North Rankin Street (Highway 21) and Turner Street Intersection Control Study

Town of Saugeen Shores

Paradigm Transportation Solutions Limited

2025-10
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Project Summary

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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct an Intersection Control Study for the North Rankin Street (Highway 21) and Turner Street intersection in the community of Southampton within the Town of Saugeen Shores, Ontario. The study provides a review of existing traffic safety and operations at the subject intersection, and an assessment of future traffic operations under different intersection control configurations. An economic evaluation (cost-benefit analysis) of the alternatives was also completed.

Conclusions

The conclusions of the **North Rankin Street (Highway 21) and Turner Street Intersection Control Study** are as follows:

Existing Conditions

- The subject intersection has experienced a total of 13 reported collisions over the past five years. Most (nine or 70%) resulted in property damage only, while the remaining four collisions resulted in non-fatal injuries. No fatal collisions were reported.
- The subject intersection currently operates with acceptable levels of service (LOS D or better) and well within capacity (v/c ratio of less than 0.85) during the weekday AM, weekday PM, and Saturday peak hours, except for the northbound and southbound approaches. These shared left/through/right movements experience considerable delay during the weekday PM and/or Saturday peak hours due to the relatively high volume of traffic traveling along North Rankin Street (Highway 21).
- The subject intersection meets the warrants for installing traffic signals set out in Ontario Traffic Manual (OTM) Book 12 – Traffic Signals based on current volumes.

Future Conditions with Current Intersection Configuration

- The subject intersection is expected to continue operating with acceptable levels of service and within capacity to the year 2036, accounting for a conservative estimate of generalized background traffic growth (i.e., 1.0% per annum growth rate). The exceptions include the previously identified critical northbound and southbound approaches under existing conditions. These shared left/through/right movements are

expected to experience worsening operations and exceed capacity (v/c ratio over 1.00) by 2031. A change in intersection traffic control would likely help resolve these critical movements.

- The subject intersection might be warranted for traffic signals according to Ontario Traffic Manual (OTM) Book 12 – Traffic Signals based on forecast 2026, 2031, and 2036 Saturday peak hour traffic volumes.

Traffic Control Alternatives

- The study considered two potential solutions to the safety and operational concerns noted at the subject intersection: Single-Lane Roundabout (Alternative 1) and Traffic Signal Control (Alternative 2). Other alternatives, such as the installation of all-way stop control or construction of a grade-separation, were considered ineffective, infeasible, or inappropriate due to efficacy, cost, property, implementation, and/or other factors and challenges and not carried forward for assessment.
- The subject intersection is projected to operate with acceptable levels of service and within capacity for all movements and approaches under all three future horizons with both intersection control alternatives. However, the single-lane roundabout (Alternative 1) offers better traffic operational performance with higher LOS and lower average vehicle delays compared to traffic signal control (Alternative 2). There is also no significant difference from an active transportation perspective, with both alternatives offering advantages.
- The life-cycle cost analysis indicates that the single-lane roundabout (Alternative 1) provides the lowest NPV of total costs and offers a higher benefit-cost ratio compared to traffic signal control (Alternative 2) and the base case (Do Nothing).
- **Based on both vehicle traffic operations and life-cycle cost, a single-lane roundabout (Alternative 1) is preferred to traffic signal control (Alternative 2) and offers advantages over doing nothing at the subject intersection.**

Recommendations

Based on the conclusions of the **North Rankin Street (Highway 21) and Turner Street Intersection Control Study**, it is recommended that the Town of Saugeen Shores pursue the construction of a single-lane roundabout at the subject intersection, as this solution is preferred to traffic signal control and offers advantages to doing nothing.

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1 Introduction

1.1 Study Overview

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct an Intersection Control Study for the North Rankin Street (Highway 21) and Turner Street intersection in the community of Southampton within the Town of Saugeen Shores, Ontario. **Figure 1.1** illustrates the study area (also referred to as the subject intersection).

1.2 Study Background

The Town of Saugeen Shores *Transportation Master Plan* (TMP)[1] included an analysis of future traffic conditions to identify intersections in the municipality that may require improvement to serve anticipated growth. The analysis identified critical traffic movements on the Turner Street approaches to the unsignalized North Rankin Street (Highway 21) intersection, with the approaches forecast to operate near or at capacity by the 2031 horizon year.

Traffic volumes for the intersection did not meet the minimum thresholds set out in Ontario Traffic Manual (OTM) Book 12 – Traffic Signals to justify the installation of traffic control signals[2]. As an alternative, the TMP recommended construction of a roundabout to address predicted traffic operational issues.

After the Town completed the TMP, Bruce County retained True North Safety Group to conduct a safety review of the subject intersection in December 2021[3]. The review identified a high number of angle conflicts and relatively high operating speeds along North Rankin Street (Highway 21). One of the recommended potential remedial measures was the construction of a roundabout at the North Rankin Street (Highway 21) and Turner Street intersection, consistent with the TMP.

With the Town planning modifications to the subject intersection in the next year, the municipality initiated the **North Rankin Street (Highway 21) and Turner Street Intersection Control Study** to confirm that a roundabout remains the most appropriate solution.

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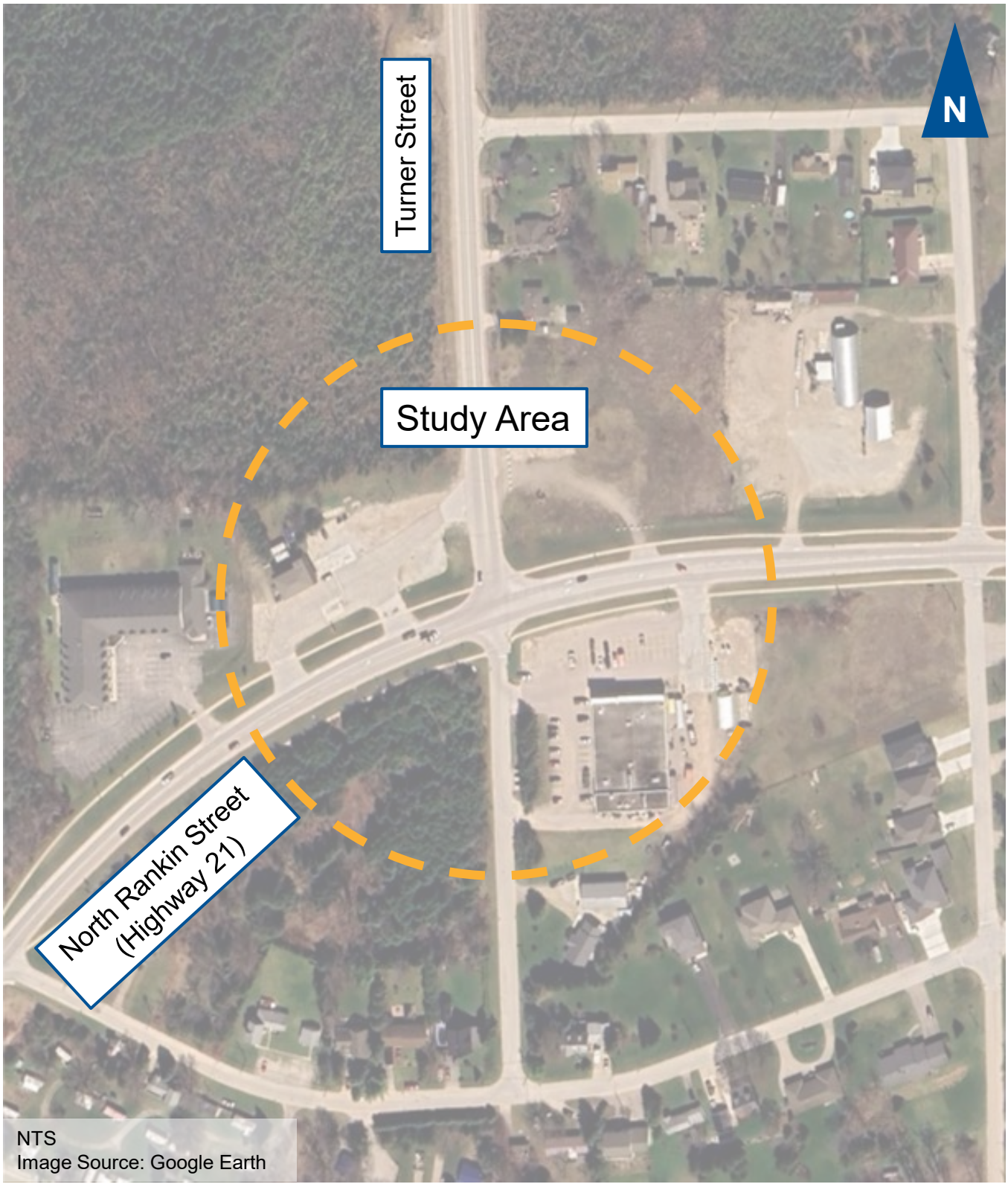
1 Town of Saugeen Shores, *Transportation Master Plan*, November 2020, p.85-92.
2 Town of Saugeen Shores, *Transportation Master Plan*, November 2020, p.87.
3 True North Safety Group, *Video Conflict Analysis at Highway 21 and Bruce Road 13/Turner Street Intersection*, December 2021. Turner Street north of North Rankin Street (Highway 21) is under the County's jurisdiction as Bruce Road 13.



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Study Area

1.3 Study Methodology

The study followed the typical methodology for an intersection control study, which involves identifying a range of reasonable alternatives and comparatively assessing their safety, operational, economic, and environmental implications to determine the preferred solution. The technical analyses completed for the study included:

- a review of existing safety and operating conditions based on traffic counts, collision data, and field observations;
- traffic forecasting and reviews of future operating conditions for opening, five-, and ten-year horizons under current and alternative intersection control configurations;
- conceptual design of the alternative configurations to aid in assessing feasibility, impacts (including property), and costs; and
- economic evaluation (benefit-cost analysis) of the alternatives.

The traffic analyses followed the Ministry of Transportation (MTO) *General Guidelines for the Preparation of Traffic Impact Studies* (March 2023), specifically Appendix A, which provides guidance for the consideration of roundabouts of provincial highways. While North Rankin Street is under the Town's jurisdiction, changing intersection control on a provincial Connecting Link (which this section of Highway 21 is designated) requires MTO consideration.

2 Existing Conditions

2.1 Transportation Network

2.1.1 Roads

The subject intersection comprises the following two roads:

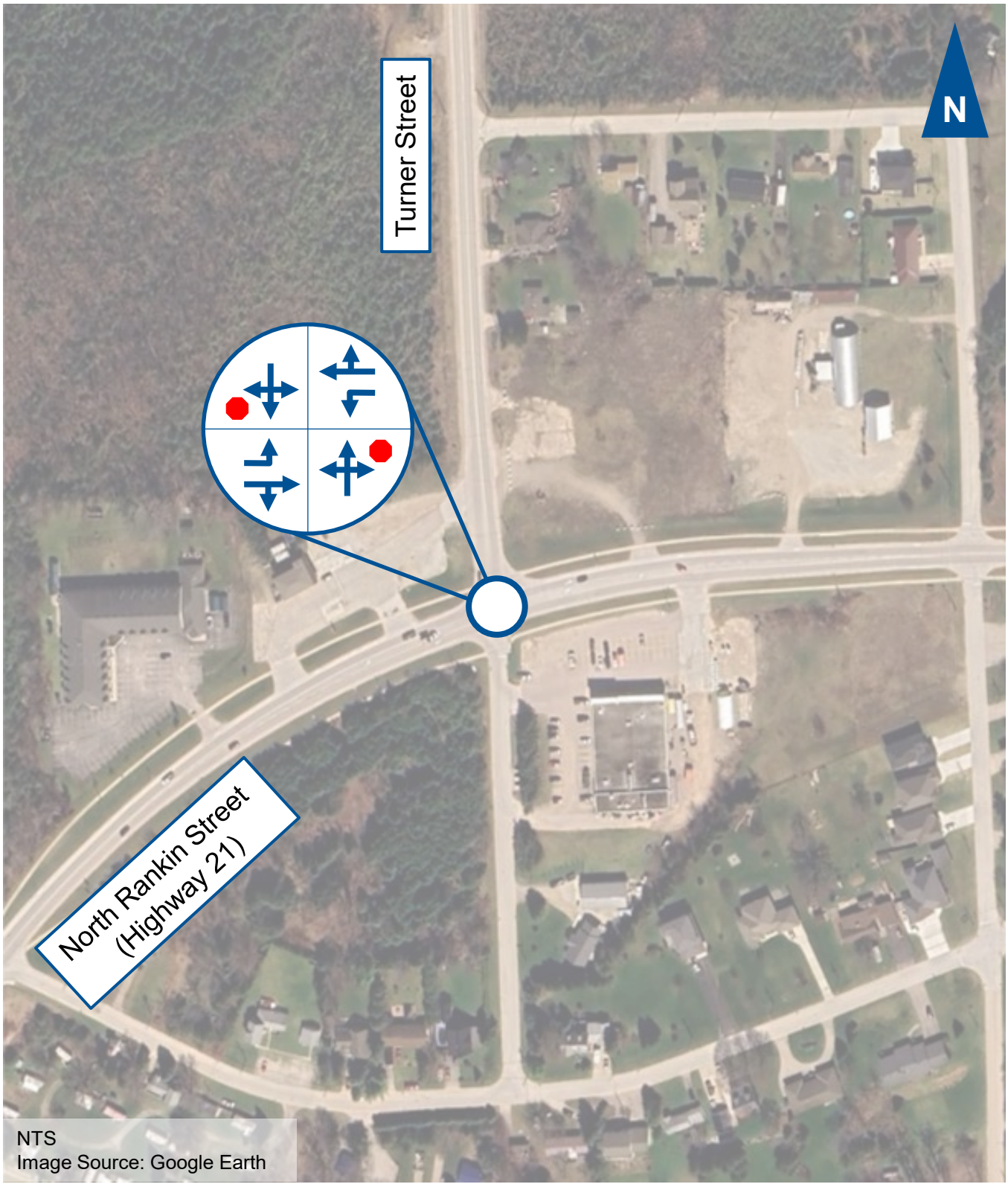
- **North Rankin Street (Highway 21)** is a two-lane arterial road[4] under the Town's jurisdiction with an urban cross-section (i.e., curb and gutter) and a 50 km/h posted speed limit. The posted speed limit increases to 60 km/h approximately 430 metres east of Turner Street. Horizontal curves exist along North Rankin Street (Highway 21) east of South Rankin Street, but the alignment does not appear to impact sightlines or operation. No significant vertical curves were noted.
- **Turner Street** is a two-lane arterial road under Bruce County jurisdiction (Bruce Road 13) with a rural cross-section (i.e., paved/unpaved shoulder and ditch) and a posted 50 km/h speed limit north of North Rankin Street (Highway 21). South of North Rankin Street (Highway 21), Turner Street is a two-lane local road under the Town's jurisdiction with an urban cross-section and a posted speed limit of 40 km/h. No significant horizontal or vertical curves exist along the subject road section to impact sightlines or operation.

Figure 2.1 illustrates the current configuration of the subject intersection. The intersection is a four-leg, two-way stop-controlled (on Turner Street) junction with generally unobstructed sightlines and turning sight triangles. The North Rankin Street (Highway 21) approaches feature exclusive left-turn lanes and shared through-right lanes in both directions. Each leg of Turner Street currently operates as a single lane, all-moves approach and includes standard STOP (Ra-1) signs per OTM *Book 5 – Regulatory Signs*[5]. An overhead flashing beacon is provided in addition to the stop sign at the southbound approach to further alert drivers to stop.

Intersection sight distances observed from the site visit, camera recordings, and Google Maps appeared to offer adequate visibility. Exact distances were not measured.

[4] Town of Saugeen Shores, *Official Plan*, (2014), Schedule 'B' – Transportation Plan with Trails.

[5] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 5 – Regulatory Signs*, December 2021.



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Current Intersection Configuration

2.1.2 Active Transportation

Sidewalks are provided on both sides of North Rankin Street (Highway 21) in the study area. No pedestrian infrastructure is provided on Turner Street aside from paved shoulders north of North Rankin Street (Highway 21). Delineated pedestrian crosswalks are provided on the minor road approaches (Turner Street) at the intersection.

On-street bike lanes are provided on both sides of North Rankin Street (Highway 21). No dedicated or delineated cycling facilities are provided on Turner Street.

2.2 Traffic Volumes

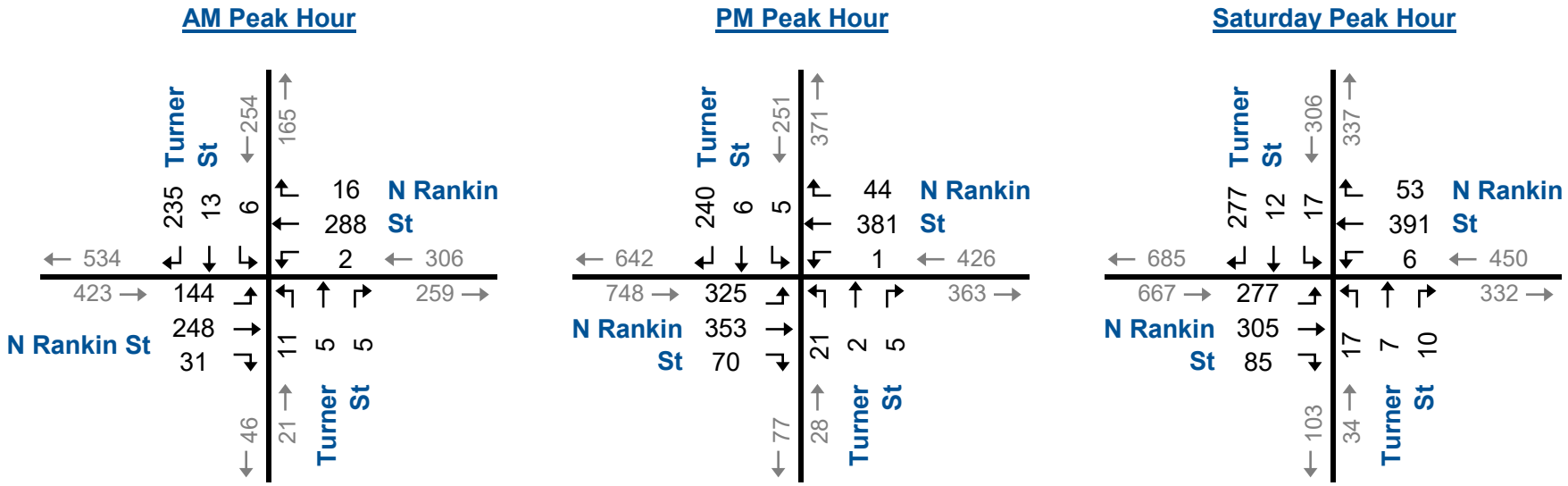
Paradigm collected turning movement counts at the subject intersection to determine current vehicle, bicycle, and pedestrian traffic volumes. The counts were carried out over periods of 14 hours on July 24, 2025 (Thursday) and July 25, 2025 (Friday), and 10 hours on July 26, 2025 (Saturday) and July 27, 2025 (Sunday). Conducting the counts late in the week during July ensured the data collected represent a worst-case condition for analysis, as traffic volumes in Southampton, a popular tourist destination, tend to peak on summer weekends. **Appendix A** contains the detailed count data.

Table 2.1 summarizes the total vehicle volumes, cyclist volumes, and unprotected pedestrian crossings observed during the peak hours of the four traffic counts. Minimal cyclist and pedestrian volumes were observed, with less than 10 pedestrians and cyclists (in total) counted per peak hour.

Figure 2.2 illustrates the vehicle turning movement volumes for the weekday AM, weekday PM, and Saturday peak hours.

TABLE 2.1: TRAFFIC COUNT SUMMARY

Date	Peak Hour	Time	Vehicles	Cyclists	Pedestrians
Thursday, July 24, 2025	AM	9:00 – 10:00 AM	949	4	2
	PM	4:30 – 5:30 PM	1,318	5	3
Friday, July 25, 2025	AM	9:00 – 10:00 AM	1,004	3	1
	PM	2:00 – 3:00 PM	1,453	6	0
Saturday, July 26, 2025	Midday	11:30 AM – 12:30 PM	1,457	4	0
Sunday, July 27, 2025	Midday	12:00 – 1:00 PM	1,397	2	2



Existing Peak Hour Traffic Volumes

2.3 Collision History

The Town provided collision data for the subject intersection for the period spanning January 1, 2020 to December 31, 2024. **Appendix B** contains the detailed collision history.

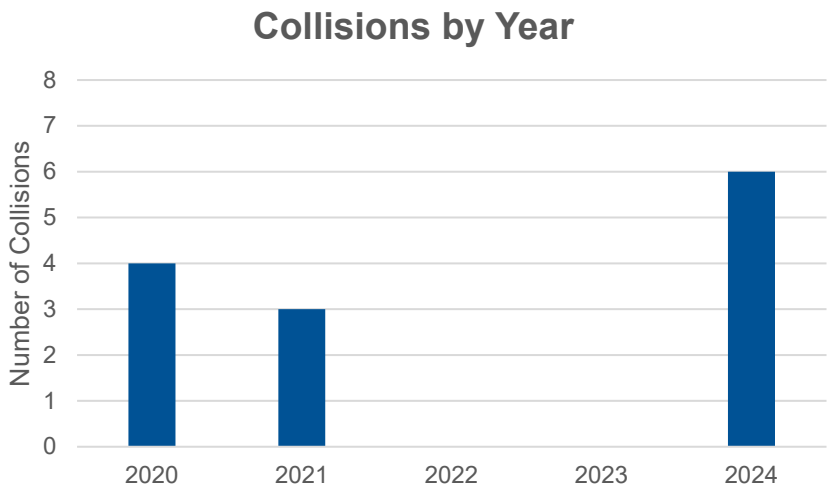
A total of 13 reported collisions occurred at the subject intersection or were considered intersection related over the five-year period analyzed. **Figure 2.3** summarizes the collisions by month, year, severity, impact type, and environment. The following is noted:

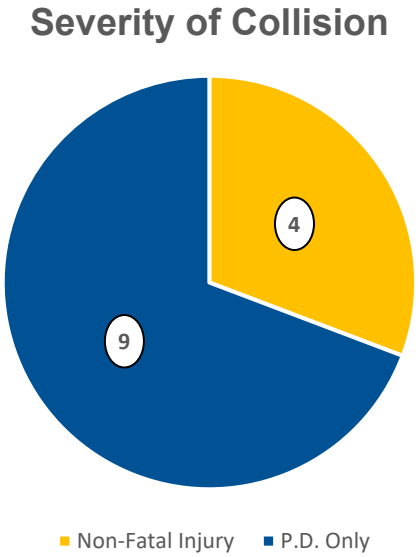
- **Frequency**: The yearly average number of collisions is relatively low at approximately 2.6 collisions per year.
- **Severity**: No fatal collisions were reported at the intersection. Four collisions resulted in non-fatal injuries. The remaining nine collisions (70%) were property damage only (i.e., no injuries).
- **Cyclists/Pedestrian**: No collisions involving cyclists or pedestrians were reported.
- **Time of Year**: Most collisions (8) occurred in the summer (between June and September). However, the highest number of collisions were reported in February (three within five years).
- **Environment**: Most collisions (8) occurred during clear/dry conditions. Five occurred under rain or snow.
- **Impact Type**: The most common collision type was Turning Movement (6), followed by Angle (4), Rear-end (2), and Single Motor Vehicle (1). Close to half of the collisions (6) were due to driver driving too fast, failed to yield right-of-way, lost control, followed too close, and improper passing.

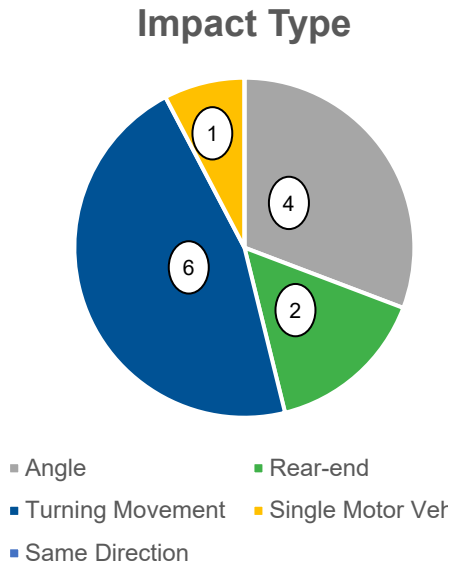
Overall, the collision history at the subject intersection is generally unremarkable with no high impact or fatal crashes reported.

