for Fast Casual (LUC 930) has limited data in the AM peak hour. To best model the trips associated with this portion of the development, the trip generation for the AM peak hour was calculated using LUC 934 Fast-Food with Drive Through Window, while the trip generation for the PM peak hour and Weekend midday peak was calculated using LUC 930 Fast Casual Restaurant. Pass-by rates for LUC 934 were used in the AM and PM peak hour, and the PM peak hour rate was used during the Weekend Midday peak.

In multi-use developments, not all the trips generated are from sources outside the boundaries of the development but are rather trips that are “internally captured” within the site. The methodology presented in the Trip Generation Handbook (Trip Generation Handbook, 3rd Edition, 2017) was followed to determine an appropriate internal capture rate for the proposed development. Accepted practice allows for the inclusion of internal capture reductions for mixed-use developments. However, these calculations were omitted in this addendum at the request of the reviewing agencies.

Not all the traffic generated by the proposed development will be new traffic added onto the adjacent roadway network. As with most new commercial development, a significant amount of the site-generated traffic is considered “pass-by” traffic. Pass-by trips are trips already present on the adjacent roadway network, which are interrupted to visit the site. Pass-by trips are accounted for by reducing the number of forecast new trips to be added to the roadway network; however, actual driveway volumes are not reduced. Pass-by trips are normally expressed as a percentage of trips generated by the new development. These pass-by rates are published in the Trip Generation Handbook.

The Trip Generation Handbook suggests a 34 percent PM pass-by rate for the Shopping Center and a 49 percent AM and 50 percent PM pass-by rate for the Fast-Food Restaurant with Drive-Through Window.

With the application of the pass-by trip factors, the site-generated trips can be classified as “pass-by” and “new” trips. The proposed development is expected to generate 185 total trips during the AM peak hour, 224 total trips during the PM peak hour, and 304 total trips during the Weekend midday peak hour. However, only 116 of the AM peak hour trips, 149 of the PM peak hour trips, and 199 of the Weekend midday peak hour trips will be new traffic not currently using the adjacent street network, whose primary purpose is to visit the new development.

The results of the trip generation forecasts are provided below in Table 1.

Table 1: Trip Generation for Proposed Development

Land Use	Land Use Code	Units	AM Peak Hour			PM Peak Hour			Sat. Midday Peak			Week Day
			In	Out	Total	In	Out	Total	In	Out	Total	
Multifamily Housing (Mid-Rise)	221	94 DU	9	25	34	25	16	41	22	24	46	511
Retail - Shopping Center	820	10,245 SF	6	4	10	48	53	101	53	49	102	1,277
Fast-Food with Drive Through Window	934	3,503 SF	72	69	141	43	39	82	82	74	156	1,650
Total	**-**	**-**	**87**	**98**	**185**	**116**	**108**	**224**	**157**	**147**	**304**	**3,438**
Pass-By Rates, LUC 820: 34% PM			-	-	-	16	18	34	14	13	27	-
Pass-By Rates, LUC 934: 49% AM; 50% PM			35	34	69	22	19	41	41	37	78	-
Total New Trips			**52**	**64**	**116**	**78**	**71**	**149**	**102**	**97**	**199**	**3,438**

Future Conditions

The results of the LOS analysis for future conditions reveals that several movements and approaches of the studied intersections would continue to operate at LOS D or better during the AM and PM peak hours, with the following exceptions:

- Rochester Road (M-150) & Auburn Road
  - LOS E
    - AM Peak Hour Movements: EBT, WBT, WBR
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBT, EBR, WBT, WBR, SBT
    - PM Peak Hour Approaches: EB, WB, SB
    - PM Peak Hour Overall Intersection
    - Saturday Peak Hour Movements: EBL, EBR, WBR, NBL, SBL
    - Saturday Peak Hour Approaches: EB, WB, NB
    - Saturday Peak Hour Overall Intersection
  - LOS F
    - AM Peak Hour Movements: EBL, EBR, WBL, NBL, SBL
    - PM Peak Hour Movements: EBL, WBL, NBL, SBL
    - Saturday Peak Hour Movements: WBL, NBT, SBT
- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - LOS E
    - AM Peak Hour Movements: EBL, WBL, WBL/T, WBR, NBL, SBL
    - AM Peak Hour Approaches: EB, WB
    - PM Peak Hour Movements: EBL, EBT/R, WBL, WBT/R, WBR, SBL
    - PM Peak Hour Approaches: EB, WB
    - Saturday Peak Hour Movements: NBL
  - LOS F
    - AM Peak Hour Movements: EBT/R
    - PM Peak Hour Movements: NBL
- Rochester Road (M-150) & South Site Driveway
  - LOS F
    - AM Peak Hour Movements: EBL
    - AM Peak Hour Approaches: EB
    - PM Peak Hour Movements: EBL
    - PM Peak Hour Approaches: EB
    - Saturday Peak Hour Movements: EBL
    - Saturday Peak Hour Approaches: EB

95th percentile queue lengths were reviewed at the site driveways. Queue lengths for left turning vehicles entering at the south site driveway do not exceed 65 feet (3 vehicles) in the AM peak hour, 73 feet (3 vehicles) in the PM peak hour, and 69 feet (3 vehicles) in the Saturday Midday peak hour. Queue lengths for vehicles exiting the south site driveway towards the north will not exceed 171 feet (7 vehicles) in the AM peak hour, 104 feet (4 vehicles) in the PM peak hour, and 289 feet (12 vehicles) in the Saturday Midday peak hour. Queue lengths for vehicles exiting the site driveway towards the south will not exceed 91 feet (4 vehicles) in the AM peak hour, 81 feet (3 vehicles) in the PM peak hour, and 333 feet (13 vehicles) in the Saturday Midday peak hour.

The following observations were made, and improvements were recommended, if applicable, at the following intersections due to future traffic conditions:

- Rochester Road (M-150) & Auburn Road
  - Southbound Rochester Road (M-150) operates at poor LOS due to the lack of progression caused by the split signal phasing at Rochester Road (M-150) & Wabash Road/Barclay Circle. It is understood that improvements are planned for this intersection which will result in the removal of this split phasing, cycle length optimization, and coordination with the Rochester Road (M-150) corridor and will improve intersection operations.
- Rochester Road (M-150) & Wabash Road/Barclay Circle
  - This signal currently operates with split signal phasing for Wabash Road and Barclay Circle. It is understood that improvements are planned for this intersection which will result in the removal of this split phasing, cycle length optimization, and coordination with the Rochester Road (M-150) corridor and will improve intersection operations.

The operational results for future conditions are presented in Table 2.

