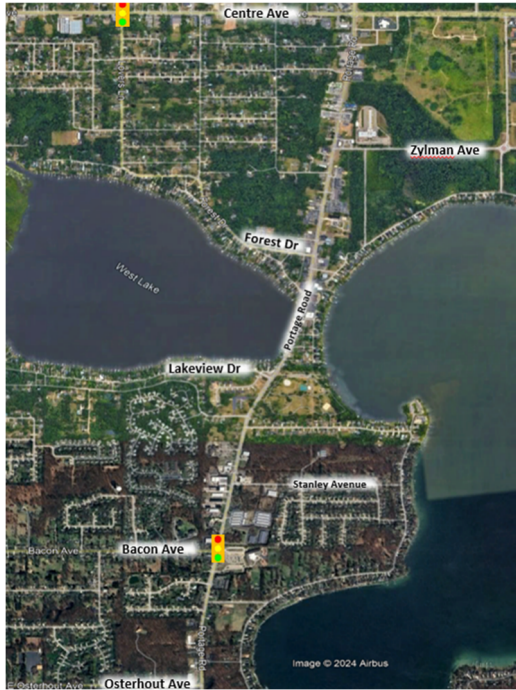




TRAFFIC ASSESSMENT PORTAGE ROAD 360 PORTAGE, MICHIGAN

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EXECUTIVE SUMMARY

The City of Portage (City) is exploring options to reconfigure Portage Road between Centre Avenue and Osterhout Avenue. Portage Road's current design focuses on moving traffic through the area quickly, with less focus on multi-modal transportation and pedestrian mobility. As a result, Portage Road has excess capacity for vehicle traffic and does not offer many options for bicyclists or pedestrians, creating a corridor that encourages increased vehicle speeds and feels unsafe to other modes of transportation. To attempt to rebalance the right-of-way, the City is considering reconfiguring Portage Road to a three-lane roadway with one (1) northbound lane, one (1) southbound lane, and one (1) center left-turn lane. This reconfiguration will allow space within the current right-of-way to also construct multi-use trails to encourage bicycling and pedestrian activity, add street lighting and landscaping. All of these additions can create a roadway that calms vehicle speeds and creates a safer corridor for all modes of transportation. Prior to implementing this roadway reconfiguration, the City would like to understand how this reconfigured roadway will operate for vehicle traffic.

Applicable information regarding the existing operating conditions of the adjacent roadways was obtained in November 2024, while schools were in session. Turning movement counts were completed at the study area intersections. Information regarding lane configurations, speed limits, traffic controls, and other related data for the study area roadways was also collected.

Analysis

Intersection "level of service" (LOS) calculations were completed to evaluate the current operational efficiency of the study area intersections. These calculations were completed using techniques outlined in the Highway Capacity Manual, published by the Transportation Research Board. Per Michigan Department of Transportation (MDOT) requirements, *Synchro*® traffic analysis software, Version 11 (based on the Highway Capacity Manual methodologies), was used in the analysis.

To determine what the best configuration of Portage Road is, several different scenarios were analyzed, each reflecting a single change to Portage Road. Reviewing these different scenarios allowed the impact of each change to be compared to the existing Portage Road performance. Each scenario analyzed is listed below, and each scenario had traffic signal timing optimized:

- **Scenario 1A, Existing:** This is Portage Road as it is today, with four-lane and five-lane sections through the corridor.
- **Scenario 1B, Basic Three-Lane:** Converting Portage Road from five-lanes and four-lanes to three-lanes throughout the entire corridor. This three-lane section consists of one (1) northbound lane, one (1) southbound lane, and one (1) center left-turn lane.
- **Scenario 1C, Three-Lane Section with Optimized Timing:** This is the same as Scenario 1B, with the traffic signal timing optimized for the new three-lane section.
- **Scenario 1D, Three-Lane Section with Optimized Timing and Turn Lanes:** This is the same as Scenario 1C, with turn lanes added at Centre Avenue, Bacon Avenue, and Osterhout Avenue.
- **Scenario 1E, Three-Lane Section with Diverted Trips:** This is the same as Scenario 1D with 5% (five percent) of Portage Road through traffic diverted to Westnedge Avenue and 5% (five percent) of Portage Road through traffic diverted to Sprinkle Road.
- **Scenario 1F, Three-Lane Section with 35 mph Speed Limit:** This is the same as Scenario 1D, with the speed limit lowered from 45 mph to 35 mph.
- **Scenario 1G, Three-Lane Section with 35 mph Speed Limit and Added Signals:** This is the same as Scenario 1F, with new traffic signals added at the intersections of Forest Drive and Osterhout Avenue.

To ensure that this proposed three-lane section can accommodate an increase in traffic, additional analyses were performed, consisting of all traffic volumes in the model grown with a background growth rate of 0.5% (zero point five percent) annually over 20 years for a future 2044 model. This background growth rate was provided by the Kalamazoo Area Transportation Study (KATS), which maintains population models based on past trends and future developments to accurately project population increases or decreases.

Lastly, a broader analysis of the entire corridor was also completed to measure the travel time that it will take to go northbound from Osterhout Avenue to Centre Road and southbound from Centre Road to Osterhout Avenue. This analysis used SimTraffic modeling with parameters set up according to MDOT's Electronic Traffic Control Device Guidelines. This modeling software simulates thousands of vehicles traveling through the Portage Road corridor during the peak hours based on the traffic counts that were collected, peak hour factors observed, and signal timing information used in the *Synchro*® model. An average of these simulated trips through the corridor is then used to give an average travel time per vehicle, including delay due to traffic signals, turning vehicles, and traffic queues at intersections.

Conclusion and Recommendations

With all the scenarios analyzed, it was shown that a three-lane Portage Road with the optimized signal timing and added turn lanes should operate with a similar LOS to the existing four-lane and five-lane configuration. It was also shown that diverting 10% (ten percent) of Portage Road traffic will have a minimal effect on the LOS on Portage Road, and Westnedge Avenue and Sprinkle Road have enough capacity to absorb the diverted traffic without major impacts as well.

The 2044 future models showed increases in delay at most intersections compared to the current 2025 models, as expected, however all intersections are still projected to operate at a LOS "C" or better. These analyses showed that Portage Road operations should remain acceptable with the three-lane cross well into the future and that there is still excess capacity.

Lastly, a comparison of the existing travel times simulated by our model with the travel time with a three-lane section and lower speed limit of 35 mph showed an average increase of 78 seconds. Of this 78 seconds, a majority of this increase is due to the lower speed limit and not due to the different road cross section; further showing that a three-lane roadway has sufficient capacity to carry current Portage Road traffic volumes effectively.

With all these considerations in mind, a three-lane Portage Road is anticipated to operate acceptably with the following recommendations:

- Two (2) southbound Portage Road lanes at Centre Avenue should continue to approximately 650 feet past the intersection where they then merge into one (1) lane.
- A second northbound Portage Road lane should develop approximately 300 feet before the Centre Avenue intersection.
- Dedicated right-turn lanes 150 feet in length should be constructed at the following intersections:
 - Northbound and Southbound Portage Road at Bacon Avenue
 - Southbound Portage Road at Osterhout Avenue
- Installation of a traffic signal is recommended for the Woodbine Avenue/South Shore Drive and Portage Road intersection.
- Signal timing should be updated at each signalized intersection in the corridor to reflect the roadway changes.

Additional benefits of reducing travel lanes and speed limits include the ability to add sidewalk and shared-use paths, landscaping, street lighting, and improved sight distance for driveways. Given the traffic analysis and relatively minimal impact, the proposed projects are expected to better balance mobility for the corridor and improve overall quality of life for residents, businesses, and visitors alike.

With this roadway reconfiguration, proper access management to businesses and side streets should also be incorporated into the design. Limiting access points creates less conflict points with vehicles on Portage Road and creates an easier to navigate road system. Aligning driveways and side streets on the east and west sides of Portage Road also limits conflict points and creates safer access to businesses.

Currently, Portage Road has one (1) mid-block pedestrian crossing and the only other crossings exist at signalized intersections. These limit pedestrians attempting to navigate the Portage Road corridor as it can take one (1) mile or more to reach the next pedestrian crossing. As part of the Portage Road 360 plan, increasing the number of pedestrian crossings in appropriate locations can increase pedestrian safety while creating an easier way to navigate the corridor for pedestrians.

CHAPTER 1

INTRODUCTION

The City of Portage (City) is exploring options to reconfigure Portage Road between Centre Avenue and Osterhout Avenue. Portage Road's current design focuses on moving traffic through the area quickly, with less focus on multi-modal transportation and pedestrian mobility. As a result, Portage Road has excess capacity for vehicle traffic and does not offer many options for bicyclists or pedestrians, creating a corridor that encourages increased vehicle speeds and feels unsafe to other modes of transportation. To attempt to rebalance the right-of-way, the City is considering reconfiguring Portage Road to a three-lane roadway with one (1) northbound lane, one (1) southbound lane, and one (1) center left-turn lane. This reconfiguration will allow space within the current right-of-way to also construct multi-use trails to encourage bicycling and pedestrian activity, add street lighting and landscaping. All of these additions can create a roadway that calms vehicle speeds and creates a safer corridor for all modes of transportation. Prior to implementing this roadway reconfiguration, the City would like to understand how this reconfigured roadway will operate for vehicle traffic.

Progressive Companies was hired to conduct a traffic study along Portage Road for the reconfigured three-lane roadway and to evaluate what the impacts to Sprinkle Road and Westnedge Avenue will be, which parallel Portage Road. Traffic counts were taken along Portage Road, Sprinkle Road, and Westnedge Avenue to create a traffic model to analyze the Portage Road reconfiguration; these counts included all turning movements at each intersection for the morning peak hours (7:00–9:00 a.m.) and afternoon peak hours (2:00–6:00 p.m.). Figure 1 shows the study area intersections.

The purpose of this traffic assessment was to analyze the existing conditions of Portage Road, Sprinkle Road, and Westnedge Avenue; identify the current level of service that these roads have; and what impact, if any, will be experienced. Tasks undertaken to complete the analysis include the following.

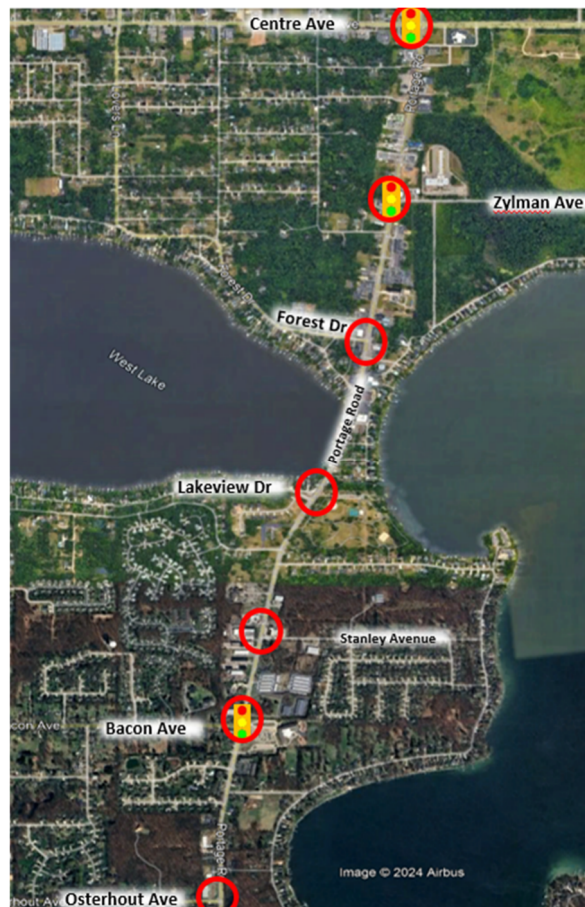


Figure 1. Study Area

1. **Data Collection.** Applicable information regarding the existing operating conditions of the adjacent roadways was obtained in November 2024, while schools were in session. Turning movement counts were completed at the study area intersections. Information regarding lane configurations, speed limits, traffic controls, and other related data for the study area roadways was also collected.
2. **Background Growth.** An annual background traffic growth rate of 0.4% (zero point four percent) was applied to the existing volumes to help reflect anticipated non-development traffic increases by the 2044 horizon year. This rate was provided by the Kalamazoo Area Transportation Study (KATS).
4. **Levels of Service.** Capacity calculations were completed at the study area intersections to identify existing and anticipated future peak hour operational characteristics.
5. **Mitigation.** Roadway/intersection improvements were identified, when applicable, that will enable the adjacent roadways and study area intersections to maintain equal and/or acceptable levels of operation under future conditions, upon the addition of background traffic growth.

Pre-study coordination was completed with the City to help identify the required study area, study parameters, and any specific areas of concern. The following outlines the results of analyses completed during the study process.

CHAPTER 2

EXISTING CONDITIONS

The first step in this analysis was to document the existing conditions of Portage Road at each intersection in the study area, including their lane configurations, speed limits, and pedestrian infrastructure.

Key Study Area Roadways

Portage Road

Portage Road is a north-south arterial roadway within the study area under City jurisdiction. It has a five-lane, four-lane, and three-lane cross-section with a center two-way left-turn lane (TWLTL) for the five-lane and three-lane sections and bike lanes striped near Osterhout Road. Portage Road has mainly retail and commercial land uses north of Lakeview Drive and mostly residential land uses south of Lakeview Drive. Portage Road has a posted speed limit of 45 miles per hour (mph) within the study area and weekday 24-hour traffic volumes average approximately 17,000 vehicles per day near the center of the corridor.



Southbound Portage Road at Forest Drive

Centre Avenue

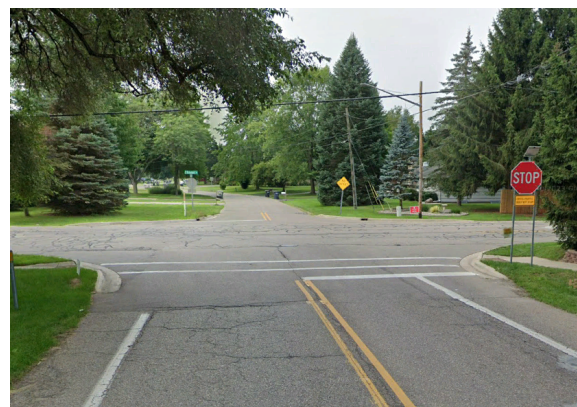
Centre Avenue is an east-west arterial roadway within the study area under City jurisdiction. It has a five-lane cross-section with a center two-way left-turn lane (TWLTL). Centre Avenue has mainly residential land uses and Portage Central High School and Portage Community Senior Center located near the intersection with Westnedge Avenue. Centre Avenue has a posted speed limit of 45 mph within the study area and weekday 24-hour traffic volumes average approximately 20,000 vehicles per day near the center of the corridor.



Eastbound Centre Avenue at Portage Road

Westnedge Avenue

Westnedge Avenue is a north-south minor arterial roadway within the study area under City jurisdiction. It has a two-lane cross-section. Westnedge Avenue has mainly residential land uses and Portage Central High School, Middle School, and Elementary School located near the intersection with Centre Avenue. Westnedge Avenue has a posted speed limit of 30 mph north of South Shore Drive and 40 mph south of South Shore Drive. Weekday 24-hour traffic volumes average approximately 8,700 vehicles per day near the center of the corridor.



Southbound Westnedge Avenue at Osterhout Road

Sprinkle Road

Sprinkle Road is a north-south minor arterial roadway within the study area under City jurisdiction. It has a five-lane cross-section north of Zylman Avenue and three-lane cross-section south of Zylman Avenue. Sprinkle Road has a Stryker facility between Centre Avenue and Zylman Avenue, Ramona Park south of Zylman Avenue, and residential land uses otherwise. Sprinkle Road has a posted speed limit of 50 mph. Weekday 24-hour traffic volumes average approximately 13,700 vehicles per day near the center of the corridor.

Existing Intersections

The study area includes nine (9) existing signalized intersections and six (6) existing unsignalized intersections, as listed in Table 1:

Table 1. Study Area Intersections

Intersection	Traffic Control
Portage Road / Centre Avenue	Signalized
Portage Road / Sylman Avenue	Signalized
Portage Road / Forest Drive	One-Way Stop
Portage Road / Lakeview Drive	One-Way Stop
Portage Road / Stanley Avenue	One-Way Stop
Portage Road / Bacon Avenue	Signalized
Portage Road / Osterhout Avenue	One-Way Stop
Centre Avenue / Lovers Lane	Signalized
Centre Avenue / Currier Drive	Signalized
Westnedge Avenue / Centre Avenue	Signalized
Westnedge Avenue / School Driveway	Signalized
Westnedge Avenue / Bacon Avenue	One-Way Stop
Westnedge Avenue / Osterhout Avenue	Two-Way Stop
Sprinkle Road / Centre Avenue	Signalized
Sprinkle Road / Zylman Avenue	Signalized

Data Collection

Turning movements at the existing intersections in the study area were collected in November 2024. This data was collected for morning (7:00 a.m. to 9:00 a.m.) and afternoon (2:00 p.m. to 6:00 p.m.) peak periods. Figure 1 shows the results of these traffic counts.

Crash Analysis

Crash information for the most recent five (5) years available (2019–2023) was reviewed, based on information available on the *Michigan Traffic Crash Facts* website. The crash analysis was completed on Portage Road between Centre Avenue and Osterhout Avenue.

Table 2. Portage Road Crash Analysis

	Total	Single Vehicle	Angle	Rear End	Side-Swipe	Head On Left	Other	Injuries (Total/A)	Fatal	Ped/Bike
Crashes	240	87	45	42	30	23	11	35/5	0	2
Percent	-	36%	19%	18%	12%	10%	5%	-	-	-

Table 2 shows a summary of the traffic crashes that occurred within the study limits on Portage Road. There was a total of 240 crashes along Portage Road between Centre Avenue and Osterhout Avenue. The majority of these crashes (36% (thirty-six percent)) were single vehicle crashes, followed by angle crashes (19% (nineteen percent)) and rear end crashes (18% (eighteen percent)). Single vehicle and rear end crashes are less likely to result in injury, however angle crashes are one (1) of the most dangerous types of crashes.

Of these crashes there were zero (0) fatalities, five (5) “A” injuries, 16 “B” injuries, 19 “C” injuries, and 200 property damage only crashes. Three (3) of the five (5) “A” injuries involved vehicles turning into driveways along Portage Road; one (1) “A” injury was a sideswipe crash and one (1) “A” injury was a crash involving a trailer parked in a bike lane that was struck by an intoxicated driver and debris from the crash injured a pedestrian nearby. The trailer crash was the only crash in the last five (5) years that involved a pedestrian. There was one (1) crash involving a bicyclist that resulted in a “B” injury. This crash involved a vehicle exiting a driveway that struck the cyclist on the sidewalk.

When looking at the worst injury crashes, it seems there is a pattern of driveway related crashes along the Portage Road corridor. These crashes are likely caused due to the high amount of driveways along the corridor and the four-lane and five-lane cross section of Portage Road. Several driveways in combination with many lanes of traffic can make vehicle turning movements unpredictable.

CHAPTER 3

EXISTING CONDITIONS WITH A THREE-LANE SECTION

To determine what the best configuration of Portage Road is, several different scenarios were analyzed, each reflecting a single change to Portage Road. Reviewing these different scenarios allowed the impact of each change to be compared to the existing Portage Road performance. Each scenario analyzed is listed below, and each scenario had traffic signal timing optimized:

- **Scenario 1A, Existing:** This is Portage Road as it is today, with four-lane and five-lane sections through the corridor.
- **Scenario 1B, Basic Three-Lane:** Converting Portage Road from five-lanes and four-lanes to three-lanes throughout the entire corridor. This three-lane section consists of one (1) northbound lane, one (1) southbound lane, and one (1) center left-turn lane.
- **Scenario 1C, Three-Lane Section with Optimized Timing:** This is the same as Scenario 1B, with the traffic signal timing optimized for the new three-lane section.
- **Scenario 1D, Three-Lane Section with Optimized Timing and Turn Lanes:** This is the same as Scenario 1C, with turn lanes added at Centre Avenue, Bacon Avenue, and Osterhout Avenue.
- **Scenario 1E, Three-Lane Section with Diverted Trips:** This is the same as Scenario 1D with 5% (five percent) of Portage Road through traffic diverted to Westnedge Avenue and 5% (five percent) of Portage Road through traffic diverted to Sprinkle Road.
- **Scenario 1F, Three-Lane Section with 35 mph Speed Limit:** This is the same as Scenario 1D, with the speed limit lowered from 45 mph to 35 mph.
- **Scenario 1G, Three-Lane Section with 35 mph Speed Limit and Added Signals:** This is the same as Scenario 1F, with new traffic signals added at the intersections of Forest Drive and a roundabout at Osterhout Avenue.

Existing Conditions Capacity Analysis

Intersection “level of service” (LOS) calculations were completed to evaluate the current operational efficiency of the study area intersections. These calculations were completed using techniques outlined in the Highway Capacity Manual, published by the Transportation Research Board. Per Michigan Department of Transportation (MDOT) requirements, Synchro® traffic analysis software, Version 11 (based on the Highway Capacity Manual methodologies), was used in the analysis.

The level of service at signalized and unsignalized intersections relates to the delay, traffic volumes, and intersection geometry. Level of service is expressed in a range from “A” to “F,” with “A” denoting the highest or best operating conditions. Generally, a LOS “D” rating is considered the minimum acceptable service level for signalized and unsignalized intersections in most areas, although a LOS “E” or LOS “F” can be deemed as acceptable during the peak hours. The criteria for determining the LOS at signalized and unsignalized intersections are outlined in the Appendix of this report.

The existing morning and afternoon peak hours were analyzed at the study area intersections. Table 3 shows the overall level of service for each signalized intersection and level of service for the worst turning movement at each unsignalized intersection. Copies of the Synchro® analyses are included in the Appendix.

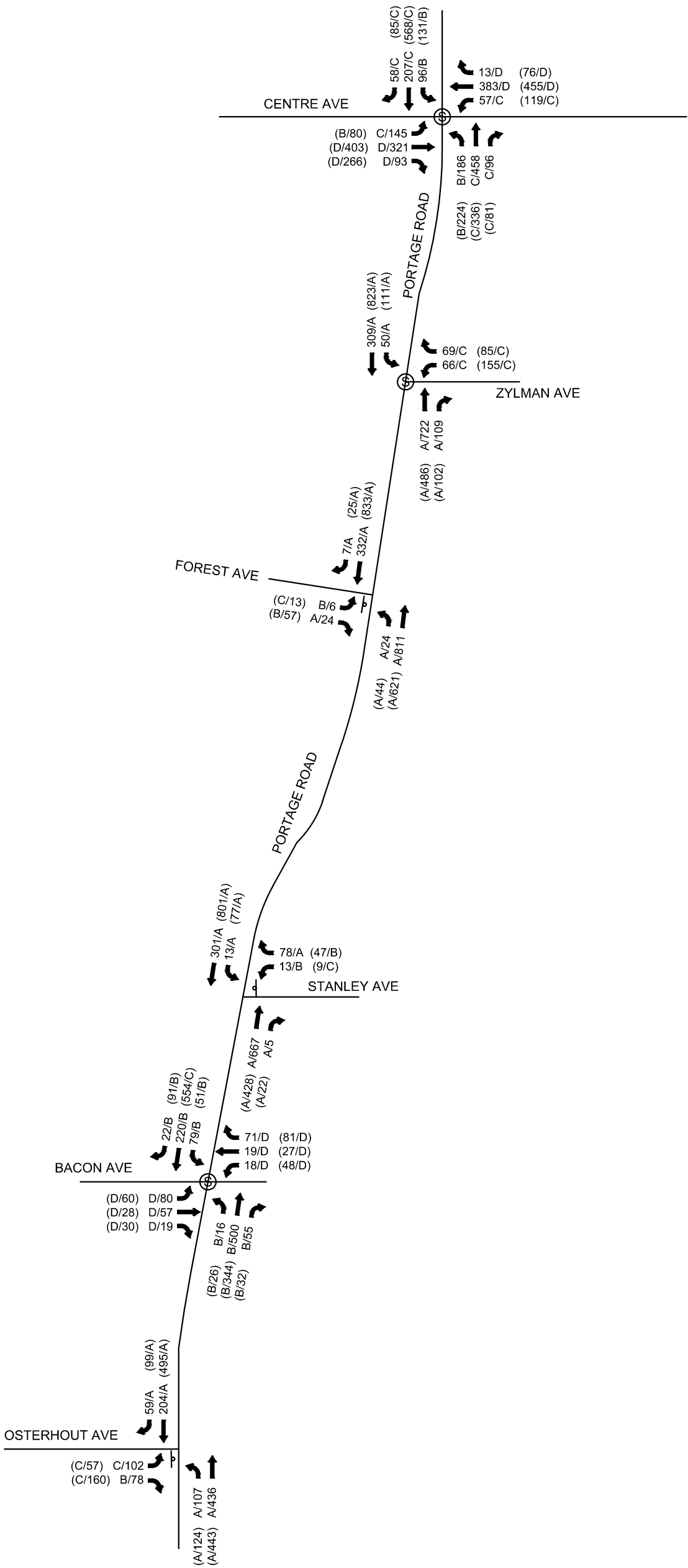
Table 3. Existing Level of Service (LOS) and Delay

Intersection	2024 Existing Conditions, Scenario 1A			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.5	C	32.8
Portage Road / Zylman Avenue	A	7.9	B	10.2
Portage Road / Forest Drive ¹	B	10.5	B	14.2
Portage Road / Lakeview Drive ¹	B	13.6	C	15.1
Portage Road / Stanley Avenue ¹	B	13.5	B	12.7
Portage Road / Bacon Avenue	C	23.9	C	26.1
Portage Road / Osterhout Avenue ¹	C	15.7	C	17.6

¹Unsignalized intersection, critical/worst approach/movement shown

Source: Progressive Companies, November 2024

The existing conditions analysis revealed that all intersections in the study area currently operate at a LOS “C” or better for the morning and afternoon peak periods. This indicates that Portage Road has excess capacity in its current configuration. Figure 2 shows the existing turning movement volumes and levels of service on Portage Road.