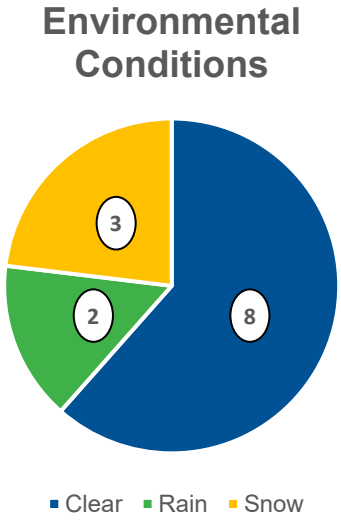
2.4 Vehicle Traffic Operations

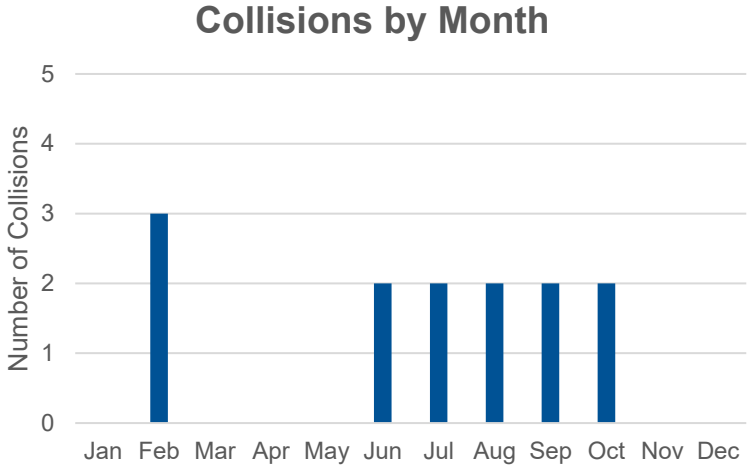
Existing vehicle traffic operations at the subject intersection were analyzed using Synchro 12, which implements the methodologies of the *Highway Capacity Manual* (HCM). Operations were assessed based on the following three measures of effectiveness:











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Collision Summary

- **Level of Service (LOS)** for each movement and approach. LOS is a quantitative measure of traffic operational conditions determined based on average control delay per vehicle, which includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay. There are six LOS classifications, ranging from "A" (best) through "F" (worst). **Table 2.2** describes the different levels of service.
- **Volume-to-capacity (v/c) ratio** for each movement. This measure provides an indication of demand flow, with an at-capacity condition represented by a v/c ratio of 1.00 (i.e., volume demand equals capacity).
- **95th percentile queue length** for each movement. This measure helps in assessing the adequacy of available vehicle storage lanes to serve approaching traffic volumes.

The operational analysis assumed the existing lane configurations, traffic control, and traffic volumes (per **Figure 2.2**) and used the criteria defined in the Transportation Master Plan[6] for identifying "critical" operations (i.e., movements or approaches with a LOS E or F and/or a v/c ratio of 0.85 or greater).

Table 2.3 summarizes existing vehicle traffic operations for the subject intersection during the weekday AM, weekday PM, and Saturday peak hours based on current volumes. The table reports the measures of effectiveness and highlights any critical movements or approaches. **Appendix C** contains the detailed Synchro reports.

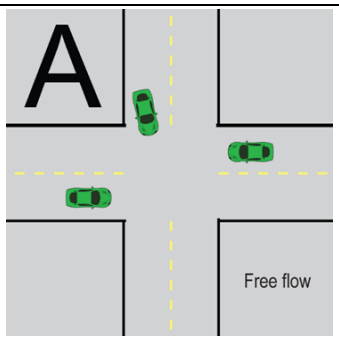
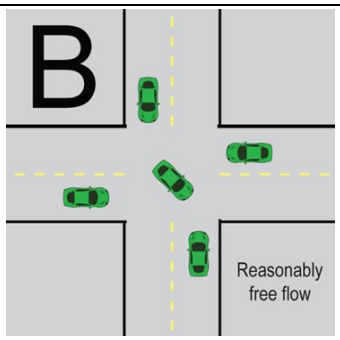
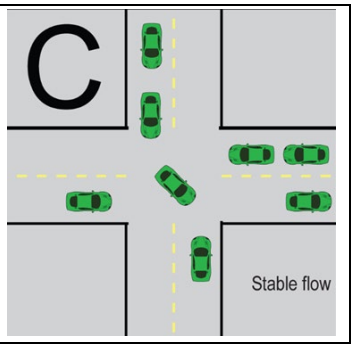
The subject intersection currently operates with acceptable levels of service (LOS D or better) and well within capacity (v/c ratio of less than 0.85), except for the:

- northbound approach, which operates at LOS F during the weekday PM and Saturday peak hours; and
- southbound approach, which operates at LOS E during the Saturday peak hour.

The northbound and southbound shared movements exiting Turner Street experience considerable delay during weekday PM and/or Saturday peak hours under existing conditions due to the relatively high volume of traffic traveling along North Rankin Street (Highway 21).

[6] Town of Saugeen Shores, *Transportation Master Plan*, November 2020, p. 46.

TABLE 2.2: LEVEL OF SERVICE THRESHOLDS FOR UNSIGNALIZED INTERSECTIONS

Level of Service and Flow Characteristics			
Average Delay	≤ 10 seconds per vehicle	> 10 and ≤ 15 seconds per vehicle	> 15 and ≤ 25 seconds per vehicle
Delay to Minor Street Traffic	Little to no	Short	Average
Typically Considered	Good operation	Good operation	Good operation

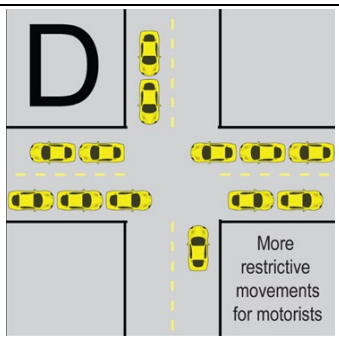
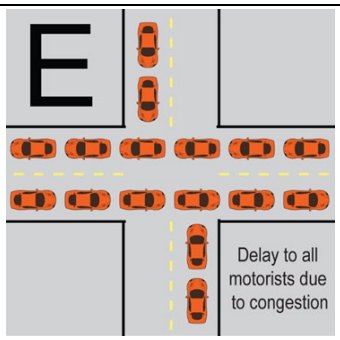
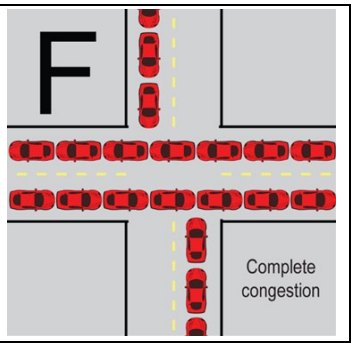
Level of Service and Flow Characteristics			
Average Delay	> 25 and ≤ 35 seconds per vehicle	> 35 and ≤ 50 seconds per vehicle	> 50 seconds per vehicle
Delay to Minor Street Traffic	Long	Very long	Extreme with queuing Congestion affects other intersections
Typically Considered	Acceptable operation	Poor operation	Poor operation Warrants improvement to intersection

TABLE 2.3: TRAFFIC OPERATIONS SUMMARY – EXISTING CONDITIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	D	>	D	<	B	>	B	A
			Delay	8	0	>	3	8	0	>	0	<	33	>	33	<	15	>	15	6
			V/C	0.13	0.17	>		0.00	0.19	>		<	0.15	>		<	0.43	>		0.50
			Q	3	0	>		0	0	>		<	4	>		<	16	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	57	-	>		70	-	>		<	-	>		<	-	>		
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	F	>	F	<	C	>	C	B
			Delay	10	0	>	4	8	0	>	0	<	238	>	238	<	21	>	21	10
			V/C	0.30	0.26	>		0.00	0.26	>		<	0.77	>		<	0.54	>		0.66
			Q	10	0	>		0	0	>		<	21	>		<	24	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	50	-	>		70	-	>		<	-	>		<	-	>		
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	F	>	F	<	E	>	E	C
			Delay	10	0	>	4	8	0	>	0	<	203	>	203	<	46	>	46	16
			V/C	0.27	0.25	>		0.01	0.28	>		<	0.78	>		<	0.83	>		0.68
			Q	8	0	>		0	0	>		<	24	>		<	59	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	52	-	>		70	-	>		<	-	>		<	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TWSC - Two-Way Stop Control
< / > - Shared with through movement

2.5 Traffic Signal Warrant

A traffic signal warrant analysis was completed for the subject intersection under existing conditions. At least one of the below justifications must be fulfilled for traffic signal installation to be warranted based on the criteria set out in OTM Book 12 – Traffic Signals[7]. "Unless one or more of the signal justifications are met, the installation of signals would not normally proceed as it would likely result in an increase in overall intersection delay and/or a negative impact on intersection safety"[8]:

- **Justification 1: Minimum Eight-Hour Vehicle Volume** – The need for traffic signals must be considered if both Justification 1A (All Approach Lanes) and Justification 1B (Minor Street Both Approaches) are 100% fulfilled.
- **Justification 2: Delay to Cross Traffic** – The need for traffic signals must be considered if both Justification 2A (Major Street Both Approaches) and Justification 2B (Traffic Crossing Major Street) are 100% fulfilled.
- **Justification 3: Combination Warrant** – Traffic signals may occasionally be justified where neither Justification 1 nor Justification 2 is 100% satisfied, but both justifications are at least 80% satisfied.
- **Justification 4: Minimum Four-Hour Vehicle Volume** – Not applicable because MTO does not consider this justification.
- **Justification 5: Collision Experience** – Traffic signals may be justified where five or more reportable collisions per year have occurred over a continuous three-year period.
- **Justification 6: Pedestrian Volume and Delay** – The need for traffic signals must be considered if both the minimum pedestrian volume and delay criteria are met.
- **Justification 7: Projected Volumes** – Not applicable for existing conditions.

Table 2.4 summarizes the calculations for each applicable justification based on existing volumes. Justification 1 is fully met under existing conditions. **Appendix D** contains the detailed calculations.

[7] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12 – Traffic Signals*, July 2024.
[8] ibid, p103.

TABLE 2.4: TRAFFIC SIGNAL WARRANT SUMMARY – EXISTING CONDITIONS

Justification (% Fulfilled)				
1	2	3	5	6
100%	44%	50%	47%	n/a[1]

Note:

1. Not calculated due to the absence of pedestrian delay data. However, observed pedestrian volumes fall considerably below the minimum thresholds set out in Justification 6 and would not meet the criteria to warrant signalization.

3 Future Conditions with Current Intersection Configuration

3.1 Forecast Volumes

3.1.1 Vehicles

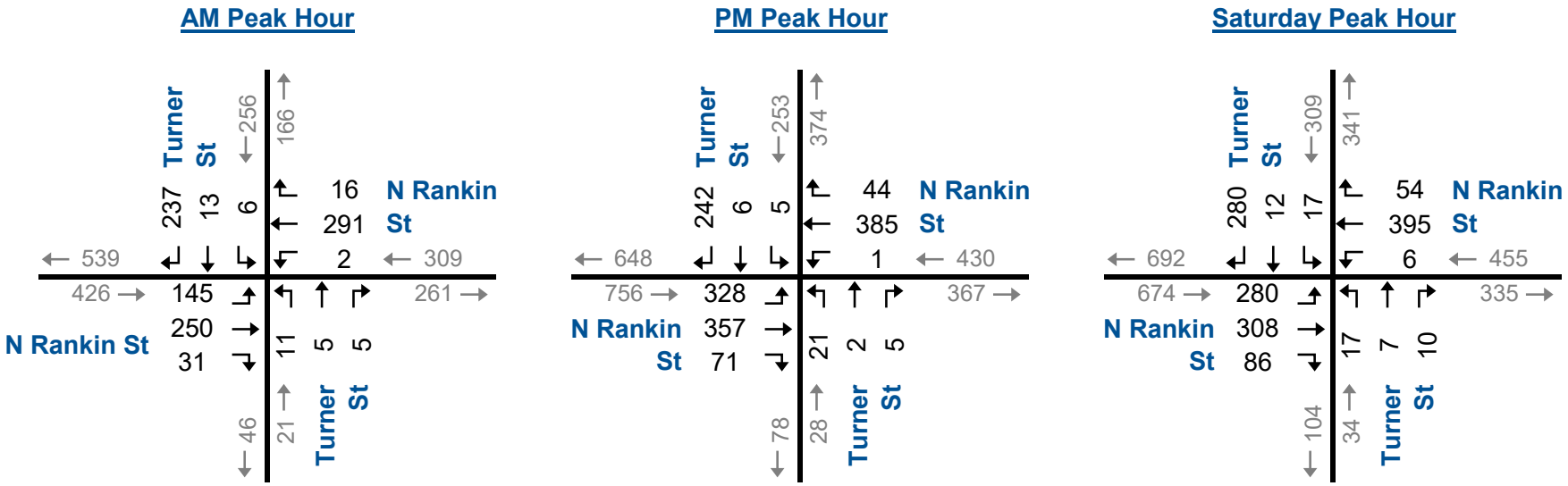
Traffic volume forecasts were prepared to assess the suitability, effectiveness, and impact of alternative traffic control measures for the North Rankin Street (Highway 21) and Turner Street intersection under future conditions. Consistent with the MTO *General Guidelines for the Preparation of Traffic Impact Studies*[9], the analysis examined three horizon years – "opening" (or implementation) date of the intersection modifications plus five and ten years after the opening date, assumed to be 2026, 2031, and 2036, respectively.

A 1.0% compounded per annum growth rate was applied to existing (2025) peak hour traffic volumes to account for broader, overall population and employment growth both internal and external to the study area. This growth factor is considered representative given historical average annual daily traffic (AADT) volumes along Highway 21 in the vicinity of Southampton. AADT data from 2016 and 2020 show that traffic volumes grew annually by 0.3% between Craig Street and Bruce Road 10 (increasing from 4,300 to 4,350 vehicles per day) and 0.97% between Bruce Road 3 and South Street (increasing from 8,850 to 9,200 vehicles per day).

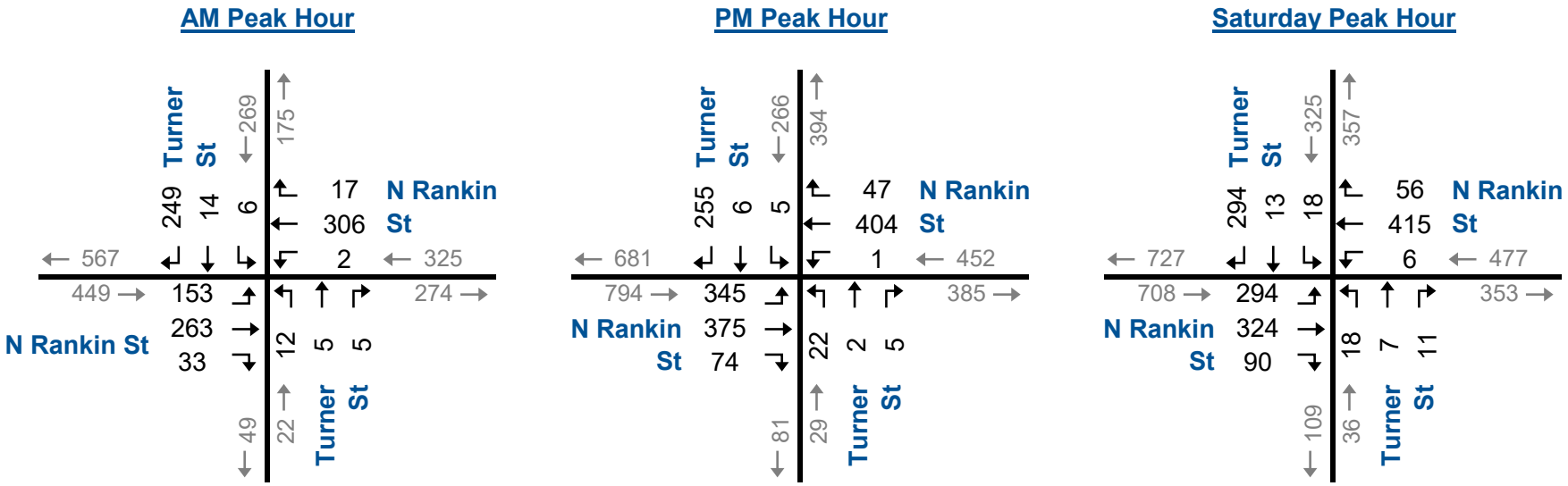
Taking a conservative approach for the analysis, the future traffic forecasts did not account for any trips generated by planned development. This recognizes that traffic signals warranted based solely on background growth would also be justified with development traffic added in the projections.

Figure 3.1, **Figure 3.2**, and **Figure 3.3** illustrate the traffic forecasts for the opening, five- and ten-year horizons, respectively.

[9] Ontario Ministry of Transportation, *General Guidelines for the Preparation of Traffic Impact Studies*, March 2023, p14.



2026 Peak Hour Traffic Forecasts



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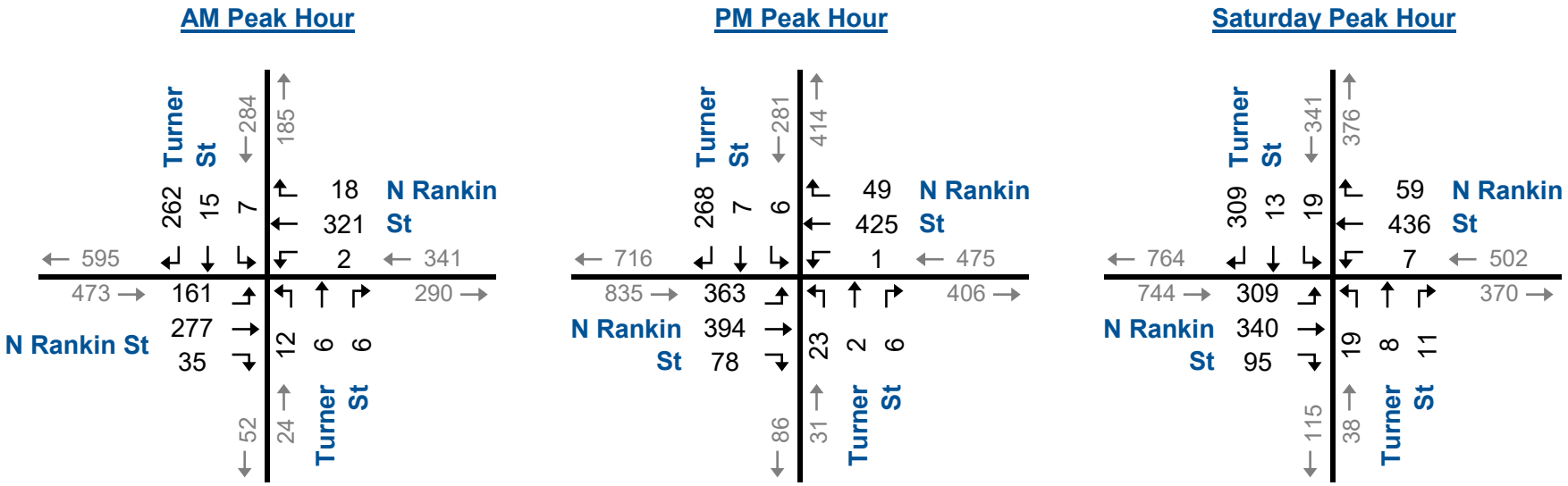
2031 Peak Hour Traffic Forecasts



2036 Peak Hour Traffic Forecasts

3.1.2 Pedestrians and Cyclists

As noted in **Section 2.2**, the existing cyclist and pedestrian volumes at North Rankin Street (Highway 21) and Turner Street were observed to be minimal (less than 10 pedestrians and cyclists total per peak hour). With a 1.0% compounded per annum growth rate, it is anticipated future pedestrian and cyclist volumes will remain similarly low.

3.2 Vehicle Traffic Operations

Future vehicle traffic operations at the subject intersection were analyzed using Synchro 12. The analysis applied the same methodology, criteria, and assumptions as the existing conditions review in **Section 2.4**, but used the forecast traffic volumes for the three horizon years (per **Figure 3.1**, **Figure 3.2**, and **Figure 3.3**) in the calculations.

Table 3.1 summarizes future vehicle traffic operations for the subject intersection during the weekday AM, weekday PM, and Saturday peak hours based on forecast volumes. The table reports the measures of effectiveness and highlights any critical movements or approaches for each horizon year. **Appendix E** contains the detailed Synchro reports.

The subject intersection is projected to operate with acceptable levels of service (LOS D or better) and well within capacity (v/c ratio of less than 0.85) for all three horizon years, except for the following critical approaches and movements:

Opening Year (2026)

- Northbound approach is forecast to operate at LOS F during the weekday PM and Saturday peak hours.
- Southbound approach is forecast to operate at LOS E during the Saturday peak hour.

Five-Year Horizon (2031)

- Northbound approach is forecast to operate at LOS E or F during the weekday AM, weekday PM, and Saturday peak hours and exceed capacity (v/c ratio over 1.00) during the weekday PM and Saturday peak hours.
- Southbound approach is forecast to operate at LOS F and v/c of 0.97 during the Saturday peak hour.

TABLE 3.1: TRAFFIC OPERATIONS SUMMARY – FUTURE CONDITIONS WITH CURRENT INTERSECTION CONFIGURATION

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
Opening Year																				
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	D	>	D	<	B	>	B	A
			Delay	8	0	>	3	8	0	>	0	<	33	>	33	<	15	>	15	6
			V/C	0.13	0.17	>		0.00	0.19	>		<	0.15	>		<	0.43	>		0.50
			Q	3	0	>		0	0	>		<	4	>		<	16	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	57	-	>		70	-	>		<	-	>		<	-	>		
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	F	>	F	<	C	>	C	B
			Delay	10	0	>	4	8	0	>	0	<	254	>	254	<	21	>	21	11
			V/C	0.31	0.26	>		0.00	0.26	>		<	0.80	>		<	0.55	>		0.67
			Q	10	0	>		0	0	>		<	22	>		<	25	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	50	-	>		70	-	>		<	-	>		<	-	>		
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	F	>	F	<	E	>	E	C
			Delay	10	0	>	4	8	0	>	0	<	221	>	221	<	49	>	49	17
			V/C	0.28	0.25	>		0.01	0.28	>		<	0.82	>		<	0.85	>		0.69
			Q	9	0	>		0	0	>		<	25	>		<	62	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	51	-	>		70	-	>		<	-	>		<	-	>		
Five-Year Horizon																				
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	E	>	E	<	C	>	C	A
			Delay	8	0	>	3	8	0	>	0	<	39	>	39	<	16	>	16	6
			V/C	0.13	0.18	>		0.00	0.20	>		<	0.18	>		<	0.47	>		0.52
			Q	4	0	>		0	0	>		<	5	>		<	19	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	56	-	>		70	-	>		<	-	>		<	-	>		
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	F	>	F	<	C	>	C	B
			Delay	10	0	>	4	8	0	>	0	<	388	>	388	<	24	>	24	14
			V/C	0.33	0.28	>		0.00	0.28	>		<	1.05	>		<	0.60	>		0.69
			Q	11	0	>		0	0	>		<	26	>		<	30	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	49	-	>		70	-	>		<	-	>		<	-	>		
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	F	>	F	<	F	>	F	D
			Delay	10	0	>	4	8	0	>	0	<	358	>	358	<	75	>	75	26
			V/C	0.30	0.26	>		0.01	0.30	>		<	1.11	>		<	0.97	>		0.71
			Q	10	0	>		0	0	>		<	31	>		<	82	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	50	-	>		70	-	>		<	-	>		<	-	>		
Ten-Year Horizon																				
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	A	A	>	A	A	A	>	A	<	E	>	E	<	C	>	C	A
			Delay	9	0	>	3	9	0	>	0	<	44	>	44	<	18	>	18	7
			V/C	0.14	0.19	>		0.00	0.21	>		<	0.22	>		<	0.51	>		0.54
			Q	4	0	>		0	0	>		<	6	>		<	22	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	56	-	>		70	-	>		<	-	>		<	-	>		
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	B	A	>	A	A	A	>	A	<	F	>	F	<	D	>	D	C
			Delay	10	0	>	4	8	0	>	0	<	600	>	600	<	32	>	32	19
			V/C	0.35	0.29	>		0.00	0.29	>		<	1.43	>		<	0.70	>		0.73
			Q	12	0	>		0	0	>		<	31	>		<	40	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	48	-	>		70	-	>		<	-	>		<	-	>		
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	TWSC	LOS	B	A	>	A	A	A	>	A	<	F	>	F	<	F	>	F	E
			Delay	10	0	>	4	8	0	>	0	<	603	>	603	<	119	>	119	41
			V/C	0.32	0.28	>		0.01	0.31	>		<	1.56	>		<	1.11	>		0.74
			Q	10	0	>		0	0	>		<	38	>		<	108	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	50	-	>		70	-	>		<	-	>		<	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TWSC - Two-Way Stop Control
< / > - Shared with through movement

Ten-Year Horizon (2036)

- Northbound approach is forecast to operate at LOS E or F during the weekday AM, weekday PM, and Saturday peak hours and exceed capacity (v/c ratio over 1.00) during the weekday PM and Saturday peak hours.
- Southbound approach is forecast to operate at LOS F and v/c of 1.11 during the Saturday peak hour.

Forecast traffic growth will further exacerbate the delay currently experienced by northbound and southbound shared movements exiting Turner Street during peak periods. With fewer available gaps for turning and crossing manoeuvres, the delay for side street traffic is projected to escalate to unacceptable levels for waiting motorists. A change in intersection traffic control would likely help resolve these critical movements.