Table 2: LOS Analysis for Future Conditions

Intersection	Control Type	Approach	LOS Results			Change from Previous Study					
			AM Peak	PM Peak	Sat. Peak	AM Peak		PM Peak		Sat. Peak	
Rochester Road (M-150) & Auburn Road	Signalized	Eastbound	E 76.9	E 72.7	E 62.1	-	-	-	+0.5	-	+1.0
		Westbound	E 73.2	E 77.3	E 66.1	-	+0.1	-	+0.6	-	+1.3
		Northbound	C 29.9	C 22.6	E 62.1	-	+0.1	-	+0.5	D to E	+7.5
		Southbound	C 34.9	E 75.5	D 50.7	-	+0.2	-	+2.8	C to D	+17.0
		Overall	**D 43.4**	**E 57.0**	**E 58.5**	**-**	**+0.1**	**-**	**+1.3**	**D to E**	**+9.0**
Rochester Road (M-150) & Wabash Road/Barclay Circle	Signalized	Eastbound	E 79.5	E 64.6	D 47.2	-	-	-	-	-	-
		Westbound	E 63.3	E 63.9	D 46.1	-	-	-	+0.5	-	+0.4
		Northbound	B 15.7	B 16.4	C 29.9	-	+0.1	-	+0.7	-	+0.2
		Southbound	C 23.4	C 29.1	C 26.6	-	-	-	+0.3	-	+0.7
		Overall	**C 26.5**	**C 30.2**	**C 31.0**	**-**	**-**	**-**	**+0.4**	**-**	**+0.5**
Rochester Road (M-150) & South Site Driveway	Stop	Eastbound	F 76.1	E 68.7	F 126.5	-	+6.0	-	+19.1	-	+59.7
	Free	Northbound	A 0.7	A 0.7	A 1.1	-	-	-	+0.3	-	+0.6
		Southbound	A 0.0	A 0.0	A 0.0	-	-	-	-	-	-
	TWSC	**Overall**	**A 3.8**	**A 2.9**	**A 7.8**	**-**	**+2.1**	**-**	**+2.0**	**-**	**+5.9**

XX.X Average seconds of delay per vehicle

Turn Lane, Passing Lane, and Taper Warrants

An evaluation was performed in accordance with MDOT requirements to determine if right turn deceleration lanes are required at the site driveways. The results of the analysis indicated that a right turn taper is warranted at the south site driveway. All turn lane warrant charts are attached to this memorandum.

The results of the analysis are presented in Table 3.

Table 3: Turn Lane Warrants

Intersection	Movement	Result
Rochester Road (M-150) & South Site Driveway	NB LT	Existing Two-Way Left Turn Lane
	SB RT	Turn Lane Warranted

Non-motorized Impacts

Reviewing pedestrian data from latest version of the Trip Generation Manual, shows that this proposed development will generate an additional two pedestrians in the AM peak hour and three additional pedestrians in the PM peak hour. The reviewing agencies expressed concern for non-motorized traffic at the intersection of Rochester Road (M-150) and Wabash Road/Barclay Circle, due to the lack of a pedestrian crossing on the south side of the intersection (running parallel to EB traffic). There are existing pedestrian signals on all other approaches of this signal. The addition of a pedestrian signal on the south side of the intersection would have a significant negative impact on the operations of the signal, given the significant number of WB to SB left turning vehicles.

Conclusions and Recommendations

The proposed project consists of 94 units of multifamily residential, 10,245 square feet of retail, and 3,503 square feet of fast-food restaurant with a drive-through with a build-out year of approximately 2022. The proposed development will have access to Rochester Road (M-150) via one existing driveway. The existing north driveway was removed at the request of MDOT, the City of Rochester Hills, and their consultants. The eastbound approach of the south site driveway will be widened to allow for a dedicated left turn lane and a dedicated right turn lane, which would replace the existing shared left/right turn lane. A Southbound right turn lane would be warranted with the removal of the north driveway.

The previously completed TIA was completed with the inclusion of internal capture reductions, in accordance with accepted practice for estimating the trip generation of a mixed-use development. MDOT, the City of Rochester Hills, and their consultants have requested that internal capture reductions should not be included in this analysis.

With the revised trip generation calculations requested by MDOT, the City of Rochester Hills, and their consultants, the proposed site is forecast to generate 116 new trips during the AM peak hour (52 inbound and 64 outbound from the site), 149 new trips during the PM peak hour (78 inbound and 71 outbound from the site), and 197 new trips during Saturday peak hour (102 inbound and 97 outbound from the site).

An operational analysis was performed for existing, background, and total future (build) conditions for the intersections of:

- Rochester Road (M-150) & Wabash Road/Barclay Circle
- Rochester Road (M-150) & Auburn Road
- Rochester Road (M-150) & South Site Driveway

The operational analysis indicated that several movements and approaches of the study intersections would operate at acceptable levels during the AM, PM, and Saturday peak hours. While several movements and approaches operate at typically unacceptable levels in all of the studied peak hours, these are existing conditions and require analysis of the entire Rochester Road (M-150) corridor to optimize the signal cycle length, splits, and coordination, which it outside the scope of this study. The addition of traffic from the proposed development does not significantly impact the operations of the studied intersections.

The signal at the intersection of Rochester Road (M-150) & Wabash Road/Barclay Circle currently operates with split signal phasing for Wabash Road and Barclay Circle. Removal of this split phasing, cycle length optimization, and coordination with the Rochester Road (M-150) corridor will improve operations at this intersection, will improve progression and gaps in traffic along southbound Rochester Road (M-150) for vehicles exiting the site driveways and will improve operations for the southbound approach at the intersection of Rochester Road (M-150) & Auburn Road.

We hope that this report meets your needs. If you have any questions, please feel free to contact us at your convenience.