PORTAGE ROAD 360 TRAFFIC IMPACT STUDY

LEGEND
XX (XX) = AM (PM)
A = LEVEL-OF-SERVICE
Ⓢ = SIGNALIZED INTERSECTION
P = STOP-CONTROLLED

SCENARIO 1A PEAK-HOUR VOLUMES
+ LEVELS-OF-SERVICE



FIGURE
2

Scenario 1B

Scenario 1B represents a reconfiguration of Portage Road with a three-lane section for the entire length of the study, Osterhout Avenue to Centre Avenue. For this scenario, the right southbound lane on Portage Road at Centre Avenue was dropped to a right-turn-only lane at Centre Avenue and the remaining intersections were converted to a three-lane section with no auxiliary right-turn lanes at any of the intersections. The resulting levels of service and delay for Scenario 1B are summarized in Table 4 below:

Table 4. Existing (2024) Conditions with Scenario 1B

Intersection	2024 Scenario 1B			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	31.8	D	38.3
Portage Road / Zylman Avenue	B	12.7	B	13.5
Portage Road / Forest Drive ¹	C	17.8	C	24.3
Portage Road / Stanley Avenue ¹	C	16.2	B	21.4
Portage Road / Bacon Avenue	C	27.5	C	30
Portage Road / Osterhout Avenue ¹	C	20.4	C	22.6

¹Unsignalized intersection, critical/worst approach/movement shown
Source: Progressive Companies, May 2025

While no intersections experienced a failing level of service with a basic three-lane cross section, delay did increase at several intersections, and southbound queues on Portage Road at Centre Avenue more than doubled in length from 300 feet in the existing condition to 670 feet.

Scenario 1C

Scenario 1C represents Portage Road with three (3) lanes throughout from Osterhout Avenue to Centre Avenue; the same as Scenario 1B, but with the traffic signal timing at each signalized intersection optimized to reflect the new lane configuration. The resulting levels of service and delay for Scenario 1C are summarized in Table 5 below:

Table 5. Existing (2024) Conditions with Scenario 1C

Intersection	2024 Scenario 1C			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	31.3	D	36.3
Portage Road / Zylman Avenue	B	12.4	B	14.1
Portage Road / Forest Drive ¹	B	17.8	C	24.3
Portage Road / Stanley Avenue ¹	C	16.2	B	21.4
Portage Road / Bacon Avenue	C	27.1	C	28.3
Portage Road / Osterhout Avenue ¹	C	20.4	C	22.6

¹Unsignalized intersection, critical/worst approach/movement shown
Source: Progressive Companies, May 2025

The optimized signal timing showed some decreases in delay, but LOSs generally remained the same for each intersection. Queues for southbound Portage Road at Centre Avenue remained high at 557 feet.

Scenario 1D

Scenario 1D represents Portage Road with three (3) lanes throughout from Osterhout Avenue to Centre Avenue; the same as Scenario 1C, but with turn lanes added at intersections with poor LOS, long queues, or high turning traffic volumes. To address the level of service and queuing issue for southbound Portage Road at Centre Avenue, two (2) southbound through lanes were modeled at Centre Avenue with the two (2) lanes merging south of the intersection near Pleasant Drive. Similarly, a second northbound lane is proposed to develop approximately 300 feet before the northbound stop bar at Centre Avenue.

These lane configurations were based on the turning movements recorded in the data collection and the changes in level of service in Scenarios 1A–1C.

In addition to these lanes, dedicated right-turn lanes were added at select intersections in the corridor, where large right-turning volumes exist. These right-turn lanes were added to the following intersections:

- Northbound and Southbound Portage Road at Bacon Avenue
- Southbound Portage Road at Osterhout Avenue

The resulting levels of service and delay for Scenario 1D are summarized in Table 6 below:

Table 6. Existing (2024) Conditions with Scenario 1D

Intersection	2024 Scenario 1D			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.2	C	29.7
Portage Road / Zylman Avenue	B	12.4	B	14.1
Portage Road / Forest Drive ¹	B	15.8	C	19.6
Portage Road / Stanley Avenue ¹	C	17.7	B	17.5
Portage Road / Bacon Avenue	C	25.7	C	26.4
Portage Road / Osterhout Avenue ¹	C	18.1	C	18.3

¹Unsignalized intersection, critical/worst approach/movement shown
Source: Progressive Companies, May 2025

Scenario 1D showed a significant reduction in delay at the Portage Road/Centre Avenue intersection and the additional right-turn lanes also decreased delay at Bacon Avenue and Osterhout Avenue.

Scenario 1E

This scenario was analyzed to determine what impacts, if any, a reduction in traffic on Portage Road will have. This scenario assumes that due to the reduction in through lanes on Portage Road, some drivers will choose to avoid Portage Road and instead take Westnedge Avenue or Sprinkle Road. To analyze this scenario, Scenario 1D was used with a 10% (ten percent) reduction in through traffic for northbound and southbound traffic. This model had 5% (five percent) of northbound and southbound traffic diverted to Westnedge Avenue and 5% (five percent) of northbound and southbound traffic diverted to Sprinkle Road. For this scenario, Westnedge Avenue and Sprinkle Road were also analyzed to determine if they have excess capacity to handle these diverted trips.

Table 7. Existing (2024) Conditions with Three-Lane Section and Diverted Trips Scenario 1E

Intersection	2024 Scenario 1E			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.4	C	29.4
Portage Road / Zylman Avenue	B	11.9	B	13.0
Portage Road / Forest Drive ¹	C	15.2	C	18.6
Portage Road / Stanley Avenue ¹	C	16.6	C	16.6
Portage Road / Bacon Avenue	C	25.6	C	25.8
Portage Road / Osterhout Avenue ¹	C	18.2	C	17.5

¹Unsignalized intersection, critical/worst approach/movement shown
Source: Progressive Companies, May 2025

Intersection	2024 Scenario 1E			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Westnedge Avenue / Center Avenue	C	28.0	C	30.0
Westnedge Avenue / School Driveway	B	12.8	B	19.1
Westnedge Avenue / Bacon Avenue ¹	B	14.8	B	14.2
Westnedge Avenue / Osterhout Avenue ¹	B	14.8	C	20.4

¹Unsignalized intersection, critical/worst approach/movement shown
Source: Progressive Companies, May 2025

Intersection	2024 Scenario 1E			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Sprinkle Road / Centre Avenue	C	22.2	C	26.4
Sprinkle Road / Zylman Avenue	B	10.9	B	10.8

Source: Progressive Companies, May 2025

This diverted trip scenario showed minor decreases in delay on Portage Road due to less through traffic, however this minor decrease in delay does not have a significant impact on any intersections. This analysis also showed that Westnedge Avenue and Sprinkle Road have sufficient capacity for additional traffic with no intersections exceeding a LOS “C” for the morning or afternoon peak periods.

Scenario 1F

This scenario represents a scenario where Portage Road has three (3) lanes in the same configuration as Scenario 1D, but with the speed limit lowered from 45 mph to 35 mph. A summary of the level of service at each intersection for this scenario is shown in Table 8 below:

Table 8. Existing (2024) Conditions with Scenario 1F

Intersection	2024 Scenario 1F			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.2	C	29.7
Portage Road / Zylman Avenue	B	12.4	B	14.1
Portage Road / Forest Drive ¹	C	15.8	C	19.6
Portage Road / Stanley Avenue ¹	C	17.7	C	17.5
Portage Road / Bacon Avenue	C	25.7	C	26.4
Portage Road / Osterhout Avenue ¹	C	17.9	C	17.8

¹Unsignalized intersection, critical/worst approach/movement shown
Source: Progressive Companies, May 2025

Scenario 1F showed that lowering the speed limit on Portage Road does not have a significant impact on individual intersections levels of service. The lowered speed limit is anticipated to have a larger effect on overall travel times through the corridor, which will be analyzed later in this report.

Scenario 1G

Scenario 1G represents a scenario where Portage Road has three (3) lanes in the same configuration as Scenario 1F, but with a traffic signal added at Forest Drive and a roundabout at Osterhout Avenue. This traffic signal is warranted by existing traffic counts performed by the city and expected to improve access from side streets by creating larger gaps in traffic along the corridor. The traffic signal timing for this new signal at Forest Drive was optimized to use the same cycle length as the other signals on Portage Road (100 seconds) and prioritize Portage Road traffic with approximately 2/3 (two-thirds) of the cycle length given to Portage Road.

Table 9. Existing (2024) Conditions with Scenario 1G

Intersection	2024 Scenario 1G			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.2	C	29.7
Portage Road / Zylman Avenue	B	12.4	B	14.1
Portage Road / Forest Drive ¹	D	45.9	D	44.5
Portage Road / Stanley Avenue ¹	C	17.2	C	17.5
Portage Road / Bacon Avenue	C	25.3	C	25.2
Portage Road / Osterhout Avenue ¹	A	8.7	B	10.7

¹Unsignalized intersection, critical/worst approach/movement shown

Source: Progressive Companies, May 2025

Scenario 1G showed that the new signal and roundabout will not cause a significant delay to through traffic on Portage Road. Delay for turning vehicles on Forest Drive and Osterhout Avenue will remain similar to the existing condition with a stop sign, however their turning movements will be protected and should create a safer intersection. The signal will also create more gaps in through traffic on Portage Road, allowing easier access from side streets downstream of these signals.

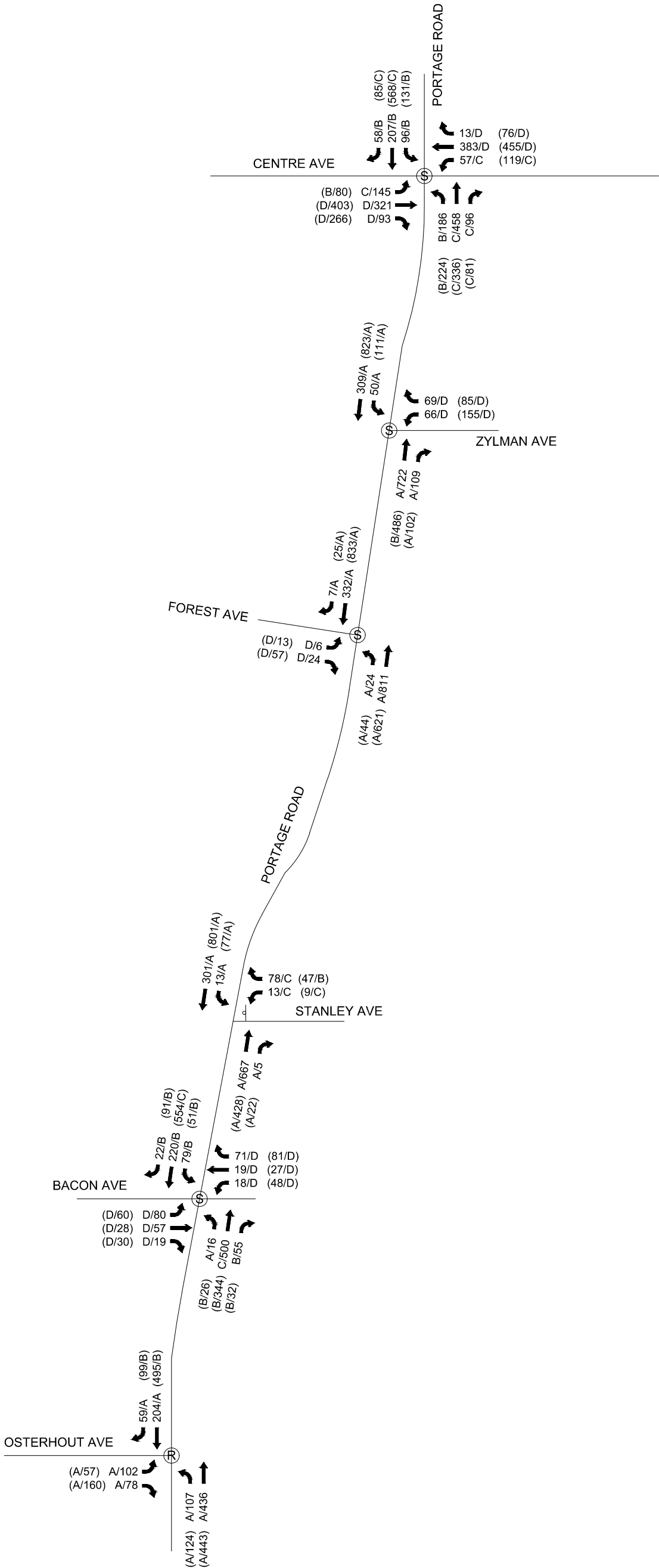
With all the scenarios analyzed, it was shown that a three-lane Portage Road with the optimized signal timing and added turn lanes should operate with a similar LOS to the existing four-lane and five-lane configuration. It was also shown that diverting 10% (ten percent) of Portage Road traffic will have a minimal effect on the LOS on Portage Road and Westnedge Avenue and Sprinkle Road have enough capacity to absorb the diverted traffic without major impacts as well. Since these changes were small and to further analyze the scenario with the most traffic on Portage Road, Scenarios 1D and 1F are the scenarios selected to be further analyzed in this study. These scenarios represent Portage Road with a three-lane cross section with optimized signal timing and key through lanes/right-turn lanes at Centre Avenue and dedicated right-turn lanes at Bacon Avenue and Osterhout Avenue.

Woodbine Avenue/South Shore Drive Signalization

Throughout the engagement process, we heard many stories of speeding vehicles, serious crashes, and concerns about crossing Portage Road as a pedestrian. With additional housing developments, investments in the park, and the community's desire to live, work, and play safely in the corridor, the concept of a traffic signal at Woodbine/South Shore became a community-supported idea. This led to understanding crash patterns, operational analysis, and what geometric signal configuration could work at this location. A traffic signal at the Woodbine Avenue/South Shore Drive intersection will add another signalized pedestrian crossing to the corridor and slow vehicle speeds through the isthmus section of Portage Road from the south. The existing intersections at South Shore Drive and Woodbine Avenue also have limited sight distance, with a horizontal curve on Portage Road in its current configuration and a traffic signal will create a safer access point from the side streets onto Portage Road. The intersections of Portage Road at Forest Drive and Osterhout Avenue were shown to operate with a LOS "A" with the construction of a new traffic signal and a signal at Woodbine Avenue/South Shore Drive can be assumed to operate similarly. The traffic signal at the Woodbine Avenue/South Shore Drive intersection would be anticipated to have a design similar to the signal at the offset intersection of Oakland Drive and Greenbriar Drive/Preserve Boulevard. Based on our analysis of the corridor, creating gaps for turning vehicles, a desire for additional pedestrian crossings, and positive public sentiment, a signal is recommended to be installed at Woodbine Avenue/South Shore Drive and Portage Road intersection.

Non-Signalized Intersections

While much of this analysis has been focused on Portage Road through traffic, it is important to acknowledge the impact that a three-lane Portage Road will have on traffic turning out of driveways or side streets onto Portage Road. Our analyses showed that none of the unsignalized intersections in the study are expected to experience a significant decrease in level of service and all unsignalized intersections maintain a LOS "C" or better. Additionally, the reduced speeds on Portage Road should create a safer roadway with through vehicles having shorter stopping distances and turning vehicles requiring less sight distance.



CHAPTER 4

FUTURE CONDITIONS

While our analyses have shown that the three-lane section on Portage Road can operate acceptably with current traffic volumes, continued growth in the area, including the villages of Vicksburg and Schoolcraft, will cause an increase in traffic on Portage Road and all other roads in the area. To ensure that this proposed three-lane section can accommodate an increase in traffic, all traffic volumes in the model were grown with a background growth rate of 0.5% (zero point five percent) annually over 20 years for a future 2044 model. This background growth rate was provided by the KATS, which maintains population models based on past trends and future developments to accurately project population increases or decreases.

With the future traffic volumes applied, the *Synchro*® model was run again to determine the level of service for each intersection using the same configurations as Scenario 1D and 1F. These future models will be referred to as 2D and 2F, respectively. Additionally, a future scenario with the proposed traffic signals, similar to Scenario 1G, will be analyzed and called scenario 2G. Traffic signal timing was re-optimized for this scenario to accommodate the future traffic volumes.

Scenario 2D

Scenario 2D represents Portage Road with 2044 traffic volumes with three (3) lanes throughout from Osterhout Avenue to Centre Avenue, but with turn lanes added at intersections with poor LOS or queues. This resulted in two (2) southbound lanes at Centre Avenue with the two (2) lanes merging near Pleasant Drive. Similarly, a second northbound lane is proposed to develop approximately 300 feet from the northbound stop bar at Centre Avenue. In addition to these lanes, dedicated right-turn lanes, 150 feet in length, were added to the following intersections:

- Northbound and Southbound Portage Road at Bacon Avenue
- Southbound Portage Road at Osterhout Avenue

The resulting levels of service and delay for Scenario 2D are summarized in Table 10 below:

Table 10. Future (2044) Conditions with Scenario 2D

Intersection	2044 Scenario 2D			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.7	C	33.8
Portage Road / Zylman Avenue	B	14.9	B	15.2
Portage Road / Forest Drive ¹	B	16.9	C	21.4
Portage Road / Stanley Avenue ¹	C	19.9	C	18.9
Portage Road / Bacon Avenue	C	27.5	C	27.2
Portage Road / Osterhout Avenue ¹	C	20.1	C	19.7

¹Unsignalized intersection, critical/worst approach/movement shown

Source: Progressive Companies, May 2025

Scenario 2F

Scenario 2F represents a scenario where Portage Road has three (3) lanes in the same configuration as Scenario 2D, but with the speed limit lowered from 45 mph to 35 mph. A summary of the level of service at each intersection for this scenario is shown in Table 11 below:

Table 11. Future (2044) Conditions with Scenario 2F

Intersection	2044 Scenario 2F			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.7	C	33.8
Portage Road / Zylman Avenue	B	14.9	B	15.2
Portage Road / Forest Drive ¹	C	16.9	C	21.4
Portage Road / Stanley Avenue ¹	C	19.9	C	18.9
Portage Road / Bacon Avenue	C	27.5	C	27.2
Portage Road / Osterhout Avenue ¹	C	20.1	C	19.7

¹Unsignalized intersection, critical/worst approach/movement shown

Source: Progressive Companies, May 2025

Scenario 2G

Scenario 2G represents a scenario where Portage Road has three (3) lanes in the same configuration and speed limit as Scenario 2F, but with a traffic signal added at Forest Drive and a roundabout at Osterhout Avenue. This traffic signal is warranted by existing traffic counts and expected to improve access from side streets by creating larger gaps in traffic along the corridor. The traffic signal timing for this new signal at Forest Drive was optimized to use the same cycle length as the other signals on Portage Road (100 seconds) and prioritize Portage Road traffic with approximately 2/3 (two-thirds) of the cycle length given to Portage Road.

Table 12. Future (2044) Conditions with Scenario 2G

Intersection	2044 Scenario 2G			
	A.M.		P.M.	
	LOS	Delay(s)	LOS	Delay(s)
Portage Road / Centre Avenue	C	28.7	C	33.8
Portage Road / Zylman Avenue	B	14.9	B	15.2
Portage Road / Forest Drive ¹	D	46.2	A	7.3
Portage Road / Stanley Avenue ¹	C	19.9	C	18.9
Portage Road / Bacon Avenue	C	27.5	C	26.3
Portage Road / Osterhout Avenue ¹	A	9.7	B	12.3

¹Unsignalized intersection, critical/worst approach/movement shown

Source: Progressive Companies, May 2025

The 2044 future models showed increases in delay at most intersections compared to the current 2025 models, as expected, however all intersections are still projected to operate at a LOS "C" or better. These analyses showed that Portage Road operations should remain acceptable with the three-lane cross well into the future, and that there is still excess capacity.

CHAPTER 5

TRAVEL TIME

A broader analysis of the entire corridor was also completed to measure the travel time that it will take to go northbound from Osterhout Avenue to Centre Avenue and southbound from Centre Avenue to Osterhout Avenue. This analysis used SimTraffic modeling with parameters set up according to MDOT's Electronic Traffic Control Device Guidelines. This modeling software simulates thousands of vehicles traveling through the Portage Road corridor during the peak hours based on the traffic counts that were collected, peak hour factors observed, and signal timing information used in the *Synchro*® model. An average of these simulated trips through the corridor is then used to give an average travel time per vehicle, including delay due to traffic signals, turning vehicles, and traffic queues at intersections.

For these travel time simulations, the following scenarios were analyzed:

- Scenario 1A
- Scenario 1D
- Scenario 1F
- Scenario 1G
- Scenario 2G

A summary of these travel times are shown below:

Table 13. Travel Time

	Travel Time									
	1A		1D		1F		1G		2G	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
NB	274.3	257.1	303.8	279.3	347.8	332	358.3	336.7	362.3	343.2
SB	265.6	294.1	280.1	323.9	328.4	372.8	333.1	379.3	339.1	382.0

These travel time analyses showed that a current trip through the Portage Road corridor takes approximately 272 seconds. If the road was reconfigured with three lanes, a traffic signal at Forest Drive and a roundabout at Osterhout Avenue, and the speed limit was changed to 35 mph, a trip will take approximately 350 seconds – an increase of approximately 78 seconds. Scenario 2G was also analyzed to determine how the new road configuration will operate 20 years into the future assuming the 0.5% (zero point five percent) annual traffic growth rate. This scenario averaged a travel time of 355 seconds, slightly more time than the 2024 analysis.

Comparing Scenario 1A to 1D shows that the three-lane roadway (296 seconds average travel time) will be responsible for an increase in travel time of approximately 24 seconds over the existing road configuration (272 seconds average travel time).

Comparing Scenario 1D to 1F shows that the change in speed limit from 45 mph (296 seconds average travel time) to 35 mph (345 seconds average travel time) will be responsible for an increase in travel time of approximately 49 seconds.

Comparing Scenario 1F to 1G shows that the addition of two (2) traffic signals in the corridor will increase the travel time approximately 5 seconds from 345 seconds of average travel time to 350 seconds of average travel time.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

With all the scenarios analyzed, it was shown that a three-lane Portage Road with the optimized signal timing and added turn lanes should operate with a similar LOS to the existing four-lane and five-lane configuration. It was also shown that diverting 10% (ten percent) of Portage Road traffic will have a minimal effect on the LOS on Portage Road, and Westnedge Avenue and Sprinkle Road have enough capacity to absorb the diverted traffic without major impacts as well.

The 2044 future models showed increases in delay at most intersections compared to the current 2025 models, as expected, however all intersections are still projected to operate at a LOS “C” or better. These analyses showed that Portage Road operations should remain acceptable with the three-lane cross well into the future and that there is still excess capacity.

Lastly, a comparison of the existing travel times simulated by our model with the travel time with a three-lane section and lower speed limit of 35 mph showed an average increase of 78 seconds. Of this 78 seconds, a majority of this increase is due to the lower speed limit and not due to the different road cross section; further showing that a three-lane roadway has sufficient capacity to carry current Portage Road traffic volumes effectively.

With all these considerations in mind, a three-lane Portage Road is anticipated to operate acceptably with the following recommendations:

- Two (2) southbound Portage Road lanes at Centre Avenue should continue to approximately 650 feet past the intersection where they then merge into one (1) lane.
- A second northbound Portage Road lane should develop approximately 300 feet before the Centre Avenue intersection.
- Dedicated right-turn lanes 150 feet in length should be constructed at the following intersections:
 - Northbound and Southbound Portage Road at Bacon Avenue
 - Southbound Portage Road at Osterhout Avenue
- Installation of a traffic signal is recommended for the Woodbine Avenue/South Shore Drive and Portage Road intersection.
- Signal timing should be updated at each signalized intersection in the corridor to reflect the roadway changes.