3.3 Traffic Signal Warrant

A traffic signal warrant analysis was completed for the subject intersection under future conditions. In this case, Justification 7 – Projected Volumes must be fulfilled for traffic signal installation to be justified based on the criteria set out in OTM Book 12 – Traffic Signals[10]. Using this justification, the calculation can be based on average hourly traffic volumes instead of eight-hour projections, with the following criteria applied to determine the merit of installing signals:

- **Case 1: Traffic Signals Certainly Warranted** – The suggested threshold for this condition is meeting 200% or more of Justification 1 or Justification 2 (see **Section 2.5** for justification criteria).
- **Case 2: Traffic Signals Might be Warranted** – This condition falls between Cases 1 and 3, so somewhere between 100% and 199% of Justification 1 or Justification 2.
- **Case 3: Traffic Signals Unlikely Warranted** – This condition meets less than 100% of Justification 1 or Justification 2.

[10] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12 – Traffic Signals*, July 2024, p. 125-127.

Table 3.2 and **Table 3.3** summarize the calculations by horizon year for the weekday AM and weekday PM peak hours, and Saturday peak hour, respectively, based on future volumes. The subject intersection would not warrant traffic signals based on forecast weekday AM and weekday PM peak hour volumes but might warrant signalization under projected Saturday peak hour conditions for all three horizons as the Justification 1B fulfilments fall between 100% and 199%. **Appendix F** contains the detailed calculations.

TABLE 3.2: TRAFFIC SIGNAL WARRANT SUMMARY – FUTURE WEEKDAY CONDITIONS WITH CURRENT INTERSECTION CONFIGURATION

Horizon Year	Justification 7			
	Justification 1		Justification 2	
	1A	1B	2A	2B
Opening Year (2026)	69%	82%	53%	21%
Five-Year Horizon (2031)	72%	87%	56%	22%
Ten-Year Horizon (2036)	76%	91%	59%	23%

TABLE 3.3: TRAFFIC SIGNAL WARRANT SUMMARY – FUTURE SATURDAY CONDITIONS WITH CURRENT INTERSECTION CONFIGURATION

Horizon Year	Justification 7			
	Justification 1		Justification 2	
	1A	1B	2A	2B
Opening Year (2026)	82%	101%	63%	31%
Five-Year Horizon (2031)	86%	106%	66%	33%
Ten-Year Horizon (2036)	90%	112%	69%	34%

Note that the subject intersection would meet the threshold for signalization for all three horizon years if the warrant calculation used eight-hour projections derived from applying the 1.0% compounded per annum growth rate to existing traffic volumes.

4 Traffic Control Alternatives

4.1 Description and Preliminary Assessment

The assessment considered two potential solutions to the safety and operational concerns noted at the subject intersection:

- Single-Lane Roundabout (Alternative 1)
- Traffic Signal Control (Alternative 2)

Other alternatives, such as the installation of all-way stop control or construction of a grade-separation, were considered ineffective, infeasible, or inappropriate due to efficacy, cost, property, implementation, and/or other factors and challenges and not carried forward for assessment.

4.1.1 Alternative 1 – Single-Lane Roundabout

The MTO *General Guidelines for the Preparation of Traffic Impact Studies* [11] recommends consideration of a roundabout as an alternative to traffic signal control at locations meeting the warrants for signal installation, as is the case for the subject intersection under existing and forecast future conditions.

Roundabouts are typically not recommended for implementation under the following circumstances. The subject intersection did not meet any of these conditions.

- Roadway with typical daily volumes greater than 20,000 vehicles per day[12].
- Sections of roadway where circulatory flow between an entry point and the next exit point is greater than 1,800 vehicles per hour.
- Intersections with right-of-way constraints.

A planning-level screening completed using the MTO *Roundabout Feasibility Initial Screening Tool (Version 1.0)* identified the number of lanes required to accommodate forecast traffic volumes. The screening applied the following capacity guidelines:

[11] Ontario Ministry of Transportation, *General Guidelines for the Preparation of Traffic Impact Studies*, March 2023, p22.

[12] The assessment assumed PM peak hour traffic volumes represent about 10 to 12% of the daily volumes.

If entry flow + circulating flow:	Then:
< 1,400 vehicles per hour (vph)	→ Single-lane entry likely sufficient
> 1,400 vph and < 2,200 vph	→ Two-lane entry likely sufficient
> 2,200 vph	→ Consider three-lane entry

Table 4.1 summarizes the screening results based on the ten-year horizon (2036) traffic forecasts, which represent the worst-case (highest volume) scenario. **Appendix G** contains the detailed roundabout screening tool analysis.

TABLE 4.1: ROUNDABOUT SCREENING RESULTS

Intersection Leg	Number of Lanes Required		
	Entry	Circulating	Exit
East	1	1	1
West	1	1	1
North	1	1	1
South	1	1	1

A single-lane roundabout will adequately serve forecast volumes, notwithstanding the recommendation in the Town's Transportation Master Plan for two-lane entries on North Rankin Street (Highway 21)[13].

Appendix H provides the conceptual drawing for Alternative 1.

4.1.2 Alternative 2 – Traffic Signal Control

As noted in **Section 3.3**, future traffic volumes are projected to warrant consideration of traffic signal control at the subject intersection. No site constraints or other considerations would preclude installation or impact the suitability of implementing signals.

Appendix H provides the conceptual drawing for Alternative 2.

4.2 Vehicle Traffic Operations

Future vehicle traffic operations at the subject intersection were analyzed for the two alternative configurations using ARCADY 8 for the single-lane roundabout and Synchro 12 for the traffic signal control. For the signal option, the analysis assumed a:

[13] Town of Saugeen Shores, *Transportation Master Plan*, November 2020, p89.

- semi-actuated timing plan with detectors on the north and south approaches and pedestrian call buttons; and
- 90 second cycle length with an eastbound advanced left-turn phase.

The analysis applied the same methodology, criteria, assumptions, and forecast traffic volumes for the three horizon years as the future conditions review with the current intersection configuration in **Section 3.2**.

Table 4.2 and **Table 4.3** summarize future vehicle traffic operations for the single-lane roundabout and traffic signal control alternatives, respectively, during the weekday AM, weekday PM, and Saturday peak hours based on forecast volumes. The tables report the measures of effectiveness and highlight any critical movements or approaches for each horizon year. **Appendix I** provides the detailed ARCADY reports. **Appendix J** contains the detailed Synchro reports.

The subject intersection is projected to operate with acceptable levels of service (LOS D or better) and within capacity (v/c ratio of less than 0.85) for all three horizon years with both traffic control alternatives (i.e., no critical movements are expected). The only exception is the eastbound left-turn movement for the traffic signal control alternative during the weekday PM peak hour in the ten-year horizon (2036). However, this is not considered critical as the minor queue exceedance could be accommodated within the existing 95-metre taper provision without blocking or impeding the adjacent travel lane.

Table 4.4 compares the overall intersection operations for Alternative 1 and Alternative 2 from a LOS and average vehicle delay perspective. Alternative 1 offers a discernable advantage over Alternative 2 with both performance metrics. The intersection is anticipated to operate at a LOS A during all three peak hours through the ten-year horizon (2036) with a roundabout configuration. Additionally, the average delay per vehicle is projected to be less than seven seconds. In contrast, the intersection is anticipated to operate at LOS B or C under traffic signal control into the future, with an average delay per vehicle close to 20 seconds.

TABLE 4.2: TRAFFIC OPERATIONS SUMMARY – FUTURE CONDITIONS WITH SINGLE-LANE ROUNDABOUT (ALTERNATIVE 1)

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach				
				East-bound	West-bound	North-bound	South-bound	Overall
Opening Year Horizon								
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 4 0.33 1	A 4 0.26 <1	A 3 0.02 <1	A 4 0.23 <1	**A** **4**
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 6 0.58 2	A 5 0.39 <1	A 4 0.03 <1	A 4 0.24 <1	**A** **6**
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 6 0.54 1	A 5 0.42 <1	A 4 0.04 <1	A 5 0.30 <1	**A** **5**
Five-Year Horizon								
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 4 0.35 1	A 4 0.27 <1	A 3 0.02 <1	A 4 0.24 <1	**A** **4**
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 7 0.61 2	A 5 0.41 <1	A 4 0.03 <1	A 5 0.25 <1	**A** **6**
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 6 0.57 1	A 6 0.44 <1	A 4 0.04 <1	A 5 0.32 1	**A** **6**
Ten-Year Horizon								
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 4 0.37 <1	A 4 0.29 <1	A 3 0.02 <1	A 4 0.26 <1	**A** **4**
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 8 0.64 3	A 6 0.44 <1	A 4 0.04 <1	A 5 0.27 1	**A** **6**
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	RBT	LOS Delay V/C Q	A 7 0.60 2	A 6 0.47 <1	A 4 0.04 <1	A 5 0.34 1	**A** **6**

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length (m)
V/C - Volume to Capacity Ratio
RBT - Roundabout

TABLE 4.3: TRAFFIC OPERATIONS SUMMARY – FUTURE CONDITIONS WITH TRAFFIC SIGNAL CONTROL (ALTERNATIVE 2)

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
Opening Year																				
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	B	>	B	C	C	>	C	<	B	>	B	<	B	>	B	B
			Delay	13	13	>	13	20	30	>	30	<	12	>	12	<	14	>	14	18
			V/C	0.38	0.35	>		0.01	0.72	>		<	0.03	>		<	0.18	>		0.39
			Q	21	38	>		2	66	>		<	6	>		<	17	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	39	-	>		68	-	>		<	-	>		<	-	>		
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	A	>	B	B	C	>	C	<	B	>	B	<	C	>	C	B
			Delay	13	8	>	10	18	32	>	32	<	19	>	19	<	20	>	20	18
			V/C	0.63	0.40	>		0.00	0.80	>		<	0.06	>		<	0.18	>		0.54
			Q	48	40	>		1	90	>		<	10	>		<	20	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	12	-	>		69	-	>		<	-	>		<	-	>		
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	A	>	B	B	C	>	C	<	B	>	B	<	C	>	C	B
			Delay	13	8	>	10	17	31	>	31	<	19	>	19	<	21	>	21	19
			V/C	0.60	0.37	>		0.02	0.81	>		<	0.06	>		<	0.25	>		0.56
			Q	42	38	>		3	95	>		<	11	>		<	26	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	18	-	>		67	-	>		<	-	>		<	-	>		
Five-Year Horizon																				
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	B	>	B	C	C	>	C	<	B	>	B	<	B	>	B	B
			Delay	13	13	>	13	20	31	>	31	<	13	>	13	<	14	>	14	19
			V/C	0.40	0.36	>		0.01	0.73	>		<	0.03	>		<	0.19	>		0.40
			Q	22	40	>		2	70	>		<	7	>		<	18	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	38	-	>		68	-	>		<	-	>		<	-	>		
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	A	>	B	B	C	>	C	<	C	>	C	<	C	>	C	B
			Delay	16	8	>	11	18	32	>	32	<	20	>	20	<	22	>	22	19
			V/C	0.66	0.41	>		0.00	0.81	>		<	0.07	>		<	0.19	>		0.56
			Q	56	43	>		1	95	>		<	10	>		<	21	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	4	-	>		69	-	>		<	-	>		<	-	>		
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	A	>	B	B	C	>	C	<	B	>	B	<	C	>	C	B
			Delay	15	8	>	11	17	32	>	32	<	20	>	20	<	22	>	22	20
			V/C	0.64	0.39	>		0.02	0.82	>		<	0.07	>		<	0.26	>		0.59
			Q	49	41	>		3	100	>		<	12	>		<	27	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	11	-	>		67	-	>		<	-	>		<	-	>		
Ten-Year Horizon																				
AM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	B	>	B	C	C	>	C	<	B	>	B	<	B	>	B	B
			Delay	14	13	>	13	20	31	>	31	<	13	>	13	<	15	>	15	19
			V/C	0.43	0.37	>		0.01	0.75	>		<	0.03	>		<	0.20	>		0.42
			Q	23	42	>		2	74	>		<	7	>		<	19	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	37	-	>		68	-	>		<	-	>		<	-	>		
PM Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	A	>	B	B	C	>	C	<	C	>	C	<	C	>	C	C
			Delay	19	8	>	13	18	33	>	33	<	21	>	21	<	22	>	22	21
			V/C	0.71	0.42	>		0.00	0.83	>		<	0.07	>		<	0.20	>		0.59
			Q	64	45	>		1	101	>		<	11	>		<	22	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	-4	-	>		69	-	>		<	-	>		<	-	>		
Sat Peak Hour	Turner Street & North Rankin Street (Highway 21)	TCS	LOS	B	A	>	B	B	C	>	C	<	C	>	C	<	C	>	C	C
			Delay	19	8	>	13	17	34	>	33	<	21	>	21	<	23	>	23	21
			V/C	0.68	0.40	>		0.03	0.84	>		<	0.08	>		<	0.27	>		0.61
			Q	57	44	>		3	107	>		<	12	>		<	28	>		
			Stor.	60	-	>		70	-	>		<	-	>		<	-	>		
			Avail.	3	-	>		67	-	>		<	-	>		<	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
Q - 95th Percentile Queue Length (m)
Stor. - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
< / > - Shared with through movement

TABLE 4.4: INTERSECTION TRAFFIC OPERATIONS COMPARISON FOR ALTERNATIVE INTERSECTION CONFIGURATIONS

Horizon	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday Peak Hour	
	Alt. 1 (SL RBT)	Alt. 2 (TSC)	Alt. 1 (SL RBT)	Alt. 2 (TSC)	Alt. 1 (SL RBT)	Alt. 2 (TSC)
Level of Service (LOS)						
Opening Year (2026)	A	B	A	B	A	B
Five-year Horizon (2031)	A	B	A	B	A	B
Ten-year Horizon (2036)	A	B	A	C	A	C
Average Delay per Vehicle (s)						
Opening Year (2026)	4	18	6	18	5	19
Five-year Horizon (2031)	4	19	6	19	6	20
Ten-year Horizon (2036)	4	19	6	21	6	21

4.3 Active Transportation Considerations

As per the Transportation Association of Canada (TAC) *Canadian Roundabout Design Guide*[14], roundabouts generally provide a safer environment for pedestrians compared to signalized and two-way stop-controlled intersections because:

- roundabouts create slower vehicle speeds and two shorter crossings of one-way traffic;
- the number of pedestrian/vehicle conflict points for a single-lane roundabout is reduced from four to two per crosswalk compared to a signalized intersection; and
- compared to two-way stop-controlled intersections, roundabouts typically make it easier and safer for pedestrians to cross a major street, as pedestrians only need to consider traffic moving in one direction at a time.

That said, roundabouts provide different challenges such as continual movement of traffic and the difficulty pedestrians can have judging gaps in an oncoming vehicle stream. This level of perception is especially difficult for children, the elderly, and persons with disabilities. These individuals generally prefer larger gaps in the traffic stream and walk at slower speeds than other pedestrians. In such contexts, traffic signal control (Alternative 2) may be perceived as a safer and more conducive option due to the provision of a controlled crossing location.

As per the TAC *Canadian Roundabout Design Guide*[15], roundabouts are also generally safe for cyclists, as the design of a roundabout reduces vehicle speeds to a rate that is more compatible with typical on-road cyclist speeds. Additionally, single-lane roundabouts provide a reduction in conflict points for cyclists (like pedestrians), compared to a conventional signalized intersection.

Table 4.5 summarizes the active transportation considerations for each alternative (Do Nothing, Single-Lane Roundabout (Alternative 1), and Traffic Signal Control (Alternative 2)).

[14] Transportation Association of Canada, *Canadian Roundabout Design Guide*, January 2017, p. 20-21.
[15] Transportation Association of Canada, *Canadian Roundabout Design Guide*, January 2017, p. 23-24.

TABLE 4.5: ACTIVE TRANSPORTATION CONSIDERATIONS

Active Transportation Consideration	Do Nothing	Alternative 1 (Single-Lane Roundabout)	Alternative 2 (Traffic Signal Control)
Vehicle Speeds on Major Road	Free flow	Reduced speeds	Controlled by traffic signals
Crossing distance	As existing	Two (2) shorter crossings of one-way traffic	As existing
Pedestrian/ Vehicle Conflict Points	Four (4) per crosswalk	Two (2) per crosswalk	Four (4) per crosswalk
Available Gaps to Cross Major Road	Consider traffic in both directions	Consider traffic in one direction at a time	Controlled by traffic signals

From an active transportation perspective, a single-lane roundabout would likely provide a safer environment for pedestrians and cyclists compared to the traffic signal control (Alternative 2) and the do nothing scenario.

4.4 Life-Cycle Costs

A life-cycle cost analysis was conducted to compare the relative economic benefit of the single-lane roundabout and traffic signal control alternatives against the ”Do Nothing” option (the base case). The analysis was completed using the National Cooperative Highway Research Program (NCHRP) spreadsheet-based Life-Cycle Cost Estimating Tool (LCCET), which assesses life-cycle costs for new and existing intersections. The LCCET converts units of various metrics into net present value (NPV) and calculates the benefit-cost ratio of NPV of costs to NPV of benefits[16] for alternative designs.

The life-cycle cost analysis captured the following cost categories:

- Pre-opening costs, which include planning, survey, geometric design, right-of-way land purchase if required, and all construction costs of the reconfiguration.
- Post-opening costs, which include on-going maintenance and operating costs.

[16] National Cooperative Highway Research Program, *Project 03-110 Estimating the Life-Cycle Cost of Intersection Designs*, Transportation Research Board, September 2015.

- Auto passenger time, which comprises the cost of delay as determined from the operational analyses and adjusted to account for typical passenger occupancy. For analysis purposes, an occupancy of 1.1 passengers per vehicle was assumed.
- Truck time, which comprises the cost of delay as determined from the operational analyses. For analysis purposes, an average annual truck percentage of 3.0% was assumed.
- Safety, which captures the cost of collisions by severity.

In calculating the benefit-cost ratio, benefits were assumed to include reductions in the auto passenger time, truck time, and safety costs relative to the base case.

The data input for the life-cycle cost analysis included the following items:

- **Projected Traffic Demand** – **Table 4.6** summarizes the projected weekday AM, weekday PM, and Saturday peak hour traffic demands for the opening year (2026) and end year (assumed to be the ten-year horizon or 2036) for each alternative.
- **Estimated Costs** – **Table 4.7** summarizes the estimated pre-opening (i.e., planning, design, and construction) costs for each alternative. **Table 4.8** summarizes the estimated post-opening (i.e., operating and maintenance) costs and the frequency at which each cost reoccurs. The existing two-way stop control served as the base case (Do Nothing) for comparison.

  GEI Consultants provided the pre-opening costs for the single-lane roundabout option based on the high-level conceptual designs shown in **Appendix H**. All other costs were adapted from the *Railway Street (Highway 21) and McNabb Street Intersection Control Study* (February 2024)[17]. Note that these costs provide order of magnitude estimates for comparative analysis purposes. Actual costs will vary (and likely be higher) once detailed design is complete.
- **Projected Traffic Delay** – **Table 4.9** summarizes the projected weekday AM, weekday PM, and Saturday peak hour traffic delays for each alternative. The values represent overall average delay per vehicle at the subject intersection in seconds.

[17] Paradigm Transportation Solutions Limited, *Railway Street (Highway 21) and McNabb Street Intersection Control Study (Revised)*, February 09, 2024.

- **Projected Collision Frequency** – **Table 4.10** summarizes the projected collision frequency for each alternative. The collision frequencies were calculated using the rates-based methodology developed by the Region of Waterloo[18], which projects the number of collisions based on the forecast traffic volumes. Collisions frequency in the opening year and end year were considered by severity, namely, fatality, injury, and property damage only.

Results

Table 4.11 and **Table 4.12** summarize the net present value of total costs and benefit-cost ratio calculation, respectively, over the ten-year study horizon (2026-2036) based on the available information. The existing two-way stop control served as the base case (Do Nothing) for comparison. **Appendix K** contains the detailed LCCET worksheets.

The NPV of total costs for the single-lane roundabout (Alternative 1) is the lowest compared to the traffic signal control (Alternative 2) and base case (Do Nothing). This is attributed to significant cost savings related to safety and auto passenger and truck times. While the pre-opening cost for the single-lane roundabout option is the highest, the longer-term collision reduction and travel time benefits help offset the more significant upfront construction cost.

Overall, the life-cycle cost analysis indicates that the single-lane roundabout (Alternative 1) provides the lowest NPV of total costs and offers a higher benefit-cost ratio compared to traffic signal control (Alternative 2) and the base case (Do Nothing).

[18] Region of Waterloo, *Collision Estimation and Cost Calculation*, October 2014.

TABLE 4.6: PROJECTED TRAFFIC DEMAND FOR LIFE-CYCLE COST ANALYSIS

Horizon Year	Weekday AM Peak Hour (vph)	Weekday PM Peak Hour (vph)	Saturday Peak Hour (vph)
Opening Year (2026)	1,012	1,467	1,472
End Year (2036)	1,122	1,622	1,625

TABLE 4.7: ESTIMATED PRE-OPENING COSTS FOR LIFE-CYCLE COST ANALYSIS

Cost Category	Do Nothing	Alternative 1 (Single-Lane Roundabout)	Alternative 2 (Traffic Signal Control)
Planning and Design	-	$137,500	$55,000
Right-of-Way Acquisition	-	-	-
Utilities	-	$185,500	-
Construction	-	$1,190,000	$350,000

TABLE 4.8: ESTIMATED POST-OPENING COSTS FOR LIFE-CYCLE COST ANALYSIS

Cost Category	Do Nothing		Alternative 1 (Single-Lane Roundabout)		Alternative 2 (Traffic Signal Control)	
	Cost	Frequency (years)	Cost	Frequency (years)	Cost	Frequency (years)
Streetlighting	$600	1	$2,500	1	$1,500	1
Pavement Markings	$5,500	1	$6,000	1	$7,000	1
Signage	$600	5	$8,500	5	$600	5
Repaving	$125,000	10	$115,000	10	$125,000	10
Landscaping	-	-	$1,500	1	-	-
Power for Traffic Control Signals (TCS)	-	-	-	-	$1,500	1
TCS Equipment Inspection and Maintenance	-	-	-	-	$3,000	1
TCS Retiming and Analysis	-	-	-	-	$5,000	5
TCS Controller Replacement	-	-	-	-	$10,000	10

TABLE 4.9: PROJECTED TRAFFIC DELAYS FOR LIFE-CYCLE COST ANALYSIS

Alternative	Opening Year (2026)			End Year (2036)		
	Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
Do Nothing	6	11	17	7	19	41
Alternative 1 (Single-Lane Roundabout)	4	6	5	4	6	6
Alternative 2 (Traffic Signal Control)	18	18	19	19	21	21

TABLE 4.10: PROJECTED COLLISION FREQUENCIES FOR LIFE-CYCLE COST ANALYSIS

Alternative	Opening Year (2026)			End Year (2036)		
	Fatality	Injury	PDO[1]	Fatality	Injury	PDO[1]
Do Nothing	0.16	0.13	0.32	0.18	0.14	0.35
Alternative 1 (Single-Lane Roundabout)	0.01	0.19	4.97	0.01	0.21	5.50
Alternative 2 (Traffic Signal Control)	0.04	0.76	2.49	0.05	0.85	2.75

Notes:

1. PDO = Property Damage Only

TABLE 4.11: LIFE-CYCLE COST SUMMARY – NET PRESENT VALUE OF TOTAL COSTS

Cost Component	Net Present Value ($ 000's)		
	Do Nothing (Base Case)	Alternative 1 (Single-Lane Roundabout)	Alternative 2 (Traffic Signal Control)
Pre-Opening Costs	$ -	$1,513	$405
Post-Opening Costs	$152	$195	$233
Auto Passenger Time	$3,603	$1,675	$7,543
Truck Time	$201	$93	$421
Safety	$3,591	$893	$1,788
TOTAL	**$7,547**	**$4,369**	**$10,390**

TABLE 4.12: LIFE-CYCLE COST SUMMARY – BENEFIT-COST RATIO

Element	Net Present Value ($ 000's)		
	Do Nothing (Base Case)	Alternative 1 (Single-Lane Roundabout)	Alternative 2 (Traffic Signal Control)
Total Costs	$7,547	$4,369	$10,390
Benefits Relative to Base Case[1]	n/a	$4,733	- $2,358
Costs Relative to Base Case[2]	n/a	$1,555	$486
BENEFIT-COST RATIO	**n/a**	**3.04**	**-4.85**

Notes:

1. Calculated as the reduction in costs for auto passenger time, truck time, and safety.
2. Calculated as the increase in pre- and post-opening costs.

4.5 Findings

Based on the vehicle traffic operations (in **Section 4.2**) and life-cycle cost (in **Section 4.3**) analyses, it is found that:

- the single-lane roundabout (Alternative 1) offers better traffic operational performance with higher LOS and lower average vehicle delays compared to traffic signal control (Alternative 2); and
- implementing the single-lane roundabout (Alternative 1) will involve higher pre-opening costs but offer lower life-cycle costs compared to traffic signal control (Alternative 2).

On this basis, a single-lane roundabout (Alternative 1) is preferred to traffic signal control (Alternative 2) and offers advantages over doing nothing at the subject intersection.