Sincerely,
ROWE Professional Services Company

Michael J. Labadie, PE
Senior Project Manager

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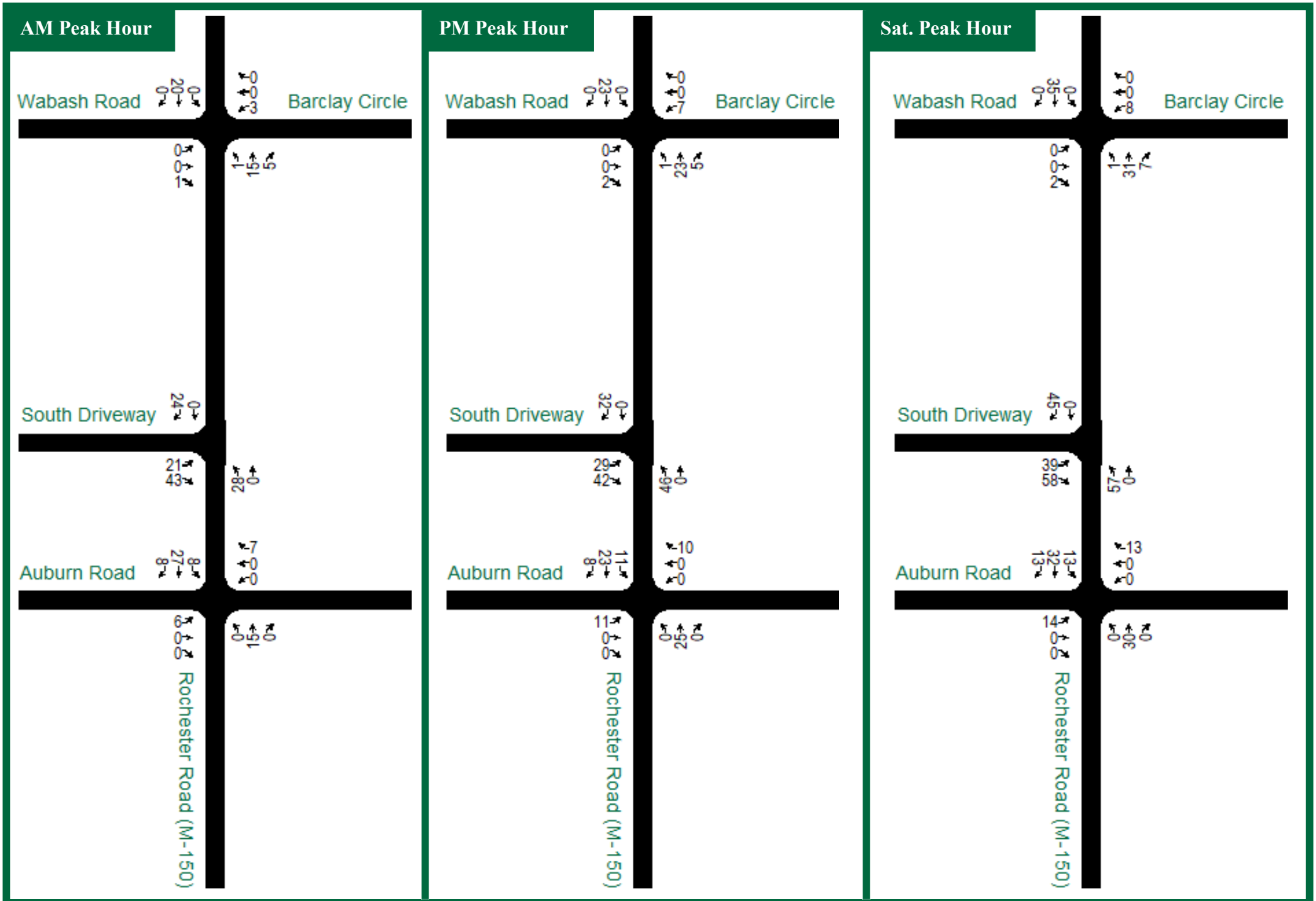
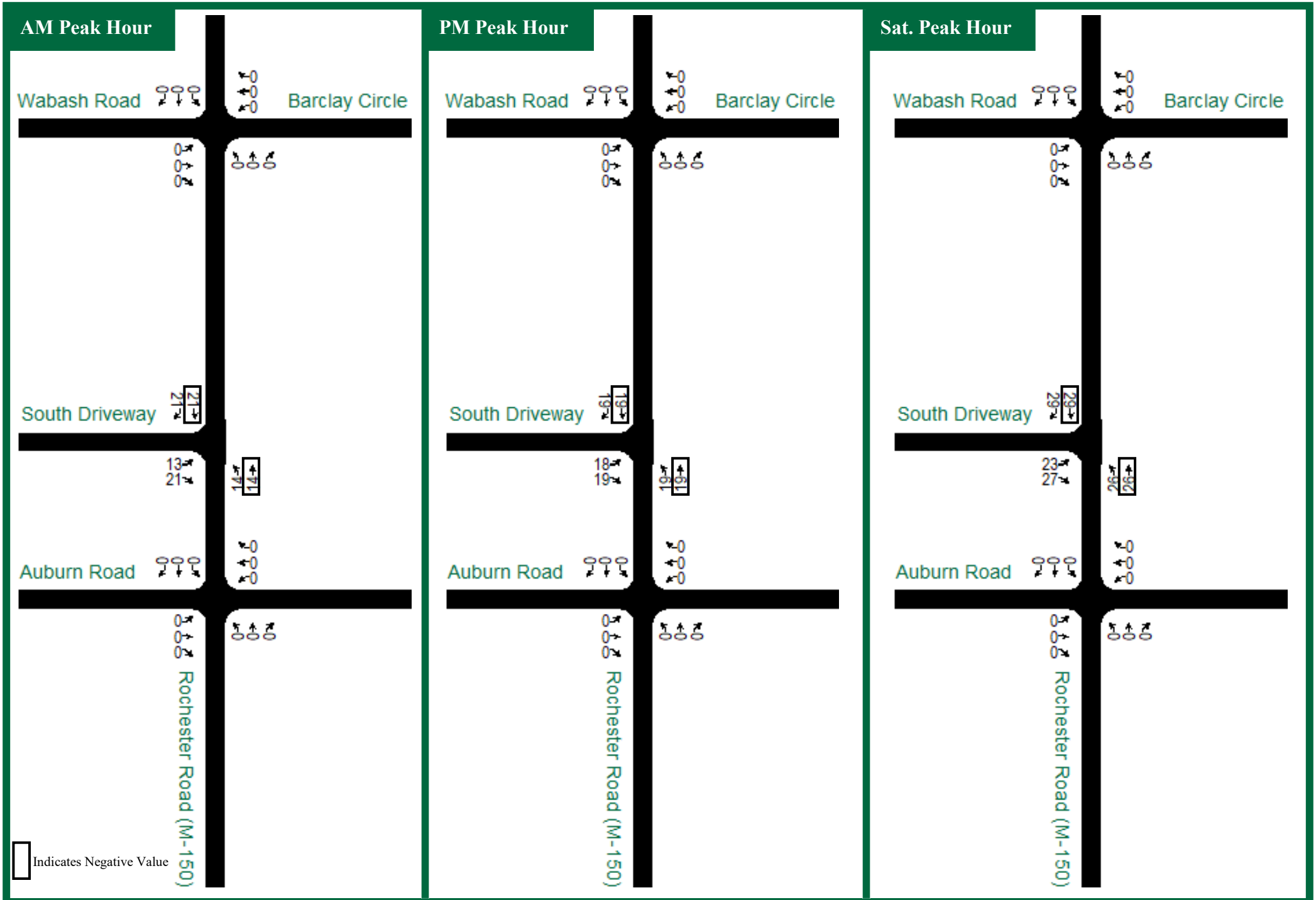


ROWE PROFESSIONAL SERVICES COMPANY
Large Firm Resources. Personal Attention.