With this roadway reconfiguration, proper access management to businesses and side streets should also be incorporated into the design. Limiting access points creates less conflict points with vehicles on Portage Road and creates an easier to navigate road system. Aligning driveways and side streets on the east and west sides of Portage Road also limits conflict points and creates safer access to businesses.

Currently, Portage Road has one (1) mid-block pedestrian crossing and the only other crossings exist at signalized intersections. These limit pedestrians attempting to navigate the Portage Road corridor as it can take one (1) mile or more to reach the next pedestrian crossing. As part of the Portage Road 360 plan, increasing the number of pedestrian crossings in appropriate locations can increase pedestrian safety while creating an easier way to navigate the corridor for pedestrians.

Additional benefits of reducing travel lanes and speed limits include the ability to add sidewalk and shared-use paths, landscaping, street lighting, and improved sight distance for driveways. Given the traffic analysis and relatively minimal impact, the proposed projects are expected to better balance mobility for the corridor and improve overall quality of life for residents, businesses, and visitors alike.

Technical Appendix

Portage Road 360 Traffic Assessment

- **Level of Service Definitions**
- **Glossary**
- **Traffic Count Data**
- **Synchro Analyses Results**

Level of Service Definitions

Signalized Intersections

Level of Service A:	Describes operations with very low average stopped delay, i.e., less than 10.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
Level of Service B:	Describes operations with an average stopped delay in the range of 10.0 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
Level of Service C:	Describes operations with an average stopped delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
Level of Service D:	Describes operations with an average stopped delay in the range of 35.1 to 55.0 seconds per vehicle. At Level of Service D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c (volume/capacity) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
Level of Service E:	Describes operations with an average stopped delay in the range of 55.1 to 80.0 seconds per vehicle. This is considered to be the limit of acceptable delay in many cases. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are a frequent occurrence.
Level of Service F:	Describes operations with an average stopped delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Level of Service Definitions

Unsignalized Intersections

Level of Service A:	Average delay per vehicles for impeded movements is less than 10 seconds. There is little or no delay with typically low side street and/or main street traffic.
Level of Service B:	Average stopped delays from 10.1 seconds to 15.0 seconds. Short delays, many acceptable gaps in main street traffic stream.
Level of Service C:	Average delay per vehicle ranges from 15.1 to 25.0 seconds. Average traffic delays with frequent gaps in main street traffic.
Level of Service D:	Average delays from 25.1 to 35.0 seconds for impeded movements. Long traffic delays for impeded movements due in part to a limited number of acceptable gaps.
Level of Service E:	Average delays in the 35.1 to 50.0 second range. May experience very long delays for impeded movements with a very small number of acceptable gaps in the traffic stream.
Level of Service F:	Average vehicle delays of over 50.0 seconds. Extreme traffic delays with virtually no acceptable gaps in main street traffic.

Glossary

Approach: A set of lanes accommodating all left-turn, through, and right-turn movements arriving at an intersection from a given direction.

Arterial: Signalized streets that serve primarily through traffic and provide access to abutting properties as a secondary function.

Average Stopped Delay: The total time vehicles are stopped in an intersection approach or lane group during a specified time interval divided by the volume departing from the approach or lane group during the same time period, in seconds per vehicle.

Background Traffic: Traffic volumes that will be on the roadway network without the presence of the proposed development.

Bypass Lane: A one-lane widening on a two-lane roadway that allows through traffic to pass by waiting left-turn traffic.

Capacity: The maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions; usually expressed as vehicles per hour or persons per hour.

Conflicting Traffic Volume: The volume of traffic which conflicts with a specific movement at an intersection.

Corridor: A lineal study area aligned with a roadway facility in which traffic, land use, right-of-way, environmental, and other factors are evaluated to determine future transportation facility needs.

Cycle: Any complete sequence of traffic signal indications.

Cycle Length: The total time for a traffic signal to complete one cycle.

Design Hour Volume: The traffic volume for the design hour, usually a forecast of the relevant peak hour volume, in vehicles per hour.

Diverted Linked Trips: Trips from the traffic volume on roadways within the vicinity of the generator but which requires a diversion from that roadway to another roadway to gain access to the site.

Driveway Offset: Distance between driveways on opposite sides of a roadway, measured parallel to roadway.

Freeway: A multi-lane divided highway having a minimum of two lanes for exclusive use of traffic in each direction and full control of access and egress.

Gaps (Critical Gap): The median time headway between vehicles in a major traffic stream which will permit side-street vehicles to cross through or merge with the major traffic stream.

Green Time: The actual length of the "green" indication for a given movement at a signalized intersection.

Level of Service: A qualitative measure describing operational conditions within a traffic stream; generally described in terms of such factors as speed and travel time, delay, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Operational Analysis: A use of capacity analysis to determine the prevailing level of service on an existing or projected facility, with known or projected traffic, roadway, and control conditions. This analysis can involve a particular location, such as an intersection or a corridor.

Pass-by Trips: Trips made as intermediate stops on the way from an origin to a primary trip destination.

Peak Hour (AM): The one hour period in the morning representing the highest hourly volume of traffic flow on the adjacent public street system.

Peak Hour (PM): The one hour period in the afternoon or evening representing the highest hourly volume of traffic flow on the adjacent public street system.

Peak Hour Factor: The hourly volume during the maximum volume hour of the day divided by four times the peak 15-minute flow within the peak hour; a measure of traffic demand fluctuation within the peak hour.

Phase: The part of the signal cycle allocated to any combination of traffic movements receiving the right-of-way simultaneously during one or more intervals.

Roadway Conditions: Geometric characteristics of a street or highway, including the type of facility, number and width of lanes (by direction), shoulder widths and lateral clearances, design speed, etc.

Service Drive: A roadway (usually private) that provides internal access to two or more uses.

Site Traffic: Existing or projected vehicular traffic generated by the development.

Study Area: The geographic area containing site access points and critical intersections (and connecting highway segments) which are impacted by the site-traffic generated by the development, and should be evaluated.

System Improvements: Added lanes, signal improvements, and other roadway improvements not considered site-related improvements.

Traffic Impact: The adverse impact on intersection Level of Service and/or street and highway safety and operations as determined by the criteria and procedures set forth in this handbook.

Trip (Directional Trip): A single or one-direction vehicle movement with either the origin or the destination (exiting or entering) inside a study site.

Trip Distribution: The distribution or assignment of site traffic into site driveways and study area roadways/intersections based upon expected direction of approach and departure.

Unsignalized Intersection: Any intersection not controlled by traffic signals.

Volume: The number of persons or vehicles passing a point on a lane or roadway during some time interval, such as one hour or during an average day.

Volume-to-Capacity Ratio (V/C): The ratio of demand flow rate to capacity for a traffic facility

Traffic Count Data



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Portage Road &
Centre Avenue
Site Code:
Start Date: 11/19/2024
Page No: 1

Turning Movement Data

11/19/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Portage Road Northbound					Portage Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	29	43	13	0	85	8	93	0	0	101	44	86	17	0	147	14	37	7	0	58	391
7:15 AM	39	60	12	0	111	13	117	0	0	130	57	114	19	0	190	13	44	10	0	67	498
7:30 AM	36	83	29	0	148	11	96	0	0	107	55	126	22	1	203	23	61	23	0	107	565
7:45 AM	42	100	30	0	172	14	105	0	1	119	45	106	36	0	187	43	49	12	1	104	582
Hourly Total	146	286	84	0	516	46	411	0	1	457	201	432	94	1	727	93	191	52	1	336	2036
8:00 AM	28	78	22	0	128	19	65	13	0	97	29	112	19	0	160	17	53	13	0	83	468
8:15 AM	27	87	25	0	139	25	96	4	0	125	35	99	15	0	149	19	43	16	0	78	491
8:30 AM	25	66	43	0	134	9	63	8	0	80	59	107	14	0	180	15	58	12	0	85	479
8:45 AM	21	56	42	0	119	12	81	20	0	113	54	96	9	0	159	17	71	16	0	104	495
Hourly Total	101	287	132	0	520	65	305	45	0	415	177	414	57	0	648	68	225	57	0	350	1933
11/19/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:30 PM	8	69	52	1	129	23	92	14	0	129	60	84	16	0	160	10	82	25	0	117	535
2:45 PM	23	102	76	0	201	22	70	14	0	106	50	63	16	0	129	17	89	25	0	131	567
Hourly Total	31	171	128	1	330	45	162	28	0	235	110	147	32	0	289	27	171	50	0	248	1102
3:00 PM	18	89	62	0	169	18	74	16	0	108	48	84	13	0	145	16	102	21	0	139	561
3:15 PM	11	74	64	0	149	14	97	16	0	127	59	107	18	1	184	25	120	36	0	181	641
3:30 PM	15	102	57	0	174	25	99	8	0	132	34	87	12	0	133	31	136	60	0	227	666
3:45 PM	16	106	69	0	191	26	98	13	0	137	57	99	18	0	174	16	96	45	0	157	659
Hourly Total	60	371	252	0	683	83	368	53	0	504	198	377	61	1	636	88	454	162	0	704	2527
4:00 PM	16	126	89	0	231	29	92	19	0	140	51	78	23	0	152	19	124	43	0	186	709
4:15 PM	14	108	78	1	200	22	90	20	0	132	38	83	27	0	148	30	123	28	0	181	661
4:30 PM	16	99	70	1	185	33	135	16	0	184	63	86	15	0	164	22	128	29	0	179	712
4:45 PM	20	94	78	1	192	30	113	14	1	157	56	94	15	0	165	21	128	32	0	181	695
Hourly Total	66	427	315	3	808	114	430	69	1	613	208	341	80	0	629	92	503	132	0	727	2777
5:00 PM	24	116	50	0	190	30	109	27	0	166	51	87	26	1	164	24	156	36	1	216	736
5:15 PM	20	94	68	0	182	26	98	19	0	143	54	69	25	0	148	18	156	34	0	208	681
5:30 PM	19	116	68	1	203	23	101	18	0	142	29	81	15	0	125	24	116	13	0	153	623
5:45 PM	21	76	38	0	135	21	75	16	0	112	50	58	20	0	128	21	104	22	0	147	522
Hourly Total	84	402	224	1	710	100	383	80	0	563	184	295	86	1	565	87	532	105	1	724	2562
6:00 PM	12	68	44	0	124	9	61	11	0	81	38	72	15	0	125	12	92	14	0	118	448
6:15 PM	17	62	43	0	122	11	40	10	0	61	36	57	14	0	107	11	76	13	0	100	390
Grand Total	517	2074	1222	5	3813	473	2160	296	2	2929	1152	2135	439	3	3726	478	2244	585	2	3307	13775
Approach %	13.6	54.4	32.0	-	-	16.1	73.7	10.1	-	-	30.9	57.3	11.8	-	-	14.5	67.9	17.7	-	-	-
Total %	3.8	15.1	8.9	-	27.7	3.4	15.7	2.1	-	21.3	8.4	15.5	3.2	-	27.0	3.5	16.3	4.2	-	24.0	-
Lights	505	2036	1147	-	3688	457	2125	290	-	2872	1130	2062	420	-	3612	466	2151	575	-	3192	13364
% Lights	97.7	98.2	93.9	-	96.7	96.6	98.4	98.0	-	98.1	98.1	96.6	95.7	-	96.9	97.5	95.9	98.3	-	96.5	97.0
Mediums	10	32	74	-	116	12	30	4	-	46	21	54	9	-	84	7	70	7	-	84	330
% Mediums	1.9	1.5	6.1	-	3.0	2.5	1.4	1.4	-	1.6	1.8	2.5	2.1	-	2.3	1.5	3.1	1.2	-	2.5	2.4
Articulated Trucks	2	6	1	-	9	4	5	2	-	11	1	19	10	-	30	5	23	3	-	31	81
% Articulated Trucks	0.4	0.3	0.1	-	0.2	0.8	0.2	0.7	-	0.4	0.1	0.9	2.3	-	0.8	1.0	1.0	0.5	-	0.9	0.6
Pedestrians	-	-	-	5	-	-	-	-	2	-	-	-	-	3	-	-	-	-	2	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Portage Road &
Centre Avenue
Site Code:
Start Date: 11/19/2024
Page No: 2

Turning Movement Peak Hour Data (7:15 AM)

11/19/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Portage Road Northbound					Portage Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:15 AM	39	60	12	0	111	13	117	0	0	130	57	114	19	0	190	13	44	10	0	67	498
7:30 AM	36	83	29	0	148	11	96	0	0	107	55	126	22	1	203	23	61	23	0	107	565
7:45 AM	42	100	30	0	172	14	105	0	1	119	45	106	36	0	187	43	49	12	1	104	582
8:00 AM	28	78	22	0	128	19	65	13	0	97	29	112	19	0	160	17	53	13	0	83	468
Total	145	321	93	0	559	57	383	13	1	453	186	458	96	1	740	96	207	58	1	361	2113
Approach %	25.9	57.4	16.6	-	-	12.6	84.5	2.9	-	-	25.1	61.9	13.0	-	-	26.6	57.3	16.1	-	-	-
Total %	6.9	15.2	4.4	-	26.5	2.7	18.1	0.6	-	21.4	8.8	21.7	4.5	-	35.0	4.5	9.8	2.7	-	17.1	-
PHF	0.863	0.803	0.775	-	0.813	0.750	0.818	0.250	-	0.871	0.816	0.909	0.667	-	0.911	0.558	0.848	0.630	-	0.843	0.908
Lights	144	316	82	-	542	56	375	13	-	444	183	450	92	-	725	91	190	56	-	337	2048
% Lights	99.3	98.4	88.2	-	97.0	98.2	97.9	100.0	-	98.0	98.4	98.3	95.8	-	98.0	94.8	91.8	96.6	-	93.4	96.9
Mediums	1	4	11	-	16	1	7	0	-	8	3	5	2	-	10	2	7	2	-	11	45
% Mediums	0.7	1.2	11.8	-	2.9	1.8	1.8	0.0	-	1.8	1.6	1.1	2.1	-	1.4	2.1	3.4	3.4	-	3.0	2.1
Articulated Trucks	0	1	0	-	1	0	1	0	-	1	0	3	2	-	5	3	10	0	-	13	20
% Articulated Trucks	0.0	0.3	0.0	-	0.2	0.0	0.3	0.0	-	0.2	0.0	0.7	2.1	-	0.7	3.1	4.8	0.0	-	3.6	0.9
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-

Turning Movement Peak Hour Data (4:30 PM)

11/19/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Portage Road Northbound					Portage Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
4:30 PM	16	99	70	1	185	33	135	16	0	184	63	86	15	0	164	22	128	29	0	179	712
4:45 PM	20	94	78	1	192	30	113	14	1	157	56	94	15	0	165	21	128	32	0	181	695
5:00 PM	24	116	50	0	190	30	109	27	0	166	51	87	26	1	164	24	156	36	1	216	736
5:15 PM	20	94	68	0	182	26	98	19	0	143	54	69	25	0	148	18	156	34	0	208	681
Total	80	403	266	2	749	119	455	76	1	650	224	336	81	1	641	85	568	131	1	784	2824
Approach %	10.7	53.8	35.5	-	-	18.3	70.0	11.7	-	-	34.9	52.4	12.6	-	-	10.8	72.4	16.7	-	-	-
Total %	2.8	14.3	9.4	-	26.5	4.2	16.1	2.7	-	23.0	7.9	11.9	2.9	-	22.7	3.0	20.1	4.6	-	27.8	-
PHF	0.833	0.869	0.853	-	0.975	0.902	0.843	0.704	-	0.883	0.889	0.894	0.779	-	0.971	0.885	0.910	0.910	-	0.907	0.959
Lights	76	396	255	-	727	118	450	76	-	644	223	327	78	-	628	84	553	131	-	768	2767
% Lights	95.0	98.3	95.9	-	97.1	99.2	98.9	100.0	-	99.1	99.6	97.3	96.3	-	98.0	98.8	97.4	100.0	-	98.0	98.0
Mediums	2	7	11	-	20	1	3	0	-	4	1	7	1	-	9	0	9	0	-	9	42
% Mediums	2.5	1.7	4.1	-	2.7	0.8	0.7	0.0	-	0.6	0.4	2.1	1.2	-	1.4	0.0	1.6	0.0	-	1.1	1.5
Articulated Trucks	2	0	0	-	2	0	2	0	-	2	0	2	2	-	4	1	6	0	-	7	15
% Articulated Trucks	2.5	0.0	0.0	-	0.3	0.0	0.4	0.0	-	0.3	0.0	0.6	2.5	-	0.6	1.2	1.1	0.0	-	0.9	0.5
Pedestrians	-	-	-	2	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Count Name: Portage Road &
Zylman Avenue
Site Code:
Start Date: 11/19/2024
Page No: 1



Count Name: Portage Road &
Zylman Avenue
Site Code:
Start Date: 11/19/2024
Page No: 2

[illegible]



Count Name: Portage Road &
Forest Drive
Site Code:
Start Date: 11/19/2024
Page No: 1



Count Name: Portage Road &
Forest Drive
Site Code:
Start Date: 11/19/2024
Page No: 2

[illegible]



Count Name: Portage Road &
Lakeview Drive
Site Code:
Start Date: 11/19/2024
Page No: 1



Count Name: Portage Road &
Lakeview Drive
Site Code:
Start Date: 11/19/2024
Page No: 2

[illegible][illegible]



Count Name: Portage Avenue &
Stanley Avenue
Site Code:
Start Date: 11/19/2024
Page No: 1



Count Name: Portage Avenue &
Stanley Avenue
Site Code:
Start Date: 11/19/2024
Page No: 2

11/19/2024	Private Drive Eastbound					Stanley Avenue Westbound					Portage Avenue Northbound					Portage Avenue Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
4:30 PM	0	0	0	0	0	1	0	9	0	10	0	98	4	0	102	17	205	0	0	222	334
4:45 PM	0	0	0	0	0	1	0	16	0	17	0	112	6	0	118	21	197	0	0	218	353
5:00 PM	0	0	0	0	0	5	0	15	0	20	0	101	4	0	105	20	199	0	0	219	344
5:15 PM	0	0	0	0	0	2	0	7	0	9	0	117	8	0	125	19	200	0	0	219	353
Total	0	0	0	0	0	9	0	47	0	56	0	428	22	0	450	77	801	0	0	878	1384
Approach %	0.0	0.0	0.0	-	-	16.1	0.0	83.9	-	-	0.0	95.1	4.9	-	-	8.8	91.2	0.0	-	-	-
Total %	0.0	0.0	0.0	-	0.0	0.7	0.0	3.4	-	4.0	0.0	30.9	1.6	-	32.5	5.6	57.9	0.0	-	63.4	-
PHF	0.000	0.000	0.000	-	0.000	0.450	0.000	0.734	-	0.700	0.000	0.915	0.688	-	0.900	0.917	0.977	0.000	-	0.989	0.980
Lights	0	0	0	-	0	9	0	46	-	55	0	418	22	-	440	77	794	0	-	871	1366
% Lights	-	-	-	-	-	100.0	-	97.9	-	98.2	-	97.7	100.0	-	97.8	100.0	99.1	-	-	99.2	98.7
Mediums	0	0	0	-	0	0	0	1	-	1	0	7	0	-	7	0	1	0	-	1	9
% Mediums	-	-	-	-	-	0.0	-	2.1	-	1.8	-	1.6	0.0	-	1.6	0.0	0.1	-	-	0.1	0.7
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	3	0	-	3	0	6	0	-	6	9
% Articulated Trucks	-	-	-	-	-	0.0	-	0.0	-	0.0	-	0.7	0.0	-	0.7	0.0	0.7	-	-	0.7	0.7
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Bacon Avenue &
Portage Road
Site Code:
Start Date: 11/21/2024
Page No: 1

Turning Movement Data

11/21/2024	Bacon Avenue Eastbound					Lake Ctr Westbound					Portage Road Northbound					Portage Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	20	0	7	0	27	0	1	6	0	7	9	126	3	0	138	2	39	8	0	49	221
7:15 AM	23	4	8	0	35	0	0	4	0	4	13	133	3	0	149	5	63	1	0	69	257
7:30 AM	26	11	9	0	46	5	4	21	0	30	3	143	6	2	152	19	55	8	0	82	310
7:45 AM	25	12	5	0	42	3	2	8	0	13	9	128	5	1	142	9	62	8	0	79	276
Hourly Total	94	27	29	0	150	8	7	39	0	54	34	530	17	3	581	35	219	25	0	279	1064
8:00 AM	11	10	3	0	24	0	2	7	1	9	3	116	9	1	128	10	53	3	0	66	227
8:15 AM	18	24	2	0	44	10	11	35	0	56	1	113	35	0	149	41	50	3	0	94	343
8:30 AM	17	6	6	0	29	26	13	34	0	73	6	83	16	0	105	6	54	4	0	64	271
8:45 AM	8	2	4	0	14	6	1	13	0	20	5	102	4	0	111	5	74	5	0	84	229
Hourly Total	54	42	15	0	111	42	27	89	1	158	15	414	64	1	493	62	231	15	0	308	1070
11/21/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:30 PM	8	0	7	0	15	0	0	2	0	2	3	87	1	0	91	1	120	12	0	133	241
2:45 PM	14	0	11	0	25	0	1	1	0	2	3	83	1	0	87	7	122	15	0	144	258
Hourly Total	22	0	18	0	40	0	1	3	0	4	6	170	2	0	178	8	242	27	0	277	499
3:00 PM	13	2	15	0	30	1	1	3	0	5	5	78	4	0	87	9	113	14	0	136	258
3:15 PM	13	12	7	0	32	0	0	4	0	4	4	99	12	0	115	30	123	22	0	175	326
3:30 PM	16	14	7	0	37	10	6	21	0	37	4	82	18	5	104	17	131	19	0	167	345
3:45 PM	18	0	6	0	24	36	18	50	0	104	10	94	1	4	105	4	147	28	0	179	412
Hourly Total	60	28	35	0	123	47	25	78	0	150	23	353	35	9	411	60	514	83	0	657	1341
4:00 PM	13	2	10	0	25	2	3	6	0	11	8	69	1	0	78	0	153	22	0	175	289
4:15 PM	12	2	4	0	18	2	5	2	0	9	7	95	1	0	103	0	131	24	0	155	285
4:30 PM	16	1	8	0	25	1	2	3	0	6	4	99	2	0	105	2	138	18	0	158	294
4:45 PM	16	0	12	0	28	1	2	5	0	8	2	98	0	0	100	3	147	27	0	177	313
Hourly Total	57	5	34	0	96	6	12	16	0	34	21	361	4	0	386	5	569	91	0	665	1181
5:00 PM	10	0	11	0	21	1	1	2	0	4	4	94	4	0	102	2	148	18	0	168	295
5:15 PM	12	0	4	0	16	0	1	5	0	6	7	102	1	0	110	6	164	13	0	183	315
5:30 PM	15	1	10	0	26	2	1	6	0	9	7	102	1	0	110	6	137	23	0	166	311
5:45 PM	14	3	9	0	26	1	4	5	0	10	0	71	3	0	74	6	114	20	0	140	250
Hourly Total	51	4	34	0	89	4	7	18	0	29	18	369	9	0	396	20	563	74	0	657	1171
6:00 PM	6	18	9	0	33	0	0	2	0	2	3	61	13	0	77	28	96	10	0	134	246
6:15 PM	7	10	0	0	17	0	0	3	0	3	4	63	9	0	76	27	116	9	0	152	248
Grand Total	351	134	174	0	659	107	79	248	1	434	124	2321	153	13	2598	245	2550	334	0	3129	6820
Approach %	53.3	20.3	26.4	-	-	24.7	18.2	57.1	-	-	4.8	89.3	5.9	-	-	7.8	81.5	10.7	-	-	-
Total %	5.1	2.0	2.6	-	9.7	1.6	1.2	3.6	-	6.4	1.8	34.0	2.2	-	38.1	3.6	37.4	4.9	-	45.9	-
Lights	344	130	168	-	642	107	79	246	-	432	120	2257	153	-	2530	244	2496	332	-	3072	6676
% Lights	98.0	97.0	96.6	-	97.4	100.0	100.0	99.2	-	99.5	96.8	97.2	100.0	-	97.4	99.6	97.9	99.4	-	98.2	97.9
Mediums	7	4	6	-	17	0	0	2	-	2	4	44	0	-	48	1	43	2	-	46	113
% Mediums	2.0	3.0	3.4	-	2.6	0.0	0.0	0.8	-	0.5	3.2	1.9	0.0	-	1.8	0.4	1.7	0.6	-	1.5	1.7
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	20	0	-	20	0	11	0	-	11	31
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.9	0.0	-	0.8	0.0	0.4	0.0	-	0.4	0.5
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	13	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Bacon Avenue &
Portage Road
Site Code:
Start Date: 11/21/2024
Page No: 2