5 Conclusions and Recommendations

5.1 Conclusions

The conclusions of the **North Rankin Street (Highway 21) and Turner Street Intersection Control Study** are as follows:

Existing Conditions

- The subject intersection has experienced a total of 13 reported collisions over the past five years. Most (nine or 70%) resulted in property damage only, while the remaining four collisions resulted in non-fatal injuries. No fatal collisions were reported.
- The subject intersection currently operates with acceptable levels of service (LOS D or better) and well within capacity (v/c ratio of less than 0.85) during the weekday AM, weekday PM, and Saturday peak hours, except for the northbound and southbound approaches. These shared left/through/right movements experience considerable delay during the weekday PM and/or Saturday peak hours due to the relatively high volume of traffic traveling along North Rankin Street (Highway 21).
- The subject intersection meets the warrants for installing traffic signals set out in Ontario Traffic Manual (OTM) Book 12 – Traffic Signals based on current volumes.

Future Conditions with Current Intersection Configuration

- The subject intersection is expected to continue operating with acceptable levels of service and within capacity to the year 2036, accounting for a conservative estimate of generalized background traffic growth (i.e., 1.0% per annum growth rate). The exceptions include the previously identified critical northbound and southbound approaches under existing conditions. These shared left/through/right movements are expected to experience worsening operations and exceed capacity (v/c ratio over 1.00) by 2031. A change in intersection traffic control would likely help resolve these critical movements.
- The subject intersection might be warranted for traffic signals according to Ontario Traffic Manual (OTM) Book 12 – Traffic Signals based on forecast 2026, 2031, and 2036 Saturday peak hour traffic volumes.

Traffic Control Alternatives

- The study considered two potential solutions to the safety and operational concerns noted at the subject intersection: Single-Lane Roundabout (Alternative 1) and Traffic Signal Control (Alternative 2). Other alternatives, such as the installation of all-way stop control or construction of a grade-separation, were considered ineffective, infeasible, or inappropriate due to efficacy, cost, property, implementation, and/or other factors and challenges and not carried forward for assessment.
- The subject intersection is projected to operate with acceptable levels of service and within capacity for all movements and approaches under all three future horizons with both intersection control alternatives. However, the single-lane roundabout (Alternative 1) offers better traffic operational performance with higher LOS and lower average vehicle delays compared to traffic signal control (Alternative 2). There is also no significant difference from an active transportation perspective, with both alternatives offering advantages.
- The life-cycle cost analysis indicates that the single-lane roundabout (Alternative 1) provides the lowest NPV of total costs and offers a higher benefit-cost ratio compared to traffic signal control (Alternative 2) and the base case (Do Nothing).
- **Based on both vehicle traffic operations and life-cycle cost, a single-lane roundabout (Alternative 1) is preferred to traffic signal control (Alternative 2) and offers advantages over doing nothing at the subject intersection.**

5.2 Recommendations

Based on the conclusions of the **North Rankin Street (Highway 21) and Turner Street Intersection Control Study**, it is recommended that the Town of Saugeen Shores pursue the construction of a single-lane roundabout at the subject intersection, as this solution is preferred to traffic signal control and offers advantages to doing nothing.

Appendix A

Detailed Traffic Count Data

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Thursday
Site Code: 250497
Start Date: 07/24/2025

Turning Movement Data

Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
6:00 AM	3	9	1	0	0	13	0	24	0	0	0	24	0	0	0	0	0	0	0	0	33	0	0	33	70
6:15 AM	8	17	0	0	0	25	0	41	0	0	0	41	0	0	0	0	0	0	1	0	34	0	0	35	101
6:30 AM	19	15	1	0	0	35	0	29	0	0	0	29	0	0	0	0	0	0	2	0	15	0	0	17	81
6:45 AM	19	24	1	0	0	44	0	38	1	0	0	39	1	0	0	0	0	1	1	0	21	0	0	22	106
Hourly Total	49	65	3	0	0	117	0	132	1	0	0	133	1	0	0	0	0	1	4	0	103	0	0	107	358
7:00 AM	18	29	0	0	0	47	1	29	1	0	0	31	1	0	0	0	0	1	0	1	27	0	0	28	107
7:15 AM	15	34	0	0	0	49	1	35	1	0	0	37	2	0	0	0	0	2	0	0	29	0	0	29	117
7:30 AM	13	46	5	0	0	64	0	48	2	0	0	50	1	0	0	0	0	1	0	1	35	0	0	36	151
7:45 AM	23	42	1	0	0	66	0	35	2	0	0	37	1	0	0	0	0	1	1	2	34	0	0	37	141
Hourly Total	69	151	6	0	0	226	2	147	6	0	0	155	5	0	0	0	0	5	1	4	125	0	0	130	516
8:00 AM	21	45	4	0	0	70	0	43	1	0	0	44	1	1	0	0	0	2	1	0	40	0	0	41	157
8:15 AM	32	41	2	0	0	75	0	65	2	0	0	67	3	0	0	0	0	3	0	0	45	0	1	45	190
8:30 AM	25	55	3	0	0	83	0	56	0	0	0	56	4	0	0	0	0	4	0	1	63	0	0	64	207
8:45 AM	25	52	13	0	0	90	0	65	2	0	0	67	3	0	0	0	0	3	0	1	54	0	0	55	215
Hourly Total	103	193	22	0	0	318	0	229	5	0	0	234	11	1	0	0	0	12	1	2	202	0	1	205	769
9:00 AM	25	55	14	0	0	94	0	61	2	0	0	63	4	1	0	0	0	5	2	1	60	0	2	63	225
9:15 AM	30	52	9	0	0	91	0	68	3	0	0	71	3	0	1	0	1	4	1	1	35	0	3	37	203
9:30 AM	42	70	11	0	0	123	1	76	3	0	0	80	2	1	0	0	0	3	0	6	46	0	0	52	258
9:45 AM	39	51	12	0	0	102	0	79	2	0	0	81	4	2	1	0	0	7	2	1	70	0	0	73	263
Hourly Total	136	228	46	0	0	410	1	284	10	0	0	295	13	4	2	0	1	19	5	9	211	0	5	225	949
10:00 AM	45	81	15	0	0	141	1	70	5	0	0	76	5	3	0	0	0	8	1	1	51	0	0	53	278
10:15 AM	38	54	21	0	0	113	0	79	9	0	0	88	4	5	0	0	0	9	2	3	70	0	0	75	285
10:30 AM	48	67	10	0	0	125	0	85	5	0	0	90	4	1	3	0	1	8	3	0	59	0	1	62	285
10:45 AM	55	60	13	0	0	128	0	57	5	0	0	62	3	3	1	0	0	7	0	1	57	0	1	58	255
Hourly Total	186	262	59	0	0	507	1	291	24	0	0	316	16	12	4	0	1	32	6	5	237	0	2	248	1103
11:00 AM	61	73	20	0	0	154	0	74	10	0	0	84	2	3	0	0	0	5	5	3	56	0	0	64	307
11:15 AM	64	65	11	0	0	140	0	92	7	0	0	99	4	2	2	0	0	8	1	2	63	0	0	66	313
11:30 AM	57	66	16	0	1	139	2	98	7	0	0	107	3	1	0	0	0	4	5	3	69	0	0	77	327
11:45 AM	62	69	13	0	0	144	1	98	7	0	0	106	4	2	2	0	0	8	7	4	70	0	1	81	339
Hourly Total	244	273	60	0	1	577	3	362	31	0	0	396	13	8	4	0	0	25	18	12	258	0	1	288	1286
12:00 PM	65	62	12	0	0	139	0	90	6	0	0	96	4	3	1	0	1	8	3	1	58	0	0	62	305
12:15 PM	60	66	23	0	0	149	1	71	8	0	1	80	1	2	3	0	1	6	4	3	80	0	0	87	322
12:30 PM	65	71	11	0	0	147	0	75	7	0	0	82	5	3	1	0	0	9	4	3	69	0	0	76	314
12:45 PM	62	83	11	0	0	156	0	70	5	0	0	75	1	3	0	0	0	4	1	1	50	0	0	52	287
Hourly Total	252	282	57	0	0	591	1	306	26	0	1	333	11	11	5	0	2	27	12	8	257	0	0	277	1228

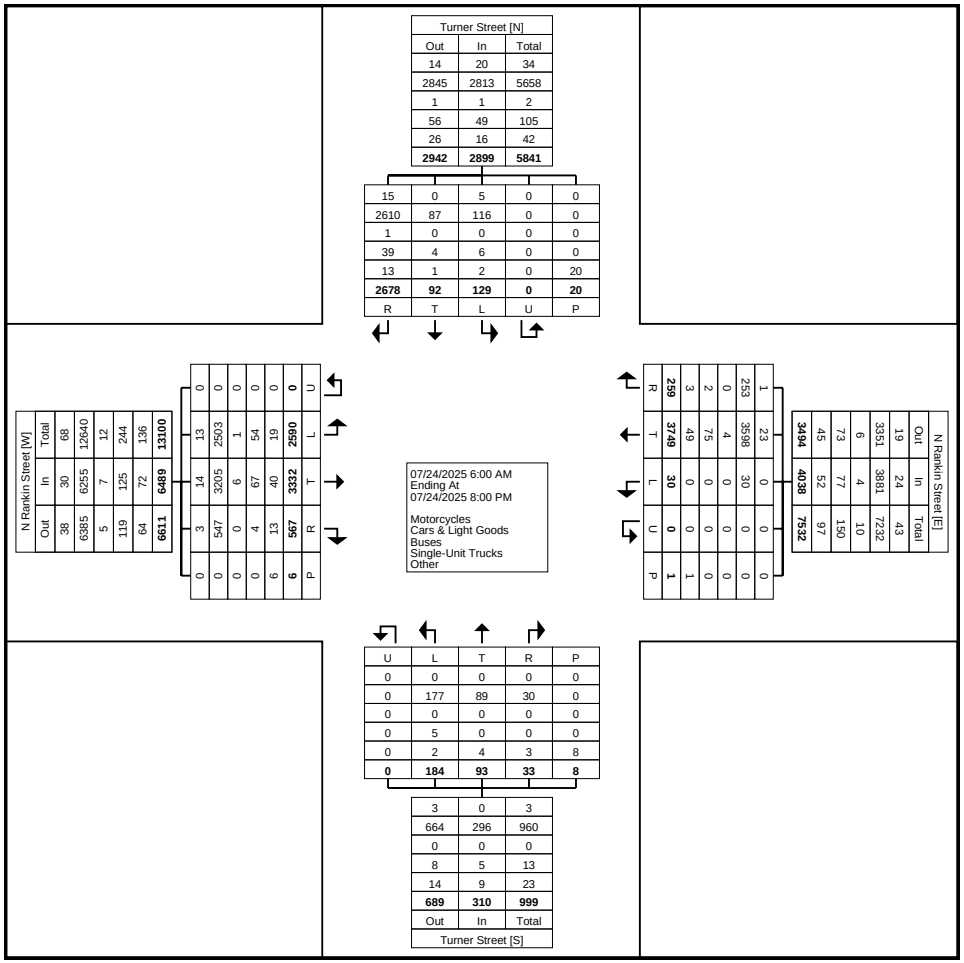
1:00 PM	56	76	22	0	0	154	0	81	7	0	0	88	8	1	2	0	0	11	2	5	44	0	0	51	304
1:15 PM	42	78	17	0	0	137	0	94	7	0	0	101	5	3	0	0	0	8	4	4	44	0	0	52	298
1:30 PM	61	80	16	0	0	157	1	80	7	0	0	88	2	4	0	0	0	6	0	1	47	0	0	48	299
1:45 PM	44	47	16	0	0	107	2	83	10	0	0	95	5	4	1	0	0	10	4	4	41	0	0	49	261
Hourly Total	203	281	71	0	0	555	3	338	31	0	0	372	20	12	3	0	0	35	10	14	176	0	0	200	1162
2:00 PM	63	60	13	0	0	136	2	75	7	0	0	84	1	4	0	0	0	5	0	2	49	0	1	51	276
2:15 PM	63	73	10	0	0	146	1	83	5	0	0	89	1	2	0	0	0	3	0	2	54	0	0	56	294
2:30 PM	67	72	14	0	0	153	1	71	10	0	0	82	4	3	0	0	0	7	5	0	58	0	0	63	305
2:45 PM	52	63	15	0	0	130	0	88	2	0	0	90	2	3	1	0	0	6	2	1	52	0	0	55	281
Hourly Total	245	268	52	0	0	565	4	317	24	0	0	345	8	12	1	0	0	21	7	5	213	0	1	225	1156
3:00 PM	55	71	19	0	4	145	0	70	2	0	0	72	6	4	0	0	2	10	4	4	53	0	0	61	288
3:15 PM	63	68	11	0	0	142	0	72	4	0	0	76	7	3	0	0	0	10	5	1	65	0	0	71	299
3:30 PM	70	67	10	0	0	147	1	88	3	0	0	92	5	1	0	0	0	6	1	1	40	0	0	42	287
3:45 PM	56	62	18	0	0	136	2	56	11	0	0	69	3	2	1	0	0	6	9	1	51	0	1	61	272
Hourly Total	244	268	58	0	4	570	3	286	20	0	0	309	21	10	1	0	2	32	19	7	209	0	1	235	1146
4:00 PM	52	74	18	0	0	144	1	87	7	0	0	95	2	5	0	0	0	7	2	5	57	0	1	64	310
4:15 PM	59	96	15	0	0	170	0	101	5	0	0	106	2	1	2	0	0	5	1	2	52	0	0	55	336
4:30 PM	79	80	17	0	0	176	2	86	5	0	0	93	5	1	2	0	0	8	4	1	57	0	3	62	339
4:45 PM	66	92	13	0	0	171	1	85	4	0	0	90	3	2	2	0	0	7	3	4	46	0	0	53	321
Hourly Total	256	342	63	0	0	661	4	359	21	0	0	384	12	9	6	0	0	27	10	12	212	0	4	234	1306
5:00 PM	58	78	8	0	0	144	2	86	6	0	0	94	5	2	4	0	0	11	3	2	42	0	0	47	296
5:15 PM	88	76	10	0	0	174	1	71	6	0	0	78	8	2	0	0	0	10	4	2	94	0	0	100	362
5:30 PM	60	69	11	0	0	140	1	79	4	0	0	84	3	2	1	0	0	6	1	1	42	0	0	44	274
5:45 PM	55	65	3	0	0	123	0	52	3	0	0	55	4	2	0	0	0	6	5	0	49	0	0	54	238
Hourly Total	261	288	32	0	0	581	4	288	19	0	0	311	20	8	5	0	0	33	13	5	227	0	0	245	1170
6:00 PM	49	90	9	0	1	148	1	53	4	0	0	58	6	1	0	0	2	7	5	3	44	0	0	52	265
6:15 PM	57	55	10	0	0	122	0	58	6	0	0	64	5	3	0	0	0	8	2	2	27	0	1	31	225
6:30 PM	43	52	7	0	0	102	1	57	3	0	0	61	8	2	1	0	0	11	5	0	34	0	0	39	213
6:45 PM	43	51	5	0	0	99	0	54	11	0	0	65	3	0	0	0	0	3	3	1	40	0	1	44	211
Hourly Total	192	248	31	0	1	471	2	222	24	0	0	248	22	6	1	0	2	29	15	6	145	0	2	166	914
7:00 PM	44	51	2	0	0	97	1	61	5	0	0	67	2	0	0	0	0	2	2	2	24	0	1	28	194
7:15 PM	36	46	1	0	0	83	0	40	7	0	0	47	2	0	1	0	0	3	3	0	30	0	1	33	166
7:30 PM	36	39	1	0	0	76	0	53	2	0	0	55	3	0	0	0	0	3	2	0	21	0	0	23	157
7:45 PM	34	47	3	0	0	84	1	34	3	0	0	38	4	0	0	0	0	4	1	1	28	0	1	30	156
Hourly Total	150	183	7	0	0	340	2	188	17	0	0	207	11	0	1	0	0	12	8	3	103	0	3	114	673
Grand Total	2590	3332	567	0	6	6489	30	3749	259	0	1	4038	184	93	33	0	8	310	129	92	2678	0	20	2899	13736
Approach %	39.9	51.3	8.7	0.0	-	-	0.7	92.8	6.4	0.0	-	-	59.4	30.0	10.6	0.0	-	-	4.4	3.2	92.4	0.0	-	-	-
Total %	18.9	24.3	4.1	0.0	-	47.2	0.2	27.3	1.9	0.0	-	29.4	1.3	0.7	0.2	0.0	-	2.3	0.9	0.7	19.5	0.0	-	21.1	-
Motorcycles	13	14	3	0	-	30	0	23	1	0	-	24	0	0	0	0	-	0	5	0	15	0	-	20	74
% Motorcycles	0.5	0.4	0.5	-	-	0.5	0.0	0.6	0.4	-	-	0.6	0.0	0.0	0.0	-	-	0.0	3.9	0.0	0.6	-	-	0.7	0.5
Cars & Light Goods	2503	3205	547	0	-	6255	30	3598	253	0	-	3881	177	89	30	0	-	296	116	87	2610	0	-	2813	13245
% Cars & Light Goods	96.6	96.2	96.5	-	-	96.4	100.0	96.0	97.7	-	-	96.1	96.2	95.7	90.9	-	-	95.5	89.9	94.6	97.5	-	-	97.0	96.4
Buses	1	6	0	0	-	7	0	4	0	0	-	4	0	0	0	0	-	0	0	0	1	0	-	1	12
% Buses	0.0	0.2	0.0	-	-	0.1	0.0	0.1	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Single-Unit Trucks	54	67	4	0	-	125	0	75	2	0	-	77	5	0	0	0	-	5	6	4	39	0	-	49	256
% Single-Unit Trucks	2.1	2.0	0.7	-	-	1.9	0.0	2.0	0.8	-	-	1.9	2.7	0.0	0.0	-	-	1.6	4.7	4.3	1.5	-	-	1.7	1.9
Articulated Trucks	17	32	3	0	-	52	0	40	1	0	-	41	1	0	2	0	-	3	2	0	12	0	-	14	110
% Articulated Trucks	0.7	1.0	0.5	-	-	0.8	0.0	1.1	0.4	-	-	1.0	0.5	0.0	6.1	-	-	1.0	1.6	0.0	0.4	-	-	0.5	0.8
Bicycles on Road	2	8	10	0	-	20	0	9	2	0	-	11	1	4	1	0	-	6	0	1	1	0	-	2	39

% Bicycles on Road	0.1	0.2	1.8	-	-	0.3	0.0	0.2	0.8	-	-	0.3	0.5	4.3	3.0	-	-	1.9	0.0	1.1	0.0	-	-	0.1	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	7	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	100.0	-	-	-	-	-	37.5	-	-	-	-	-	35.0	-	-
Pedestrians	-	-	-	-	6	-	-	-	-	-	0	-	-	-	-	-	5	-	-	-	-	-	13	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	0.0	-	-	-	-	-	62.5	-	-	-	-	-	65.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Thursday
Site Code: 250497
Start Date: 07/24/2025



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Thursday
Site Code: 250497
Start Date: 07/24/2025

Turning Movement Peak Hour Data (4:30 PM)

Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
4:30 PM	79	80	17	0	0	176	2	86	5	0	0	93	5	1	2	0	0	8	4	1	57	0	3	62	339
4:45 PM	66	92	13	0	0	171	1	85	4	0	0	90	3	2	2	0	0	7	3	4	46	0	0	53	321
5:00 PM	58	78	8	0	0	144	2	86	6	0	0	94	5	2	4	0	0	11	3	2	42	0	0	47	296
5:15 PM	88	76	10	0	0	174	1	71	6	0	0	78	8	2	0	0	0	10	4	2	94	0	0	100	362
Total	291	326	48	0	0	665	6	328	21	0	0	355	21	7	8	0	0	36	14	9	239	0	3	262	1318
Approach %	43.8	49.0	7.2	0.0	-	-	1.7	92.4	5.9	0.0	-	-	58.3	19.4	22.2	0.0	-	-	5.3	3.4	91.2	0.0	-	-	-
Total %	22.1	24.7	3.6	0.0	-	50.5	0.5	24.9	1.6	0.0	-	26.9	1.6	0.5	0.6	0.0	-	2.7	1.1	0.7	18.1	0.0	-	19.9	-
PHF	0.827	0.886	0.706	0.000	-	0.945	0.750	0.953	0.875	0.000	-	0.944	0.656	0.875	0.500	0.000	-	0.818	0.875	0.563	0.636	0.000	-	0.655	0.910
Motorcycles	1	1	0	0	-	2	0	2	0	0	-	2	0	0	0	0	-	0	1	0	0	0	-	1	5
% Motorcycles	0.3	0.3	0.0	-	-	0.3	0.0	0.6	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	7.1	0.0	0.0	-	-	0.4	0.4
Cars & Light Goods	280	312	48	0	-	640	6	320	21	0	-	347	21	7	8	0	-	36	12	9	238	0	-	259	1282
% Cars & Light Goods	96.2	95.7	100.0	-	-	96.2	100.0	97.6	100.0	-	-	97.7	100.0	100.0	100.0	-	-	100.0	85.7	100.0	99.6	-	-	98.9	97.3
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	9	9	0	0	-	18	0	2	0	0	-	2	0	0	0	0	-	0	1	0	1	0	-	2	22
% Single-Unit Trucks	3.1	2.8	0.0	-	-	2.7	0.0	0.6	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	7.1	0.0	0.4	-	-	0.8	1.7
Articulated Trucks	1	1	0	0	-	2	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	4
% Articulated Trucks	0.3	0.3	0.0	-	-	0.3	0.0	0.6	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Road	0	3	0	0	-	3	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	5
% Bicycles on Road	0.0	0.9	0.0	-	-	0.5	0.0	0.6	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.4
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
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Count Name: Highway 21 & Turner Street - Thursday
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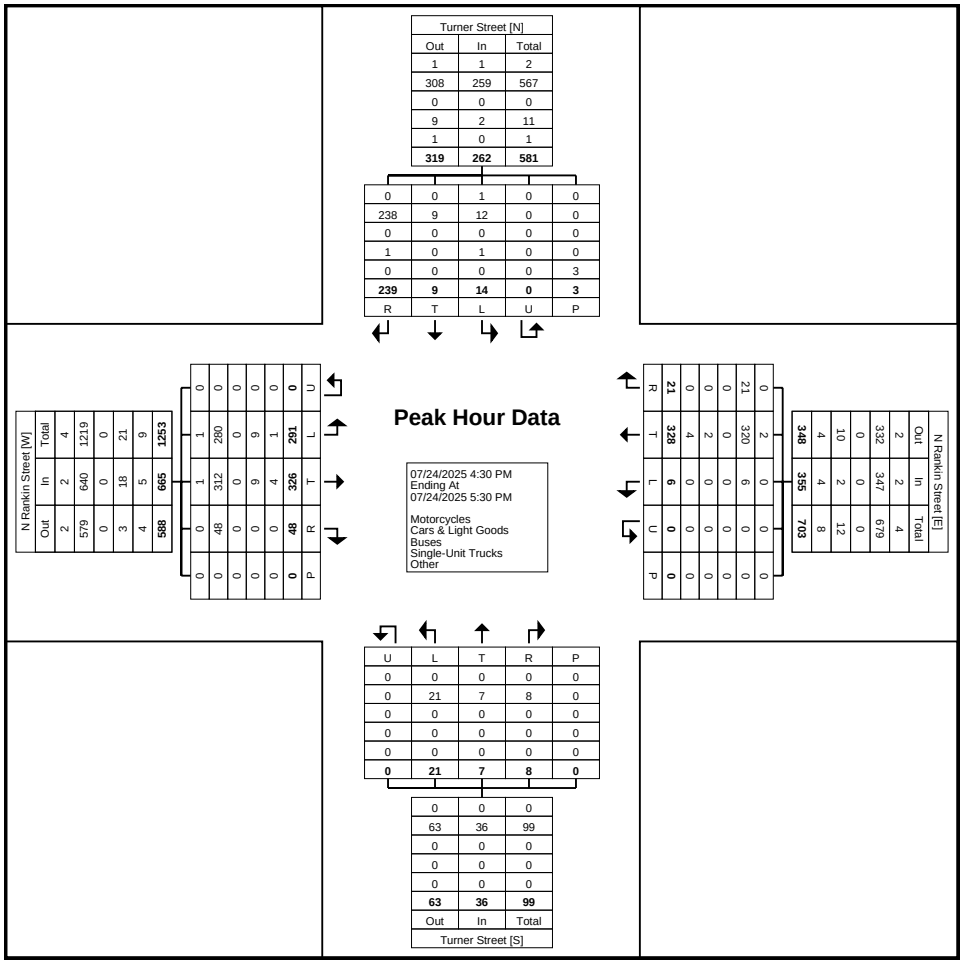
Start Date: 07/24/2025



Turning Movement Peak Hour Data Plot (4:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Friday
Site Code: 250497
Start Date: 07/25/2025