Trip Generation Volumes
Bebb Oak TIS
Figure 1
Not to scale – for illustrative purposes only



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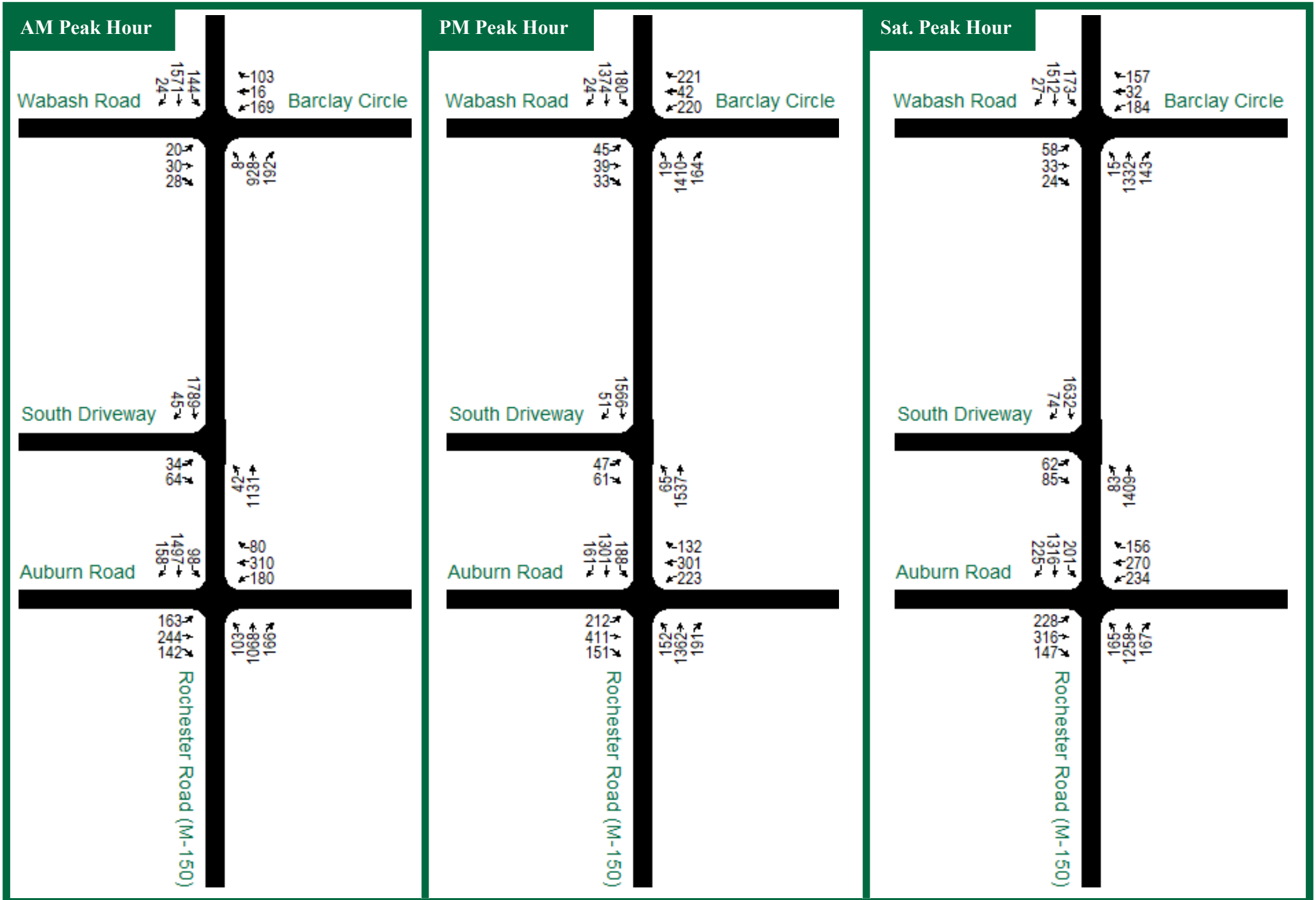
Pass-By Volumes
Bebb Oak TIS
Figure 2
Not to scale – for illustrative purposes only



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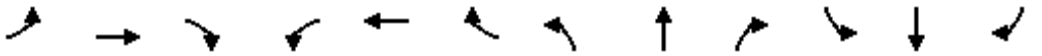
2022 Future Conditions Volumes
Bebb Oak TIS
Figure 3
Not to scale – for illustrative purposes only



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	163	244	142	180	310	80	103	1068	166	98	1497	158
Future Volume (veh/h)	163	244	142	180	310	80	103	1068	166	98	1497	158
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	1953	1953	1953	1953	1953	1953	1953	1953	1953	1969	1969	1969
Adj Flow Rate, veh/h	183	274	157	191	330	73	129	1335	199	103	1576	160
Peak Hour Factor	0.89	0.89	0.89	0.94	0.94	0.94	0.80	0.80	0.80	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	2	2	2
Cap, veh/h	209	407	182	217	423	188	112	1949	869	113	1965	876
Arrive On Green	0.11	0.11	0.11	0.12	0.11	0.11	0.08	0.70	0.70	0.06	0.53	0.53
Sat Flow, veh/h	1860	3711	1655	1860	3711	1655	1860	3711	1655	1875	3741	1668
Grp Volume(v), veh/h	183	274	157	191	330	73	129	1335	199	103	1576	160
Grp Sat Flow(s),veh/h/ln	1860	1856	1655	1860	1856	1655	1860	1856	1655	1875	1870	1668
Q Serve(g_s), s	13.6	9.9	13.1	14.2	12.1	5.7	8.4	29.1	6.0	7.6	48.4	7.0
Cycle Q Clear(g_c), s	13.6	9.9	13.1	14.2	12.1	5.7	8.4	29.1	6.0	7.6	48.4	7.0
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	209	407	182	217	423	188	112	1949	869	113	1965	876
V/C Ratio(X)	0.88	0.67	0.86	0.88	0.78	0.39	1.16	0.68	0.23	0.92	0.80	0.18
Avail Cap(c_a), veh/h	258	435	194	258	435	194	112	1949	869	113	1965	876
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	61.2	59.9	61.3	60.9	60.3	57.5	64.4	14.4	10.9	65.4	27.3	17.4
Incr Delay (d2), s/veh	23.4	3.7	29.8	25.0	8.7	1.3	133.1	2.0	0.6	59.0	3.6	0.5
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	7.6	4.8	6.9	8.1	6.1	2.4	7.9	9.1	2.2	5.4	21.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	84.6	63.6	91.1	85.9	69.0	58.8	197.5	16.4	11.5	124.4	30.8	17.9
LnGrp LOS	F	E	F	F	E	E	F	B	B	F	C	B
Approach Vol, veh/h		614			594			1663			1839	
Approach Delay, s/veh		76.9			73.2			29.9			34.9	
Approach LOS		E			E			C			C	