Turning Movement Peak Hour Data (7:30 AM)

11/21/2024	Bacon Avenue Eastbound					Lake Ctr Westbound					Portage Road Northbound					Portage Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:30 AM	26	11	9	0	46	5	4	21	0	30	3	143	6	2	152	19	55	8	0	82	310
7:45 AM	25	12	5	0	42	3	2	8	0	13	9	128	5	1	142	9	62	8	0	79	276
8:00 AM	11	10	3	0	24	0	2	7	1	9	3	116	9	1	128	10	53	3	0	66	227
8:15 AM	18	24	2	0	44	10	11	35	0	56	1	113	35	0	149	41	50	3	0	94	343
Total	80	57	19	0	156	18	19	71	1	108	16	500	55	4	571	79	220	22	0	321	1156
Approach %	51.3	36.5	12.2	-	-	16.7	17.6	65.7	-	-	2.8	87.6	9.6	-	-	24.6	68.5	6.9	-	-	-
Total %	6.9	4.9	1.6	-	13.5	1.6	1.6	6.1	-	9.3	1.4	43.3	4.8	-	49.4	6.8	19.0	1.9	-	27.8	-
PHF	0.769	0.594	0.528	-	0.848	0.450	0.432	0.507	-	0.482	0.444	0.874	0.393	-	0.939	0.482	0.887	0.688	-	0.854	0.843
Lights	79	56	17	-	152	18	19	71	-	108	15	492	55	-	562	79	206	22	-	307	1129
% Lights	98.8	98.2	89.5	-	97.4	100.0	100.0	100.0	-	100.0	93.8	98.4	100.0	-	98.4	100.0	93.6	100.0	-	95.6	97.7
Mediums	1	1	2	-	4	0	0	0	-	0	1	6	0	-	7	0	11	0	-	11	22
% Mediums	1.3	1.8	10.5	-	2.6	0.0	0.0	0.0	-	0.0	6.3	1.2	0.0	-	1.2	0.0	5.0	0.0	-	3.4	1.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	2	0	-	2	0	3	0	-	3	5
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.4	0.0	-	0.4	0.0	1.4	0.0	-	0.9	0.4
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	4	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-

Turning Movement Peak Hour Data (3:15 PM)

11/21/2024	Bacon Avenue Eastbound					Lake Ctr Westbound					Portage Road Northbound					Portage Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
3:15 PM	13	12	7	0	32	0	0	4	0	4	4	99	12	0	115	30	123	22	0	175	326
3:30 PM	16	14	7	0	37	10	6	21	0	37	4	82	18	5	104	17	131	19	0	167	345
3:45 PM	18	0	6	0	24	36	18	50	0	104	10	94	1	4	105	4	147	28	0	179	412
4:00 PM	13	2	10	0	25	2	3	6	0	11	8	69	1	0	78	0	153	22	0	175	289
Total	60	28	30	0	118	48	27	81	0	156	26	344	32	9	402	51	554	91	0	696	1372
Approach %	50.8	23.7	25.4	-	-	30.8	17.3	51.9	-	-	6.5	85.6	8.0	-	-	7.3	79.6	13.1	-	-	-
Total %	4.4	2.0	2.2	-	8.6	3.5	2.0	5.9	-	11.4	1.9	25.1	2.3	-	29.3	3.7	40.4	6.6	-	50.7	-
PHF	0.833	0.500	0.750	-	0.797	0.333	0.375	0.405	-	0.375	0.650	0.869	0.444	-	0.874	0.425	0.905	0.813	-	0.972	0.833
Lights	56	27	28	-	111	48	27	81	-	156	23	325	32	-	380	50	548	90	-	688	1335
% Lights	93.3	96.4	93.3	-	94.1	100.0	100.0	100.0	-	100.0	88.5	94.5	100.0	-	94.5	98.0	98.9	98.9	-	98.9	97.3
Mediums	4	1	2	-	7	0	0	0	-	0	3	11	0	-	14	1	5	1	-	7	28
% Mediums	6.7	3.6	6.7	-	5.9	0.0	0.0	0.0	-	0.0	11.5	3.2	0.0	-	3.5	2.0	0.9	1.1	-	1.0	2.0
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	8	0	-	8	0	1	0	-	1	9
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	2.3	0.0	-	2.0	0.0	0.2	0.0	-	0.1	0.7
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	9	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



Count Name: Portage Avenue &
Osterhout Avenue
Site Code:
Start Date: 11/19/2024
Page No: 1



Count Name: Portage Avenue &
Osterhout Avenue
Site Code:
Start Date: 11/19/2024
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[illegible][illegible]



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Centre Avenue &
Westnidge Avenue
Site Code:
Start Date: 11/21/2024
Page No: 1

Turning Movement Data

11/21/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Westnidge Avenue Northbound					Westnidge Avenue Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	3	122	52	0	177	32	83	14	0	129	31	29	28	0	88	19	31	1	0	51	445
7:15 AM	3	211	63	0	277	52	128	11	0	191	61	52	52	0	165	21	35	2	0	58	691
7:30 AM	3	196	40	0	239	27	153	17	0	197	64	53	51	0	168	14	26	0	0	40	644
7:45 AM	3	164	20	0	187	21	131	11	0	163	34	30	16	0	80	10	14	2	0	26	456
Hourly Total	12	693	175	0	880	132	495	53	0	680	190	164	147	0	501	64	106	5	0	175	2236
8:00 AM	1	115	16	0	132	15	113	6	0	134	23	35	19	0	77	15	8	1	0	24	367
8:15 AM	5	95	19	0	119	49	99	12	0	160	48	37	27	0	112	16	27	3	0	46	437
8:30 AM	4	108	15	0	127	27	120	17	0	164	38	46	42	0	126	19	21	1	0	41	458
8:45 AM	8	123	12	0	143	21	122	13	0	156	17	33	16	0	66	14	22	1	0	37	402
Hourly Total	18	441	62	0	521	112	454	48	0	614	126	151	104	0	381	64	78	6	0	148	1664
11/21/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:30 PM	8	140	31	0	179	53	141	24	0	218	50	32	19	1	101	22	34	6	1	62	560
2:45 PM	5	162	36	1	203	22	218	21	3	261	99	70	72	2	241	28	35	12	0	75	780
Hourly Total	13	302	67	1	382	75	359	45	3	479	149	102	91	3	342	50	69	18	1	137	1340
3:00 PM	2	148	23	0	173	33	184	23	1	240	39	29	18	0	86	26	41	6	1	73	572
3:15 PM	6	137	38	0	181	56	184	13	0	253	36	29	26	0	91	15	37	3	0	55	580
3:30 PM	8	151	40	0	199	46	178	26	0	250	31	37	30	0	98	22	36	2	0	60	607
3:45 PM	10	147	40	0	197	36	197	30	0	263	43	48	44	0	135	26	36	2	0	64	659
Hourly Total	26	583	141	0	750	171	743	92	1	1006	149	143	118	0	410	89	150	13	1	252	2418
4:00 PM	2	183	24	0	209	37	206	32	0	275	37	33	33	0	103	36	37	4	0	77	664
4:15 PM	6	169	25	0	200	37	151	19	0	207	20	32	19	0	71	29	35	6	0	70	548
4:30 PM	8	137	28	0	173	36	169	27	1	232	27	30	30	0	87	22	38	2	0	62	554
4:45 PM	7	150	31	0	188	37	178	25	0	240	28	34	31	0	93	25	38	3	0	66	587
Hourly Total	23	639	108	0	770	147	704	103	1	954	112	129	113	0	354	112	148	15	0	275	2353
5:00 PM	6	159	30	0	195	49	199	17	0	265	23	33	33	0	89	31	56	6	0	93	642
5:15 PM	3	199	39	0	241	31	174	25	0	230	23	38	23	0	84	29	55	3	0	87	642
5:30 PM	8	148	56	0	212	45	123	31	0	199	53	50	32	0	135	40	48	4	0	92	638
5:45 PM	5	146	37	0	188	29	109	24	0	162	26	33	25	0	84	25	42	2	0	69	503
Hourly Total	22	652	162	0	836	154	605	97	0	856	125	154	113	0	392	125	201	15	0	341	2425
6:00 PM	3	114	27	0	144	19	92	24	0	135	26	19	24	0	69	28	37	2	0	67	415
6:15 PM	3	85	21	0	109	20	102	18	0	140	15	21	14	0	50	17	34	2	0	53	352
Grand Total	120	3509	763	1	4392	830	3554	480	5	4864	892	883	724	3	2499	549	823	76	2	1448	13203
Approach %	2.7	79.9	17.4	-	-	17.1	73.1	9.9	-	-	35.7	35.3	29.0	-	-	37.9	56.8	5.2	-	-	-
Total %	0.9	26.6	5.8	-	33.3	6.3	26.9	3.6	-	36.8	6.8	6.7	5.5	-	18.9	4.2	6.2	0.6	-	11.0	-
Lights	120	3428	746	-	4294	800	3498	478	-	4776	879	868	693	-	2440	534	814	70	-	1418	12928
% Lights	100.0	97.7	97.8	-	97.8	96.4	98.4	99.6	-	98.2	98.5	98.3	95.7	-	97.6	97.3	98.9	92.1	-	97.9	97.9
Mediums	0	65	17	-	82	30	41	2	-	73	13	15	30	-	58	15	9	6	-	30	243
% Mediums	0.0	1.9	2.2	-	1.9	3.6	1.2	0.4	-	1.5	1.5	1.7	4.1	-	2.3	2.7	1.1	7.9	-	2.1	1.8
Articulated Trucks	0	16	0	-	16	0	15	0	-	15	0	0	1	-	1	0	0	0	-	0	32
% Articulated Trucks	0.0	0.5	0.0	-	0.4	0.0	0.4	0.0	-	0.3	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	-	0.0	0.2
Pedestrians	-	-	-	1	-	-	-	-	5	-	-	-	-	3	-	-	-	-	2	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Centre Avenue &
Westnidge Avenue
Site Code:
Start Date: 11/21/2024
Page No: 2

Turning Movement Peak Hour Data (7:00 AM)

11/21/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Westnidge Avenue Northbound					Westnidge Avenue Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	3	122	52	0	177	32	83	14	0	129	31	29	28	0	88	19	31	1	0	51	445
7:15 AM	3	211	63	0	277	52	128	11	0	191	61	52	52	0	165	21	35	2	0	58	691
7:30 AM	3	196	40	0	239	27	153	17	0	197	64	53	51	0	168	14	26	0	0	40	644
7:45 AM	3	164	20	0	187	21	131	11	0	163	34	30	16	0	80	10	14	2	0	26	456
Total	12	693	175	0	880	132	495	53	0	680	190	164	147	0	501	64	106	5	0	175	2236
Approach %	1.4	78.8	19.9	-	-	19.4	72.8	7.8	-	-	37.9	32.7	29.3	-	-	36.6	60.6	2.9	-	-	-
Total %	0.5	31.0	7.8	-	39.4	5.9	22.1	2.4	-	30.4	8.5	7.3	6.6	-	22.4	2.9	4.7	0.2	-	7.8	-
PHF	1.000	0.821	0.694	-	0.794	0.635	0.809	0.779	-	0.863	0.742	0.774	0.707	-	0.746	0.762	0.757	0.625	-	0.754	0.809
Lights	12	685	168	-	865	126	483	53	-	662	186	160	142	-	488	61	103	4	-	168	2183
% Lights	100.0	98.8	96.0	-	98.3	95.5	97.6	100.0	-	97.4	97.9	97.6	96.6	-	97.4	95.3	97.2	80.0	-	96.0	97.6
Mediums	0	6	7	-	13	6	8	0	-	14	4	4	5	-	13	3	3	1	-	7	47
% Mediums	0.0	0.9	4.0	-	1.5	4.5	1.6	0.0	-	2.1	2.1	2.4	3.4	-	2.6	4.7	2.8	20.0	-	4.0	2.1
Articulated Trucks	0	2	0	-	2	0	4	0	-	4	0	0	0	-	0	0	0	0	-	0	6
% Articulated Trucks	0.0	0.3	0.0	-	0.2	0.0	0.8	0.0	-	0.6	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.3
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Turning Movement Peak Hour Data (2:45 PM)

11/21/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Westnidge Avenue Northbound					Westnidge Avenue Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
2:45 PM	5	162	36	1	203	22	218	21	3	261	99	70	72	2	241	28	35	12	0	75	780
3:00 PM	2	148	23	0	173	33	184	23	1	240	39	29	18	0	86	26	41	6	1	73	572
3:15 PM	6	137	38	0	181	56	184	13	0	253	36	29	26	0	91	15	37	3	0	55	580
3:30 PM	8	151	40	0	199	46	178	26	0	250	31	37	30	0	98	22	36	2	0	60	607
Total	21	598	137	1	756	157	764	83	4	1004	205	165	146	2	516	91	149	23	1	263	2539
Approach %	2.8	79.1	18.1	-	-	15.6	76.1	8.3	-	-	39.7	32.0	28.3	-	-	34.6	56.7	8.7	-	-	-
Total %	0.8	23.6	5.4	-	29.8	6.2	30.1	3.3	-	39.5	8.1	6.5	5.8	-	20.3	3.6	5.9	0.9	-	10.4	-
PHF	0.656	0.923	0.856	-	0.931	0.701	0.876	0.798	-	0.962	0.518	0.589	0.507	-	0.535	0.813	0.909	0.479	-	0.877	0.814
Lights	21	584	131	-	736	151	756	83	-	990	199	157	139	-	495	89	148	22	-	259	2480
% Lights	100.0	97.7	95.6	-	97.4	96.2	99.0	100.0	-	98.6	97.1	95.2	95.2	-	95.9	97.8	99.3	95.7	-	98.5	97.7
Mediums	0	10	6	-	16	6	6	0	-	12	6	8	7	-	21	2	1	1	-	4	53
% Mediums	0.0	1.7	4.4	-	2.1	3.8	0.8	0.0	-	1.2	2.9	4.8	4.8	-	4.1	2.2	0.7	4.3	-	1.5	2.1
Articulated Trucks	0	4	0	-	4	0	2	0	-	2	0	0	0	-	0	0	0	0	-	0	6
% Articulated Trucks	0.0	0.7	0.0	-	0.5	0.0	0.3	0.0	-	0.2	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.2
Pedestrians	-	-	-	1	-	-	-	-	4	-	-	-	-	2	-	-	-	-	1	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



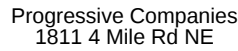
Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Centre Avenue &
Currier-Mustang Drive
Site Code:
Start Date: 11/21/2024
Page No: 1

Turning Movement Data

11/21/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Mustang Drive Northbound					Currier Dr Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	3	103	62	2	168	26	123	7	0	156	14	0	8	0	22	6	1	2	1	9	355
7:15 AM	4	128	141	0	273	69	152	5	0	226	39	5	22	3	66	0	20	0	0	20	585
7:30 AM	7	195	73	0	275	48	149	5	0	202	43	3	13	0	59	1	10	2	0	13	549
7:45 AM	6	172	11	0	189	5	153	12	0	170	3	1	0	0	4	1	0	6	0	7	370
Hourly Total	20	598	287	2	905	148	577	29	0	754	99	9	43	3	151	8	31	10	1	49	1859
8:00 AM	7	132	12	0	151	2	129	2	0	133	2	0	3	0	5	7	1	4	0	12	301
8:15 AM	10	112	13	0	135	6	157	10	0	173	3	1	2	0	6	2	0	2	0	4	318
8:30 AM	7	152	7	0	166	6	161	5	0	172	7	0	0	0	7	6	0	3	0	9	354
8:45 AM	7	135	5	0	147	3	154	15	3	172	1	0	4	0	5	4	0	4	1	8	332
Hourly Total	31	531	37	0	599	17	601	32	3	650	13	1	9	0	23	19	1	13	1	33	1305
11/21/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:30 PM	10	154	15	0	179	17	186	9	1	212	35	4	10	0	49	8	2	2	0	12	452
2:45 PM	11	214	25	28	250	19	146	20	1	185	112	17	31	0	160	18	0	17	6	35	630
Hourly Total	21	368	40	28	429	36	332	29	2	397	147	21	41	0	209	26	2	19	6	47	1082
3:00 PM	11	159	10	0	180	5	176	12	0	193	42	7	13	0	62	26	1	25	0	52	487
3:15 PM	5	158	8	0	171	6	227	7	0	240	13	1	9	0	23	11	0	13	0	24	458
3:30 PM	7	186	9	4	202	2	220	9	0	231	19	0	3	0	22	17	0	10	0	27	482
3:45 PM	9	207	3	0	219	1	230	18	0	249	28	1	8	0	37	14	1	10	0	25	530
Hourly Total	32	710	30	4	772	14	853	46	0	913	102	9	33	0	144	68	2	58	0	128	1957
4:00 PM	8	235	4	0	247	0	236	14	0	250	23	2	2	0	27	21	1	10	0	32	556
4:15 PM	9	189	6	0	204	3	190	10	0	203	14	1	6	0	21	5	0	4	0	9	437
4:30 PM	6	179	4	0	189	1	198	5	0	204	15	1	2	0	18	10	0	7	0	17	428
4:45 PM	5	192	5	1	202	4	227	11	0	242	8	3	3	0	14	9	0	10	0	19	477
Hourly Total	28	795	19	1	842	8	851	40	0	899	60	7	13	0	80	45	1	31	0	77	1898
5:00 PM	4	205	14	0	223	4	240	7	0	251	3	0	4	0	7	19	1	13	0	33	514
5:15 PM	4	228	14	0	246	3	211	8	0	222	8	2	6	0	16	6	1	5	0	12	496
5:30 PM	6	211	10	0	227	13	177	2	0	192	8	0	3	0	11	13	0	8	0	21	451
5:45 PM	10	155	26	0	191	16	141	10	0	167	17	3	5	0	25	5	1	8	0	14	397
Hourly Total	24	799	64	0	887	36	769	27	0	832	36	5	18	0	59	43	3	34	0	80	1858
6:00 PM	4	157	12	0	173	6	122	6	0	134	5	1	5	0	11	7	0	10	0	17	335
6:15 PM	2	106	5	1	113	1	117	8	0	126	3	1	0	0	4	4	0	7	0	11	254
Grand Total	162	4064	494	36	4720	266	4222	217	5	4705	465	54	162	3	681	220	40	182	8	442	10548
Approach %	3.4	86.1	10.5	-	-	5.7	89.7	4.6	-	-	68.3	7.9	23.8	-	-	49.8	9.0	41.2	-	-	-
Total %	1.5	38.5	4.7	-	44.7	2.5	40.0	2.1	-	44.6	4.4	0.5	1.5	-	6.5	2.1	0.4	1.7	-	4.2	-
Lights	159	3939	491	-	4589	263	4148	203	-	4614	464	54	160	-	678	216	40	170	-	426	10307
% Lights	98.1	96.9	99.4	-	97.2	98.9	98.2	93.5	-	98.1	99.8	100.0	98.8	-	99.6	98.2	100.0	93.4	-	96.4	97.7
Mediums	3	109	0	-	112	3	63	14	-	80	1	0	1	-	2	4	0	11	-	15	209
% Mediums	1.9	2.7	0.0	-	2.4	1.1	1.5	6.5	-	1.7	0.2	0.0	0.6	-	0.3	1.8	0.0	6.0	-	3.4	2.0
Articulated Trucks	0	16	3	-	19	0	11	0	-	11	0	0	1	-	1	0	0	1	-	1	32
% Articulated Trucks	0.0	0.4	0.6	-	0.4	0.0	0.3	0.0	-	0.2	0.0	0.0	0.6	-	0.1	0.0	0.0	0.5	-	0.2	0.3
Pedestrians	-	-	-	36	-	-	-	-	5	-	-	-	-	3	-	-	-	-	8	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Count Name: Centre Avenue &
Currier-Mustang Drive
Site Code:
Start Date: 11/21/2024
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Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Centre Avenue &
Sprinkle Road
Site Code:
Start Date: 11/21/2024
Page No: 1

Turning Movement Data

11/21/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Sprinkle Road Northbound					Sprinkle Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	28	8	11	0	47	4	25	4	0	33	57	95	4	0	156	4	45	11	0	60	296
7:15 AM	39	7	20	0	66	5	31	5	0	41	57	135	2	0	194	1	55	30	0	86	387
7:30 AM	46	6	20	0	72	2	17	9	0	28	67	154	4	0	225	1	46	36	0	83	408
7:45 AM	61	5	25	0	91	4	18	8	0	30	43	133	5	0	181	3	62	36	0	101	403
Hourly Total	174	26	76	0	276	15	91	26	0	132	224	517	15	0	756	9	208	113	0	330	1494
8:00 AM	35	15	19	0	69	4	21	6	0	31	37	87	1	0	125	2	48	39	0	89	314
8:15 AM	31	10	18	0	59	7	19	5	0	31	38	87	3	0	128	3	58	38	0	99	317
8:30 AM	40	6	23	0	69	5	18	6	0	29	47	87	2	0	136	9	55	22	0	86	320
8:45 AM	26	3	13	0	42	5	11	7	0	23	45	75	6	0	126	2	57	35	0	94	285
Hourly Total	132	34	73	0	239	21	69	24	0	114	167	336	12	0	515	16	218	134	0	368	1236
11/21/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:30 PM	35	14	41	0	90	3	12	4	0	19	42	89	4	0	135	1	106	59	0	166	410
2:45 PM	60	19	46	0	125	3	8	3	0	14	36	80	2	0	118	2	82	37	0	121	378
Hourly Total	95	33	87	0	215	6	20	7	0	33	78	169	6	0	253	3	188	96	0	287	788
3:00 PM	52	16	56	0	124	2	20	1	0	23	45	85	4	0	134	6	110	50	0	166	447
3:15 PM	45	17	43	0	105	4	10	4	0	18	25	79	6	0	110	6	127	51	0	184	417
3:30 PM	51	14	65	0	130	5	14	4	0	23	42	72	4	0	118	6	114	50	0	170	441
3:45 PM	58	20	45	0	123	3	14	3	0	20	34	69	12	0	115	11	93	57	0	161	419
Hourly Total	206	67	209	0	482	14	58	12	0	84	146	305	26	0	477	29	444	208	0	681	1724
4:00 PM	56	26	68	0	150	7	16	2	0	25	48	59	10	0	117	3	134	44	0	181	473
4:15 PM	67	10	52	0	129	3	12	6	0	21	42	63	3	0	108	7	107	33	0	147	405
4:30 PM	48	26	39	0	113	8	14	5	0	27	50	49	4	0	103	13	144	55	0	212	455
4:45 PM	52	17	39	0	108	2	12	4	1	18	52	72	5	1	129	4	151	52	0	207	462
Hourly Total	223	79	198	0	500	20	54	17	1	91	192	243	22	1	457	27	536	184	0	747	1795
5:00 PM	62	22	58	0	142	3	14	8	0	25	43	67	3	0	113	10	155	48	0	213	493
5:15 PM	56	26	58	0	140	8	10	1	0	19	44	72	4	0	120	5	136	57	0	198	477
5:30 PM	57	13	49	0	119	1	15	7	1	23	41	67	1	0	109	4	106	18	0	128	379
5:45 PM	34	20	45	0	99	0	9	3	0	12	36	44	1	0	81	11	88	14	0	113	305
Hourly Total	209	81	210	0	500	12	48	19	1	79	164	250	9	0	423	30	485	137	0	652	1654
6:00 PM	50	17	50	0	117	1	18	1	0	20	28	48	2	0	78	5	82	10	0	97	312
6:15 PM	27	19	35	0	81	0	13	2	0	15	34	44	2	0	80	11	69	12	0	92	268
Grand Total	1116	356	938	0	2410	89	371	108	2	568	1033	1912	94	1	3039	130	2230	894	0	3254	9271
Approach %	46.3	14.8	38.9	-	-	15.7	65.3	19.0	-	-	34.0	62.9	3.1	-	-	4.0	68.5	27.5	-	-	-
Total %	12.0	3.8	10.1	-	26.0	1.0	4.0	1.2	-	6.1	11.1	20.6	1.0	-	32.8	1.4	24.1	9.6	-	35.1	-
Lights	1082	353	919	-	2354	85	360	104	-	549	1025	1839	90	-	2954	126	2145	878	-	3149	9006
% Lights	97.0	99.2	98.0	-	97.7	95.5	97.0	96.3	-	96.7	99.2	96.2	95.7	-	97.2	96.9	96.2	98.2	-	96.8	97.1
Mediums	25	3	14	-	42	4	10	4	-	18	7	40	4	-	51	4	53	12	-	69	180
% Mediums	2.2	0.8	1.5	-	1.7	4.5	2.7	3.7	-	3.2	0.7	2.1	4.3	-	1.7	3.1	2.4	1.3	-	2.1	1.9
Articulated Trucks	9	0	5	-	14	0	1	0	-	1	1	33	0	-	34	0	32	4	-	36	85
% Articulated Trucks	0.8	0.0	0.5	-	0.6	0.0	0.3	0.0	-	0.2	0.1	1.7	0.0	-	1.1	0.0	1.4	0.4	-	1.1	0.9
Pedestrians	-	-	-	0	-	-	-	-	2	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Centre Avenue &
Sprinkle Road
Site Code:
Start Date: 11/21/2024
Page No: 2