Turning Movement Data

Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
6:00 AM	12	12	0	0	0	24	0	19	0	0	0	19	1	0	0	0	0	1	0	0	14	0	0	14	58
6:15 AM	6	16	1	0	0	23	1	32	0	0	0	33	0	0	0	0	0	0	1	0	22	0	0	23	79
6:30 AM	12	17	1	0	0	30	0	37	0	0	0	37	0	0	0	0	0	0	2	0	17	0	0	19	86
6:45 AM	18	19	1	0	0	38	0	21	0	0	0	21	0	0	0	0	0	0	1	2	13	0	0	16	75
Hourly Total	48	64	3	0	0	115	1	109	0	0	0	110	1	0	0	0	0	1	4	2	66	0	0	72	298
7:00 AM	22	23	0	0	1	45	0	41	1	0	0	42	2	0	0	0	2	2	0	0	20	0	0	20	109
7:15 AM	8	28	1	0	0	37	0	37	1	0	0	38	1	0	0	0	0	1	1	0	33	0	0	34	110
7:30 AM	18	37	0	0	0	55	2	42	0	0	0	44	0	0	0	0	0	0	2	2	44	0	0	48	147
7:45 AM	29	41	3	0	0	73	1	48	2	0	0	51	4	0	0	0	0	4	1	1	34	0	0	36	164
Hourly Total	77	129	4	0	1	210	3	168	4	0	0	175	7	0	0	0	2	7	4	3	131	0	0	138	530
8:00 AM	25	37	3	0	0	65	0	54	0	0	0	54	1	1	0	0	0	2	0	0	36	0	1	36	157
8:15 AM	16	38	12	0	0	66	0	56	0	0	0	56	2	1	0	0	0	3	2	1	54	0	0	57	182
8:30 AM	25	44	9	0	0	78	1	66	0	0	0	67	5	3	0	0	0	8	2	2	45	0	0	49	202
8:45 AM	30	55	6	0	0	91	1	51	1	0	0	53	3	0	2	0	0	5	5	0	49	0	0	54	203
Hourly Total	96	174	30	0	0	300	2	227	1	0	0	230	11	5	2	0	0	18	9	3	184	0	1	196	744
9:00 AM	30	61	8	0	0	99	0	74	1	0	0	75	2	0	0	0	0	2	1	3	52	0	0	56	232
9:15 AM	38	59	7	0	0	104	1	75	7	0	0	83	1	1	2	0	0	4	3	6	58	0	1	67	258
9:30 AM	37	70	5	0	0	112	1	66	5	0	0	72	6	1	1	0	0	8	0	1	57	0	0	58	250
9:45 AM	39	58	11	0	0	108	0	73	3	0	0	76	2	3	2	0	0	7	2	3	68	0	0	73	264
Hourly Total	144	248	31	0	0	423	2	288	16	0	0	306	11	5	5	0	0	21	6	13	235	0	1	254	1004
10:00 AM	55	54	9	0	0	118	0	71	3	0	0	74	3	2	0	0	0	5	2	2	82	0	0	86	283
10:15 AM	54	56	14	0	0	124	1	92	3	0	0	96	1	0	3	0	0	4	1	2	67	0	2	70	294
10:30 AM	58	74	12	0	0	144	1	70	3	0	0	74	4	1	0	0	0	5	1	2	65	0	0	68	291
10:45 AM	59	69	19	0	0	147	1	78	5	0	0	84	2	3	1	0	0	6	4	3	66	0	0	73	310
Hourly Total	226	253	54	0	0	533	3	311	14	0	0	328	10	6	4	0	0	20	8	9	280	0	2	297	1178
11:00 AM	49	75	17	0	0	141	3	80	6	0	0	89	4	4	1	0	0	9	5	3	70	0	0	78	317
11:15 AM	61	52	15	0	0	128	1	95	7	0	0	103	7	0	2	0	0	9	3	2	68	0	2	73	313
11:30 AM	61	66	16	0	0	143	1	86	10	0	0	97	6	1	0	0	0	7	5	4	63	0	0	72	319
11:45 AM	67	79	19	0	0	165	1	60	16	0	0	77	4	3	2	0	0	9	6	0	73	0	1	79	330
Hourly Total	238	272	67	0	0	577	6	321	39	0	0	366	21	8	5	0	0	34	19	9	274	0	3	302	1279
12:00 PM	40	89	17	0	0	146	0	90	8	0	0	98	6	2	1	0	0	9	0	1	76	0	0	77	330
12:15 PM	58	86	14	0	0	158	1	87	7	0	0	95	3	1	3	0	0	7	2	4	60	0	0	66	326
12:30 PM	68	74	22	0	0	164	0	82	12	0	0	94	5	5	2	2	0	14	4	3	63	0	0	70	342
12:45 PM	72	68	14	0	0	154	4	88	10	0	0	102	5	2	2	0	0	9	4	3	68	0	0	75	340
Hourly Total	238	317	67	0	0	622	5	347	37	0	0	389	19	10	8	2	0	39	10	11	267	0	0	288	1338

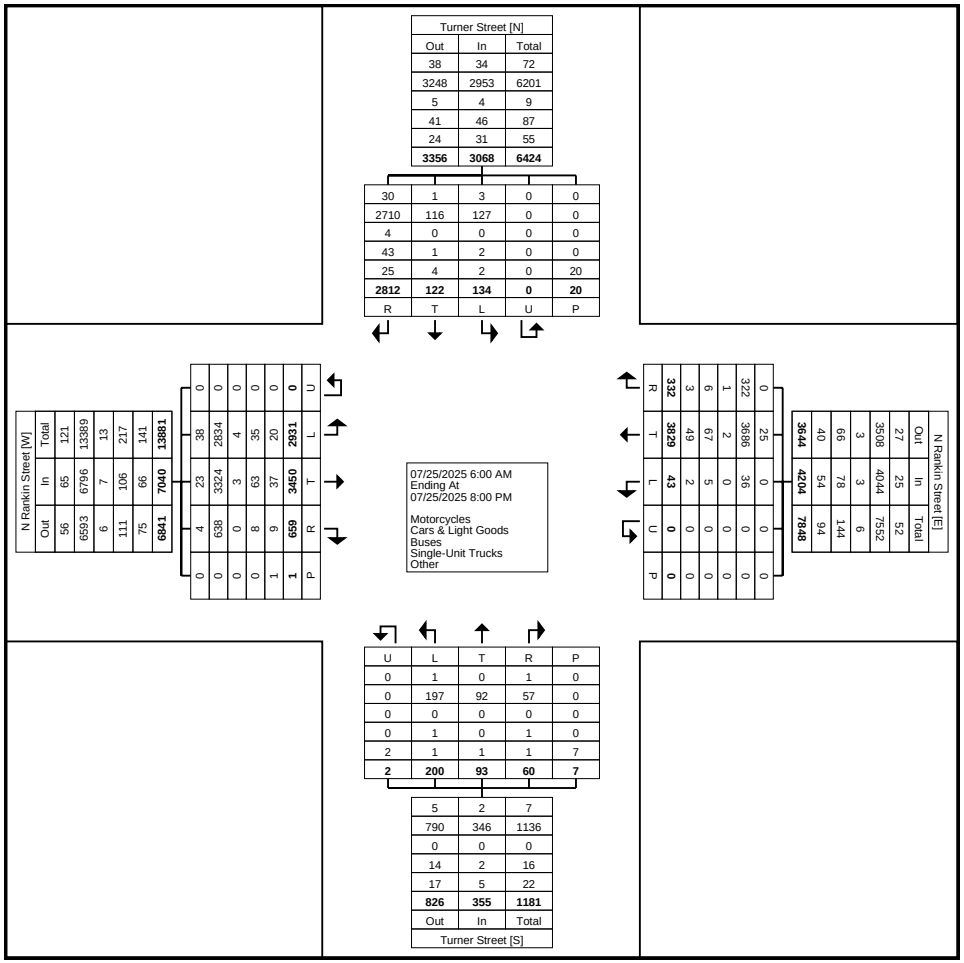
1:00 PM	73	98	7	0	0	178	0	82	8	0	0	90	5	0	3	0	0	8	6	2	57	0	0	65	341
1:15 PM	68	78	24	0	0	170	2	63	8	0	0	73	4	2	1	0	0	7	4	3	52	0	1	59	309
1:30 PM	69	77	24	0	0	170	2	81	10	0	0	93	3	2	2	0	0	7	6	1	63	0	0	70	340
1:45 PM	68	57	16	0	0	141	1	81	13	0	0	95	0	3	1	0	0	4	1	3	68	0	0	72	312
Hourly Total	278	310	71	0	0	659	5	307	39	0	0	351	12	7	7	0	0	26	17	9	240	0	1	266	1302
2:00 PM	80	89	17	0	0	186	1	96	10	0	0	107	9	0	3	0	1	12	2	0	62	0	0	64	369
2:15 PM	66	98	20	0	0	184	0	93	10	0	0	103	3	2	2	0	0	7	2	4	70	0	1	76	370
2:30 PM	101	83	17	0	0	201	0	99	12	0	0	111	6	0	0	0	0	6	1	0	59	0	0	60	378
2:45 PM	78	83	16	0	0	177	0	93	12	0	0	105	3	0	0	0	2	3	0	2	49	0	1	51	336
Hourly Total	325	353	70	0	0	748	1	381	44	0	0	426	21	2	5	0	3	28	5	6	240	0	2	251	1453
3:00 PM	63	88	24	0	0	175	0	82	6	0	0	88	2	2	2	0	0	6	6	3	53	0	1	62	331
3:15 PM	80	94	15	0	0	189	3	87	11	0	0	101	2	7	0	0	0	9	3	3	50	0	0	56	355
3:30 PM	74	82	20	0	0	176	1	74	7	0	0	82	5	0	0	0	0	5	4	2	60	0	0	66	329
3:45 PM	56	80	18	0	0	154	0	82	4	0	0	86	4	1	1	0	0	6	1	0	56	0	0	57	303
Hourly Total	273	344	77	0	0	694	4	325	28	0	0	357	13	10	3	0	0	26	14	8	219	0	1	241	1318
4:00 PM	78	83	16	0	0	177	2	79	15	0	0	96	2	3	5	0	2	10	4	1	40	0	0	45	328
4:15 PM	66	71	13	0	0	150	1	75	10	0	0	86	6	2	1	0	0	9	2	3	55	0	1	60	305
4:30 PM	62	67	13	0	0	142	0	98	9	0	0	107	4	4	3	0	0	11	6	2	49	0	1	57	317
4:45 PM	69	84	16	0	0	169	1	81	9	0	0	91	2	0	1	0	0	3	0	2	48	0	1	50	313
Hourly Total	275	305	58	0	0	638	4	333	43	0	0	380	14	9	10	0	2	33	12	8	192	0	3	212	1263
5:00 PM	88	84	19	0	0	191	2	71	8	0	0	81	9	0	4	0	0	13	4	2	49	0	2	55	340
5:15 PM	57	69	16	0	0	142	2	72	6	0	0	80	8	2	0	0	0	10	2	6	58	0	1	66	298
5:30 PM	63	63	14	0	0	140	1	61	9	0	0	71	5	5	1	0	0	11	1	2	44	0	2	47	269
5:45 PM	60	71	9	0	0	140	1	69	10	0	0	80	3	3	1	0	0	7	4	5	37	0	0	46	273
Hourly Total	268	287	58	0	0	613	6	273	33	0	0	312	25	10	6	0	0	41	11	15	188	0	5	214	1180
6:00 PM	74	71	12	0	0	157	0	51	4	0	0	55	3	6	2	0	0	11	1	1	32	0	0	34	257
6:15 PM	71	43	1	0	0	115	0	70	6	0	0	76	1	2	1	0	0	4	2	8	25	0	0	35	230
6:30 PM	57	51	17	0	0	125	0	49	3	0	0	52	1	4	0	0	0	5	4	4	51	0	0	59	241
6:45 PM	48	45	12	0	0	105	0	57	9	0	0	66	6	1	1	0	0	8	6	2	50	0	0	58	237
Hourly Total	250	210	42	0	0	502	0	227	22	0	0	249	11	13	4	0	0	28	13	15	158	0	0	186	965
7:00 PM	52	50	12	0	0	114	1	46	3	0	0	50	5	1	1	0	0	7	0	4	37	0	1	41	212
7:15 PM	45	51	4	0	0	100	0	76	4	0	0	80	6	5	0	0	0	11	2	2	37	0	0	41	232
7:30 PM	55	36	7	0	0	98	0	31	3	0	0	34	6	1	0	0	0	7	0	5	32	0	0	37	176
7:45 PM	43	47	4	0	0	94	0	59	2	0	0	61	7	1	0	0	0	8	0	0	32	0	0	32	195
Hourly Total	195	184	27	0	0	406	1	212	12	0	0	225	24	8	1	0	0	33	2	11	138	0	1	151	815
Grand Total	2931	3450	659	0	1	7040	43	3829	332	0	0	4204	200	93	60	2	7	355	134	122	2812	0	20	3068	14667
Approach %	41.6	49.0	9.4	0.0	-	-	1.0	91.1	7.9	0.0	-	-	56.3	26.2	16.9	0.6	-	-	4.4	4.0	91.7	0.0	-	-	-
Total %	20.0	23.5	4.5	0.0	-	48.0	0.3	26.1	2.3	0.0	-	28.7	1.4	0.6	0.4	0.0	-	2.4	0.9	0.8	19.2	0.0	-	20.9	-
Motorcycles	38	23	4	0	-	65	0	25	0	0	-	25	1	0	1	0	-	2	3	1	30	0	-	34	126
% Motorcycles	1.3	0.7	0.6	-	-	0.9	0.0	0.7	0.0	-	-	0.6	0.5	0.0	1.7	0.0	-	0.6	2.2	0.8	1.1	-	-	1.1	0.9
Cars & Light Goods	2834	3324	638	0	-	6796	36	3686	322	0	-	4044	197	92	57	0	-	346	127	116	2710	0	-	2953	14139
% Cars & Light Goods	96.7	96.3	96.8	-	-	96.5	83.7	96.3	97.0	-	-	96.2	98.5	98.9	95.0	0.0	-	97.5	94.8	95.1	96.4	-	-	96.3	96.4
Buses	4	3	0	0	-	7	0	2	1	0	-	3	0	0	0	0	-	0	0	0	4	0	-	4	14
% Buses	0.1	0.1	0.0	-	-	0.1	0.0	0.1	0.3	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.1	-	-	0.1	0.1
Single-Unit Trucks	35	63	8	0	-	106	5	67	6	0	-	78	1	0	1	0	-	2	2	1	43	0	-	46	232
% Single-Unit Trucks	1.2	1.8	1.2	-	-	1.5	11.6	1.7	1.8	-	-	1.9	0.5	0.0	1.7	0.0	-	0.6	1.5	0.8	1.5	-	-	1.5	1.6
Articulated Trucks	16	25	0	0	-	41	1	27	3	0	-	31	0	0	0	0	-	0	2	1	22	0	-	25	97
% Articulated Trucks	0.5	0.7	0.0	-	-	0.6	2.3	0.7	0.9	-	-	0.7	0.0	0.0	0.0	0.0	-	0.0	1.5	0.8	0.8	-	-	0.8	0.7
Bicycles on Road	4	12	9	0	-	25	1	22	0	0	-	23	1	1	1	2	-	5	0	3	3	0	-	6	59

% Bicycles on Road	0.1	0.3	1.4	-	-	0.4	2.3	0.6	0.0	-	-	0.5	0.5	1.1	1.7	100.0	-	1.4	0.0	2.5	0.1	-	-	0.2	0.4
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	5	-	-	-	-	-	7	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	71.4	-	-	-	-	-	35.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	13	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	28.6	-	-	-	-	-	65.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Friday
Site Code: 250497
Start Date: 07/25/2025



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Friday
Site Code: 250497
Start Date: 07/25/2025

Turning Movement Peak Hour Data (2:00 PM)

Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
2:00 PM	80	89	17	0	0	186	1	96	10	0	0	107	9	0	3	0	1	12	2	0	62	0	0	64	369
2:15 PM	66	98	20	0	0	184	0	93	10	0	0	103	3	2	2	0	0	7	2	4	70	0	1	76	370
2:30 PM	101	83	17	0	0	201	0	99	12	0	0	111	6	0	0	0	0	6	1	0	59	0	0	60	378
2:45 PM	78	83	16	0	0	177	0	93	12	0	0	105	3	0	0	0	2	3	0	2	49	0	1	51	336
Total	325	353	70	0	0	748	1	381	44	0	0	426	21	2	5	0	3	28	5	6	240	0	2	251	1453
Approach %	43.4	47.2	9.4	0.0	-	-	0.2	89.4	10.3	0.0	-	-	75.0	7.1	17.9	0.0	-	-	2.0	2.4	95.6	0.0	-	-	-
Total %	22.4	24.3	4.8	0.0	-	51.5	0.1	26.2	3.0	0.0	-	29.3	1.4	0.1	0.3	0.0	-	1.9	0.3	0.4	16.5	0.0	-	17.3	-
PHF	0.804	0.901	0.875	0.000	-	0.930	0.250	0.962	0.917	0.000	-	0.959	0.583	0.250	0.417	0.000	-	0.583	0.625	0.375	0.857	0.000	-	0.826	0.961
Motorcycles	4	2	1	0	-	7	0	3	0	0	-	3	0	0	0	0	-	0	0	0	6	0	-	6	16
% Motorcycles	1.2	0.6	1.4	-	-	0.9	0.0	0.8	0.0	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	2.5	-	-	2.4	1.1
Cars & Light Goods	314	345	69	0	-	728	1	377	44	0	-	422	21	2	5	0	-	28	5	6	225	0	-	236	1414
% Cars & Light Goods	96.6	97.7	98.6	-	-	97.3	100.0	99.0	100.0	-	-	99.1	100.0	100.0	100.0	-	-	100.0	100.0	100.0	93.8	-	-	94.0	97.3
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	1
% Buses	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	0.4	-	-	0.4	0.1
Single-Unit Trucks	6	3	0	0	-	9	0	1	0	0	-	1	0	0	0	0	-	0	0	0	3	0	-	3	13
% Single-Unit Trucks	1.8	0.8	0.0	-	-	1.2	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	1.3	-	-	1.2	0.9
Articulated Trucks	1	2	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	0	0	5	0	-	5	8
% Articulated Trucks	0.3	0.6	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	2.1	-	-	2.0	0.6
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.3	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-

Paradigm Transportation Solutions Limited
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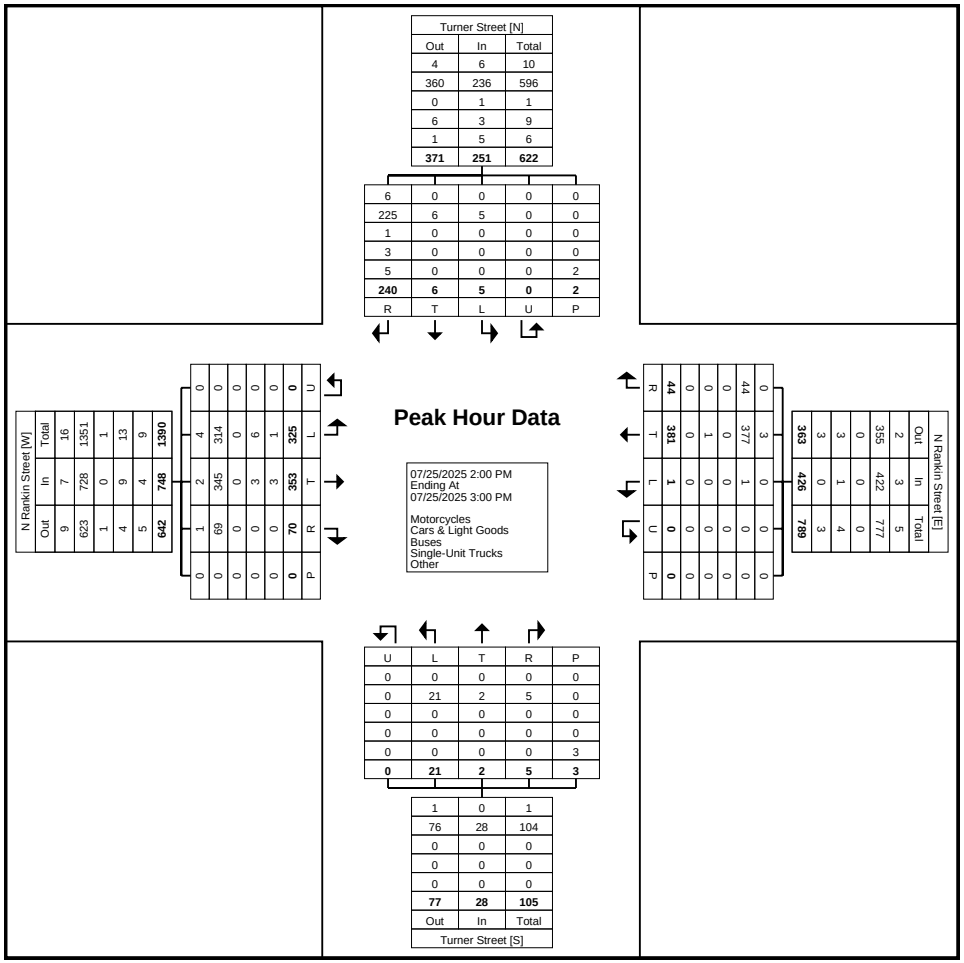
Count Name: Highway 21 & Turner Street - Friday
Site Code: 250497
Start Date: 07/25/2025



Turning Movement Peak Hour Data Plot (2:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Saturday
Site Code: 250497
Start Date: 07/26/2025

Turning Movement Data

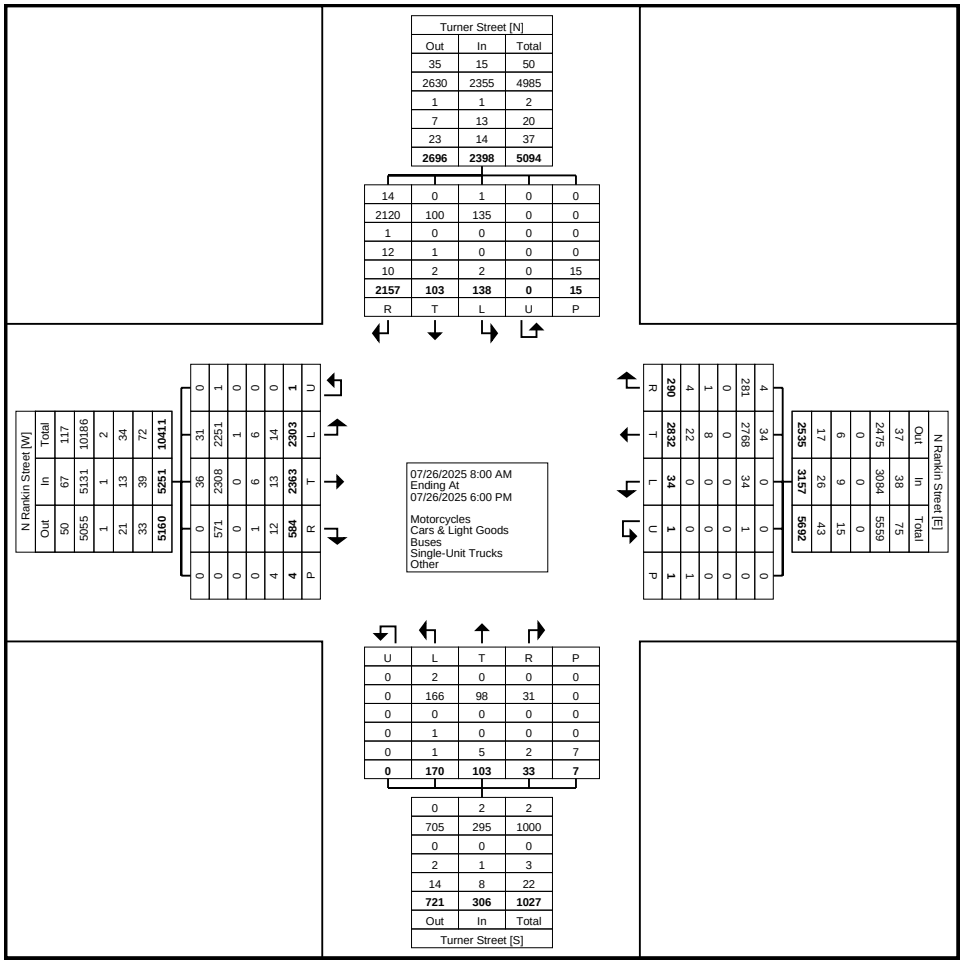
Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	15	31	9	0	0	55	0	23	2	0	0	25	1	3	0	0	2	4	1	1	22	0	1	24	108
8:15 AM	21	26	4	0	0	51	0	34	1	0	0	35	2	0	0	0	0	2	2	1	33	0	0	36	124
8:30 AM	18	34	8	0	1	60	0	44	2	0	0	46	2	2	0	0	0	4	2	4	34	0	0	40	150
8:45 AM	26	44	11	0	1	81	0	50	4	0	0	54	4	1	0	0	0	5	4	4	48	0	0	56	196
Hourly Total	80	135	32	0	2	247	0	151	9	0	0	160	9	6	0	0	2	15	9	10	137	0	1	156	578
9:00 AM	38	33	7	0	0	78	0	33	4	0	0	37	3	1	0	0	0	4	0	4	38	0	1	42	161
9:15 AM	42	61	10	0	0	113	0	56	6	0	0	62	2	3	1	0	0	6	4	1	47	0	0	52	233
9:30 AM	51	54	14	0	0	119	0	71	5	0	0	76	2	1	1	0	0	4	3	2	61	0	0	66	265
9:45 AM	47	71	18	0	0	136	1	56	6	0	0	63	5	0	0	0	0	5	6	1	57	0	0	64	268
Hourly Total	178	219	49	0	0	446	1	216	21	0	0	238	12	5	2	0	0	19	13	8	203	0	1	224	927
10:00 AM	48	49	13	0	0	110	1	81	4	0	0	86	8	1	0	0	0	9	1	0	61	0	1	62	267
10:15 AM	58	53	12	0	1	123	1	72	7	1	0	81	3	0	1	0	0	4	5	2	51	0	2	58	266
10:30 AM	45	58	17	0	0	120	3	90	6	0	0	99	3	2	0	0	0	5	3	3	63	0	0	69	293
10:45 AM	61	52	6	0	0	119	1	78	10	0	0	89	6	2	0	0	0	8	5	3	88	0	0	96	312
Hourly Total	212	212	48	0	1	472	6	321	27	1	0	355	20	5	1	0	0	26	14	8	263	0	3	285	1138
11:00 AM	60	76	26	0	0	162	3	72	7	0	0	82	4	4	1	0	0	9	4	5	58	0	0	67	320
11:15 AM	67	77	13	0	0	157	1	76	11	0	0	88	0	8	1	0	0	9	1	0	69	0	0	70	324
11:30 AM	74	73	24	0	0	171	0	107	17	0	0	124	3	2	2	0	0	7	5	3	67	0	0	75	377
11:45 AM	73	85	19	0	0	177	3	100	13	0	0	116	3	1	3	0	0	7	4	4	82	0	0	90	390
Hourly Total	274	311	82	0	0	667	7	355	48	0	0	410	10	15	7	0	0	32	14	12	276	0	0	302	1411
12:00 PM	66	81	24	0	0	171	2	88	10	0	0	100	4	2	2	0	0	8	2	2	67	0	0	71	350
12:15 PM	64	66	18	0	0	148	1	96	13	0	0	110	7	2	3	0	0	12	6	3	61	0	0	70	340
12:30 PM	75	58	21	0	0	154	2	96	8	0	1	106	2	3	1	0	1	6	4	2	63	0	0	69	335
12:45 PM	80	56	13	0	0	149	0	89	15	0	0	104	0	4	0	0	0	4	5	3	67	0	0	75	332
Hourly Total	285	261	76	0	0	622	5	369	46	0	1	420	13	11	6	0	1	30	17	10	258	0	0	285	1357
1:00 PM	75	63	15	0	0	153	0	82	6	0	0	88	2	3	1	0	0	6	2	2	56	0	0	60	307
1:15 PM	55	82	10	0	0	147	1	77	8	0	0	86	4	3	1	0	0	8	3	3	41	0	1	47	288
1:30 PM	74	60	15	0	0	149	1	95	11	0	0	107	2	1	0	0	0	3	5	2	54	0	1	61	320
1:45 PM	77	83	22	1	0	183	2	100	6	0	0	108	10	0	0	0	0	10	2	2	47	0	1	51	352
Hourly Total	281	288	62	1	0	632	4	354	31	0	0	389	18	7	2	0	0	27	12	9	198	0	3	219	1267
2:00 PM	77	68	18	0	0	163	1	76	7	0	0	84	8	3	1	0	1	12	4	2	46	0	1	52	311
2:15 PM	65	74	13	0	0	152	1	91	9	0	0	101	5	1	1	0	0	7	7	3	68	0	1	78	338
2:30 PM	74	70	14	0	0	158	1	70	12	0	0	83	5	2	0	0	0	7	3	4	51	0	0	58	306
2:45 PM	65	61	23	0	0	149	2	62	7	0	0	71	5	4	1	0	0	10	4	0	56	0	0	60	290
Hourly Total	281	273	68	0	0	622	5	299	35	0	0	339	23	10	3	0	1	36	18	9	221	0	2	248	1245