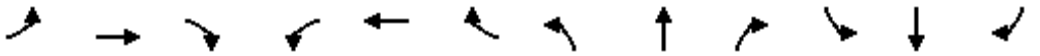
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	80.1	22.3	22.5	15.0	80.1	22.9	22.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 8.4	* 69	* 19	* 16	* 8.4	* 69	* 19	* 16
Max Q Clear Time (g_c+I1), s	9.6	31.1	15.6	14.1	10.4	50.4	16.2	15.1
Green Ext Time (p_c), s	0.0	12.6	0.2	0.5	0.0	11.1	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	43.4
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 (vph)	20	30	28	169	16	103	8	928	192	144	1571	24
Future Volume (vph)	20	30	28	169	16	103	8	928	192	144	1571	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1863	1818		1787	1807	1683	1845	3689	1650	1845	3681	
Flt Permitted	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1863	1818		1787	1807	1683	1845	3689	1650	1845	3681	
Peak-hour factor, PHF	0.60	0.60	0.60	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	33	50	47	211	20	129	9	1092	226	157	1708	26
RTOR Reduction (vph)	0	25	0	0	0	116	0	0	70	0	0	0
Lane Group Flow (vph)	33	72	0	116	115	13	9	1092	156	157	1734	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	8.0	8.0		14.4	14.4	14.4	1.5	74.3	74.3	16.8	89.6	
Effective Green, g (s)	8.0	8.0		14.4	14.4	14.4	1.5	74.3	74.3	16.8	89.6	
Actuated g/C Ratio	0.06	0.06		0.10	0.10	0.10	0.01	0.53	0.53	0.12	0.64	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	106	103		183	185	173	19	1957	875	221	2355	
v/s Ratio Prot	0.02	c0.04		c0.06	0.06		0.00	0.30		c0.09	c0.47	
v/s Ratio Perm						0.01			0.09			
v/c Ratio	0.31	0.70		0.63	0.62	0.08	0.47	0.56	0.18	0.71	0.74	
Uniform Delay, d1	63.4	64.8		60.3	60.2	56.8	68.9	21.9	17.0	59.3	17.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.94	0.70	0.61	1.00	1.00	
Incremental Delay, d2	1.7	19.6		7.0	6.3	0.2	14.8	1.0	0.4	10.3	2.1	
Delay (s)	65.0	84.4		67.3	66.5	57.0	79.6	16.2	10.7	69.5	19.2	
Level of Service	E	F		E	E	E	E	B	B	E	B	
Approach Delay (s)		79.5			63.3			15.7			23.4	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	34	64	42	1131	1789	45
Future Vol, veh/h	34	64	42	1131	1789	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	84	84	93	93
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	57	107	50	1346	1924	48

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2697	962	1972	0	-	0
Stage 1	1924	-	-	-	-	-
Stage 2	773	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.18	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.24	-	-	-
Pot Cap-1 Maneuver	~ 18	260	283	-	-	-
Stage 1	102	-	-	-	-	-
Stage 2	421	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 15	260	283	-	-	-
Mov Cap-2 Maneuver	68	-	-	-	-	-
Stage 1	84	-	-	-	-	-
Stage 2	421	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	76.1	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	283	-	68	260	-	-
HCM Lane V/C Ratio	0.177	-	0.833	0.41	-	-
HCM Control Delay (s)	20.4	-	166.2	28.2	-	-
HCM Lane LOS	C	-	F	D	-	-
HCM 95th %tile Q(veh)	0.6	-	4	1.9	-	-

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

Intersection: 1: M-150 & Auburn /Auburn

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	326	257	159	297	238	210	76	219	341	362	200
Average Queue (ft)	124	138	92	70	158	138	105	28	129	195	194	69
95th Queue (ft)	194	237	191	130	257	209	183	62	220	322	321	197
Link Distance (ft)		792	792			597	597			378	378	
Upstream Blk Time (%)										1	1	
Queuing Penalty (veh)										6	5	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	24	20	1	2			2		11	11	9	0
Queuing Penalty (veh)	29	33	2	2			2		63	13	17	0

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	214	552	547	385
Average Queue (ft)	128	324	326	84
95th Queue (ft)	226	505	502	296
Link Distance (ft)		490	490	
Upstream Blk Time (%)		2	2	
Queuing Penalty (veh)		16	17	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	4	30	19	
Queuing Penalty (veh)	33	29	30	

Intersection: 2: M-150 & Wabash /Barclay

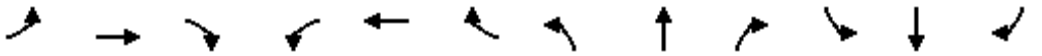
Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	73	181	172	154	84	33	311	318	212	195	474	452
Average Queue (ft)	23	55	94	57	25	4	159	167	53	132	255	213
95th Queue (ft)	61	125	157	129	59	18	266	274	148	222	459	392
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											2	1
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0		0			8	8		7	9	
Queuing Penalty (veh)		0		0			1	17		53	13	

Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	NB	NB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	198	140	70	117	56	17
Average Queue (ft)	59	35	29	11	5	1
95th Queue (ft)	171	91	65	67	44	7
Link Distance (ft)	251	251		437	437	
Upstream Blk Time (%)	1					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)			50			100
Storage Blk Time (%)			10	0		
Queuing Penalty (veh)			63	0		