Turning Movement Peak Hour Data (7:15 AM)

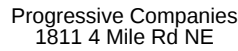
11/21/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Sprinkle Road Northbound					Sprinkle Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:15 AM	39	7	20	0	66	5	31	5	0	41	57	135	2	0	194	1	55	30	0	86	387
7:30 AM	46	6	20	0	72	2	17	9	0	28	67	154	4	0	225	1	46	36	0	83	408
7:45 AM	61	5	25	0	91	4	18	8	0	30	43	133	5	0	181	3	62	36	0	101	403
8:00 AM	35	15	19	0	69	4	21	6	0	31	37	87	1	0	125	2	48	39	0	89	314
Total	181	33	84	0	298	15	87	28	0	130	204	509	12	0	725	7	211	141	0	359	1512
Approach %	60.7	11.1	28.2	-	-	11.5	66.9	21.5	-	-	28.1	70.2	1.7	-	-	1.9	58.8	39.3	-	-	-
Total %	12.0	2.2	5.6	-	19.7	1.0	5.8	1.9	-	8.6	13.5	33.7	0.8	-	47.9	0.5	14.0	9.3	-	23.7	-
PHF	0.742	0.550	0.840	-	0.819	0.750	0.702	0.778	-	0.793	0.761	0.826	0.600	-	0.806	0.583	0.851	0.904	-	0.889	0.926
Lights	175	32	79	-	286	15	84	26	-	125	203	497	9	-	709	6	192	138	-	336	1456
% Lights	96.7	97.0	94.0	-	96.0	100.0	96.6	92.9	-	96.2	99.5	97.6	75.0	-	97.8	85.7	91.0	97.9	-	93.6	96.3
Mediums	5	1	4	-	10	0	3	2	-	5	1	10	3	-	14	1	12	1	-	14	43
% Mediums	2.8	3.0	4.8	-	3.4	0.0	3.4	7.1	-	3.8	0.5	2.0	25.0	-	1.9	14.3	5.7	0.7	-	3.9	2.8
Articulated Trucks	1	0	1	-	2	0	0	0	-	0	0	2	0	-	2	0	7	2	-	9	13
% Articulated Trucks	0.6	0.0	1.2	-	0.7	0.0	0.0	0.0	-	0.0	0.0	0.4	0.0	-	0.3	0.0	3.3	1.4	-	2.5	0.9
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Turning Movement Peak Hour Data (4:30 PM)

11/21/2024	Centre Avenue Eastbound					Centre Avenue Westbound					Sprinkle Road Northbound					Sprinkle Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
4:30 PM	48	26	39	0	113	8	14	5	0	27	50	49	4	0	103	13	144	55	0	212	455
4:45 PM	52	17	39	0	108	2	12	4	1	18	52	72	5	1	129	4	151	52	0	207	462
5:00 PM	62	22	58	0	142	3	14	8	0	25	43	67	3	0	113	10	155	48	0	213	493
5:15 PM	56	26	58	0	140	8	10	1	0	19	44	72	4	0	120	5	136	57	0	198	477
Total	218	91	194	0	503	21	50	18	1	89	189	260	16	1	465	32	586	212	0	830	1887
Approach %	43.3	18.1	38.6	-	-	23.6	56.2	20.2	-	-	40.6	55.9	3.4	-	-	3.9	70.6	25.5	-	-	-
Total %	11.6	4.8	10.3	-	26.7	1.1	2.6	1.0	-	4.7	10.0	13.8	0.8	-	24.6	1.7	31.1	11.2	-	44.0	-
PHF	0.879	0.875	0.836	-	0.886	0.656	0.893	0.563	-	0.824	0.909	0.903	0.800	-	0.901	0.615	0.945	0.930	-	0.974	0.957
Lights	215	91	192	-	498	19	49	18	-	86	188	255	16	-	459	30	565	209	-	804	1847
% Lights	98.6	100.0	99.0	-	99.0	90.5	98.0	100.0	-	96.6	99.5	98.1	100.0	-	98.7	93.8	96.4	98.6	-	96.9	97.9
Mediums	3	0	2	-	5	2	1	0	-	3	1	3	0	-	4	2	14	1	-	17	29
% Mediums	1.4	0.0	1.0	-	1.0	9.5	2.0	0.0	-	3.4	0.5	1.2	0.0	-	0.9	6.3	2.4	0.5	-	2.0	1.5
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	2	0	-	2	0	7	2	-	9	11
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.8	0.0	-	0.4	0.0	1.2	0.9	-	1.1	0.6
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-



Count Name: Westnedge
Avenue & Ostrerhout Avenue
Site Code:
Start Date: 12/11/2024
Page No: 1



Count Name: Westnedge
Avenue & Ostrerhout Avenue
Site Code:
Start Date: 12/11/2024
Page No: 2



Count Name: Westnidge Avenue
& Bacon Ave
Site Code:
Start Date: 11/21/2024
Page No: 1



Count Name: Westnidge Avenue
& Bacon Ave
Site Code:
Start Date: 11/21/2024
Page No: 2

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Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Westnidge Avenue
& Portage Central Entrance
Site Code:
Start Date: 11/21/2024
Page No: 1

Turning Movement Data

11/21/2024	Parking Lot Eastbound					Portage Central Entrance Westbound					Westnidge Avenue Northbound					Westnidge Avenue Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	0	0	0	0	0	8	0	14	0	22	1	84	34	0	119	25	87	0	0	112	253
7:15 AM	0	1	2	0	3	21	0	45	0	66	2	126	77	0	205	66	85	0	1	151	425
7:30 AM	0	0	1	0	1	22	0	30	0	52	0	150	56	0	206	29	70	0	0	99	358
7:45 AM	0	0	0	0	0	3	0	3	0	6	0	70	5	0	75	3	51	0	0	54	135
Hourly Total	0	1	3	0	4	54	0	92	0	146	3	430	172	0	605	123	293	0	1	416	1171
8:00 AM	1	0	0	0	1	0	0	1	0	1	0	80	2	0	82	1	38	0	0	39	123
8:15 AM	0	0	0	0	0	0	0	2	0	2	0	99	3	0	102	1	92	0	0	93	197
8:30 AM	0	0	0	0	0	3	0	1	0	4	0	124	0	0	124	3	59	0	0	62	190
8:45 AM	0	0	0	0	0	1	0	3	0	4	0	61	1	0	62	5	54	0	0	59	125
Hourly Total	1	0	0	0	1	4	0	7	0	11	0	364	6	0	370	10	243	0	0	253	635
11/21/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:30 PM	2	0	1	1	3	23	1	38	1	62	5	55	10	14	70	7	94	15	0	116	251
2:45 PM	15	0	8	17	23	62	1	87	4	150	1	143	9	22	153	12	78	5	0	95	421
Hourly Total	17	0	9	18	26	85	2	125	5	212	6	198	19	36	223	19	172	20	0	211	672
3:00 PM	1	1	0	2	2	13	0	15	0	28	0	59	7	0	66	2	90	2	0	94	190
3:15 PM	0	0	1	5	1	7	0	1	0	8	0	92	3	3	95	4	127	0	0	131	235
3:30 PM	0	0	0	6	0	5	0	9	0	14	0	98	5	0	103	3	118	0	0	121	238
3:45 PM	1	0	0	0	1	10	0	7	0	17	0	127	2	2	129	5	115	0	0	120	267
Hourly Total	2	1	1	13	4	35	0	32	0	67	0	376	17	5	393	14	450	2	0	466	930
4:00 PM	0	0	0	0	0	3	0	3	0	6	0	102	1	0	103	2	103	0	0	105	214
4:15 PM	2	0	0	0	2	4	0	1	0	5	0	62	1	0	63	0	89	0	0	89	159
4:30 PM	0	0	0	0	0	3	0	0	0	3	0	88	0	0	88	1	105	1	0	107	198
4:45 PM	0	0	0	1	0	0	0	0	0	0	0	88	2	0	90	1	105	0	0	106	196
Hourly Total	2	0	0	1	2	10	0	4	0	14	0	340	4	0	344	4	402	1	0	407	767
5:00 PM	1	0	0	0	1	2	0	2	0	4	0	86	9	0	95	2	126	1	0	129	229
5:15 PM	0	0	0	0	0	5	0	2	0	7	0	80	4	0	84	0	126	2	0	128	219
5:30 PM	2	0	0	0	2	3	0	3	0	6	0	136	10	0	146	6	140	0	0	146	300
5:45 PM	2	0	1	0	3	5	0	3	0	8	0	81	7	0	88	2	94	1	0	97	196
Hourly Total	5	0	1	0	6	15	0	10	0	25	0	383	30	0	413	10	486	4	0	500	944
6:00 PM	0	0	1	0	1	1	0	0	0	1	0	71	4	0	75	2	79	1	0	82	159
6:15 PM	0	0	0	0	0	1	0	0	0	1	0	56	0	0	56	0	81	0	0	81	138
Grand Total	27	2	15	32	44	205	2	270	5	477	9	2218	252	41	2479	182	2206	28	1	2416	5416
Approach %	61.4	4.5	34.1	-	-	43.0	0.4	56.6	-	-	0.4	89.5	10.2	-	-	7.5	91.3	1.2	-	-	-
Total %	0.5	0.0	0.3	-	0.8	3.8	0.0	5.0	-	8.8	0.2	41.0	4.7	-	45.8	3.4	40.7	0.5	-	44.6	-
Lights	27	2	14	-	43	205	2	270	-	477	9	2156	252	-	2417	180	2150	27	-	2357	5294
% Lights	100.0	100.0	93.3	-	97.7	100.0	100.0	100.0	-	100.0	100.0	97.2	100.0	-	97.5	98.9	97.5	96.4	-	97.6	97.7
Mediums	0	0	1	-	1	0	0	0	-	0	0	62	0	-	62	2	56	1	-	59	122
% Mediums	0.0	0.0	6.7	-	2.3	0.0	0.0	0.0	-	0.0	0.0	2.8	0.0	-	2.5	1.1	2.5	3.6	-	2.4	2.3
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	-	32	-	-	-	-	5	-	-	-	-	41	-	-	-	-	1	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Progressive Companies
1811 4 Mile Rd NE

Grand Rapids, Michigan, United States 49525
(616) 361-2664

Count Name: Westnidge Avenue
& Portage Central Entrance
Site Code:
Start Date: 11/21/2024
Page No: 2

Turning Movement Peak Hour Data (7:00 AM)

11/21/2024	Parking Lot Eastbound					Portage Central Entrance Westbound					Westnidge Avenue Northbound					Westnidge Avenue Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	0	0	0	0	0	8	0	14	0	22	1	84	34	0	119	25	87	0	0	112	253
7:15 AM	0	1	2	0	3	21	0	45	0	66	2	126	77	0	205	66	85	0	1	151	425
7:30 AM	0	0	1	0	1	22	0	30	0	52	0	150	56	0	206	29	70	0	0	99	358
7:45 AM	0	0	0	0	0	3	0	3	0	6	0	70	5	0	75	3	51	0	0	54	135
Total	0	1	3	0	4	54	0	92	0	146	3	430	172	0	605	123	293	0	1	416	1171
Approach %	0.0	25.0	75.0	-	-	37.0	0.0	63.0	-	-	0.5	71.1	28.4	-	-	29.6	70.4	0.0	-	-	-
Total %	0.0	0.1	0.3	-	0.3	4.6	0.0	7.9	-	12.5	0.3	36.7	14.7	-	51.7	10.5	25.0	0.0	-	35.5	-
PHF	0.000	0.250	0.375	-	0.333	0.614	0.000	0.511	-	0.553	0.375	0.717	0.558	-	0.734	0.466	0.842	0.000	-	0.689	0.689
Lights	0	1	3	-	4	54	0	92	-	146	3	414	172	-	589	122	278	0	-	400	1139
% Lights	-	100.0	100.0	-	100.0	100.0	-	100.0	-	100.0	100.0	96.3	100.0	-	97.4	99.2	94.9	-	-	96.2	97.3
Mediums	0	0	0	-	0	0	0	0	-	0	0	16	0	-	16	1	15	0	-	16	32
% Mediums	-	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0	3.7	0.0	-	2.6	0.8	5.1	-	-	3.8	2.7
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	-	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Turning Movement Peak Hour Data (2:30 PM)

11/21/2024	Parking Lot Eastbound					Portage Central Entrance Westbound					Westnidge Avenue Northbound					Westnidge Avenue Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
2:30 PM	2	0	1	1	3	23	1	38	1	62	5	55	10	14	70	7	94	15	0	116	251
2:45 PM	15	0	8	17	23	62	1	87	4	150	1	143	9	22	153	12	78	5	0	95	421
3:00 PM	1	1	0	2	2	13	0	15	0	28	0	59	7	0	66	2	90	2	0	94	190
3:15 PM	0	0	1	5	1	7	0	1	0	8	0	92	3	3	95	4	127	0	0	131	235
Total	18	1	10	25	29	105	2	141	5	248	6	349	29	39	384	25	389	22	0	436	1097
Approach %	62.1	3.4	34.5	-	-	42.3	0.8	56.9	-	-	1.6	90.9	7.6	-	-	5.7	89.2	5.0	-	-	-
Total %	1.6	0.1	0.9	-	2.6	9.6	0.2	12.9	-	22.6	0.5	31.8	2.6	-	35.0	2.3	35.5	2.0	-	39.7	-
PHF	0.300	0.250	0.313	-	0.315	0.423	0.500	0.405	-	0.413	0.300	0.610	0.725	-	0.627	0.521	0.766	0.367	-	0.832	0.651
Lights	18	1	9	-	28	105	2	141	-	248	6	330	29	-	365	25	367	21	-	413	1054
% Lights	100.0	100.0	90.0	-	96.6	100.0	100.0	100.0	-	100.0	100.0	94.6	100.0	-	95.1	100.0	94.3	95.5	-	94.7	96.1
Mediums	0	0	1	-	1	0	0	0	-	0	0	19	0	-	19	0	22	1	-	23	43
% Mediums	0.0	0.0	10.0	-	3.4	0.0	0.0	0.0	-	0.0	0.0	5.4	0.0	-	4.9	0.0	5.7	4.5	-	5.3	3.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	-	25	-	-	-	-	5	-	-	-	-	39	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-



Count Name: Sprinkle Road &
Zylman Avenue
Site Code:
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Count Name: Sprinkle Road &
Zylman Avenue
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11/21/2024	Zylman Avenue Eastbound					Zylman Avenue Westbound					Sprinkle Road Northbound					Sprinkle Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	12	0	6	0	18	0	0	0	0	0	19	137	0	0	156	1	43	9	0	53	227
7:15 AM	20	2	6	0	28	1	0	0	0	1	16	166	1	0	183	1	61	12	0	74	286
7:30 AM	22	2	15	0	39	0	1	0	0	1	19	190	0	0	209	0	38	12	0	50	299
7:45 AM	22	1	2	0	25	1	1	0	0	2	20	153	0	0	173	0	60	10	0	70	270
Total	76	5	29	0	110	2	2	0	0	4	74	646	1	0	721	2	202	43	0	247	1082
Approach %	69.1	4.5	26.4	-	-	50.0	50.0	0.0	-	-	10.3	89.6	0.1	-	-	0.8	81.8	17.4	-	-	-
Total %	7.0	0.5	2.7	-	10.2	0.2	0.2	0.0	-	0.4	6.8	59.7	0.1	-	66.6	0.2	18.7	4.0	-	22.8	-
PHF	0.864	0.625	0.483	-	0.705	0.500	0.500	0.000	-	0.500	0.925	0.850	0.250	-	0.862	0.500	0.828	0.896	-	0.834	0.905
Lights	70	5	29	-	104	2	2	0	-	4	71	637	1	-	709	1	191	41	-	233	1050
% Lights	92.1	100.0	100.0	-	94.5	100.0	100.0	-	-	100.0	95.9	98.6	100.0	-	98.3	50.0	94.6	95.3	-	94.3	97.0
Mediums	6	0	0	-	6	0	0	0	-	0	3	8	0	-	11	0	10	1	-	11	28
% Mediums	7.9	0.0	0.0	-	5.5	0.0	0.0	-	-	0.0	4.1	1.2	0.0	-	1.5	0.0	5.0	2.3	-	4.5	2.6
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1	1	1	-	3	4
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	0.1	50.0	0.5	2.3	-	1.2	0.4
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[illegible]

Synchro Analysis Results

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Centre Ave

Portage Road Corridor Study

Existing AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Future Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3443		1787	3555		1787	3474		1735	3357	
Flt Permitted	0.25	1.00		0.30	1.00		0.53	1.00		0.38	1.00	
Satd. Flow (perm)	474	3443		564	3555		999	3474		690	3357	
Peak-hour factor, PHF	0.81	0.81	0.81	0.87	0.87	0.87	0.91	0.91	0.91	0.84	0.84	0.84
Adj. Flow (vph)	179	396	115	66	440	15	204	503	105	114	246	69
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	179	511	0	66	455	0	204	608	0	114	315	0
Confl. Peds. (#/hr)	1		1	1		1			1	1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	
Effective Green, g (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	
Actuated g/C Ratio	0.32	0.21		0.27	0.18		0.54	0.43		0.50	0.40	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	296	712		256	647		627	1479		436	1356	
v/s Ratio Prot	c0.07	c0.15		0.02	0.13		c0.04	c0.18		0.02	0.09	
v/s Ratio Perm	0.13			0.05			0.14			0.11		
v/c Ratio	0.60	0.72		0.26	0.70		0.33	0.41		0.26	0.23	
Uniform Delay, d1	26.5	36.9		28.0	38.4		12.0	20.0		13.8	19.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	3.5		0.5	3.5		0.3	0.8		0.3	0.4	
Delay (s)	29.9	40.4		28.6	41.8		12.3	20.8		14.1	20.0	
Level of Service	C	D		C	D		B	C		B	C	
Approach Delay (s)		37.7			40.2			18.7			18.4	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay	28.5			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)			19.0					
Intersection Capacity Utilization	61.8%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Existing AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	69	66	722	109	50	309
Future Volume (vph)	69	66	722	109	50	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3504		1752	3505
Flt Permitted	0.95	1.00	1.00		0.26	1.00
Satd. Flow (perm)	1770	1583	3504		487	3505
Peak-hour factor, PHF	0.87	0.87	0.88	0.88	0.89	0.89
Adj. Flow (vph)	79	76	820	124	56	347
RTOR Reduction (vph)	0	68	6	0	0	0
Lane Group Flow (vph)	79	8	938	0	56	347
Heavy Vehicles (%)	2%	2%	1%	1%	3%	3%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	7.4	7.4	47.6		55.1	55.1
Effective Green, g (s)	7.4	7.4	47.6		55.1	55.1
Actuated g/C Ratio	0.10	0.10	0.66		0.76	0.76
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	180	161	2300		448	2663
v/s Ratio Prot			c0.27		0.01	c0.10
v/s Ratio Perm	c0.04	0.00			0.09	
v/c Ratio	0.44	0.05	0.41		0.12	0.13
Uniform Delay, d1	30.6	29.4	5.8		2.5	2.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	0.1	0.5		0.1	0.1
Delay (s)	32.3	29.5	6.4		2.6	2.4
Level of Service	C	C	A		A	A
Approach Delay (s)	30.9		6.4			2.4
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			7.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			72.5		Sum of lost time (s)	13.0
Intersection Capacity Utilization			48.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Existing AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Future Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96			1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	1817			1855	1615	1787	3513		1787	1881	1599
Flt Permitted	0.95	1.00			0.98	1.00	0.57	1.00		0.38	1.00	1.00
Satd. Flow (perm)	1805	1817			1855	1615	1073	3513		714	1881	1599
Peak-hour factor, PHF	0.85	0.85	0.85	0.60	0.60	0.60	0.94	0.94	0.94	0.85	0.85	0.85
Adj. Flow (vph)	94	67	22	30	32	118	17	532	59	93	259	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	94	89	0	0	62	118	17	591	0	93	259	26
Confl. Peds. (#/hr)			4	4					1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		2
Actuated Green, G (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	47.9
Effective Green, g (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	47.9
Actuated g/C Ratio	0.09	0.09			0.13	0.13	0.55	0.47		0.56	0.48	0.48
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	169	170			235	205	651	1665		493	900	765
v/s Ratio Prot	c0.05	0.05			0.03		0.00	c0.17		c0.02	0.14	
v/s Ratio Perm						c0.07	0.01			0.09		0.02
v/c Ratio	0.56	0.52			0.26	0.58	0.03	0.35		0.19	0.29	0.03
Uniform Delay, d1	43.3	43.2			39.4	41.1	10.1	16.6		10.2	15.7	13.8
Progression Factor	1.02	1.02			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.9	2.9			0.6	3.9	0.0	0.6		0.2	0.8	0.1
Delay (s)	48.0	46.8			40.0	45.0	10.1	17.2		10.4	16.5	13.9
Level of Service	D	D			D	D	B	B		B	B	B
Approach Delay (s)		47.4			43.3			17.0			14.8	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			24.0				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			48.4%				ICU Level of Service			A		
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	6	24	24	811	332	7
Future Vol, veh/h	6	24	24	811	332	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	90	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	68	68	90	90	89	89
Heavy Vehicles, %	0	0	1	1	3	3
Mvmt Flow	9	35	27	901	373	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	882	191	381	0	-	0
Stage 1	377	-	-	-	-	-
Stage 2	505	-	-	-	-	-
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	290	825	1181	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	283	825	1181	-	-	-
Mov Cap-2 Maneuver	408	-	-	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.5	0.2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1181	-	408	825	-	-
HCM Lane V/C Ratio	0.023	-	0.022	0.043	-	-
HCM Control Delay (s)	8.1	-	14	9.6	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	78	667	5	13	301
Future Vol, veh/h	13	78	667	5	13	301
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	89	89	81	81
Heavy Vehicles, %	0	0	1	1	3	3
Mvmt Flow	22	130	749	6	16	372
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	972	380	0	0	757	0
Stage 1	754	-	-	-	-	-
Stage 2	218	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.16	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.23	-
Pot Cap-1 Maneuver	254	624	-	-	843	-
Stage 1	431	-	-	-	-	-
Stage 2	803	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	247	623	-	-	842	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	430	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	13.5	0		0.5		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 247 623	842	-		
HCM Lane V/C Ratio	-	- 0.088 0.209	0.019	-		
HCM Control Delay (s)	-	- 21 12.3	9.4	0.1		
HCM Lane LOS	-	- C B	A	A		
HCM 95th %tile Q(veh)	-	- 0.3 0.8	0.1	-		

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	102	78	107	436	204	59
Future Vol, veh/h	102	78	107	436	204	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	90	0	250	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	89	89	89	89
Heavy Vehicles, %	1	1	1	1	3	3
Mvmt Flow	134	103	120	490	229	66
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	959	229	295	0	-	0
Stage 1	229	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	286	813	1272	-	-	-
Stage 1	811	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	259	813	1272	-	-	-
Mov Cap-2 Maneuver	374	-	-	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	15.7	1.6		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1272	-	374	813	-	-
HCM Lane V/C Ratio	0.095	-	0.359	0.126	-	-
HCM Control Delay (s)	8.1	-	19.9	10.1	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1.6	0.4	-	-

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	2	1	789	319	12
Future Vol, veh/h	22	2	1	789	319	12
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	90	90	82	82
Heavy Vehicles, %	0	0	1	1	3	3
Mvmt Flow	29	3	1	877	389	15

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	838	202	404	0	-	0
Stage 1	397	-	-	-	-	-
Stage 2	441	-	-	-	-	-
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	309	811	1158	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	622	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	308	811	1158	-	-	-
Mov Cap-2 Maneuver	431	-	-	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	622	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1158	-	449	-	-
HCM Lane V/C Ratio	0.001	-	0.071	-	-
HCM Control Delay (s)	8.1	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Centre Ave