3:00 PM	89	74	15	0	0	178	0	81	10	0	0	91	5	3	2	0	1	10	6	5	47	0	1	58	337
3:15 PM	80	68	17	0	1	165	0	80	10	0	0	90	4	2	2	0	2	8	6	0	65	0	1	71	334
3:30 PM	76	57	14	0	0	147	1	72	8	0	0	81	3	8	1	0	0	12	5	1	56	0	0	62	302
3:45 PM	67	66	17	0	0	150	0	80	4	0	0	84	6	4	0	0	0	10	2	3	67	0	0	72	316
Hourly Total	312	265	63	0	1	640	1	313	32	0	0	346	18	17	5	0	3	40	19	9	235	0	2	263	1289
4:00 PM	71	58	13	0	0	142	1	74	4	0	0	79	5	3	2	0	0	10	4	2	40	0	0	46	277
4:15 PM	52	51	15	0	0	118	1	62	3	0	0	66	3	2	0	0	0	5	3	4	39	0	1	46	235
4:30 PM	60	48	16	0	0	124	1	56	3	0	0	60	7	4	0	0	0	11	3	1	47	0	0	51	246
4:45 PM	54	47	16	0	0	117	0	57	7	0	0	64	12	1	1	0	0	14	2	2	46	0	0	50	245
Hourly Total	237	204	60	0	0	501	3	249	17	0	0	269	27	10	3	0	0	40	12	9	172	0	1	193	1003
5:00 PM	46	43	15	0	0	104	0	58	7	0	0	65	3	3	0	0	0	6	4	4	58	0	0	66	241
5:15 PM	47	56	13	0	0	116	0	56	10	0	0	66	5	3	2	0	0	10	2	8	40	0	0	50	242
5:30 PM	40	38	7	0	0	85	1	47	3	0	0	51	9	4	0	0	0	13	2	2	46	0	1	50	199
5:45 PM	30	58	9	0	0	97	1	44	4	0	0	49	3	7	2	0	0	12	2	5	50	0	1	57	215
Hourly Total	163	195	44	0	0	402	2	205	24	0	0	231	20	17	4	0	0	41	10	19	194	0	2	223	897
Grand Total	2303	2363	584	1	4	5251	34	2832	290	1	1	3157	170	103	33	0	7	306	138	103	2157	0	15	2398	11112
Approach %	43.9	45.0	11.1	0.0	-	-	1.1	89.7	9.2	0.0	-	-	55.6	33.7	10.8	0.0	-	-	5.8	4.3	89.9	0.0	-	-	-
Total %	20.7	21.3	5.3	0.0	-	47.3	0.3	25.5	2.6	0.0	-	28.4	1.5	0.9	0.3	0.0	-	2.8	1.2	0.9	19.4	0.0	-	21.6	-
Motorcycles	31	36	0	0	-	67	0	34	4	0	-	38	2	0	0	0	-	2	1	0	14	0	-	15	122
% Motorcycles	1.3	1.5	0.0	0.0	-	1.3	0.0	1.2	1.4	0.0	-	1.2	1.2	0.0	0.0	-	-	0.7	0.7	0.0	0.6	-	-	0.6	1.1
Cars & Light Goods	2251	2308	571	1	-	5131	34	2768	281	1	-	3084	166	98	31	0	-	295	135	100	2120	0	-	2355	10865
% Cars & Light Goods	97.7	97.7	97.8	100.0	-	97.7	100.0	97.7	96.9	100.0	-	97.7	97.6	95.1	93.9	-	-	96.4	97.8	97.1	98.3	-	-	98.2	97.8
Buses	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	2
% Buses	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	-	-	0.0	0.0
Single-Unit Trucks	6	6	1	0	-	13	0	8	1	0	-	9	1	0	0	0	-	1	0	1	12	0	-	13	36
% Single-Unit Trucks	0.3	0.3	0.2	0.0	-	0.2	0.0	0.3	0.3	0.0	-	0.3	0.6	0.0	0.0	-	-	0.3	0.0	1.0	0.6	-	-	0.5	0.3
Articulated Trucks	3	6	0	0	-	9	0	5	1	0	-	6	0	0	0	0	-	0	1	0	3	0	-	4	19
% Articulated Trucks	0.1	0.3	0.0	0.0	-	0.2	0.0	0.2	0.3	0.0	-	0.2	0.0	0.0	0.0	-	-	0.0	0.7	0.0	0.1	-	-	0.2	0.2
Bicycles on Road	11	7	12	0	-	30	0	17	3	0	-	20	1	5	2	0	-	8	1	2	7	0	-	10	68
% Bicycles on Road	0.5	0.3	2.1	0.0	-	0.6	0.0	0.6	1.0	0.0	-	0.6	0.6	4.9	6.1	-	-	2.6	0.7	1.9	0.3	-	-	0.4	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	4	-	-	-	-	-	5	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	100.0	-	-	-	-	-	57.1	-	-	-	-	-	33.3	-	-
Pedestrians	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	10	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	0.0	-	-	-	-	-	42.9	-	-	-	-	-	66.7	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Saturday
Site Code: 250497
Start Date: 07/26/2025



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & Turner Street - Saturday
Site Code: 250497
Start Date: 07/26/2025

Turning Movement Peak Hour Data (11:30 AM)

Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
11:30 AM	74	73	24	0	0	171	0	107	17	0	0	124	3	2	2	0	0	7	5	3	67	0	0	75	377
11:45 AM	73	85	19	0	0	177	3	100	13	0	0	116	3	1	3	0	0	7	4	4	82	0	0	90	390
12:00 PM	66	81	24	0	0	171	2	88	10	0	0	100	4	2	2	0	0	8	2	2	67	0	0	71	350
12:15 PM	64	66	18	0	0	148	1	96	13	0	0	110	7	2	3	0	0	12	6	3	61	0	0	70	340
Total	277	305	85	0	0	667	6	391	53	0	0	450	17	7	10	0	0	34	17	12	277	0	0	306	1457
Approach %	41.5	45.7	12.7	0.0	-	-	1.3	86.9	11.8	0.0	-	-	50.0	20.6	29.4	0.0	-	-	5.6	3.9	90.5	0.0	-	-	-
Total %	19.0	20.9	5.8	0.0	-	45.8	0.4	26.8	3.6	0.0	-	30.9	1.2	0.5	0.7	0.0	-	2.3	1.2	0.8	19.0	0.0	-	21.0	-
PHF	0.936	0.897	0.885	0.000	-	0.942	0.500	0.914	0.779	0.000	-	0.907	0.607	0.875	0.833	0.000	-	0.708	0.708	0.750	0.845	0.000	-	0.850	0.934
Motorcycles	6	7	0	0	-	13	0	5	0	0	-	5	0	0	0	0	-	0	0	0	1	0	-	1	19
% Motorcycles	2.2	2.3	0.0	-	-	1.9	0.0	1.3	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.4	-	-	0.3	1.3
Cars & Light Goods	269	297	84	0	-	650	6	380	53	0	-	439	17	7	10	0	-	34	17	12	276	0	-	305	1428
% Cars & Light Goods	97.1	97.4	98.8	-	-	97.5	100.0	97.2	100.0	-	-	97.6	100.0	100.0	100.0	-	-	100.0	100.0	100.0	99.6	-	-	99.7	98.0
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	2	0	0	0	-	2	0	4	0	0	-	4	0	0	0	0	-	0	0	0	0	0	-	0	6
% Single-Unit Trucks	0.7	0.0	0.0	-	-	0.3	0.0	1.0	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.4
Articulated Trucks	0	0	0	0	-	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
Bicycles on Road	0	1	1	0	-	2	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	4
% Bicycles on Road	0.0	0.3	1.2	-	-	0.3	0.0	0.5	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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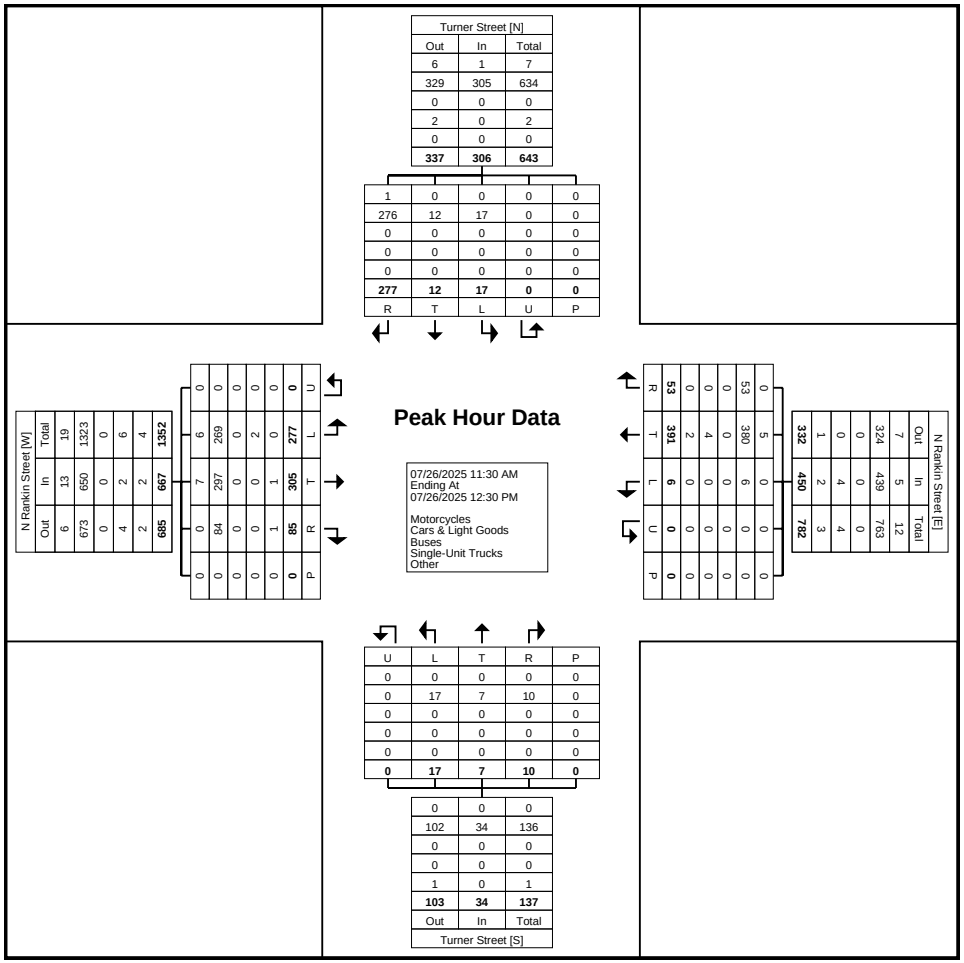
Start Date: 07/26/2025



Turning Movement Peak Hour Data Plot (11:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & N Rankin Street - Sunday
Site Code: 250497
Start Date: 07/27/2025

Turning Movement Data

Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
8:00 AM	11	18	6	0	0	35	0	27	2	0	0	29	0	0	0	0	0	0	0	2	19	0	0	21	85
8:15 AM	18	26	2	0	0	46	0	24	3	0	0	27	1	2	0	0	0	3	0	3	32	0	0	35	111
8:30 AM	13	21	4	0	0	38	0	31	1	0	0	32	1	1	0	0	0	2	1	3	44	0	0	48	120
8:45 AM	20	22	11	0	0	53	0	35	1	0	0	36	2	3	2	0	0	7	0	1	39	0	0	40	136
Hourly Total	62	87	23	0	0	172	0	117	7	0	0	124	4	6	2	0	0	12	1	9	134	0	0	144	452
9:00 AM	13	35	5	0	0	53	0	42	1	0	0	43	5	0	0	0	0	5	2	1	24	0	0	27	128
9:15 AM	31	26	6	0	0	63	1	44	4	0	0	49	1	0	0	0	0	1	3	1	40	0	0	44	157
9:30 AM	35	44	10	0	0	89	0	53	4	0	0	57	5	2	0	0	2	7	3	2	48	0	2	53	206
9:45 AM	34	34	10	0	0	78	0	50	0	0	0	50	1	3	0	0	0	4	5	1	55	0	3	61	193
Hourly Total	113	139	31	0	0	283	1	189	9	0	0	199	12	5	0	0	2	17	13	5	167	0	5	185	684
10:00 AM	31	36	12	0	0	79	0	64	5	0	0	69	1	1	0	0	0	2	2	1	59	0	0	62	212
10:15 AM	49	46	13	0	1	108	1	60	5	0	0	66	5	1	0	0	0	6	2	2	71	0	0	75	255
10:30 AM	40	53	9	0	0	102	3	57	4	0	0	64	2	1	3	0	0	6	2	1	80	0	0	83	255
10:45 AM	52	58	10	0	0	120	1	75	3	0	0	79	2	2	2	0	0	6	4	0	66	0	3	70	275
Hourly Total	172	193	44	0	1	409	5	256	17	0	0	278	10	5	5	0	0	20	10	4	276	0	3	290	997
11:00 AM	46	50	11	0	0	107	2	56	6	0	0	64	8	0	1	0	0	9	4	4	74	0	1	82	262
11:15 AM	59	47	9	0	0	115	1	65	9	0	0	75	7	4	1	0	0	12	4	3	84	0	0	91	293
11:30 AM	47	65	15	0	0	127	0	72	6	0	0	78	3	1	2	0	0	6	4	3	70	0	0	77	288
11:45 AM	66	61	18	0	0	145	2	76	8	0	0	86	4	5	1	0	0	10	4	2	86	0	1	92	333
Hourly Total	218	223	53	0	0	494	5	269	29	0	0	303	22	10	5	0	0	37	16	12	314	0	2	342	1176
12:00 PM	61	88	18	0	0	167	1	88	8	0	0	97	4	4	1	0	0	9	4	8	71	0	1	83	356
12:15 PM	69	75	16	0	0	160	0	75	11	0	0	86	5	5	0	0	0	10	2	2	72	0	0	76	332
12:30 PM	61	58	14	0	0	133	5	82	10	0	0	97	4	2	0	0	0	6	3	4	96	0	0	103	339
12:45 PM	66	71	23	0	0	160	1	95	12	0	0	108	7	4	1	0	0	12	4	0	86	0	1	90	370
Hourly Total	257	292	71	0	0	620	7	340	41	0	0	388	20	15	2	0	0	37	13	14	325	0	2	352	1397
1:00 PM	57	57	11	0	1	125	0	84	7	0	0	91	7	4	4	0	0	15	3	3	62	0	0	68	299
1:15 PM	64	68	11	0	0	143	0	70	13	0	0	83	2	2	0	0	0	4	6	2	83	0	0	91	321
1:30 PM	69	58	11	0	0	138	1	71	8	0	0	80	5	3	1	0	0	9	4	1	88	0	0	93	320
1:45 PM	74	54	18	0	0	146	0	81	4	0	0	85	5	5	3	0	0	13	5	3	72	0	0	80	324
Hourly Total	264	237	51	0	1	552	1	306	32	0	0	339	19	14	8	0	0	41	18	9	305	0	0	332	1264
2:00 PM	55	77	10	0	0	142	0	73	6	0	0	79	7	2	0	0	0	9	5	2	76	0	0	83	313
2:15 PM	76	53	14	0	0	143	1	66	7	0	0	74	2	3	0	0	0	5	9	3	67	0	0	79	301
2:30 PM	82	62	14	0	0	158	0	75	6	0	0	81	4	0	0	0	0	4	4	3	83	0	0	90	333
2:45 PM	53	70	17	0	0	140	0	58	2	0	0	60	6	1	0	0	0	7	5	2	66	0	0	73	280
Hourly Total	266	262	55	0	0	583	1	272	21	0	0	294	19	6	0	0	0	25	23	10	292	0	0	325	1227

3:00 PM	71	69	10	0	0	150	0	82	8	0	0	90	6	5	1	0	0	12	7	5	55	0	0	67	319
3:15 PM	52	64	15	0	0	131	0	63	5	0	0	68	5	4	1	0	0	10	5	1	59	0	0	65	274
3:30 PM	63	51	16	0	0	130	0	83	4	0	0	87	3	2	0	0	0	5	9	2	63	0	0	74	296
3:45 PM	49	47	19	0	0	115	1	67	6	0	2	74	5	1	1	0	0	7	2	1	87	0	2	90	286
Hourly Total	235	231	60	0	0	526	1	295	23	0	2	319	19	12	3	0	0	34	23	9	264	0	2	296	1175
4:00 PM	50	61	13	0	0	124	1	62	5	0	0	68	6	2	2	0	0	10	2	6	87	0	1	95	297
4:15 PM	50	61	10	0	0	121	1	62	7	0	0	70	3	3	1	0	0	7	2	8	86	0	0	96	294
4:30 PM	55	50	12	0	0	117	1	44	9	0	0	54	2	2	1	0	0	5	7	3	63	0	1	73	249
4:45 PM	52	56	13	0	0	121	1	52	4	0	0	57	6	6	0	0	0	12	3	1	46	0	0	50	240
Hourly Total	207	228	48	0	0	483	4	220	25	0	0	249	17	13	4	0	0	34	14	18	282	0	2	314	1080
5:00 PM	47	56	24	0	1	127	1	53	6	0	0	60	4	2	0	0	1	6	3	4	45	0	0	52	245
5:15 PM	42	45	11	0	0	98	1	64	6	0	0	71	6	1	1	0	1	8	2	4	56	0	0	62	239
5:30 PM	53	46	9	0	0	108	3	49	5	0	0	57	6	2	0	0	0	8	1	5	54	0	1	60	233
5:45 PM	35	36	8	0	0	79	0	50	8	0	0	58	4	2	1	0	0	7	1	1	54	0	1	56	200
Hourly Total	177	183	52	0	1	412	5	216	25	0	0	246	20	7	2	0	2	29	7	14	209	0	2	230	917
Grand Total	1971	2075	488	0	3	4534	30	2480	229	0	2	2739	162	93	31	0	4	286	138	104	2568	0	18	2810	10369
Approach %	43.5	45.8	10.8	0.0	-	-	1.1	90.5	8.4	0.0	-	-	56.6	32.5	10.8	0.0	-	-	4.9	3.7	91.4	0.0	-	-	-
Total %	19.0	20.0	4.7	0.0	-	43.7	0.3	23.9	2.2	0.0	-	26.4	1.6	0.9	0.3	0.0	-	2.8	1.3	1.0	24.8	0.0	-	27.1	-
Motorcycles	37	33	2	0	-	72	0	37	4	0	-	41	0	1	0	0	-	1	1	2	59	0	-	62	176
% Motorcycles	1.9	1.6	0.4	-	-	1.6	0.0	1.5	1.7	-	-	1.5	0.0	1.1	0.0	-	-	0.3	0.7	1.9	2.3	-	-	2.2	1.7
Cars & Light Goods	1921	2027	477	0	-	4425	29	2417	219	0	-	2665	159	91	30	0	-	280	137	101	2491	0	-	2729	10099
% Cars & Light Goods	97.5	97.7	97.7	-	-	97.6	96.7	97.5	95.6	-	-	97.3	98.1	97.8	96.8	-	-	97.9	99.3	97.1	97.0	-	-	97.1	97.4
Buses	2	1	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	4
% Buses	0.1	0.0	0.0	-	-	0.1	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
Single-Unit Trucks	7	4	2	0	-	13	0	8	0	0	-	8	1	0	1	0	-	2	0	1	12	0	-	13	36
% Single-Unit Trucks	0.4	0.2	0.4	-	-	0.3	0.0	0.3	0.0	-	-	0.3	0.6	0.0	3.2	-	-	0.7	0.0	1.0	0.5	-	-	0.5	0.3
Articulated Trucks	0	6	0	0	-	6	1	2	1	0	-	4	0	0	0	0	-	0	0	0	3	0	-	3	13
% Articulated Trucks	0.0	0.3	0.0	-	-	0.1	3.3	0.1	0.4	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.1	-	-	0.1	0.1
Bicycles on Road	4	4	7	0	-	15	0	16	5	0	-	21	2	1	0	0	-	3	0	0	2	0	-	2	41
% Bicycles on Road	0.2	0.2	1.4	-	-	0.3	0.0	0.6	2.2	-	-	0.8	1.2	1.1	0.0	-	-	1.0	0.0	0.0	0.1	-	-	0.1	0.4
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	6	-	-
% Bicycles on Crosswalk	-	-	-	-	33.3	-	-	-	-	-	50.0	-	-	-	-	-	25.0	-	-	-	-	-	33.3	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	12	-	-
% Pedestrians	-	-	-	-	66.7	-	-	-	-	-	50.0	-	-	-	-	-	75.0	-	-	-	-	-	66.7	-	-