Zone Summary

Zone wide Queuing Penalty: 443



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	212	411	151	223	301	132	152	1362	191	188	1301	161
Future Volume (veh/h)	212	411	151	223	301	132	152	1362	191	188	1301	161
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	233	452	164	275	372	156	162	1449	197	202	1399	170
Peak Hour Factor	0.91	0.91	0.91	0.81	0.81	0.81	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	258	534	238	275	569	254	167	1642	733	167	1642	733
Arrive On Green	0.14	0.14	0.14	0.15	0.15	0.15	0.18	0.87	0.87	0.03	0.14	0.14
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	233	452	164	275	372	156	162	1449	197	202	1399	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	17.0	16.4	13.0	20.4	13.0	12.2	11.9	29.9	2.8	12.4	50.7	12.5
Cycle Q Clear(g_c), s	17.0	16.4	13.0	20.4	13.0	12.2	11.9	29.9	2.8	12.4	50.7	12.5
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	258	534	238	275	569	254	167	1642	733	167	1642	733
V/C Ratio(X)	0.90	0.85	0.69	1.00	0.65	0.61	0.97	0.88	0.27	1.21	0.85	0.23
Avail Cap(c_a), veh/h	275	630	281	275	630	281	167	1642	733	167	1642	733
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
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	59.5	58.6	57.2	59.8	56.0	55.6	57.4	7.0	5.3	68.0	55.5	39.2
Incr Delay (d2), s/veh	29.6	9.2	5.6	53.8	2.1	3.4	59.8	7.2	0.9	136.0	5.8	0.7
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	10.0	8.3	5.7	13.7	6.2	5.3	7.8	4.9	1.0	12.5	26.9	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	89.1	67.8	62.8	113.6	58.1	59.0	117.2	14.2	6.2	203.9	61.3	39.9
LnGrp LOS	F	E	E	F	E	E	F	B	A	F	E	D
Approach Vol, veh/h		849			803			1808			1771	
Approach Delay, s/veh		72.7			77.3			22.6			75.5	
Approach LOS		E			E			C			E	

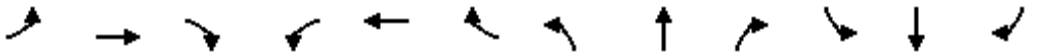
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	67.6	25.7	27.7	19.0	67.6	27.0	26.4
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 57	* 20	* 23	* 12	* 57	* 20	* 23
Max Q Clear Time (g_c+I1), s	14.4	31.9	19.0	15.0	13.9	52.7	22.4	18.4
Green Ext Time (p_c), s	0.0	12.1	0.1	1.7	0.0	3.4	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	57.0
HCM 6th LOS	E

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 (vph)	45	39	33	220	42	221	19	1410	164	180	1374	24
Future Volume (vph)	45	39	33	220	42	221	19	1410	164	180	1374	24
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1843		1805	1837	1700	1881	3762	1683	1881	3753	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1843		1805	1837	1700	1881	3762	1683	1881	3753	
Peak-hour factor, PHF	0.68	0.68	0.68	0.85	0.85	0.85	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	66	57	49	259	49	260	20	1484	173	194	1477	26
RTOR Reduction (vph)	0	23	0	0	0	229	0	0	68	0	1	0
Lane Group Flow (vph)	66	83	0	153	155	31	20	1484	105	194	1502	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	11.6	11.6		16.5	16.5	16.5	4.7	67.6	67.6	17.8	80.7	
Effective Green, g (s)	11.6	11.6		16.5	16.5	16.5	4.7	67.6	67.6	17.8	80.7	
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.03	0.48	0.48	0.13	0.58	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	155	152		212	216	200	63	1816	812	239	2163	
v/s Ratio Prot	0.04	c0.05		c0.08	0.08		0.01	c0.39		c0.10	c0.40	
v/s Ratio Perm						0.02			0.06			
v/c Ratio	0.43	0.55		0.72	0.72	0.15	0.32	0.82	0.13	0.81	0.69	
Uniform Delay, d1	61.0	61.7		59.5	59.5	55.5	66.1	30.9	20.0	59.5	20.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.27	0.48	0.14	1.00	1.00	
Incremental Delay, d2	1.9	4.0		11.5	10.8	0.4	1.6	2.4	0.2	18.5	1.9	
Delay (s)	62.9	65.6		71.0	70.3	55.8	85.3	17.1	2.9	78.0	22.8	
Level of Service	E	E		E	E	E	F	B	A	E	C	
Approach Delay (s)		64.6			63.9			16.4			29.1	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	47	61	65	1537	1566	51
Future Vol, veh/h	47	61	65	1537	1566	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	95	95	94	94
Heavy Vehicles, %	8	8	1	1	1	1
Mvmt Flow	58	75	68	1618	1666	54

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2611	833	1720	0	-	0
Stage 1	1666	-	-	-	-	-
Stage 2	945	-	-	-	-	-
Critical Hdwy	6.96	7.06	4.12	-	-	-
Critical Hdwy Stg 1	5.96	-	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-	-
Follow-up Hdwy	3.58	3.38	2.21	-	-	-
Pot Cap-1 Maneuver	~ 18	300	368	-	-	-
Stage 1	131	-	-	-	-	-
Stage 2	324	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 15	300	368	-	-	-
Mov Cap-2 Maneuver	78	-	-	-	-	-
Stage 1	107	-	-	-	-	-
Stage 2	324	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	68.7	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	368	-	78	300	-	-
HCM Lane V/C Ratio	0.186	-	0.744	0.251	-	-
HCM Control Delay (s)	17	-	130.5	21	-	-
HCM Lane LOS	C	-	F	C	-	-
HCM 95th %tile Q(veh)	0.7	-	3.6	1	-	-

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

Intersection: 1: M-150 & Auburn /Auburn

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)	290	324	245	183	379	224	192	124	310	398	413	200
Average Queue (ft)	171	179	141	75	210	128	95	51	215	353	356	142
95th Queue (ft)	274	274	220	160	345	199	176	101	362	450	454	272
Link Distance (ft)		792	792			597	597			378	378	
Upstream Blk Time (%)										20	20	
Queuing Penalty (veh)										170	171	
Storage Bay Dist (ft)	250			135	430			155	250			175
Storage Blk Time (%)	4	1	11	0	0		2	0	4	37	46	0
Queuing Penalty (veh)	7	1	16	1	0		3	0	30	56	87	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	395	581	585	385
Average Queue (ft)	320	478	474	170
95th Queue (ft)	475	634	626	451
Link Distance (ft)		490	490	
Upstream Blk Time (%)		16	15	
Queuing Penalty (veh)		131	127	
Storage Bay Dist (ft)	350			260
Storage Blk Time (%)	18	26	38	
Queuing Penalty (veh)	116	49	62	