Portage Road Corridor Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Future Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343		1787	3491		1787	3462		1787	3464	
Flt Permitted	0.24	1.00		0.16	1.00		0.21	1.00		0.50	1.00	
Satd. Flow (perm)	449	3343		306	3491		389	3462		935	3464	
Peak-hour factor, PHF	0.95	0.95	0.95	0.88	0.88	0.88	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	84	424	280	135	517	86	236	354	85	93	624	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	84	704	0	135	603	0	236	439	0	93	768	0
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	32.7	23.9		34.1	24.6		51.4	38.9		43.8	35.1	
Effective Green, g (s)	32.7	23.9		34.1	24.6		51.4	38.9		43.8	35.1	
Actuated g/C Ratio	0.33	0.24		0.34	0.25		0.51	0.39		0.44	0.35	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	264	798		245	858		374	1346		483	1215	
v/s Ratio Prot	0.03	c0.21		c0.05	0.17		c0.08	0.13		0.02	0.22	
v/s Ratio Perm	0.08			0.14			c0.25			0.07		
v/c Ratio	0.32	0.88		0.55	0.70		0.63	0.33		0.19	0.63	
Uniform Delay, d1	24.4	36.7		24.9	34.4		15.7	21.4		16.7	27.1	
Progression Factor	0.69	0.83		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	10.7		2.7	2.6		3.5	0.6		0.2	2.5	
Delay (s)	17.5	41.1		27.6	37.0		19.2	22.0		16.9	29.6	
Level of Service	B	D		C	D		B	C		B	C	
Approach Delay (s)		38.6			35.3			21.0			28.2	
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			0.72									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			74.6%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			
Traffic Volume (vph)	155	85	486	102	111	823
Future Volume (vph)	155	85	486	102	111	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	3482		1787	3574
Flt Permitted	0.95	1.00	1.00		0.38	1.00
Satd. Flow (perm)	1805	1615	3482		709	3574
Peak-hour factor, PHF	0.87	0.87	0.95	0.95	0.95	0.95
Adj. Flow (vph)	178	98	512	107	117	866
RTOR Reduction (vph)	0	82	12	0	0	0
Lane Group Flow (vph)	178	16	607	0	117	866
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	12.9	12.9	44.1		55.3	55.3
Effective Green, g (s)	12.9	12.9	44.1		55.3	55.3
Actuated g/C Ratio	0.16	0.16	0.56		0.71	0.71
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	297	266	1963		614	2527
v/s Ratio Prot			0.17		0.02	c0.24
v/s Ratio Perm	c0.10	0.01			0.11	
v/c Ratio	0.60	0.06	0.31		0.19	0.34
Uniform Delay, d1	30.3	27.5	9.0		3.7	4.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.1	0.4		0.2	0.4
Delay (s)	33.5	27.6	9.4		3.9	4.8
Level of Service	C	C	A		A	A
Approach Delay (s)	31.4		9.4			4.7
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.41			
Actuated Cycle Length (s)			78.2		Sum of lost time (s)	13.0
Intersection Capacity Utilization			43.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	91
Future Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.92			1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	1719			1841	1615	1770	3494		1787	1881	1599
Flt Permitted	0.95	1.00			0.97	1.00	0.26	1.00		0.48	1.00	1.00
Satd. Flow (perm)	1805	1719			1841	1615	491	3494		907	1881	1599
Peak-hour factor, PHF	0.80	0.80	0.80	0.60	0.60	0.60	0.87	0.87	0.87	0.95	0.95	0.95
Adj. Flow (vph)	75	35	38	80	45	135	30	395	37	54	583	96
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	75	73	0	0	125	135	30	432	0	54	583	96
Confl. Peds. (#/hr)			9	9								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		2
Actuated Green, G (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	47.2
Effective Green, g (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	47.2
Actuated g/C Ratio	0.09	0.09			0.14	0.14	0.55	0.47		0.55	0.47	0.47
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	164	156			252	221	372	1645		572	887	754
v/s Ratio Prot	0.04	c0.04			0.07		0.01	0.12		c0.01	c0.31	
v/s Ratio Perm						c0.08	0.04			0.04		0.06
v/c Ratio	0.46	0.47			0.50	0.61	0.08	0.26		0.09	0.66	0.13
Uniform Delay, d1	43.1	43.2			40.0	40.6	12.2	16.0		10.3	20.2	14.8
Progression Factor	1.08	1.08			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.9	2.1			1.5	4.9	0.1	0.4		0.1	3.8	0.3
Delay (s)	48.6	48.8			41.5	45.6	12.3	16.4		10.4	24.0	15.2
Level of Service	D	D			D	D	B	B		B	C	B
Approach Delay (s)		48.7			43.6			16.1			21.8	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			26.2									
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			100.0									
Intersection Capacity Utilization			62.4%									
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	57	44	621	833	25
Future Vol, veh/h	13	57	44	621	833	25
Conflicting Peds, #/hr	3	0	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	90	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	74	74	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	19	81	59	839	877	26
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1432	453	904	0	-	0
Stage 1	891	-	-	-	-	-
Stage 2	541	-	-	-	-	-
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	127	559	754	-	-	-
Stage 1	366	-	-	-	-	-
Stage 2	553	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	117	559	753	-	-	-
Mov Cap-2 Maneuver	240	-	-	-	-	-
Stage 1	337	-	-	-	-	-
Stage 2	552	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	14.1	0.7		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	753	-	240	559	-	-
HCM Lane V/C Ratio	0.079	-	0.077	0.146	-	-
HCM Control Delay (s)	10.2	-	21.3	12.5	-	-
HCM Lane LOS	B	-	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.2	0.5	-	-

Intersection						
Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	47	428	22	77	801
Future Vol, veh/h	9	47	428	22	77	801
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	90	90	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	13	67	476	24	81	843
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1072	250	0	0	500	0
Stage 1	488	-	-	-	-	-
Stage 2	584	-	-	-	-	-
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	219	756	-	-	1067	-
Stage 1	588	-	-	-	-	-
Stage 2	526	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	188	756	-	-	1067	-
Mov Cap-2 Maneuver	188	-	-	-	-	-
Stage 1	588	-	-	-	-	-
Stage 2	451	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	12.7	0	1.2			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 188 756 1067			-	
HCM Lane V/C Ratio	-	- 0.068 0.089 0.076			-	
HCM Control Delay (s)	-	- 25.6 10.2 8.7			0.5	
HCM Lane LOS	-	- D B A A				
HCM 95th %tile Q(veh)	-	- 0.2 0.3 0.2			-	

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	57	160	124	443	495	99
Future Vol, veh/h	57	160	124	443	495	99
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	90	0	250	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	94	94	82	82
Heavy Vehicles, %	0	0	2	2	1	1
Mvmt Flow	65	182	132	471	604	121
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1339	604	725	0	-	0
Stage 1	604	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.218	-	-	-
Pot Cap-1 Maneuver	170	502	878	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	145	502	878	-	-	-
Mov Cap-2 Maneuver	282	-	-	-	-	-
Stage 1	468	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	17.6	2.1		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	878	-	282	502	-	-
HCM Lane V/C Ratio	0.15	-	0.23	0.362	-	-
HCM Control Delay (s)	9.8	-	21.5	16.2	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.5	-	0.9	1.6	-	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	8	2	658	797	31
Future Vol, veh/h	8	8	2	658	797	31
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	81	81	95	95
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	13	13	2	812	839	33
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1266	436	872	0	-	0
Stage 1	856	-	-	-	-	-
Stage 2	410	-	-	-	-	-
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	164	574	775	-	-	-
Stage 1	382	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	163	574	775	-	-	-
Mov Cap-2 Maneuver	285	-	-	-	-	-
Stage 1	380	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	15.2	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	775	-	381	-	-	
HCM Lane V/C Ratio	0.003	-	0.07	-	-	
HCM Control Delay (s)	9.7	0	15.2	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Center Ave

Portage Road Corridor Study

Scenario 1 AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Future Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3436		1787	3555		1787	1828		1735	1827	1553
Flt Permitted	0.25	1.00		0.30	1.00		0.53	1.00		0.21	1.00	1.00
Satd. Flow (perm)	471	3436		570	3555		991	1828		375	1827	1553
Peak-hour factor, PHF	0.81	0.81	0.81	0.87	0.87	0.87	0.91	0.91	0.91	0.84	0.84	0.84
Adj. Flow (vph)	179	396	115	66	440	15	204	503	105	114	246	69
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	179	511	0	66	455	0	204	608	0	114	246	69
Confl. Peds. (#/hr)	1		1	1		1			1	1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		6
Actuated Green, G (s)	32.0	20.8		26.8	18.2		53.7	42.4		49.5	40.3	40.3
Effective Green, g (s)	32.0	20.8		26.8	18.2		53.7	42.4		49.5	40.3	40.3
Actuated g/C Ratio	0.32	0.21		0.27	0.18		0.54	0.42		0.50	0.40	0.40
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	298	714		257	647		622	775		310	736	625
v/s Ratio Prot	c0.07	c0.15		0.02	0.13		c0.04	c0.33		0.03	0.13	
v/s Ratio Perm	0.12			0.05			0.14			0.15		0.04
v/c Ratio	0.60	0.72		0.26	0.70		0.33	0.78		0.37	0.33	0.11
Uniform Delay, d1	26.3	36.8		28.0	38.4		12.3	24.9		16.3	20.6	18.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.4	3.4		0.5	3.5		0.3	7.8		0.7	1.2	0.4
Delay (s)	29.7	40.3		28.6	41.8		12.6	32.7		17.0	21.8	19.0
Level of Service	C	D		C	D		B	C		B	C	B
Approach Delay (s)		37.5			40.2			27.6			20.1	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			31.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			71.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 1 AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	69	66	722	109	50	309
Future Volume (vph)	69	66	722	109	50	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1599	1848		1770	1863
Flt Permitted	0.95	1.00	1.00		0.16	1.00
Satd. Flow (perm)	1787	1599	1848		306	1863
Peak-hour factor, PHF	0.86	0.86	0.88	0.88	0.89	0.89
Adj. Flow (vph)	80	77	820	124	56	347
RTOR Reduction (vph)	0	69	3	0	0	0
Lane Group Flow (vph)	80	8	941	0	56	347
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	7.4	7.4	47.6		55.1	55.1
Effective Green, g (s)	7.4	7.4	47.6		55.1	55.1
Actuated g/C Ratio	0.10	0.10	0.66		0.76	0.76
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	182	163	1213		323	1415
v/s Ratio Prot			c0.51		0.01	c0.19
v/s Ratio Perm	c0.04	0.00			0.12	
v/c Ratio	0.44	0.05	0.78		0.17	0.25
Uniform Delay, d1	30.6	29.4	8.7		6.7	2.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	0.1	4.9		0.3	0.4
Delay (s)	32.3	29.5	13.6		7.0	3.0
Level of Service	C	C	B		A	A
Approach Delay (s)	30.9		13.6			3.5
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			12.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.70			
Actuated Cycle Length (s)			72.5		Sum of lost time (s)	13.0
Intersection Capacity Utilization			59.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 1 AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Future Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1817			1855	1615	1787	1849		1787	1855	
Flt Permitted	0.95	1.00			0.98	1.00	0.54	1.00		0.26	1.00	
Satd. Flow (perm)	1805	1817			1855	1615	1024	1849		480	1855	
Peak-hour factor, PHF	0.85	0.85	0.85	0.60	0.60	0.60	0.94	0.94	0.94	0.85	0.85	0.85
Adj. Flow (vph)	94	67	22	30	32	118	17	532	59	93	259	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	94	89	0	0	62	118	17	591	0	93	285	0
Confl. Peds. (#/hr)			4	4					1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Effective Green, g (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Actuated g/C Ratio	0.09	0.09			0.13	0.13	0.55	0.47		0.56	0.48	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	169	170			235	205	628	876		381	888	
v/s Ratio Prot	c0.05	0.05			0.03		0.00	c0.32		c0.02	0.15	
v/s Ratio Perm						c0.07	0.01			0.12		
v/c Ratio	0.56	0.52			0.26	0.58	0.03	0.67		0.24	0.32	
Uniform Delay, d1	43.3	43.2			39.4	41.1	10.1	20.3		12.3	16.0	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	2.9			0.6	3.9	0.0	4.1		0.3	1.0	
Delay (s)	47.2	46.1			40.0	45.0	10.1	24.5		12.7	17.0	
Level of Service	D	D			D	D	B	C		B	B	
Approach Delay (s)		46.7			43.3			24.1			15.9	
Approach LOS		D			D			C			B	
Intersection Summary												
HCM 2000 Control Delay			27.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			62.2%				ICU Level of Service			B		
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	6	24	24	811	332	7
Future Vol, veh/h	6	24	24	811	332	7
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	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	68	68	90	90	89	89
Heavy Vehicles, %	0	0	1	1	5	5
Mvmt Flow	9	35	27	901	373	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1332	377	381	0	-	0
Stage 1	377	-	-	-	-	-
Stage 2	955	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	172	674	1183	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	168	674	1183	-	-	-
Mov Cap-2 Maneuver	289	-	-	-	-	-
Stage 1	682	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	12	0.2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1183	-	289	674	-	-
HCM Lane V/C Ratio	0.023	-	0.031	0.052	-	-
HCM Control Delay (s)	8.1	-	17.8	10.6	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.2	-	-

Intersection						
Int Delay, s/veh	2.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	78	667	5	13	301
Future Vol, veh/h	13	78	667	5	13	301
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	89	89	81	81
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	22	130	749	6	16	372
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1158	754	0	0	757	0
Stage 1	754	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.12	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.218	-
Pot Cap-1 Maneuver	219	412	-	-	854	-
Stage 1	468	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	213	411	-	-	853	-
Mov Cap-2 Maneuver	343	-	-	-	-	-
Stage 1	467	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	17.6	0	0.4			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 343 411	853	-		
HCM Lane V/C Ratio	-	- 0.063 0.316	0.019	-		
HCM Control Delay (s)	-	- 16.2 17.8	9.3	0		
HCM Lane LOS	-	- C C	A	A		
HCM 95th %tile Q(veh)	-	- 0.2 1.3	0.1	-		

Intersection							
Int Delay, s/veh	4.2						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	102	78	107	436	204	59	
Future Vol, veh/h	102	78	107	436	204	59	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	110	0	250	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	76	76	89	89	89	89	
Heavy Vehicles, %	1	1	1	1	3	3	
Mvmt Flow	134	103	120	490	229	66	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	992	262	295	0	-	0	
Stage 1	262	-	-	-	-	-	
Stage 2	730	-	-	-	-	-	
Critical Hdwy	6.41	6.21	4.11	-	-	-	
Critical Hdwy Stg 1	5.41	-	-	-	-	-	
Critical Hdwy Stg 2	5.41	-	-	-	-	-	
Follow-up Hdwy	3.509	3.309	2.209	-	-	-	
Pot Cap-1 Maneuver	274	779	1272	-	-	-	
Stage 1	784	-	-	-	-	-	
Stage 2	479	-	-	-	-	-	
Platoon blocked, %				-	-	-	
Mov Cap-1 Maneuver	248	779	1272	-	-	-	
Mov Cap-2 Maneuver	367	-	-	-	-	-	
Stage 1	710	-	-	-	-	-	
Stage 2	479	-	-	-	-	-	
Approach	EB		NB		SB		
HCM Control Delay, s	16		1.6		0		
HCM LOS	C						
Minor Lane/Major Mvmt	NBL		NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1272		-	367	779	-	-
HCM Lane V/C Ratio	0.095		-	0.366	0.132	-	-
HCM Control Delay (s)	8.1		-	20.4	10.3	-	-
HCM Lane LOS	A		-	C	B	-	-
HCM 95th %tile Q(veh)	0.3		-	1.6	0.5	-	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	2	1	789	319	12
Future Vol, veh/h	22	2	1	789	319	12
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	-	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	90	90	82	82
Heavy Vehicles, %	0	0	1	1	3	3
Mvmt Flow	29	3	1	877	389	15

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1276	397	404	0	-	0
Stage 1	397	-	-	-	-	-
Stage 2	879	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	186	657	1160	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	409	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	186	657	1160	-	-	-
Mov Cap-2 Maneuver	310	-	-	-	-	-
Stage 1	682	-	-	-	-	-
Stage 2	409	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1160	-	324	-	-
HCM Lane V/C Ratio	0.001	-	0.099	-	-
HCM Control Delay (s)	8.1	-	17.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Center Ave

Portage Road Corridor Study

Scenario 1 PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Future Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.98		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3332		1787	3491		1787	1822		1787	1881	1576
Flt Permitted	0.24	1.00		0.16	1.00		0.10	1.00		0.37	1.00	1.00
Satd. Flow (perm)	451	3332		305	3491		194	1822		688	1881	1576
Peak-hour factor, PHF	0.95	0.95	0.95	0.88	0.88	0.88	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	84	424	280	135	517	86	236	354	85	93	624	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	84	704	0	135	603	0	236	439	0	93	624	144
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		6
Actuated Green, G (s)	32.8	24.0		34.2	24.7		51.5	38.8		43.5	34.8	34.8
Effective Green, g (s)	32.8	24.0		34.2	24.7		51.5	38.8		43.5	34.8	34.8
Actuated g/C Ratio	0.33	0.24		0.34	0.25		0.52	0.39		0.44	0.35	0.35
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	265	799		245	862		302	706		394	654	548
v/s Ratio Prot	0.03	c0.21		c0.05	0.17		c0.10	0.24		0.02	c0.33	
v/s Ratio Perm	0.08			0.14			0.30			0.08		0.09
v/c Ratio	0.32	0.88		0.55	0.70		0.78	0.62		0.24	0.95	0.26
Uniform Delay, d1	24.3	36.6		24.8	34.3		24.0	24.7		17.4	31.8	23.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	11.2		2.7	2.5		12.3	4.1		0.3	25.6	1.2
Delay (s)	25.0	47.8		27.5	36.8		36.3	28.8		17.7	57.4	24.6
Level of Service	C	D		C	D		D	C		B	E	C
Approach Delay (s)		45.4			35.1			31.4			47.6	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			40.4			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			84.5%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 1 PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	85	486	102	111	823
Future Volume (vph)	155	85	486	102	111	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	1837		1787	1881
Flt Permitted	0.95	1.00	1.00		0.29	1.00
Satd. Flow (perm)	1805	1615	1837		554	1881
Peak-hour factor, PHF	0.87	0.87	0.95	0.95	0.94	0.94
Adj. Flow (vph)	178	98	512	107	118	876
RTOR Reduction (vph)	0	82	5	0	0	0
Lane Group Flow (vph)	178	16	614	0	118	876
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	12.9	12.9	44.1		55.3	55.3
Effective Green, g (s)	12.9	12.9	44.1		55.3	55.3
Actuated g/C Ratio	0.16	0.16	0.56		0.71	0.71
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	297	266	1035		521	1330
v/s Ratio Prot			0.33		0.02	c0.47
v/s Ratio Perm	c0.10	0.01			0.14	
v/c Ratio	0.60	0.06	0.59		0.23	0.66
Uniform Delay, d1	30.3	27.5	11.2		5.2	6.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.1	2.5		0.2	2.6
Delay (s)	33.5	27.6	13.7		5.5	8.8
Level of Service	C	C	B		A	A
Approach Delay (s)	31.4		13.7			8.4
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			13.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.68			
Actuated Cycle Length (s)			78.2		Sum of lost time (s)	13.0
Intersection Capacity Utilization			60.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 1 PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Future Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.92			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1719			1841	1615	1770	1839		1787	1870	
Flt Permitted	0.95	1.00			0.97	1.00	0.24	1.00		0.39	1.00	
Satd. Flow (perm)	1805	1719			1841	1615	455	1839		742	1870	
Peak-hour factor, PHF	0.80	0.80	0.80	0.60	0.60	0.60	0.87	0.87	0.87	0.95	0.95	0.95
Adj. Flow (vph)	75	35	38	80	45	135	30	395	37	54	583	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	75	73	0	0	125	135	30	432	0	54	606	0
Confl. Peds. (#/hr)			9	9								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Effective Green, g (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Actuated g/C Ratio	0.09	0.09			0.14	0.14	0.55	0.47		0.55	0.47	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	156			252	221	355	866		494	882	
v/s Ratio Prot	0.04	c0.04			0.07		0.01	0.23		c0.01	c0.32	
v/s Ratio Perm						c0.08	0.04			0.05		
v/c Ratio	0.46	0.47			0.50	0.61	0.08	0.50		0.11	0.69	
Uniform Delay, d1	43.1	43.2			40.0	40.6	12.5	18.3		10.9	20.6	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	2.2			1.5	4.9	0.1	2.1		0.1	4.3	
Delay (s)	45.1	45.4			41.5	45.6	12.6	20.3		11.0	25.0	
Level of Service	D	D			D	D	B	C		B	C	
Approach Delay (s)		45.2			43.6			19.8			23.8	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			28.1									
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			100.0									
Intersection Capacity Utilization			63.7%									
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	57	44	621	833	25
Future Vol, veh/h	13	57	44	621	833	25
Conflicting Peds, #/hr	3	0	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	74	74	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	19	81	59	839	886	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1861	901	914	0	-	0
Stage 1	901	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	81	340	750	-	-	-
Stage 1	400	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	74	340	749	-	-	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	368	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	19.9	0.7		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	749	-	203	340	-	-
HCM Lane V/C Ratio	0.079	-	0.091	0.239	-	-
HCM Control Delay (s)	10.2	-	24.5	18.9	-	-
HCM Lane LOS	B	-	C	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.3	0.9	-	-

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	47	428	22	77	801
Future Vol, veh/h	9	47	428	22	77	801
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	90	90	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	13	67	476	24	81	843
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1495	490	0	0	502	0
Stage 1	490	-	-	-	-	-
Stage 2	1005	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.209	-
Pot Cap-1 Maneuver	137	582	-	-	1068	-
Stage 1	620	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	117	581	-	-	1066	-
Mov Cap-2 Maneuver	232	-	-	-	-	-
Stage 1	619	-	-	-	-	-
Stage 2	306	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	13.5	0		0.8		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT	
Capacity (veh/h)	-	-	232	581	1066	-
HCM Lane V/C Ratio	-	-	0.055	0.116	0.076	-
HCM Control Delay (s)	-	-	21.4	12	8.7	0
HCM Lane LOS	-	-	C	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.4	0.2	-

Intersection							
Int Delay, s/veh	3.8						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	57	160	124	443	495	99	
Future Vol, veh/h	57	160	124	443	495	99	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	110	0	250	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	88	88	94	94	82	82	
Heavy Vehicles, %	0	0	2	2	1	1	
Mvmt Flow	65	182	132	471	604	121	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	1400	665	725	0	-	0	
Stage 1	665	-	-	-	-	-	
Stage 2	735	-	-	-	-	-	
Critical Hdwy	6.4	6.2	4.12	-	-	-	
Critical Hdwy Stg 1	5.4	-	-	-	-	-	
Critical Hdwy Stg 2	5.4	-	-	-	-	-	
Follow-up Hdwy	3.5	3.3	2.218	-	-	-	
Pot Cap-1 Maneuver	156	464	878	-	-	-	
Stage 1	515	-	-	-	-	-	
Stage 2	478	-	-	-	-	-	
Platoon blocked, %				-	-	-	
Mov Cap-1 Maneuver	133	464	878	-	-	-	
Mov Cap-2 Maneuver	269	-	-	-	-	-	
Stage 1	438	-	-	-	-	-	
Stage 2	478	-	-	-	-	-	
Approach	EB		NB		SB		
HCM Control Delay, s	19		2.1		0		
HCM LOS	C						
Minor Lane/Major Mvmt	NBL		NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	878		-	269	464	-	-
HCM Lane V/C Ratio	0.15		-	0.241	0.392	-	-
HCM Control Delay (s)	9.8		-	22.6	17.7	-	-
HCM Lane LOS	A		-	C	C	-	-
HCM 95th %tile Q(veh)	0.5		-	0.9	1.8	-	-

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	8	2	658	797	31
Future Vol, veh/h	8	8	2	658	797	31
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	-	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	81	81	95	95
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	13	13	2	812	839	33
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1672	856	872	0	-	0
Stage 1	856	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	107	360	778	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	107	360	778	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	18.6	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	778	-	291	-	-	
HCM Lane V/C Ratio	0.003	-	0.092	-	-	
HCM Control Delay (s)	9.6	-	18.6	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Center Ave