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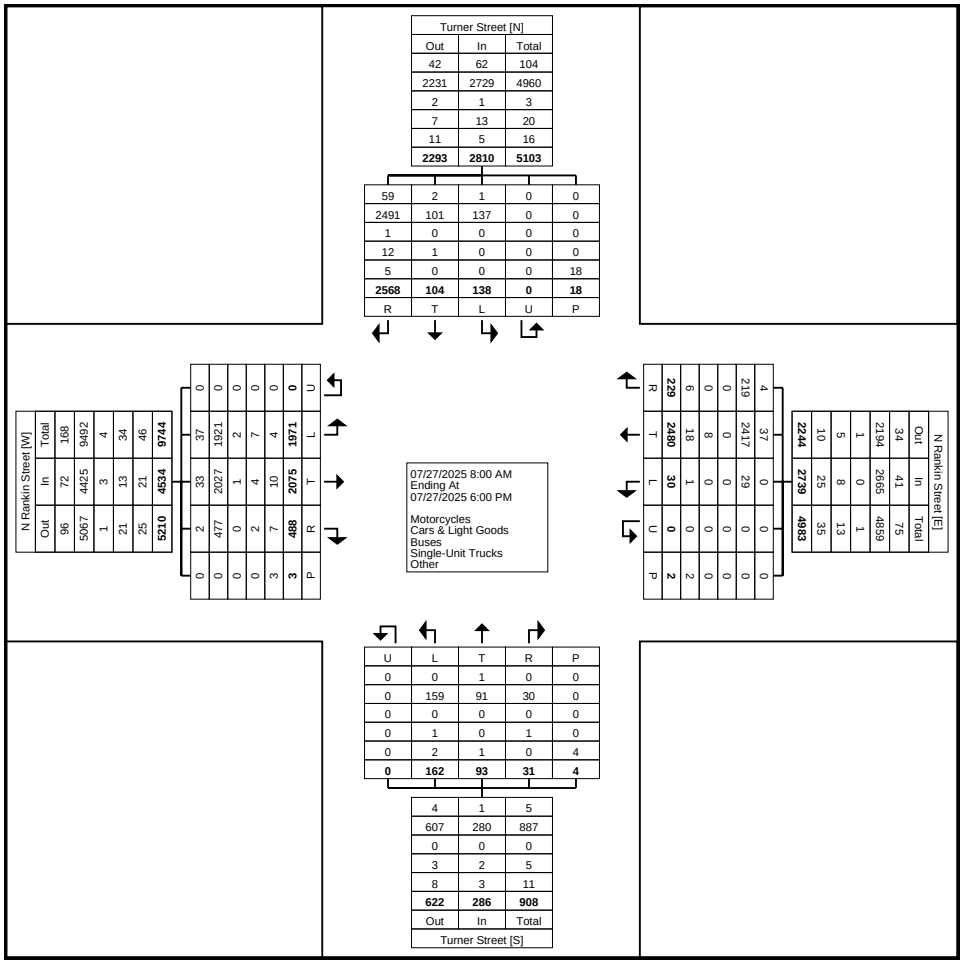
Start Date: 07/27/2025



Turning Movement Data Plot

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5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Highway 21 & N Rankin Street - Sunday
Site Code: 250497
Start Date: 07/27/2025

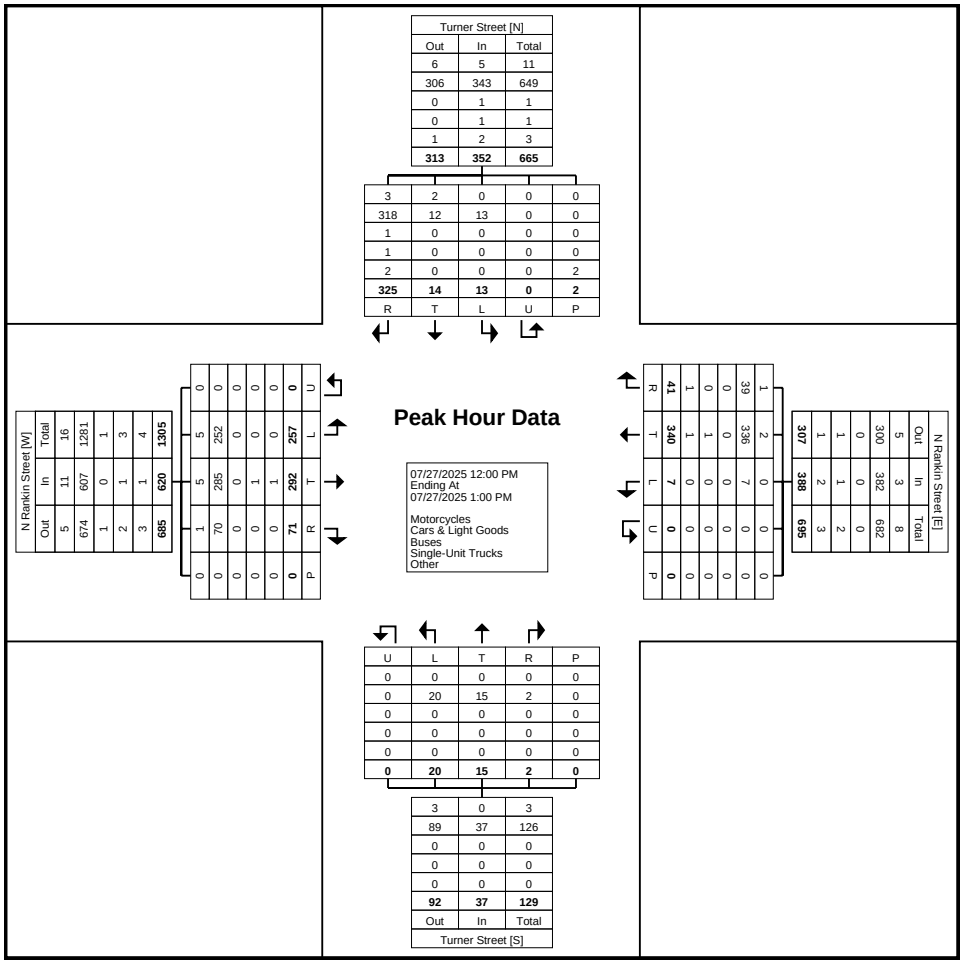
Turning Movement Peak Hour Data (12:00 PM)

Start Time	N Rankin Street Eastbound						N Rankin Street Westbound						Turner Street Northbound						Turner Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	61	88	18	0	0	167	1	88	8	0	0	97	4	4	1	0	0	9	4	8	71	0	1	83	356
12:15 PM	69	75	16	0	0	160	0	75	11	0	0	86	5	5	0	0	0	10	2	2	72	0	0	76	332
12:30 PM	61	58	14	0	0	133	5	82	10	0	0	97	4	2	0	0	0	6	3	4	96	0	0	103	339
12:45 PM	66	71	23	0	0	160	1	95	12	0	0	108	7	4	1	0	0	12	4	0	86	0	1	90	370
Total	257	292	71	0	0	620	7	340	41	0	0	388	20	15	2	0	0	37	13	14	325	0	2	352	1397
Approach %	41.5	47.1	11.5	0.0	-	-	1.8	87.6	10.6	0.0	-	-	54.1	40.5	5.4	0.0	-	-	3.7	4.0	92.3	0.0	-	-	-
Total %	18.4	20.9	5.1	0.0	-	44.4	0.5	24.3	2.9	0.0	-	27.8	1.4	1.1	0.1	0.0	-	2.6	0.9	1.0	23.3	0.0	-	25.2	-
PHF	0.931	0.830	0.772	0.000	-	0.928	0.350	0.895	0.854	0.000	-	0.898	0.714	0.750	0.500	0.000	-	0.771	0.813	0.438	0.846	0.000	-	0.854	0.944
Motorcycles	5	5	1	0	-	11	0	2	1	0	-	3	0	0	0	0	-	0	0	2	3	0	-	5	19
% Motorcycles	1.9	1.7	1.4	-	-	1.8	0.0	0.6	2.4	-	-	0.8	0.0	0.0	0.0	-	-	0.0	0.0	14.3	0.9	-	-	1.4	1.4
Cars & Light Goods	252	285	70	0	-	607	7	336	39	0	-	382	20	15	2	0	-	37	13	12	318	0	-	343	1369
% Cars & Light Goods	98.1	97.6	98.6	-	-	97.9	100.0	98.8	95.1	-	-	98.5	100.0	100.0	100.0	-	-	100.0	100.0	85.7	97.8	-	-	97.4	98.0
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	1
% Buses	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	0.3	-	-	0.3	0.1
Single-Unit Trucks	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	0	0	1	0	-	1	3
% Single-Unit Trucks	0.0	0.3	0.0	-	-	0.2	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.3	-	-	0.3	0.2
Articulated Trucks	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	2	0	-	2	3
% Articulated Trucks	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.6	-	-	0.6	0.2
Bicycles on Road	0	0	0	0	-	0	0	1	1	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.3	2.4	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Highway 21 & N Rankin Street - Sunday
Site Code: 250497
Start Date: 07/27/2025



Turning Movement Peak Hour Data Plot (12:00 PM)

Appendix B

Detailed Collision Data

DriverNumber	Classification of Collision	Collision Date	Collision Day	Collision Location	Collision Report Number	Collision Time	Description of Codes 97, 98, 99	Driver Action	Driver Condition	Environment Condition (1)	Environment Condition (2)	Failed to Remain?
D1	03 P.D. only	10-11-2024 06:43 PM	10-11-2024 06:43 PM	02 intersection related	ACC-503936295	10-11-2024 06:43 PM		10 lost control	00 unknown	01 clear		True
D2	03 P.D. only	10-11-2024 06:43 PM	10-11-2024 06:43 PM	02 intersection related	ACC-503936295	10-11-2024 06:43 PM		01 driving properly	01 normal	01 clear		True
D1	03 P.D. only	07-30-2024 10:00 AM	07-30-2024 10:00 AM	02 intersection related	ACC-503879274	07-30-2024 10:00 AM		09 improper passin	01 normal	02 rain		False
D2	03 P.D. only	07-30-2024 10:00 AM	07-30-2024 10:00 AM	02 intersection related	ACC-503879274	07-30-2024 10:00 AM		01 driving properly	01 normal	02 rain		False
D1	03 P.D. only	06-18-2021 02:53 PM	06-18-2021 02:53 PM	02 intersection related	ACC-502990681	06-18-2021 02:53 PM		02 following too cl	08 inattentive	01 clear		True
D2	03 P.D. only	06-18-2021 02:53 PM	06-18-2021 02:53 PM	02 intersection related	ACC-502990681	06-18-2021 02:53 PM		01 driving properly	01 normal	01 clear		True
D1	03 P.D. only	02-23-2021 06:08 AM	02-23-2021 06:08 AM	02 intersection related	ACC-502954686	02-23-2021 06:08 AM		01 driving properly	01 normal	03 snow		False
D1	02 non-fatal injury	09-26-2020 10:43 AM	09-26-2020 10:43 AM	03 at intersection	ACC-502909644	09-26-2020 10:43 AM		08 failed to yield ri	01 normal	01 clear		False
D2	02 non-fatal injury	09-26-2020 10:43 AM	09-26-2020 10:43 AM	03 at intersection	ACC-502909644	09-26-2020 10:43 AM		01 driving properly	01 normal	01 clear		False
D1	02 non-fatal injury	02-19-2020 12:05 PM	02-19-2020 12:05 PM	03 at intersection	ACC-502849721	02-19-2020 12:05 PM		04 speed too fast f	01 normal	03 snow		False
D2	02 non-fatal injury	02-19-2020 12:05 PM	02-19-2020 12:05 PM	03 at intersection	ACC-502849721	02-19-2020 12:05 PM		01 driving properly	01 normal	03 snow		False
D1	03 P.D. only	08-28-2024 08:07 PM	08-28-2024 08:07 PM	30 four-way	ACC-503887885	08-28-2024 08:07 PM		08 failed to yield ri	01 normal	01 clear		False
D2	03 P.D. only	08-28-2024 08:07 PM	08-28-2024 08:07 PM	30 four-way	ACC-503887885	08-28-2024 08:07 PM		01 driving properly	01 normal	01 clear		False

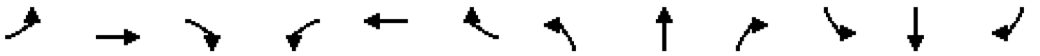
DriverNumber	Impact Location	Initial Direction of Travel	Initial Impact	Initial Impact Type	Latitude	Light	Local Incident Number	Longitude	Person Charged Act	Person Charged Section	R1 Location	R2 Location
D1	02 thru lane	03 east		05 turning moveme	44.50252829999999	01 daylight	SS24008473	-81.3643606999999			N RANKIN ST	BRUCE RD 13
D2	02 thru lane	03 east	04 right rear	05 turning moveme	44.50249413964300	01 daylight	SS24008473	-81.364182014358			N RANKIN ST	BRUCE RD 13
D1	02 thru lane	02 south	10 left front	05 turning moveme	44.50255003501800	01 daylight	SS24005958	-81.3642660162250	Highway Traffic Ac	150(1)	TURNER ST	RANKIN ST
D2	02 thru lane	02 south	05 right rear corne	05 turning moveme	44.50255003501800	01 daylight	SS24005958	-81.3642660162250			TURNER ST	RANKIN ST
D1	01 within intersecti	02 south	01 right front corne	03 rear end	44.50252829999999	01 daylight	SS21005090	-81.3643606999999	Highway Traffic Ac	200(1)(A)	N RANKIN ST	TURNER ST
D2	01 within intersecti	02 south	07 left rear corner	03 rear end	44.50252829999999	01 daylight	SS21005090	-81.3643606999999			N RANKIN ST	TURNER ST
D1	02 thru lane	02 south	01 right front corne	07 single motor vel	44.50252829999999	07 dark	SS21001451	-81.3643606999999			TURNER ST	N RANKIN ST
D1	01 within intersecti	04 west	02 right front	05 turning moveme	44.50252829999999	01 daylight	SS20008003	-81.3643606999999	Highway Traffic Ac	136(1)(B)	N RANKIN ST	TURNER ST
D2	01 within intersecti	02 south	11 left front corner	05 turning moveme	44.50252829999999	01 daylight	SS20008003	-81.3643606999999			N RANKIN ST	TURNER ST
D1	01 within intersecti	02 south	08 left rear	02 angle	44.50252829999999	01 daylight	SS20001258	-81.3643606999999	Highway Traffic Ac	130	N RANKIN ST	TURNER ST
D2	01 within intersecti	04 west	11 left front corner	02 angle	44.50252829999999	01 daylight	SS20001258	-81.3643606999999			N RANKIN ST	TURNER ST
D1	01 within intersecti	02 south	03 right centre	02 angle	44.50252531672800	08 dark-artificial	SS24007010	-81.3641840565450	Highway Traffic Ac	136(1)(B)	NORTH RANKIN ST.	TURNER ST.
D2	01 within intersecti	03 east	12 front centre	02 angle	44.50252531672800	08 dark-artificial	SS24007010	-81.3641840565450			NORTH RANKIN ST.	TURNER ST.

DriverNumber	Road Alignment (R1)	Road Alignment (R2)	Road Character (R1)	Road Character (R2)	Road Condition (R1)	Road Condition (R2)	Road Jurisdiction	Road Pavement Marking (R1)	Road Pavement Marking (R2)	Road Surface (R1)	Road Surface (R2)	Road Surface Condition (R1)	Road Surface Condition (R2)
D1	03 curve-on level	03 curve-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry
D2	03 curve-on level	03 curve-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry
D1	01 straight-on level	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	02 wet	02 wet
D2	01 straight-on level	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	02 wet	02 wet
D1	02 straight-on hill	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry
D2	02 straight-on hill	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry
D1	01 straight-on level	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	03 obscured	03 obscured	01 asphalt	01 asphalt	04 slush	04 slush
D1	04 curve-on hill	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry
D2	04 curve-on hill	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry
D1	01 straight-on level	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	03 loose snow	03 loose snow
D2	01 straight-on level	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	03 loose snow	03 loose snow
D1	01 straight-on level	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry
D2	01 straight-on level	01 straight-on level	02 undivided-two v	02 undivided-two v	01 good	01 good	01 municipal (excl.	01 exist	01 exist	01 asphalt	01 asphalt	01 dry	01 dry

DriverNumber	Sequence of Events 1	Sequence of Events 1 Offset	Sequence of Events 2	Sequence of Events 2 Offset	Sequence of Events 3	Sequence of Events 3 Offset	Service Performed	Snow Tires	Traffic Control	Traffic Control Condition	Vehicle Condition	Vehicle Damage	Vehicle Manoeuver
D1	01 other motor veh							00 unknown	10 no control			00 unknown	07 changing lanes
D2	01 other motor veh							00 unknown	10 no control		01 no apparent de	03 moderate	04 turning left
D1	01 other motor veh							00 unknown	10 no control		01 no apparent de	04 severe	05 turning right
D2	01 other motor veh							00 unknown	10 no control		01 no apparent de	02 light	05 turning right
D1	01 other motor veh						NOT SPECIFIED		02 stop sign	01 functioning	01 no apparent de	02 light	01 going ahead
D2	01 other motor veh						NOT SPECIFIED		02 stop sign	01 functioning	01 no apparent de	02 light	10 stopped
D1	09 animal (wild)								02 stop sign	01 functioning	01 no apparent de	02 light	01 going ahead
D1	01 other motor veh								02 stop sign	01 functioning	01 no apparent de	02 light	04 turning left
D2	01 other motor veh								02 stop sign	01 functioning	01 no apparent de	02 light	01 going ahead
D1	21 skidding/sliding		01 other motor veh		20 ran off road				02 stop sign	01 functioning	01 no apparent de	04 severe	01 going ahead
D2	21 skidding/sliding		01 other motor veh						02 stop sign	01 functioning	01 no apparent de	03 moderate	01 going ahead
D1	01 other motor veh							00 unknown	02 stop sign	01 functioning	01 no apparent de	03 moderate	01 going ahead
D2	01 other motor veh							00 unknown	02 stop sign	01 functioning	01 no apparent de	02 light	01 going ahead

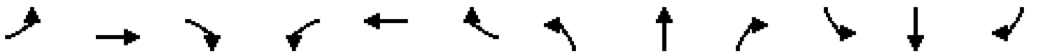
Appendix C

Synchro Reports – Existing Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	248	31	2	288	16	11	5	5	6	13	235
Future Volume (vph)	144	248	31	2	288	16	11	5	5	6	13	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.983			0.992			0.969			0.875	
Flt Protected	0.950			0.950				0.973			0.999	
Satd. Flow (prot)	1722	1824	0	1217	1820	0	0	1811	0	0	1642	0
Flt Permitted	0.950			0.950				0.973			0.999	
Satd. Flow (perm)	1722	1824	0	1217	1820	0	0	1811	0	0	1642	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Adj. Flow (vph)	152	261	33	2	303	17	12	5	5	6	14	247
Shared Lane Traffic (%)												
Lane Group Flow (vph)	152	294	0	2	320	0	0	22	0	0	267	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

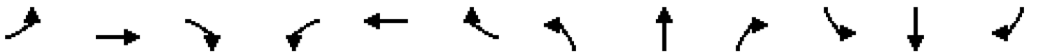
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	248	31	2	288	16	11	5	5	6	13	235
Future Volume (Veh/h)	144	248	31	2	288	16	11	5	5	6	13	235
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	152	261	33	2	303	17	12	5	5	6	14	247
Pedestrians											1	
Lane Width (m)											3.7	
Walking Speed (m/s)											1.1	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	321			294			1143	907	278	889	915	313
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	321			294			1143	907	278	889	915	313
tC, single (s)	4.2			4.6			7.1	6.5	6.2	7.1	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.7			3.5	4.0	3.3	3.5	4.1	3.3
p0 queue free %	87			100			88	98	99	97	94	66
cM capacity (veh/h)	1215			1038			102	242	766	235	233	727

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	152	294	2	320	22	267
Volume Left	152	0	2	0	12	6
Volume Right	0	33	0	17	5	247
cSH	1215	1700	1038	1700	152	628
Volume to Capacity	0.13	0.17	0.00	0.19	0.15	0.43
Queue Length 95th (m)	3.2	0.0	0.0	0.0	3.8	16.1
Control Delay (s/veh)	8.4	0.0	8.5	0.0	32.7	14.9
Lane LOS	A		A		D	B
Approach Delay (s/veh)	2.9		0.1		32.7	14.9
Approach LOS					D	B

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	49.6%	ICU Level of Service		A
Analysis Period (min)	15			



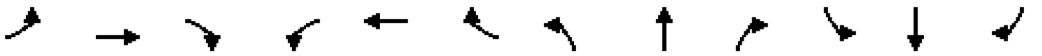
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	325	353	70	1	381	44	21	2	5	5	6	240
Future Volume (vph)	325	353	70	1	381	44	21	2	5	5	6	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975			0.984			0.977			0.871	
Flt Protected	0.950			0.950				0.963			0.999	
Satd. Flow (prot)	1789	1858	0	1825	1890	0	0	1807	0	0	1610	0
Flt Permitted	0.950			0.950				0.963			0.999	
Satd. Flow (perm)	1789	1858	0	1825	1890	0	0	1807	0	0	1610	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	2		3	3		2						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Adj. Flow (vph)	339	368	73	1	397	46	22	2	5	5	6	250
Shared Lane Traffic (%)												
Lane Group Flow (vph)	339	441	0	1	443	0	0	29	0	0	261	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 66.1%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	325	353	70	1	381	44	21	2	5	5	6	240
Future Volume (Veh/h)	325	353	70	1	381	44	21	2	5	5	6	240
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	339	368	73	1	397	46	22	2	5	5	6	250
Pedestrians								3			2	
Lane Width (m)								3.7			3.7	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	445			444			1738	1533	408	1476	1546	422
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	445			444			1738	1533	408	1476	1546	422
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			100			26	98	99	94	92	60
cM capacity (veh/h)	1113			1124			30	81	646	78	80	626

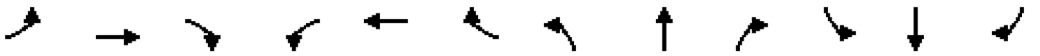
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	339	441	1	443	29	261
Volume Left	339	0	1	0	22	5
Volume Right	0	73	0	46	5	250
cSH	1113	1700	1124	1700	38	485
Volume to Capacity	0.30	0.26	0.00	0.26	0.77	0.54
Queue Length 95th (m)	9.9	0.0	0.0	0.0	21.3	23.9
Control Delay (s/veh)	9.6	0.0	8.2	0.0	237.7	20.8
Lane LOS	A		A		F	C
Approach Delay (s/veh)	4.2		0.0		237.7	20.8
Approach LOS					F	C

Intersection Summary				
Average Delay	10.3			
Intersection Capacity Utilization	66.1%	ICU Level of Service	C	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	277	305	85	6	391	53	17	7	10	17	12	277
Future Volume (vph)	277	305	85	6	391	53	17	7	10	17	12	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.982			0.960			0.878	
Flt Protected	0.950			0.950				0.976			0.997	
Satd. Flow (prot)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Flt Permitted	0.950			0.950				0.976			0.997	
Satd. Flow (perm)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	298	328	91	6	420	57	18	8	11	18	13	298
Shared Lane Traffic (%)												
Lane Group Flow (vph)	298	419	0	6	477	0	0	37	0	0	329	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	277	305	85	6	391	53	17	7	10	17	12	277
Future Volume (Veh/h)	277	305	85	6	391	53	17	7	10	17	12	277
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	298	328	91	6	420	57	18	8	11	18	13	298
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	477			419			1706	1459	374	1400	1476	449
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	477			419			1706	1459	374	1400	1476	449
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	73			99			32	92	98	79	86	52
cM capacity (veh/h)	1090			1151			26	94	677	86	92	615

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	298	419	6	477	37	329
Volume Left	298	0	6	0	18	18
Volume Right	0	91	0	57	11	298
cSH	1090	1700	1151	1700	47	394
Volume to Capacity	0.27	0.25	0.01	0.28	0.78	0.83
Queue Length 95th (m)	8.5	0.0	0.1	0.0	23.8	58.9
Control Delay (s/veh)	9.5	0.0	8.1	0.0	202.6	46.2
Lane LOS	A		A		F	E
Approach Delay (s/veh)	4.0		0.1		202.6	46.2
Approach LOS					F	E

Intersection Summary				
Average Delay	16.3			
Intersection Capacity Utilization	67.8%	ICU Level of Service	C	
Analysis Period (min)	15			

Appendix D

Traffic Signal Warrant Calculations – Existing Conditions

Signal Justification Calculation
(OTM Book 12 - Justifications 1, 2, 3)

Horizon Year: 2025 - Thursday
Region/City/Township: Town of Saugeen Shores

Major Street: N Rankin St (Hwy 21)
Minor Street: Turner St
North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Hour	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						
	Eastbound			Westbound			Northbound			Southbound			Major X
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Peds
09:45 - 10:45	170	253	58	1	313	21	17	11	4	8	5	250	1
10:45 - 11:45	237	264	60	2	321	29	12	9	3	11	9	245	1
11:45 - 12:45	252	268	59	2	334	28	14	10	7	18	11	277	0
12:45 - 13:45	221	317	66	1	325	26	16	11	2	7	11	185	0
13:45 - 14:45	237	252	53	6	312	32	11	13	1	9	8	202	1
14:45 - 15:45	240	269	55	1	318	11	20	11	1	12	7	210	2
15:45 - 16:45	246	312	68	5	330	28	12	9	5	16	9	217	4
16:45 - 17:45	272	315	42	5	321	20	19	8	7	11	9	224	0