Intersection: 2: M-150 & Wabash /Barclay

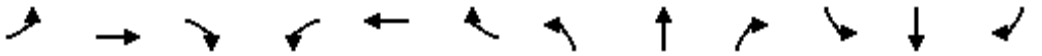
Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	112	149	235	203	184	187	353	357	204	195	464	456
Average Queue (ft)	45	54	127	94	89	22	225	231	53	155	311	256
95th Queue (ft)	92	108	206	178	161	99	325	330	159	234	498	449
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											5	1
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)		0		0	1		26	27		14	12	
Queuing Penalty (veh)		0		1	1		5	45		100	22	

Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	NB	NB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	124	101	74	182	155	26
Average Queue (ft)	45	35	40	21	12	1
95th Queue (ft)	104	81	73	111	86	13
Link Distance (ft)	251	251		437	437	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			50			100
Storage Blk Time (%)			16			
Queuing Penalty (veh)			125			

Zone Summary

Zone wide Queuing Penalty: 1327



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	228	316	147	234	270	156	165	1258	167	201	1316	225
Future Volume (veh/h)	228	316	147	234	270	156	165	1258	167	201	1316	225
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	248	343	150	257	297	166	181	1382	183	212	1385	234
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	272	430	192	272	430	192	215	1335	595	234	1374	613
Arrive On Green	0.14	0.11	0.11	0.14	0.11	0.11	0.11	0.35	0.35	0.16	0.48	0.48
Sat Flow, veh/h	1890	3770	1682	1890	3770	1682	1890	3770	1682	1890	3770	1682
Grp Volume(v), veh/h	248	343	150	257	297	166	181	1382	183	212	1385	234
Grp Sat Flow(s),veh/h/ln	1890	1885	1682	1890	1885	1682	1890	1885	1682	1890	1885	1682
Q Serve(g_s), s	12.9	8.9	8.7	13.5	7.6	9.7	9.4	35.4	7.9	11.0	36.4	8.8
Cycle Q Clear(g_c), s	12.9	8.9	8.7	13.5	7.6	9.7	9.4	35.4	7.9	11.0	36.4	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	272	430	192	272	430	192	215	1335	595	234	1374	613
V/C Ratio(X)	0.91	0.80	0.78	0.94	0.69	0.87	0.84	1.04	0.31	0.90	1.01	0.38
Avail Cap(c_a), veh/h	272	430	192	272	430	192	234	1335	595	234	1374	613
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
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	42.2	43.2	43.1	42.4	42.6	43.5	43.4	32.3	23.4	41.2	25.8	18.6
Incr Delay (d2), s/veh	32.3	10.2	18.7	39.7	4.7	31.5	22.1	34.3	1.3	34.4	26.3	1.8
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	8.1	4.5	4.4	9.0	3.7	5.5	5.5	21.0	3.1	6.9	17.4	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.5	53.3	61.8	82.1	47.3	75.0	65.5	66.6	24.7	75.6	52.0	20.4
LnGrp LOS	E	D	E	F	D	E	E	F	C	E	F	C
Approach Vol, veh/h		741			720			1746			1831	
Approach Delay, s/veh		62.1			66.1			62.1			50.7	
Approach LOS		E			E			E			D	

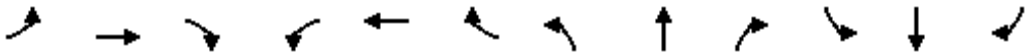
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	42.0	21.0	18.0	18.0	43.0	21.0	18.0
Change Period (Y+Rc), s	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6	* 6.6
Max Green Setting (Gmax), s	* 12	* 35	* 14	* 11	* 12	* 35	* 14	* 11
Max Q Clear Time (g_c+I1), s	13.0	37.4	14.9	11.7	11.4	38.4	15.5	10.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	58.5
HCM 6th LOS	E

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 (vph)	58	33	24	184	32	157	15	1332	143	173	1512	27
Future Volume (vph)	58	33	24	184	32	157	15	1332	143	173	1512	27
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1881	1854		1805	1835	1700	1881	3762	1683	1881	3753	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1881	1854		1805	1835	1700	1881	3762	1683	1881	3753	
Peak-hour factor, PHF	0.84	0.84	0.84	0.78	0.78	0.78	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	69	39	29	236	41	201	16	1432	154	182	1592	28
RTOR Reduction (vph)	0	27	0	0	0	178	0	0	91	0	1	0
Lane Group Flow (vph)	69	41	0	137	140	23	16	1432	63	182	1619	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	7.0	7.0		11.4	11.4	11.4	3.0	40.6	40.6	14.5	52.1	
Effective Green, g (s)	7.0	7.0		11.4	11.4	11.4	3.0	40.6	40.6	14.5	52.1	
Actuated g/C Ratio	0.07	0.07		0.11	0.11	0.11	0.03	0.41	0.41	0.14	0.52	
Clearance Time (s)	6.8	6.8		6.3	6.3	6.3	6.7	6.7	6.7	6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	131	129		205	209	193	56	1527	683	272	1955	
v/s Ratio Prot	c0.04	0.02		0.08	c0.08		0.01	c0.38		c0.10	c0.43	
v/s Ratio Perm						0.01			0.04			
v/c Ratio	0.53	0.32		0.67	0.67	0.12	0.29	0.94	0.09	0.67	0.83	
Uniform Delay, d1	44.9	44.2		42.5	42.5	39.8	47.5	28.5	18.3	40.5	20.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.19	0.76	2.52	1.00	1.00	
Incremental Delay, d2	3.8	1.4		8.0	7.9	0.3	1.2	6.1	0.1	6.1	4.2	
Delay (s)	48.7	45.7		50.5	50.4	40.1	57.7	27.9	46.3	46.6	24.4	
Level of Service	D	D		D	D	D	E	C	D	D	C	
Approach Delay (s)		47.2			46.1			29.9			26.6	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	26.5
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	62	85	82	1410	1632	74
Future Vol, veh/h	62	85	82	1410	1632	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	94	94	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	89	121	87	1500	1736	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2660	868	1815	0	-	0
Stage 1	1736	-	-	-	-	-
Stage 2	924	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	~ 19	300	338	-	-	-
Stage 1	130	-	-	-	-	-
Stage 2	352	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 14	300	338	-	-	-
Mov Cap-2 Maneuver	~ 74	-	-	-	-	-
Stage 1	97	-	-	-	-	-
Stage 2	352	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	126.5	1.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	338	-	74	300	-	-
HCM Lane V/C Ratio	0.258	-	1.197	0.405	-	-
HCM Control Delay (s)	19.3	-	265.8	24.9	-	-
HCM Lane LOS	C	-	F	C	-	-
HCM 95th %tile Q(veh)	1	-	6.7	1.9	-	-