Portage Road Corridor Study

Scenario 2 AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Future Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3443		1787	3555		1787	3474		1735	3357	
Flt Permitted	0.25	1.00		0.30	1.00		0.53	1.00		0.38	1.00	
Satd. Flow (perm)	474	3443		564	3555		999	3474		690	3357	
Peak-hour factor, PHF	0.81	0.81	0.81	0.87	0.87	0.87	0.91	0.91	0.91	0.84	0.84	0.84
Adj. Flow (vph)	179	396	115	66	440	15	204	503	105	114	246	69
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	179	511	0	66	455	0	204	608	0	114	315	0
Confl. Peds. (#/hr)	1		1	1		1			1	1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	
Effective Green, g (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	
Actuated g/C Ratio	0.32	0.21		0.27	0.18		0.54	0.43		0.50	0.40	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	296	712		256	647		627	1479		436	1356	
v/s Ratio Prot	c0.07	c0.15		0.02	0.13		c0.04	c0.18		0.02	0.09	
v/s Ratio Perm	0.13			0.05			0.14			0.11		
v/c Ratio	0.60	0.72		0.26	0.70		0.33	0.41		0.26	0.23	
Uniform Delay, d1	26.5	36.9		28.0	38.4		12.0	20.0		13.8	19.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	3.5		0.5	3.5		0.3	0.8		0.3	0.4	
Delay (s)	29.9	40.4		28.6	41.8		12.3	20.8		14.1	20.0	
Level of Service	C	D		C	D		B	C		B	C	
Approach Delay (s)		37.7			40.2			18.7			18.4	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay	28.5			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)			19.0					
Intersection Capacity Utilization	61.8%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 2 AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	69	66	722	109	50	309
Future Volume (vph)	69	66	722	109	50	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	0.95
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1599	1848		1770	3539
Flt Permitted	0.95	1.00	1.00		0.16	1.00
Satd. Flow (perm)	1787	1599	1848		306	3539
Peak-hour factor, PHF	0.86	0.86	0.88	0.88	0.89	0.89
Adj. Flow (vph)	80	77	820	124	56	347
RTOR Reduction (vph)	0	69	3	0	0	0
Lane Group Flow (vph)	80	8	941	0	56	347
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	7.4	7.4	47.6		55.1	55.1
Effective Green, g (s)	7.4	7.4	47.6		55.1	55.1
Actuated g/C Ratio	0.10	0.10	0.66		0.76	0.76
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	182	163	1213		323	2689
v/s Ratio Prot			c0.51		c0.01	0.10
v/s Ratio Perm	c0.04	0.00			0.12	
v/c Ratio	0.44	0.05	0.78		0.17	0.13
Uniform Delay, d1	30.6	29.4	8.7		6.7	2.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	0.1	4.9		0.3	0.1
Delay (s)	32.3	29.5	13.6		7.0	2.4
Level of Service	C	C	B		A	A
Approach Delay (s)	30.9		13.6			3.0
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			12.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.69			
Actuated Cycle Length (s)			72.5		Sum of lost time (s)	13.0
Intersection Capacity Utilization			59.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 2 AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Future Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1817			1855	1615	1787	1849		1787	1855	
Flt Permitted	0.95	1.00			0.98	1.00	0.54	1.00		0.26	1.00	
Satd. Flow (perm)	1805	1817			1855	1615	1024	1849		480	1855	
Peak-hour factor, PHF	0.85	0.85	0.85	0.60	0.60	0.60	0.94	0.94	0.94	0.85	0.85	0.85
Adj. Flow (vph)	94	67	22	30	32	118	17	532	59	93	259	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	94	89	0	0	62	118	17	591	0	93	285	0
Confl. Peds. (#/hr)			4	4					1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Effective Green, g (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Actuated g/C Ratio	0.09	0.09			0.13	0.13	0.55	0.47		0.56	0.48	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	169	170			235	205	628	876		381	888	
v/s Ratio Prot	c0.05	0.05			0.03		0.00	c0.32		c0.02	0.15	
v/s Ratio Perm						c0.07	0.01			0.12		
v/c Ratio	0.56	0.52			0.26	0.58	0.03	0.67		0.24	0.32	
Uniform Delay, d1	43.3	43.2			39.4	41.1	10.1	20.3		12.3	16.0	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	2.9			0.6	3.9	0.0	4.1		0.3	1.0	
Delay (s)	47.2	46.1			40.0	45.0	10.1	24.5		12.7	17.0	
Level of Service	D	D			D	D	B	C		B	B	
Approach Delay (s)		46.7			43.3			24.1			15.9	
Approach LOS		D			D			C			B	
Intersection Summary												
HCM 2000 Control Delay	27.4			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.60											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)			22.0					
Intersection Capacity Utilization	62.2%			ICU Level of Service			B					
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	6	24	24	811	332	7
Future Vol, veh/h	6	24	24	811	332	7
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	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	68	68	90	90	89	89
Heavy Vehicles, %	0	0	1	1	5	5
Mvmt Flow	9	35	27	901	373	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1332	377	381	0	-	0
Stage 1	377	-	-	-	-	-
Stage 2	955	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	172	674	1183	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	168	674	1183	-	-	-
Mov Cap-2 Maneuver	289	-	-	-	-	-
Stage 1	682	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	12	0.2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1183	-	289	674	-	-
HCM Lane V/C Ratio	0.023	-	0.031	0.052	-	-
HCM Control Delay (s)	8.1	-	17.8	10.6	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.2	-	-

Intersection						
Int Delay, s/veh	2.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	78	667	5	13	301
Future Vol, veh/h	13	78	667	5	13	301
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	89	89	81	81
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	22	130	749	6	16	372
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1158	754	0	0	757	0
Stage 1	754	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.12	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.218	-
Pot Cap-1 Maneuver	219	412	-	-	854	-
Stage 1	468	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	213	411	-	-	853	-
Mov Cap-2 Maneuver	343	-	-	-	-	-
Stage 1	467	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	17.6	0	0.4			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 343 411	853	-		
HCM Lane V/C Ratio	-	- 0.063 0.316	0.019	-		
HCM Control Delay (s)	-	- 16.2 17.8	9.3	0		
HCM Lane LOS	-	- C C	A	A		
HCM 95th %tile Q(veh)	-	- 0.2 1.3	0.1	-		

Intersection							
Int Delay, s/veh	4.2						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	102	78	107	436	204	59	
Future Vol, veh/h	102	78	107	436	204	59	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	110	0	250	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	76	76	89	89	89	89	
Heavy Vehicles, %	1	1	1	1	3	3	
Mvmt Flow	134	103	120	490	229	66	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	992	262	295	0	-	0	
Stage 1	262	-	-	-	-	-	
Stage 2	730	-	-	-	-	-	
Critical Hdwy	6.41	6.21	4.11	-	-	-	
Critical Hdwy Stg 1	5.41	-	-	-	-	-	
Critical Hdwy Stg 2	5.41	-	-	-	-	-	
Follow-up Hdwy	3.509	3.309	2.209	-	-	-	
Pot Cap-1 Maneuver	274	779	1272	-	-	-	
Stage 1	784	-	-	-	-	-	
Stage 2	479	-	-	-	-	-	
Platoon blocked, %				-	-	-	
Mov Cap-1 Maneuver	248	779	1272	-	-	-	
Mov Cap-2 Maneuver	367	-	-	-	-	-	
Stage 1	710	-	-	-	-	-	
Stage 2	479	-	-	-	-	-	
Approach	EB		NB		SB		
HCM Control Delay, s	16		1.6		0		
HCM LOS	C						
Minor Lane/Major Mvmt	NBL		NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1272		-	367	779	-	-
HCM Lane V/C Ratio	0.095		-	0.366	0.132	-	-
HCM Control Delay (s)	8.1		-	20.4	10.3	-	-
HCM Lane LOS	A		-	C	B	-	-
HCM 95th %tile Q(veh)	0.3		-	1.6	0.5	-	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	2	1	789	319	12
Future Vol, veh/h	22	2	1	789	319	12
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	-	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	90	90	82	82
Heavy Vehicles, %	0	0	1	1	3	3
Mvmt Flow	29	3	1	877	389	15
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1276	397	404	0	-	0
Stage 1	397	-	-	-	-	-
Stage 2	879	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	186	657	1160	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	409	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	186	657	1160	-	-	-
Mov Cap-2 Maneuver	310	-	-	-	-	-
Stage 1	682	-	-	-	-	-
Stage 2	409	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	17.3	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1160	-	324	-	-	
HCM Lane V/C Ratio	0.001	-	0.099	-	-	
HCM Control Delay (s)	8.1	-	17.3	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Center Ave

Portage Road Corridor Study

Scenario 2 PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Future Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343		1787	3491		1787	3462		1787	3464	
Flt Permitted	0.24	1.00		0.16	1.00		0.21	1.00		0.50	1.00	
Satd. Flow (perm)	449	3343		306	3491		389	3462		935	3464	
Peak-hour factor, PHF	0.95	0.95	0.95	0.88	0.88	0.88	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	84	424	280	135	517	86	236	354	85	93	624	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	84	704	0	135	603	0	236	439	0	93	768	0
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	32.7	23.9		34.1	24.6		51.4	38.9		43.8	35.1	
Effective Green, g (s)	32.7	23.9		34.1	24.6		51.4	38.9		43.8	35.1	
Actuated g/C Ratio	0.33	0.24		0.34	0.25		0.51	0.39		0.44	0.35	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	264	798		245	858		374	1346		483	1215	
v/s Ratio Prot	0.03	c0.21		c0.05	0.17		c0.08	0.13		0.02	0.22	
v/s Ratio Perm	0.08			0.14			c0.25			0.07		
v/c Ratio	0.32	0.88		0.55	0.70		0.63	0.33		0.19	0.63	
Uniform Delay, d1	24.4	36.7		24.9	34.4		15.7	21.4		16.7	27.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	11.3		2.7	2.6		3.5	0.6		0.2	2.5	
Delay (s)	25.1	48.0		27.6	37.0		19.2	22.0		16.9	29.6	
Level of Service	C	D		C	D		B	C		B	C	
Approach Delay (s)		45.5			35.3			21.0			28.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			74.6%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 2 PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	85	486	102	111	823
Future Volume (vph)	155	85	486	102	111	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	0.95
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	1837		1787	3574
Flt Permitted	0.95	1.00	1.00		0.29	1.00
Satd. Flow (perm)	1805	1615	1837		554	3574
Peak-hour factor, PHF	0.87	0.87	0.95	0.95	0.94	0.94
Adj. Flow (vph)	178	98	512	107	118	876
RTOR Reduction (vph)	0	82	5	0	0	0
Lane Group Flow (vph)	178	16	614	0	118	876
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	12.9	12.9	44.1		55.3	55.3
Effective Green, g (s)	12.9	12.9	44.1		55.3	55.3
Actuated g/C Ratio	0.16	0.16	0.56		0.71	0.71
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	297	266	1035		521	2527
v/s Ratio Prot			c0.33		0.02	c0.25
v/s Ratio Perm	c0.10	0.01			0.14	
v/c Ratio	0.60	0.06	0.59		0.23	0.35
Uniform Delay, d1	30.3	27.5	11.2		5.2	4.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.1	2.5		0.2	0.4
Delay (s)	33.5	27.6	13.7		5.5	4.8
Level of Service	C	C	B		A	A
Approach Delay (s)	31.4		13.7			4.9
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			11.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			78.2		Sum of lost time (s)	13.0
Intersection Capacity Utilization			58.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 2 PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Future Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.92			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1719			1841	1615	1770	1839		1787	1870	
Flt Permitted	0.95	1.00			0.97	1.00	0.24	1.00		0.39	1.00	
Satd. Flow (perm)	1805	1719			1841	1615	455	1839		742	1870	
Peak-hour factor, PHF	0.80	0.80	0.80	0.60	0.60	0.60	0.87	0.87	0.87	0.95	0.95	0.95
Adj. Flow (vph)	75	35	38	80	45	135	30	395	37	54	583	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	75	73	0	0	125	135	30	432	0	54	606	0
Confl. Peds. (#/hr)			9	9								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Effective Green, g (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Actuated g/C Ratio	0.09	0.09			0.14	0.14	0.55	0.47		0.55	0.47	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	156			252	221	355	866		494	882	
v/s Ratio Prot	0.04	c0.04			0.07		0.01	0.23		c0.01	c0.32	
v/s Ratio Perm						c0.08	0.04			0.05		
v/c Ratio	0.46	0.47			0.50	0.61	0.08	0.50		0.11	0.69	
Uniform Delay, d1	43.1	43.2			40.0	40.6	12.5	18.3		10.9	20.6	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	2.2			1.5	4.9	0.1	2.1		0.1	4.3	
Delay (s)	45.1	45.4			41.5	45.6	12.6	20.3		11.0	25.0	
Level of Service	D	D			D	D	B	C		B	C	
Approach Delay (s)		45.2			43.6			19.8			23.8	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			28.1									
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			100.0									
Intersection Capacity Utilization			63.7%									
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	57	44	621	833	25
Future Vol, veh/h	13	57	44	621	833	25
Conflicting Peds, #/hr	3	0	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	74	74	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	19	81	59	839	886	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1861	901	914	0	-	0
Stage 1	901	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	81	340	750	-	-	-
Stage 1	400	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	74	340	749	-	-	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	368	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	19.9	0.7		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	749	-	203	340	-	-
HCM Lane V/C Ratio	0.079	-	0.091	0.239	-	-
HCM Control Delay (s)	10.2	-	24.5	18.9	-	-
HCM Lane LOS	B	-	C	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.3	0.9	-	-

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	47	428	22	77	801
Future Vol, veh/h	9	47	428	22	77	801
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	90	90	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	13	67	476	24	81	843
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1495	490	0	0	502	0
Stage 1	490	-	-	-	-	-
Stage 2	1005	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.209	-
Pot Cap-1 Maneuver	137	582	-	-	1068	-
Stage 1	620	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	117	581	-	-	1066	-
Mov Cap-2 Maneuver	232	-	-	-	-	-
Stage 1	619	-	-	-	-	-
Stage 2	306	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	13.5	0	0.8			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 232 581 1066		-		
HCM Lane V/C Ratio	-	- 0.055 0.116 0.076		-		
HCM Control Delay (s)	-	- 21.4 12 8.7		0		
HCM Lane LOS	-	- C B A		A		
HCM 95th %tile Q(veh)	-	- 0.2 0.4 0.2		-		

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	57	160	124	443	495	99
Future Vol, veh/h	57	160	124	443	495	99
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	94	94	82	82
Heavy Vehicles, %	0	0	2	2	1	1
Mvmt Flow	65	182	132	471	604	121
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1400	665	725	0	-	0
Stage 1	665	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.218	-	-	-
Pot Cap-1 Maneuver	156	464	878	-	-	-
Stage 1	515	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	464	878	-	-	-
Mov Cap-2 Maneuver	269	-	-	-	-	-
Stage 1	438	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	19	2.1		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	878	-	269	464	-	-
HCM Lane V/C Ratio	0.15	-	0.241	0.392	-	-
HCM Control Delay (s)	9.8	-	22.6	17.7	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.5	-	0.9	1.8	-	-

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	8	2	658	797	31
Future Vol, veh/h	8	8	2	658	797	31
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	-	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	81	81	95	95
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	13	13	2	812	839	33
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1672	856	872	0	-	0
Stage 1	856	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	107	360	778	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	107	360	778	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	18.6	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	778	-	291	-	-	
HCM Lane V/C Ratio	0.003	-	0.092	-	-	
HCM Control Delay (s)	9.6	-	18.6	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Center Ave

Portage Road Corridor Study

Scenario 3 AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Future Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3443		1787	3555		1787	3474		1735	3357	
Flt Permitted	0.25	1.00		0.30	1.00		0.53	1.00		0.38	1.00	
Satd. Flow (perm)	474	3443		564	3555		999	3474		690	3357	
Peak-hour factor, PHF	0.81	0.81	0.81	0.87	0.87	0.87	0.91	0.91	0.91	0.84	0.84	0.84
Adj. Flow (vph)	179	396	115	66	440	15	204	503	105	114	246	69
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	179	511	0	66	455	0	204	608	0	114	315	0
Confl. Peds. (#/hr)	1		1	1		1			1	1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	
Effective Green, g (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	
Actuated g/C Ratio	0.32	0.21		0.27	0.18		0.54	0.43		0.50	0.40	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	296	712		256	647		627	1479		436	1356	
v/s Ratio Prot	c0.07	c0.15		0.02	0.13		c0.04	c0.18		0.02	0.09	
v/s Ratio Perm	0.13			0.05			0.14			0.11		
v/c Ratio	0.60	0.72		0.26	0.70		0.33	0.41		0.26	0.23	
Uniform Delay, d1	26.5	36.9		28.0	38.4		12.0	20.0		13.8	19.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	3.5		0.5	3.5		0.3	0.8		0.3	0.4	
Delay (s)	29.9	40.4		28.6	41.8		12.3	20.8		14.1	20.0	
Level of Service	C	D		C	D		B	C		B	C	
Approach Delay (s)		37.7			40.2			18.7			18.4	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay	28.5			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)			19.0					
Intersection Capacity Utilization	61.8%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 3 AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	69	66	722	109	50	309
Future Volume (vph)	69	66	722	109	50	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1599	3504		1770	3539
Flt Permitted	0.95	1.00	1.00		0.26	1.00
Satd. Flow (perm)	1787	1599	3504		492	3539
Peak-hour factor, PHF	0.86	0.86	0.88	0.88	0.89	0.89
Adj. Flow (vph)	80	77	820	124	56	347
RTOR Reduction (vph)	0	69	6	0	0	0
Lane Group Flow (vph)	80	8	938	0	56	347
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	7.4	7.4	47.6		55.1	55.1
Effective Green, g (s)	7.4	7.4	47.6		55.1	55.1
Actuated g/C Ratio	0.10	0.10	0.66		0.76	0.76
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	182	163	2300		453	2689
v/s Ratio Prot			c0.27		0.01	c0.10
v/s Ratio Perm	c0.04	0.00			0.09	
v/c Ratio	0.44	0.05	0.41		0.12	0.13
Uniform Delay, d1	30.6	29.4	5.8		2.5	2.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	0.1	0.5		0.1	0.1
Delay (s)	32.3	29.5	6.4		2.6	2.4
Level of Service	C	C	A		A	A
Approach Delay (s)	30.9		6.4			2.4
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			7.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			72.5		Sum of lost time (s)	13.0
Intersection Capacity Utilization			48.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 3 AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Future Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1817			1855	1615	1787	1849		1787	1855	
Flt Permitted	0.95	1.00			0.98	1.00	0.54	1.00		0.26	1.00	
Satd. Flow (perm)	1805	1817			1855	1615	1024	1849		480	1855	
Peak-hour factor, PHF	0.85	0.85	0.85	0.60	0.60	0.60	0.94	0.94	0.94	0.85	0.85	0.85
Adj. Flow (vph)	94	67	22	30	32	118	17	532	59	93	259	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	94	89	0	0	62	118	17	591	0	93	285	0
Confl. Peds. (#/hr)			4	4					1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Effective Green, g (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Actuated g/C Ratio	0.09	0.09			0.13	0.13	0.55	0.47		0.56	0.48	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	169	170			235	205	628	876		381	888	
v/s Ratio Prot	c0.05	0.05			0.03		0.00	c0.32		c0.02	0.15	
v/s Ratio Perm						c0.07	0.01			0.12		
v/c Ratio	0.56	0.52			0.26	0.58	0.03	0.67		0.24	0.32	
Uniform Delay, d1	43.3	43.2			39.4	41.1	10.1	20.3		12.3	16.0	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	2.9			0.6	3.9	0.0	4.1		0.3	1.0	
Delay (s)	47.2	46.1			40.0	45.0	10.1	24.5		12.7	17.0	
Level of Service	D	D			D	D	B	C		B	B	
Approach Delay (s)		46.7			43.3			24.1			15.9	
Approach LOS		D			D			C			B	
Intersection Summary												
HCM 2000 Control Delay			27.4									
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			100.0									
Intersection Capacity Utilization			62.2%									
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	6	24	24	811	332	7
Future Vol, veh/h	6	24	24	811	332	7
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	68	68	90	90	89	89
Heavy Vehicles, %	0	0	1	1	5	5
Mvmt Flow	9	35	27	901	373	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1332	191	381	0	-	0
Stage 1	377	-	-	-	-	-
Stage 2	955	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.115	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2095	-	-	-
Pot Cap-1 Maneuver	160	825	1182	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	156	825	1182	-	-	-
Mov Cap-2 Maneuver	282	-	-	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11.3	0.2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1182	-	282	825	-	-
HCM Lane V/C Ratio	0.023	-	0.031	0.043	-	-
HCM Control Delay (s)	8.1	-	18.2	9.6	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-

Intersection						
Int Delay, s/veh	2.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	78	667	5	13	301
Future Vol, veh/h	13	78	667	5	13	301
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	89	89	81	81
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	22	130	749	6	16	372
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1158	754	0	0	757	0
Stage 1	754	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.12	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.218	-
Pot Cap-1 Maneuver	219	412	-	-	854	-
Stage 1	468	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	213	411	-	-	853	-
Mov Cap-2 Maneuver	343	-	-	-	-	-
Stage 1	467	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	17.6	0	0.4			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 343 411	853	-		
HCM Lane V/C Ratio	-	- 0.063 0.316	0.019	-		
HCM Control Delay (s)	-	- 16.2 17.8	9.3	0		
HCM Lane LOS	-	- C C	A	A		
HCM 95th %tile Q(veh)	-	- 0.2 1.3	0.1	-		

Intersection							
Int Delay, s/veh	4.2						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	102	78	107	436	204	59	
Future Vol, veh/h	102	78	107	436	204	59	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	110	0	250	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	76	76	89	89	89	89	
Heavy Vehicles, %	1	1	1	1	3	3	
Mvmt Flow	134	103	120	490	229	66	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	992	262	295	0	-	0	
Stage 1	262	-	-	-	-	-	
Stage 2	730	-	-	-	-	-	
Critical Hdwy	6.41	6.21	4.11	-	-	-	
Critical Hdwy Stg 1	5.41	-	-	-	-	-	
Critical Hdwy Stg 2	5.41	-	-	-	-	-	
Follow-up Hdwy	3.509	3.309	2.209	-	-	-	
Pot Cap-1 Maneuver	274	779	1272	-	-	-	
Stage 1	784	-	-	-	-	-	
Stage 2	479	-	-	-	-	-	
Platoon blocked, %				-	-	-	
Mov Cap-1 Maneuver	248	779	1272	-	-	-	
Mov Cap-2 Maneuver	367	-	-	-	-	-	
Stage 1	710	-	-	-	-	-	
Stage 2	479	-	-	-	-	-	
Approach	EB		NB		SB		
HCM Control Delay, s	16		1.6		0		
HCM LOS	C						
Minor Lane/Major Mvmt	NBL		NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1272		-	367	779	-	-
HCM Lane V/C Ratio	0.095		-	0.366	0.132	-	-
HCM Control Delay (s)	8.1		-	20.4	10.3	-	-
HCM Lane LOS	A		-	C	B	-	-
HCM 95th %tile Q(veh)	0.3		-	1.6	0.5	-	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	2	1	789	319	12
Future Vol, veh/h	22	2	1	789	319	12
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	75	75	90	90	82	82
Heavy Vehicles, %	0	0	1	1	3	3
Mvmt Flow	29	3	1	877	389	15

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1276	397	404
Stage 1	397	-	-
Stage 2	879	-	-
Critical Hdwy	6.4	6.2	4.11
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.209
Pot Cap-1 Maneuver	186	657	1160
Stage 1	683	-	-
Stage 2	409	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	186	657	1160
Mov Cap-2 Maneuver	310	-	-
Stage 1	682	-	-
Stage 2	409	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1160	-	324	-	-
HCM Lane V/C Ratio	0.001	-	0.099	-	-
HCM Control Delay (s)	8.1	-	17.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & Center Ave