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

Intersection: 1: M-150 & Auburn /Auburn

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)	190	420	379	140	260	186	154	122	220	321	325	200
Average Queue (ft)	143	191	137	56	147	103	66	52	174	292	295	146
95th Queue (ft)	211	415	338	124	229	165	132	98	270	331	332	276
Link Distance (ft)		792	792			597	597			287	287	
Upstream Blk Time (%)										30	32	
Queuing Penalty (veh)										242	252	
Storage Bay Dist (ft)	110			135	430			155	160			175
Storage Blk Time (%)	38	15	5	0			0	0	8	48	49	0
Queuing Penalty (veh)	60	33	7	0			0	0	50	79	81	1

Intersection: 1: M-150 & Auburn /Auburn

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	215	570	575	385
Average Queue (ft)	175	416	421	199
95th Queue (ft)	262	678	674	487
Link Distance (ft)		490	490	
Upstream Blk Time (%)		21	23	
Queuing Penalty (veh)		183	196	
Storage Bay Dist (ft)	170			260
Storage Blk Time (%)	9	41	35	
Queuing Penalty (veh)	58	81	78	

Intersection: 2: M-150 & Wabash /Barclay

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	99	108	177	126	128	142	323	308	152	195	438	423
Average Queue (ft)	43	41	90	51	53	10	149	164	32	125	246	215
95th Queue (ft)	85	83	157	112	106	55	264	272	100	214	407	357
Link Distance (ft)		586	359	359			524	524			445	445
Upstream Blk Time (%)											1	0
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	200				180	175			175	170		
Storage Blk Time (%)							5	6		2	13	
Queuing Penalty (veh)							1	9		15	22	

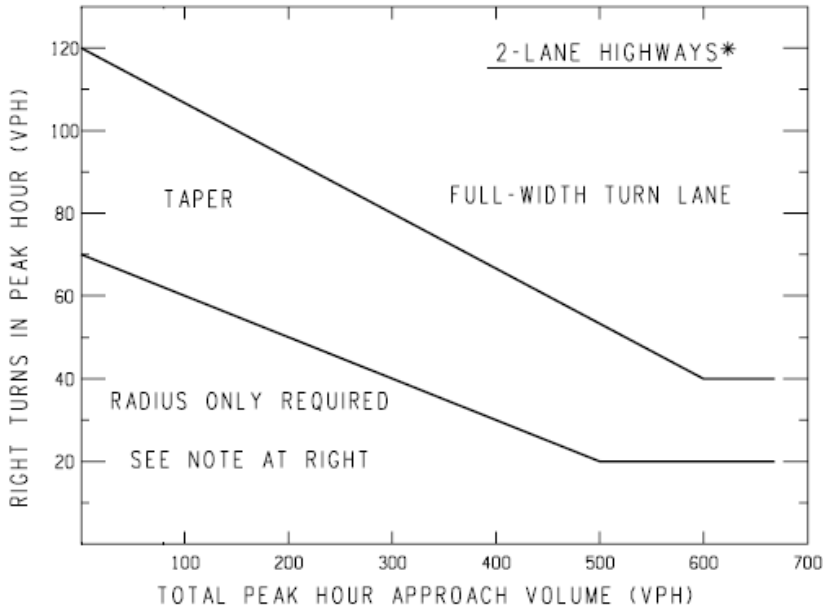
Intersection: 4: M-150 & South Driveway

Movement	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	T	T	R
Maximum Queue (ft)	266	260	69	93	90	103	86	48
Average Queue (ft)	245	133	36	11	7	11	11	3
95th Queue (ft)	289	333	69	78	68	79	81	38
Link Distance (ft)	251	251		437	437	613	613	
Upstream Blk Time (%)	85	44						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (ft)			50					100
Storage Blk Time (%)			15				1	
Queuing Penalty (veh)			106				1	

Zone Summary

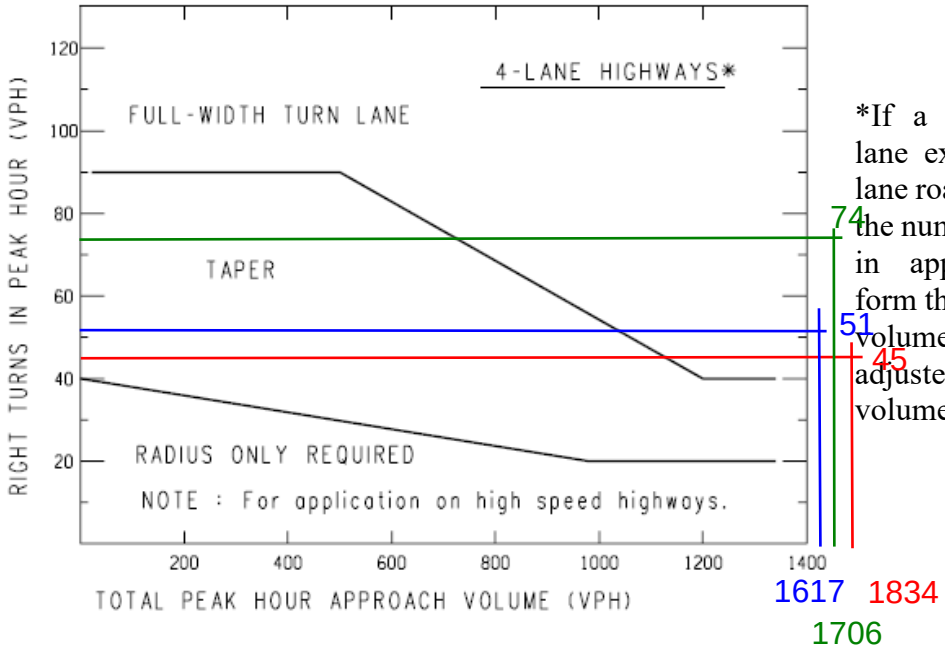
Zone wide Queuing Penalty: 1557

South Driveway:
AM Peak Hour
PM Peak Hour
Saturday Peak Hour



NOTE: For posted speeds at or under 45 mph, peak hour right turns greater than 40 vph, and total peak hour approach less than 300 vph, adjust right turn volumes.

Adjust peak hour
Right turns = Peak hour Right turns – 20



*If a center left-turn lane exists (ie 3 or 5 lane roadway), subtract the number of left turns in approach volume form the total approach volume to get an adjusted total approach volume.

Sample Problem: The Design Speed is 55 mph. The Peak Hour Approach Volume is 300 vph. The Number of Right Turns in the Peak Hous is 100 vph. Determine if a right turn lane is recommended.

Solution: Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus, a right-turn lane may be recommended.