Portage Road Corridor Study

Scenario 3 PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Future Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343		1787	3491		1787	3462		1787	3464	
Flt Permitted	0.24	1.00		0.16	1.00		0.21	1.00		0.50	1.00	
Satd. Flow (perm)	449	3343		306	3491		389	3462		935	3464	
Peak-hour factor, PHF	0.95	0.95	0.95	0.88	0.88	0.88	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	84	424	280	135	517	86	236	354	85	93	624	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	84	704	0	135	603	0	236	439	0	93	768	0
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	32.7	23.9		34.1	24.6		51.4	38.9		43.8	35.1	
Effective Green, g (s)	32.7	23.9		34.1	24.6		51.4	38.9		43.8	35.1	
Actuated g/C Ratio	0.33	0.24		0.34	0.25		0.51	0.39		0.44	0.35	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	264	798		245	858		374	1346		483	1215	
v/s Ratio Prot	0.03	c0.21		c0.05	0.17		c0.08	0.13		0.02	0.22	
v/s Ratio Perm	0.08			0.14			c0.25			0.07		
v/c Ratio	0.32	0.88		0.55	0.70		0.63	0.33		0.19	0.63	
Uniform Delay, d1	24.4	36.7		24.9	34.4		15.7	21.4		16.7	27.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	11.3		2.7	2.6		3.5	0.6		0.2	2.5	
Delay (s)	25.1	48.0		27.6	37.0		19.2	22.0		16.9	29.6	
Level of Service	C	D		C	D		B	C		B	C	
Approach Delay (s)		45.5			35.3			21.0			28.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			74.6%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 3 PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	85	486	102	111	823
Future Volume (vph)	155	85	486	102	111	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0		3.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	3482		1787	3574
Flt Permitted	0.95	1.00	1.00		0.38	1.00
Satd. Flow (perm)	1805	1615	3482		709	3574
Peak-hour factor, PHF	0.87	0.87	0.95	0.95	0.94	0.94
Adj. Flow (vph)	178	98	512	107	118	876
RTOR Reduction (vph)	0	82	12	0	0	0
Lane Group Flow (vph)	178	16	607	0	118	876
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3			6	
Actuated Green, G (s)	12.9	12.9	44.1		55.3	55.3
Effective Green, g (s)	12.9	12.9	44.1		55.3	55.3
Actuated g/C Ratio	0.16	0.16	0.56		0.71	0.71
Clearance Time (s)	4.0	4.0	6.0		3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	297	266	1963		614	2527
v/s Ratio Prot			0.17		0.02	c0.25
v/s Ratio Perm	c0.10	0.01			0.12	
v/c Ratio	0.60	0.06	0.31		0.19	0.35
Uniform Delay, d1	30.3	27.5	9.0		3.7	4.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.1	0.4		0.2	0.4
Delay (s)	33.5	27.6	9.4		3.9	4.8
Level of Service	C	C	A		A	A
Approach Delay (s)	31.4		9.4			4.7
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.41			
Actuated Cycle Length (s)			78.2		Sum of lost time (s)	13.0
Intersection Capacity Utilization			43.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 3 PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Future Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.92			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1719			1841	1615	1770	1839		1787	1870	
Flt Permitted	0.95	1.00			0.97	1.00	0.24	1.00		0.39	1.00	
Satd. Flow (perm)	1805	1719			1841	1615	455	1839		742	1870	
Peak-hour factor, PHF	0.80	0.80	0.80	0.60	0.60	0.60	0.87	0.87	0.87	0.95	0.95	0.95
Adj. Flow (vph)	75	35	38	80	45	135	30	395	37	54	583	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	75	73	0	0	125	135	30	432	0	54	606	0
Confl. Peds. (#/hr)			9	9								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Effective Green, g (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Actuated g/C Ratio	0.09	0.09			0.14	0.14	0.55	0.47		0.55	0.47	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	156			252	221	355	866		494	882	
v/s Ratio Prot	0.04	c0.04			0.07		0.01	0.23		c0.01	c0.32	
v/s Ratio Perm						c0.08	0.04			0.05		
v/c Ratio	0.46	0.47			0.50	0.61	0.08	0.50		0.11	0.69	
Uniform Delay, d1	43.1	43.2			40.0	40.6	12.5	18.3		10.9	20.6	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	2.2			1.5	4.9	0.1	2.1		0.1	4.3	
Delay (s)	45.1	45.4			41.5	45.6	12.6	20.3		11.0	25.0	
Level of Service	D	D			D	D	B	C		B	C	
Approach Delay (s)		45.2			43.6			19.8			23.8	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			28.1									
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			100.0									
Intersection Capacity Utilization			63.7%									
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations					 	
Traffic Vol, veh/h	13	57	44	621	833	25
Future Vol, veh/h	13	57	44	621	833	25
Conflicting Peds, #/hr	3	0	1	0	0	1
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	74	74	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	19	81	59	839	886	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1861	458	914	0	-	0
Stage 1	901	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.115	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2095	-	-	-
Pot Cap-1 Maneuver	73	555	749	-	-	-
Stage 1	362	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	67	555	748	-	-	-
Mov Cap-2 Maneuver	191	-	-	-	-	-
Stage 1	333	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	15.1	0.7		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	748	-	191	555	-	-
HCM Lane V/C Ratio	0.079	-	0.097	0.147	-	-
HCM Control Delay (s)	10.2	-	25.9	12.6	-	-
HCM Lane LOS	B	-	D	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.3	0.5	-	-

Intersection							
Int Delay, s/veh	1.2						
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Vol, veh/h	9	47	428	22	77	801	
Future Vol, veh/h	9	47	428	22	77	801	
Conflicting Peds, #/hr	0	0	0	2	2	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	110	0	-	-	-	-	
Veh in Median Storage, #	0	-	0	-	-	0	
Grade, %	0	-	0	-	-	0	
Peak Hour Factor	70	70	90	90	95	95	
Heavy Vehicles, %	0	0	1	1	1	1	
Mvmt Flow	13	67	476	24	81	843	
Major/Minor	Minor1	Major1		Major2			
Conflicting Flow All	1495	490	0	0	502	0	
Stage 1	490	-	-	-	-	-	
Stage 2	1005	-	-	-	-	-	
Critical Hdwy	6.4	6.2	-	-	4.11	-	
Critical Hdwy Stg 1	5.4	-	-	-	-	-	
Critical Hdwy Stg 2	5.4	-	-	-	-	-	
Follow-up Hdwy	3.5	3.3	-	-	2.209	-	
Pot Cap-1 Maneuver	137	582	-	-	1068	-	
Stage 1	620	-	-	-	-	-	
Stage 2	357	-	-	-	-	-	
Platoon blocked, %			-	-		-	
Mov Cap-1 Maneuver	117	581	-	-	1066	-	
Mov Cap-2 Maneuver	232	-	-	-	-	-	
Stage 1	619	-	-	-	-	-	
Stage 2	306	-	-	-	-	-	
Approach	WB	NB		SB			
HCM Control Delay, s	13.5	0		0.8			
HCM LOS	B						
Minor Lane/Major Mvmt		NBT	NBRWBLn1	WBLn2	SBL	SBT	
Capacity (veh/h)		-	-	232	581	1066	-
HCM Lane V/C Ratio		-	-	0.055	0.116	0.076	-
HCM Control Delay (s)		-	-	21.4	12	8.7	0
HCM Lane LOS		-	-	C	B	A	A
HCM 95th %tile Q(veh)		-	-	0.2	0.4	0.2	-

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	57	160	124	443	495	99
Future Vol, veh/h	57	160	124	443	495	99
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	94	94	82	82
Heavy Vehicles, %	0	0	2	2	1	1
Mvmt Flow	65	182	132	471	604	121
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1400	665	725	0	-	0
Stage 1	665	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.218	-	-	-
Pot Cap-1 Maneuver	156	464	878	-	-	-
Stage 1	515	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	464	878	-	-	-
Mov Cap-2 Maneuver	269	-	-	-	-	-
Stage 1	438	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	19	2.1		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	878	-	269	464	-	-
HCM Lane V/C Ratio	0.15	-	0.241	0.392	-	-
HCM Control Delay (s)	9.8	-	22.6	17.7	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.5	-	0.9	1.8	-	-

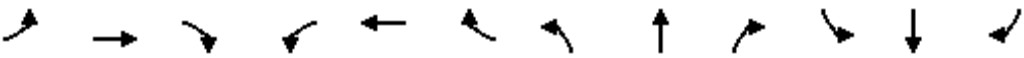
Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	8	2	658	797	31
Future Vol, veh/h	8	8	2	658	797	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	81	81	95	95
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	13	13	2	812	839	33
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1672	856	872	0	-	0
Stage 1	856	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	107	360	778	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	107	360	778	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	18.6	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	778	-	291	-	-	
HCM Lane V/C Ratio	0.003	-	0.092	-	-	
HCM Control Delay (s)	9.6	-	18.6	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & W Centre Ave

Portage Road Corridor Study

Scenario 1 w Turn Lanes AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Future Volume (vph)	145	321	93	57	383	13	186	458	96	96	207	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3436		1787	3555		1787	3474		1735	1827	1553
Flt Permitted	0.25	1.00		0.30	1.00		0.53	1.00		0.38	1.00	1.00
Satd. Flow (perm)	474	3436		564	3555		990	3474		690	1827	1553
Peak-hour factor, PHF	0.81	0.81	0.81	0.87	0.87	0.87	0.91	0.91	0.91	0.84	0.84	0.84
Adj. Flow (vph)	179	396	115	66	440	15	204	503	105	114	246	69
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	179	511	0	66	455	0	204	608	0	114	246	69
Confl. Peds. (#/hr)	1		1	1		1			1	1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	4%	4%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		6
Actuated Green, G (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	40.4
Effective Green, g (s)	31.8	20.7		26.8	18.2		53.9	42.6		49.5	40.4	40.4
Actuated g/C Ratio	0.32	0.21		0.27	0.18		0.54	0.43		0.50	0.40	0.40
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	296	711		256	647		623	1479		436	738	627
v/s Ratio Prot	c0.07	c0.15		0.02	0.13		c0.04	c0.18		0.02	0.13	
v/s Ratio Perm	0.13			0.05			0.14			0.11		0.04
v/c Ratio	0.60	0.72		0.26	0.70		0.33	0.41		0.26	0.33	0.11
Uniform Delay, d1	26.5	36.9		28.0	38.4		12.2	20.0		13.8	20.5	18.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.5	3.5		0.5	3.5		0.3	0.8		0.3	1.2	0.4
Delay (s)	29.9	40.4		28.6	41.8		12.5	20.8		14.1	21.7	18.9
Level of Service	C	D		C	D		B	C		B	C	B
Approach Delay (s)		37.7			40.2			18.7			19.3	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			28.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.53									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			61.8%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 1 w Turn Lanes AM Peak

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	69	66	722	109	50	309
Future Volume (vph)	69	66	722	109	50	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0	6.0	3.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1787	1599	1881	1599	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.23	1.00
Satd. Flow (perm)	1787	1599	1881	1599	430	1863
Peak-hour factor, PHF	0.86	0.86	0.88	0.88	0.89	0.89
Adj. Flow (vph)	80	77	820	124	56	347
RTOR Reduction (vph)	0	69	0	20	0	0
Lane Group Flow (vph)	80	8	820	104	56	347
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3		2	6	
Actuated Green, G (s)	7.4	7.4	47.6	47.6	55.1	55.1
Effective Green, g (s)	7.4	7.4	47.6	47.6	55.1	55.1
Actuated g/C Ratio	0.10	0.10	0.66	0.66	0.76	0.76
Clearance Time (s)	4.0	4.0	6.0	6.0	3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	182	163	1234	1049	409	1415
v/s Ratio Prot			c0.44		0.01	c0.19
v/s Ratio Perm	c0.04	0.00		0.07	0.10	
v/c Ratio	0.44	0.05	0.66	0.10	0.14	0.25
Uniform Delay, d1	30.6	29.4	7.6	4.6	4.6	2.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.1	2.8	0.2	0.2	0.4
Delay (s)	32.3	29.5	10.4	4.8	4.7	3.0
Level of Service	C	C	B	A	A	A
Approach Delay (s)	30.9		9.7			3.2
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			10.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.61			
Actuated Cycle Length (s)			72.5		Sum of lost time (s)	13.0
Intersection Capacity Utilization			56.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 1 w Turn Lanes AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Future Volume (vph)	80	57	19	18	19	71	16	500	55	79	220	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1817			1855	1615	1787	1849		1787	1855	
Flt Permitted	0.95	1.00			0.98	1.00	0.54	1.00		0.26	1.00	
Satd. Flow (perm)	1805	1817			1855	1615	1024	1849		480	1855	
Peak-hour factor, PHF	0.85	0.85	0.85	0.60	0.60	0.60	0.94	0.94	0.94	0.85	0.85	0.85
Adj. Flow (vph)	94	67	22	30	32	118	17	532	59	93	259	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	94	89	0	0	62	118	17	591	0	93	285	0
Confl. Peds. (#/hr)			4	4					1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Effective Green, g (s)	9.4	9.4			12.7	12.7	55.4	47.4		56.4	47.9	
Actuated g/C Ratio	0.09	0.09			0.13	0.13	0.55	0.47		0.56	0.48	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	169	170			235	205	628	876		381	888	
v/s Ratio Prot	c0.05	0.05			0.03		0.00	c0.32		c0.02	0.15	
v/s Ratio Perm						c0.07	0.01			0.12		
v/c Ratio	0.56	0.52			0.26	0.58	0.03	0.67		0.24	0.32	
Uniform Delay, d1	43.3	43.2			39.4	41.1	10.1	20.3		12.3	16.0	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	2.9			0.6	3.9	0.0	4.1		0.3	1.0	
Delay (s)	47.2	46.1			40.0	45.0	10.1	24.5		12.7	17.0	
Level of Service	D	D			D	D	B	C		B	B	
Approach Delay (s)		46.7			43.3			24.1			15.9	
Approach LOS		D			D			C			B	
Intersection Summary												
HCM 2000 Control Delay			27.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			62.2%				ICU Level of Service			B		
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	6	24	24	811	332	7
Future Vol, veh/h	6	24	24	811	332	7
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	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	68	68	90	90	89	89
Heavy Vehicles, %	0	0	1	1	5	5
Mvmt Flow	9	35	27	901	373	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1332	377	381	0	-	0
Stage 1	377	-	-	-	-	-
Stage 2	955	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	172	674	1183	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	168	674	1183	-	-	-
Mov Cap-2 Maneuver	289	-	-	-	-	-
Stage 1	682	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	12	0.2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1183	-	289	674	-	-
HCM Lane V/C Ratio	0.023	-	0.031	0.052	-	-
HCM Control Delay (s)	8.1	-	17.8	10.6	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.2	-	-

Intersection						
Int Delay, s/veh	2.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	78	667	5	13	301
Future Vol, veh/h	13	78	667	5	13	301
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	89	89	81	81
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	22	130	749	6	16	372
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1158	754	0	0	757	0
Stage 1	754	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.12	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.218	-
Pot Cap-1 Maneuver	219	412	-	-	854	-
Stage 1	468	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	213	411	-	-	853	-
Mov Cap-2 Maneuver	343	-	-	-	-	-
Stage 1	467	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	17.6	0	0.4			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 343 411	853	-		
HCM Lane V/C Ratio	-	- 0.063 0.316	0.019	-		
HCM Control Delay (s)	-	- 16.2 17.8	9.3	0		
HCM Lane LOS	-	- C C	A	A		
HCM 95th %tile Q(veh)	-	- 0.2 1.3	0.1	-		

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	102	78	107	436	204	59
Future Vol, veh/h	102	78	107	436	204	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	89	89	89	89
Heavy Vehicles, %	1	1	1	1	3	3
Mvmt Flow	134	103	120	490	229	66
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	992	262	295	0	-	0
Stage 1	262	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	274	779	1272	-	-	-
Stage 1	784	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	248	779	1272	-	-	-
Mov Cap-2 Maneuver	367	-	-	-	-	-
Stage 1	710	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	16	1.6		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1272	-	367	779	-	-
HCM Lane V/C Ratio	0.095	-	0.366	0.132	-	-
HCM Control Delay (s)	8.1	-	20.4	10.3	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1.6	0.5	-	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	2	1	789	319	12
Future Vol, veh/h	22	2	1	789	319	12
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	-	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	90	90	82	82
Heavy Vehicles, %	0	0	1	1	3	3
Mvmt Flow	29	3	1	877	389	15

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1276	397	404
Stage 1	397	-	-
Stage 2	879	-	-
Critical Hdwy	6.4	6.2	4.11
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.209
Pot Cap-1 Maneuver	186	657	1160
Stage 1	683	-	-
Stage 2	409	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	186	657	1160
Mov Cap-2 Maneuver	310	-	-
Stage 1	682	-	-
Stage 2	409	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1160	-	324	-	-
HCM Lane V/C Ratio	0.001	-	0.099	-	-
HCM Control Delay (s)	8.1	-	17.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

HCM Signalized Intersection Capacity Analysis

1: Portage Rd & W Centre Ave

Portage Road Corridor Study

Scenario 1 w Turn Lanes PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Future Volume (vph)	80	403	266	119	455	76	224	336	81	85	568	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.98		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3332		1787	3491		1787	3462		1787	1881	1576
Flt Permitted	0.24	1.00		0.16	1.00		0.10	1.00		0.50	1.00	1.00
Satd. Flow (perm)	451	3332		305	3491		194	3462		935	1881	1576
Peak-hour factor, PHF	0.95	0.95	0.95	0.88	0.88	0.88	0.95	0.95	0.95	0.91	0.91	0.91
Adj. Flow (vph)	84	424	280	135	517	86	236	354	85	93	624	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	84	704	0	135	603	0	236	439	0	93	624	144
Confl. Peds. (#/hr)	1		1	1		1	2		1	1		2
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		6
Actuated Green, G (s)	32.8	24.0		34.2	24.7		51.5	38.8		43.5	34.8	34.8
Effective Green, g (s)	32.8	24.0		34.2	24.7		51.5	38.8		43.5	34.8	34.8
Actuated g/C Ratio	0.33	0.24		0.34	0.25		0.52	0.39		0.44	0.35	0.35
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	265	799		245	862		302	1343		480	654	548
v/s Ratio Prot	0.03	c0.21		c0.05	0.17		c0.10	0.13		0.02	c0.33	
v/s Ratio Perm	0.08			0.14			0.30			0.07		0.09
v/c Ratio	0.32	0.88		0.55	0.70		0.78	0.33		0.19	0.95	0.26
Uniform Delay, d1	24.3	36.6		24.8	34.3		24.0	21.4		16.8	31.8	23.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	11.2		2.7	2.5		12.3	0.6		0.2	25.6	1.2
Delay (s)	25.0	47.8		27.5	36.8		36.3	22.1		17.0	57.4	24.6
Level of Service	C	D		C	D		D	C		B	E	C
Approach Delay (s)		45.4			35.1			27.1			47.5	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			39.5			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			84.5%			ICU Level of Service				E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Portage Rd & Zylman Ave

Portage Road Corridor Study
Scenario 1 w Turn Lanes PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	85	486	102	111	823
Future Volume (vph)	155	85	486	102	111	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	6.0	6.0	3.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1881	1599	1787	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.37	1.00
Satd. Flow (perm)	1805	1615	1881	1599	693	1881
Peak-hour factor, PHF	0.87	0.87	0.95	0.95	0.94	0.94
Adj. Flow (vph)	178	98	512	107	118	876
RTOR Reduction (vph)	0	82	0	35	0	0
Lane Group Flow (vph)	178	16	512	72	118	876
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	3	3		2	6	
Actuated Green, G (s)	12.9	12.9	44.1	44.1	55.3	55.3
Effective Green, g (s)	12.9	12.9	44.1	44.1	55.3	55.3
Actuated g/C Ratio	0.16	0.16	0.56	0.56	0.71	0.71
Clearance Time (s)	4.0	4.0	6.0	6.0	3.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	297	266	1060	901	604	1330
v/s Ratio Prot			0.27		0.02	c0.47
v/s Ratio Perm	c0.10	0.01		0.05	0.12	
v/c Ratio	0.60	0.06	0.48	0.08	0.20	0.66
Uniform Delay, d1	30.3	27.5	10.2	7.8	4.4	6.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	0.1	1.6	0.2	0.2	2.6
Delay (s)	33.5	27.6	11.8	8.0	4.6	8.8
Level of Service	C	C	B	A	A	A
Approach Delay (s)	31.4		11.1			8.3
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			12.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.68			
Actuated Cycle Length (s)			78.2		Sum of lost time (s)	13.0
Intersection Capacity Utilization			60.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

3: Portage Rd & Bacon Ave/Lake Ctr

Portage Road Corridor Study

Scenario 1 w Turn Lanes PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Future Volume (vph)	60	28	30	48	27	81	26	344	32	51	554	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.92			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1719			1841	1615	1770	1839		1787	1870	
Flt Permitted	0.95	1.00			0.97	1.00	0.24	1.00		0.39	1.00	
Satd. Flow (perm)	1805	1719			1841	1615	455	1839		742	1870	
Peak-hour factor, PHF	0.80	0.80	0.80	0.60	0.60	0.60	0.87	0.87	0.87	0.95	0.95	0.95
Adj. Flow (vph)	75	35	38	80	45	135	30	395	37	54	583	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	75	73	0	0	125	135	30	432	0	54	606	0
Confl. Peds. (#/hr)			9	9								
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases						3	6			2		
Actuated Green, G (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Effective Green, g (s)	9.1	9.1			13.7	13.7	55.1	47.1		55.3	47.2	
Actuated g/C Ratio	0.09	0.09			0.14	0.14	0.55	0.47		0.55	0.47	
Clearance Time (s)	6.0	6.0			6.0	6.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	156			252	221	355	866		494	882	
v/s Ratio Prot	0.04	c0.04			0.07		0.01	0.23		c0.01	c0.32	
v/s Ratio Perm						c0.08	0.04			0.05		
v/c Ratio	0.46	0.47			0.50	0.61	0.08	0.50		0.11	0.69	
Uniform Delay, d1	43.1	43.2			40.0	40.6	12.5	18.3		10.9	20.6	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	2.2			1.5	4.9	0.1	2.1		0.1	4.3	
Delay (s)	45.1	45.4			41.5	45.6	12.6	20.3		11.0	25.0	
Level of Service	D	D			D	D	B	C		B	C	
Approach Delay (s)		45.2			43.6			19.8			23.8	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			28.1									
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			100.0									
Intersection Capacity Utilization			63.7%									
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	57	44	621	833	25
Future Vol, veh/h	13	57	44	621	833	25
Conflicting Peds, #/hr	3	0	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	74	74	94	94
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	19	81	59	839	886	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1861	901	914	0	-	0
Stage 1	901	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	81	340	750	-	-	-
Stage 1	400	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	74	340	749	-	-	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	368	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	19.9	0.7		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	749	-	203	340	-	-
HCM Lane V/C Ratio	0.079	-	0.091	0.239	-	-
HCM Control Delay (s)	10.2	-	24.5	18.9	-	-
HCM Lane LOS	B	-	C	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.3	0.9	-	-

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	47	428	22	77	801
Future Vol, veh/h	9	47	428	22	77	801
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	110	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	90	90	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	13	67	476	24	81	843
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1495	490	0	0	502	0
Stage 1	490	-	-	-	-	-
Stage 2	1005	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.209	-
Pot Cap-1 Maneuver	137	582	-	-	1068	-
Stage 1	620	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	117	581	-	-	1066	-
Mov Cap-2 Maneuver	232	-	-	-	-	-
Stage 1	619	-	-	-	-	-
Stage 2	306	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	13.5	0		0.8		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	232	581	1066	-
HCM Lane V/C Ratio	-	-	0.055	0.116	0.076	-
HCM Control Delay (s)	-	-	21.4	12	8.7	0
HCM Lane LOS	-	-	C	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.4	0.2	-

Intersection							
Int Delay, s/veh	3.8						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	57	160	124	443	495	99	
Future Vol, veh/h	57	160	124	443	495	99	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	110	0	250	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	88	88	94	94	82	82	
Heavy Vehicles, %	0	0	2	2	1	1	
Mvmt Flow	65	182	132	471	604	121	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	1400	665	725	0	-	0	
Stage 1	665	-	-	-	-	-	
Stage 2	735	-	-	-	-	-	
Critical Hdwy	6.4	6.2	4.12	-	-	-	
Critical Hdwy Stg 1	5.4	-	-	-	-	-	
Critical Hdwy Stg 2	5.4	-	-	-	-	-	
Follow-up Hdwy	3.5	3.3	2.218	-	-	-	
Pot Cap-1 Maneuver	156	464	878	-	-	-	
Stage 1	515	-	-	-	-	-	
Stage 2	478	-	-	-	-	-	
Platoon blocked, %				-	-	-	
Mov Cap-1 Maneuver	133	464	878	-	-	-	
Mov Cap-2 Maneuver	269	-	-	-	-	-	
Stage 1	438	-	-	-	-	-	
Stage 2	478	-	-	-	-	-	
Approach	EB		NB		SB		
HCM Control Delay, s	19		2.1		0		
HCM LOS	C						
Minor Lane/Major Mvmt	NBL		NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	878		-	269	464	-	-
HCM Lane V/C Ratio	0.15		-	0.241	0.392	-	-
HCM Control Delay (s)	9.8		-	22.6	17.7	-	-
HCM Lane LOS	A		-	C	C	-	-
HCM 95th %tile Q(veh)	0.5		-	0.9	1.8	-	-

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	8	2	658	797	31
Future Vol, veh/h	8	8	2	658	797	31
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	-	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	60	60	81	81	95	95
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	13	13	2	812	839	33

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1672	856	872	0	-	0
Stage 1	856	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	107	360	778	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	107	360	778	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	438	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	778	-	291	-	-
HCM Lane V/C Ratio	0.003	-	0.092	-	-
HCM Control Delay (s)	9.6	-	18.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-