Hour	1A All Approach Lanes		1B Minor Street Both Approaches		2A Major Street Both Approaches		2B Traffic Crossing Major Street	
Threshold	*900*		*170*		*900*		*75*	
1	1111	100%	295	100%	816	91%	37	49%
2	1202	100%	289	100%	913	100%	33	44%
3	1280	100%	337	100%	943	100%	43	57%
4	1188	100%	232	100%	956	100%	34	45%
5	1136	100%	244	100%	892	99%	34	45%
6	1155	100%	261	100%	894	99%	45	60%
7	1257	100%	268	100%	989	100%	41	55%
8	1253	100%	278	100%	975	100%	39	52%
8 Hours 100%	***Yes***		***Yes***		***No***		***No***	
8 Hours 80%	***Yes***		***Yes***		***Yes***		***No***	

Justification Results	
Justification 1 (Minimum Vehicle Volume)	Yes
Justification 2 (Delay To Cross Traffic)	No
Justification 3 (Volume/Delay Combination)	No

Is A Signal Justfied?	Yes

Signal Justification Calculation
(OTM Book 12 - Justifications 1, 2, 3)

Horizon Year: 2025 - Friday
Region/City/Township: Town of Saugeen Shores

Major Street: N Rankin St (Hwy 21)
Minor Street: Turner St
North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Hour	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						Major X Peds
	Eastbound			Westbound			Northbound			Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
10:00 - 11:00	226	253	54	3	311	14	10	6	4	8	9	280	0
11:00 - 12:00	238	272	67	6	321	39	21	8	5	19	9	274	3
12:00 - 13:00	238	317	67	5	347	37	21	10	8	10	11	267	0
13:00 - 14:00	278	310	71	5	307	39	12	7	7	17	9	240	1
14:00 - 15:00	325	353	70	1	381	44	21	2	5	5	6	240	0
15:00 - 16:00	273	344	77	4	325	28	13	10	3	14	8	219	1
16:00 - 17:00	275	305	58	4	333	43	14	9	10	12	8	192	1
17:00 - 18:00	268	287	58	6	273	33	25	10	6	11	15	188	5

Hour	1A All Approach Lanes		1B Minor Street Both Approaches		2A Major Street Both Approaches		2B Traffic Crossing Major Street	
Threshold	*900*		*170*		*900*		*75*	
1	1178	100%	317	100%	861	96%	27	36%
2	1279	100%	336	100%	943	100%	52	69%
3	1338	100%	327	100%	1011	100%	42	56%
4	1302	100%	292	100%	1010	100%	39	52%
5	1453	100%	279	100%	1174	100%	32	43%
6	1318	100%	267	100%	1051	100%	38	51%
7	1263	100%	245	100%	1018	100%	36	48%
8	1180	100%	255	100%	925	100%	56	75%
8 Hours 100%	***Yes***		***Yes***		***No***		***No***	
8 Hours 80%	***Yes***		***Yes***		***Yes***		***No***	

Justification Results	
Justification 1 (Minimum Vehicle Volume)	Yes
Justification 2 (Delay To Cross Traffic)	No
Justification 3 (Volume/Delay Combination)	No

Is A Signal Justfied?	Yes

Signal Justification Calculation
(OTM Book 12 - Justifications 1, 2, 3)

Horizon Year: 2025 - Saturday
Region/City/Township: Town of Saugeen Shores

Major Street: N Rankin St (Hwy 21)
Minor Street: Turner St
North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Hour	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						Major X Peds
	Eastbound			Westbound			Northbound			Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
09:30 - 10:30	204	227	57	4	280	22	18	2	2	15	5	230	3
10:30 - 11:30	233	263	62	8	316	34	13	16	2	13	11	278	0
11:30 - 12:30	277	305	85	6	391	53	17	7	10	17	12	277	0
12:30 - 13:30	285	259	59	3	344	37	8	13	3	14	10	227	0
13:30 - 14:30	294	285	68	5	362	33	25	5	2	18	9	215	3
14:30 - 15:30	308	273	69	3	293	39	19	11	5	19	9	219	3
15:30 - 16:30	266	232	59	3	288	19	17	17	3	14	10	202	1
16:30 - 17:30	207	194	60	1	227	27	27	11	3	11	15	191	0

Hour	1A All Approach Lanes		1B Minor Street Both Approaches		2A Major Street Both Approaches		2B Traffic Crossing Major Street	
Threshold	*900*		*170*		*900*		*75*	
1	1066	100%	272	100%	794	88%	41	55%
2	1249	100%	333	100%	916	100%	42	56%
3	1457	100%	340	100%	1117	100%	46	61%
4	1262	100%	275	100%	987	100%	35	47%
5	1321	100%	274	100%	1047	100%	55	73%
6	1267	100%	282	100%	985	100%	52	69%
7	1130	100%	263	100%	867	96%	49	65%
8	974	100%	258	100%	716	80%	53	71%
8 Hours 100%	***Yes***		***Yes***		***No***		***No***	
8 Hours 80%	***Yes***		***Yes***		***No***		***No***	

Justification Results	
Justification 1 (Minimum Vehicle Volume)	Yes
Justification 2 (Delay To Cross Traffic)	No
Justification 3 (Volume/Delay Combination)	No

Is A Signal Justfied?	Yes

Signal Justification Calculation
(OTM Book 12 - Justifications 1, 2, 3)

Horizon Year: 2025 - Sunday
Region/City/Township: Town of Saugeen Shores

Major Street: N Rankin St (Hwy 21)
Minor Street: Turner St
North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Hour	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						Major X Peds
	Eastbound			Westbound			Northbound			Southbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
10:00 - 11:00	172	193	44	5	256	17	10	5	5	10	4	276	0
11:00 - 12:00	218	223	53	5	269	29	22	10	5	16	12	314	2
12:00 - 13:00	257	292	71	7	340	41	20	15	2	13	14	325	2
13:00 - 14:00	264	237	51	1	306	32	19	14	8	18	9	305	0
14:00 - 15:00	266	262	55	1	272	21	19	6	0	23	10	292	0
15:00 - 16:00	235	231	60	1	295	23	19	12	3	23	9	264	2
16:00 - 17:00	207	228	48	4	220	25	17	13	4	14	18	282	1
17:00 - 18:00	177	183	52	5	216	25	20	7	2	7	14	209	2

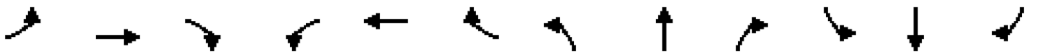
Hour	1A All Approach Lanes		1B Minor Street Both Approaches		2A Major Street Both Approaches		2B Traffic Crossing Major Street	
Threshold	*900*		*170*		*900*		*75*	
1	997	100%	310	100%	687	76%	25	33%
2	1176	100%	379	100%	797	89%	52	69%
3	1397	100%	389	100%	1008	100%	50	67%
4	1264	100%	373	100%	891	99%	51	68%
5	1227	100%	350	100%	877	97%	52	69%
6	1175	100%	330	100%	845	94%	56	75%
7	1080	100%	348	100%	732	81%	50	67%
8	917	100%	259	100%	658	73%	43	57%
8 Hours 100%	***Yes***		***Yes***		***No***		***No***	
8 Hours 80%	***Yes***		***Yes***		***No***		***No***	

Justification Results	
Justification 1 (Minimum Vehicle Volume)	Yes
Justification 2 (Delay To Cross Traffic)	No
Justification 3 (Volume/Delay Combination)	No

Is A Signal Justfied?	Yes

Appendix E

Synchro Reports – Future Conditions with Current Intersection Configuration



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	250	31	2	291	16	11	5	5	6	13	237
Future Volume (vph)	145	250	31	2	291	16	11	5	5	6	13	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.983			0.992			0.969			0.875	
Flt Protected	0.950			0.950				0.973			0.999	
Satd. Flow (prot)	1722	1824	0	1217	1820	0	0	1811	0	0	1642	0
Flt Permitted	0.950			0.950				0.973			0.999	
Satd. Flow (perm)	1722	1824	0	1217	1820	0	0	1811	0	0	1642	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Adj. Flow (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	296	0	2	323	0	0	22	0	0	269	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	250	31	2	291	16	11	5	5	6	13	237
Future Volume (Veh/h)	145	250	31	2	291	16	11	5	5	6	13	237
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Pedestrians											1	
Lane Width (m)											3.7	
Walking Speed (m/s)											1.1	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	324			296			1152	914	280	896	922	316
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	324			296			1152	914	280	896	922	316
tC, single (s)	4.2			4.6			7.1	6.5	6.2	7.1	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.7			3.5	4.0	3.3	3.5	4.1	3.3
p0 queue free %	87			100			88	98	99	97	94	66
cM capacity (veh/h)	1212			1036			100	240	764	232	230	724

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	153	296	2	323	22	269
Volume Left	153	0	2	0	12	6
Volume Right	0	33	0	17	5	249
cSH	1212	1700	1036	1700	149	625
Volume to Capacity	0.13	0.17	0.00	0.19	0.15	0.43
Queue Length 95th (m)	3.3	0.0	0.0	0.0	3.8	16.4
Control Delay (s/veh)	8.4	0.0	8.5	0.0	33.3	15.0
Lane LOS	A		A		D	C
Approach Delay (s/veh)	2.9		0.1		33.3	15.0
Approach LOS					D	C

Intersection Summary				
Average Delay	5.7			
Intersection Capacity Utilization	50.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	328	357	71	1	385	44	21	2	5	5	6	242
Future Volume (vph)	328	357	71	1	385	44	21	2	5	5	6	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975			0.985			0.977			0.871	
Flt Protected	0.950			0.950				0.963			0.999	
Satd. Flow (prot)	1789	1858	0	1825	1892	0	0	1807	0	0	1610	0
Flt Permitted	0.950			0.950				0.963			0.999	
Satd. Flow (perm)	1789	1858	0	1825	1892	0	0	1807	0	0	1610	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	2		3	3		2						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Adj. Flow (vph)	342	372	74	1	401	46	22	2	5	5	6	252
Shared Lane Traffic (%)												
Lane Group Flow (vph)	342	446	0	1	447	0	0	29	0	0	263	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 66.6%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	328	357	71	1	385	44	21	2	5	5	6	242
Future Volume (Veh/h)	328	357	71	1	385	44	21	2	5	5	6	242
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	342	372	74	1	401	46	22	2	5	5	6	252
Pedestrians								3			2	
Lane Width (m)								3.7			3.7	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	449			449			1754	1547	412	1490	1561	426
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	449			449			1754	1547	412	1490	1561	426
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	69			100			23	97	99	93	92	60
cM capacity (veh/h)	1109			1119			29	79	642	76	78	623

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	342	446	1	447	29	263
Volume Left	342	0	1	0	22	5
Volume Right	0	74	0	46	5	252
cSH	1109	1700	1119	1700	36	480
Volume to Capacity	0.31	0.26	0.00	0.26	0.80	0.55
Queue Length 95th (m)	10.0	0.0	0.0	0.0	21.9	24.6
Control Delay (s/veh)	9.7	0.0	8.2	0.0	254.0	21.2
Lane LOS	A		A		F	C
Approach Delay (s/veh)	4.2		0.0		254.0	21.2
Approach LOS					F	C

Intersection Summary				
Average Delay	10.6			
Intersection Capacity Utilization	66.6%	ICU Level of Service	C	
Analysis Period (min)	15			

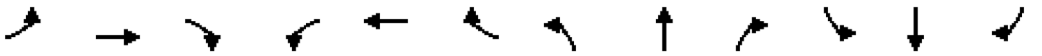
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	308	86	6	395	54	17	7	10	17	12	280
Future Volume (vph)	280	308	86	6	395	54	17	7	10	17	12	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.982			0.960			0.878	
Flt Protected	0.950			0.950				0.976			0.997	
Satd. Flow (prot)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Flt Permitted	0.950			0.950				0.976			0.997	
Satd. Flow (perm)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	301	331	92	6	425	58	18	8	11	18	13	301
Shared Lane Traffic (%)												
Lane Group Flow (vph)	301	423	0	6	483	0	0	37	0	0	332	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 68.5%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	308	86	6	395	54	17	7	10	17	12	280
Future Volume (Veh/h)	280	308	86	6	395	54	17	7	10	17	12	280
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	301	331	92	6	425	58	18	8	11	18	13	301
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	483			423			1724	1474	377	1414	1491	454
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	483			423			1724	1474	377	1414	1491	454
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	72			99			28	91	98	79	86	51
cM capacity (veh/h)	1085			1147			25	92	674	84	90	610

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	301	423	6	483	37	332
Volume Left	301	0	6	0	18	18
Volume Right	0	92	0	58	11	301
cSH	1085	1700	1147	1700	45	389
Volume to Capacity	0.28	0.25	0.01	0.28	0.82	0.85
Queue Length 95th (m)	8.7	0.0	0.1	0.0	24.7	61.8
Control Delay (s/veh)	9.6	0.0	8.2	0.0	220.6	49.3
Lane LOS	A		A		F	E
Approach Delay (s/veh)	4.0		0.1		220.6	49.3
Approach LOS					F	E

Intersection Summary				
Average Delay	17.4			
Intersection Capacity Utilization	68.5%	ICU Level of Service	C	
Analysis Period (min)	15			



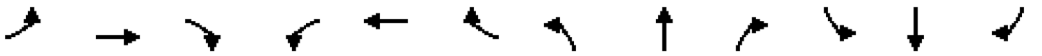
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Future Volume (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.983			0.992			0.971			0.875	
Flt Protected	0.950			0.950				0.973			0.999	
Satd. Flow (prot)	1722	1824	0	1217	1820	0	0	1815	0	0	1642	0
Flt Permitted	0.950			0.950				0.973			0.999	
Satd. Flow (perm)	1722	1824	0	1217	1820	0	0	1815	0	0	1642	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Adj. Flow (vph)	161	277	35	2	322	18	13	5	5	6	15	262
Shared Lane Traffic (%)												
Lane Group Flow (vph)	161	312	0	2	340	0	0	23	0	0	283	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	263	33	2	306	17	12	5	5	6	14	249
Future Volume (Veh/h)	153	263	33	2	306	17	12	5	5	6	14	249
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	161	277	35	2	322	18	13	5	5	6	15	262
Pedestrians											1	
Lane Width (m)											3.7	
Walking Speed (m/s)											1.1	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	341			312			1212	962	295	943	970	332
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	341			312			1212	962	295	943	970	332
tC, single (s)	4.2			4.6			7.1	6.5	6.2	7.1	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.7			3.5	4.0	3.3	3.5	4.1	3.3
p0 queue free %	87			100			85	98	99	97	93	63
cM capacity (veh/h)	1195			1021			86	223	750	214	213	709

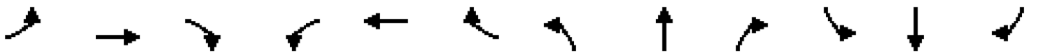
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	161	312	2	340	23	283
Volume Left	161	0	2	0	13	6
Volume Right	0	35	0	18	5	262
cSH	1195	1700	1021	1700	127	605
Volume to Capacity	0.13	0.18	0.00	0.20	0.18	0.47
Queue Length 95th (m)	3.5	0.0	0.0	0.0	4.8	18.9
Control Delay (s/veh)	8.5	0.0	8.5	0.0	39.4	16.1
Lane LOS	A		A		E	C
Approach Delay (s/veh)	2.9		0.0		39.4	16.1
Approach LOS					E	C

Intersection Summary				
Average Delay	6.1			
Intersection Capacity Utilization	52.0%	ICU Level of Service		A
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	375	74	1	404	47	22	2	5	5	6	255
Future Volume (vph)	345	375	74	1	404	47	22	2	5	5	6	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975			0.984			0.977			0.870	
Flt Protected	0.950			0.950				0.963			0.999	
Satd. Flow (prot)	1789	1858	0	1825	1890	0	0	1807	0	0	1608	0
Flt Permitted	0.950			0.950				0.963			0.999	
Satd. Flow (perm)	1789	1858	0	1825	1890	0	0	1807	0	0	1608	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	2		3	3		2						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Adj. Flow (vph)	359	391	77	1	421	49	23	2	5	5	6	266
Shared Lane Traffic (%)												
Lane Group Flow (vph)	359	468	0	1	470	0	0	30	0	0	277	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

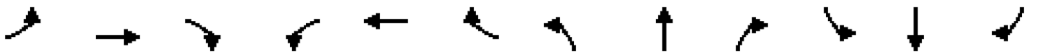
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 69.5%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	345	375	74	1	404	47	22	2	5	5	6	255
Future Volume (Veh/h)	345	375	74	1	404	47	22	2	5	5	6	255
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	359	391	77	1	421	49	23	2	5	5	6	266
Pedestrians								3			2	
Lane Width (m)								3.7			3.7	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	472			471			1843	1625	433	1565	1639	448
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	472			471			1843	1625	433	1565	1639	448
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			100			0	97	99	92	91	56
cM capacity (veh/h)	1088			1098			23	69	626	66	68	606

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	359	468	1	470	30	277
Volume Left	359	0	1	0	23	5
Volume Right	0	77	0	49	5	266
cSH	1088	1700	1098	1700	29	459
Volume to Capacity	0.33	0.28	0.00	0.28	1.05	0.60
Queue Length 95th (m)	11.1	0.0	0.0	0.0	26.2	29.7
Control Delay (s/veh)	9.9	0.0	8.3	0.0	387.7	24.1
Lane LOS	A		A		F	C
Approach Delay (s/veh)	4.3		0.0		387.7	24.1
Approach LOS					F	C

Intersection Summary				
Average Delay	13.6			
Intersection Capacity Utilization	69.5%	ICU Level of Service	C	
Analysis Period (min)	15			



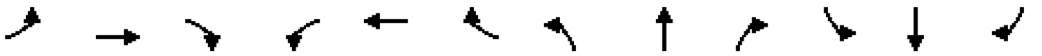
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	294	324	90	6	415	56	18	7	11	18	13	294
Future Volume (vph)	294	324	90	6	415	56	18	7	11	18	13	294
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.982			0.958			0.878	
Flt Protected	0.950			0.950				0.976			0.997	
Satd. Flow (prot)	1807	1858	0	1825	1870	0	0	1796	0	0	1682	0
Flt Permitted	0.950			0.950				0.976			0.997	
Satd. Flow (perm)	1807	1858	0	1825	1870	0	0	1796	0	0	1682	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	316	348	97	6	446	60	19	8	12	19	14	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	316	445	0	6	506	0	0	39	0	0	349	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	294	324	90	6	415	56	18	7	11	18	13	294
Future Volume (Veh/h)	294	324	90	6	415	56	18	7	11	18	13	294
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	316	348	97	6	446	60	19	8	12	19	14	316
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	506			445			1810	1547	397	1484	1565	476
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	506			445			1810	1547	397	1484	1565	476
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			99			1	90	98	74	82	47
cM capacity (veh/h)	1064			1126			19	81	657	73	79	593

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	316	445	6	506	39	349
Volume Left	316	0	6	0	19	19
Volume Right	0	97	0	60	12	316
cSH	1064	1700	1126	1700	35	359
Volume to Capacity	0.30	0.26	0.01	0.30	1.11	0.97
Queue Length 95th (m)	9.5	0.0	0.1	0.0	30.9	82.3
Control Delay (s/veh)	9.8	0.0	8.2	0.0	357.5	75.2
Lane LOS	A		A		F	F
Approach Delay (s/veh)	4.1		0.1		357.5	75.2
Approach LOS					F	F

Intersection Summary				
Average Delay	26.1			
Intersection Capacity Utilization	71.4%	ICU Level of Service	C	
Analysis Period (min)	15			



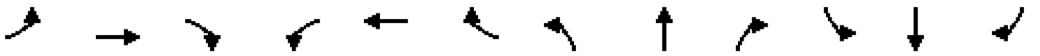
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	277	35	2	321	18	12	6	6	7	15	262
Future Volume (vph)	161	277	35	2	321	18	12	6	6	7	15	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.983			0.992			0.968			0.875	
Flt Protected	0.950			0.950				0.975			0.999	
Satd. Flow (prot)	1722	1824	0	1217	1820	0	0	1813	0	0	1642	0
Flt Permitted	0.950			0.950				0.975			0.999	
Satd. Flow (perm)	1722	1824	0	1217	1820	0	0	1813	0	0	1642	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Adj. Flow (vph)	169	292	37	2	338	19	13	6	6	7	16	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	329	0	2	357	0	0	25	0	0	299	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	161	277	35	2	321	18	12	6	6	7	15	262
Future Volume (Veh/h)	161	277	35	2	321	18	12	6	6	7	15	262
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	169	292	37	2	338	19	13	6	6	7	16	276
Pedestrians											1	
Lane Width (m)											3.7	
Walking Speed (m/s)											1.1	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	358			329			1275	1011	311	992	1020	349
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	358			329			1275	1011	311	992	1020	349
tC, single (s)	4.2			4.6			7.1	6.5	6.2	7.1	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.7			3.5	4.0	3.3	3.5	4.1	3.3
p0 queue free %	86			100			82	97	99	96	92	60
cM capacity (veh/h)	1178			1005			73	206	734	195	197	694

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	169	329	2	357	25	299
Volume Left	169	0	2	0	13	7
Volume Right	0	37	0	19	6	276
cSH	1178	1700	1005	1700	116	581
Volume to Capacity	0.14	0.19	0.00	0.21	0.22	0.51
Queue Length 95th (m)	3.8	0.0	0.0	0.0	5.9	22.3
Control Delay (s/veh)	8.6	0.0	8.6	0.0	44.3	17.6
Lane LOS	A		A		E	C
Approach Delay (s/veh)	2.9		0.0		44.3	17.6
Approach LOS					E	C

Intersection Summary				
Average Delay	6.6			
Intersection Capacity Utilization	54.3%	ICU Level of Service		A
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	363	394	78	1	425	49	23	2	6	6	7	268
Future Volume (vph)	363	394	78	1	425	49	23	2	6	6	7	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975			0.985			0.975			0.871	
Flt Protected	0.950			0.950				0.964			0.999	
Satd. Flow (prot)	1789	1858	0	1825	1892	0	0	1806	0	0	1610	0
Flt Permitted	0.950			0.950				0.964			0.999	
Satd. Flow (perm)	1789	1858	0	1825	1892	0	0	1806	0	0	1610	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	2		3	3		2						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Adj. Flow (vph)	378	410	81	1	443	51	24	2	6	6	7	279
Shared Lane Traffic (%)												
Lane Group Flow (vph)	378	491	0	1	494	0	0	32	0	0	292	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 72.6%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	363	394	78	1	425	49	23	2	6	6	7	268
Future Volume (Veh/h)	363	394	78	1	425	49	23	2	6	6	7	268
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	378	410	81	1	443	51	24	2	6	6	7	279
Pedestrians								3			2	
Lane Width (m)								3.7			3.7	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	496			494			1937	1708	454	1646	1723	471
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496			494			1937	1708	454	1646	1723	471
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	65			100			0	97	99	89	88	53
cM capacity (veh/h)	1066			1077			17	59	609	56	58	588

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	378	491	1	494	32	292
Volume Left	378	0	1	0	24	6
Volume Right	0	81	0	51	6	279
cSH	1066	1700	1077	1700	22	415
Volume to Capacity	0.35	0.29	0.00	0.29	1.43	0.70
Queue Length 95th (m)	12.3	0.0	0.0	0.0	31.3	40.2
Control Delay (s/veh)	10.2	0.0	8.3	0.0	599.9	31.7
Lane LOS	B		A		F	D
Approach Delay (s/veh)	4.4		0.0		599.9	31.7
Approach LOS					F	D

Intersection Summary				
Average Delay	19.2			
Intersection Capacity Utilization	72.6%	ICU Level of Service	C	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	340	95	7	436	59	19	8	11	19	13	309
Future Volume (vph)	309	340	95	7	436	59	19	8	11	19	13	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.982			0.960			0.878	
Flt Protected	0.950			0.950				0.976			0.997	
Satd. Flow (prot)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Flt Permitted	0.950			0.950				0.976			0.997	
Satd. Flow (perm)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	332	366	102	8	469	63	20	9	12	20	14	332
Shared Lane Traffic (%)												
Lane Group Flow (vph)	332	468	0	8	532	0	0	41	0	0	366	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 74.5%		ICU Level of Service D	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	309	340	95	7	436	59	19	8	11	19	13	309
Future Volume (Veh/h)	309	340	95	7	436	59	19	8	11	19	13	309
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	332	366	102	8	469	63	20	9	12	20	14	332
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	532			468			1905	1629	417	1563	1649	501
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	532			468			1905	1629	417	1563	1649	501
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	68			99			0	87	98	67	79	42
cM capacity (veh/h)	1041			1104			14	70	640	61	68	574

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	332	468	8	532	41	366
Volume Left	332	0	8	0	20	20
Volume Right	0	102	0	63	12	332
cSH	1041	1700	1104	1700	26	329
Volume to Capacity	0.32	0.28	0.01	0.31	1.56	1.11
Queue Length 95th (m)	10.5	0.0	0.2	0.0	37.6	108.3
Control Delay (s/veh)	10.1	0.0	8.3	0.0	602.6	119.4
Lane LOS	B		A		F	F
Approach Delay (s/veh)	4.2		0.1		602.6	119.4
Approach LOS					F	F

Intersection Summary				
Average Delay	41.1			
Intersection Capacity Utilization	74.5%	ICU Level of Service		D
Analysis Period (min)	15			

Appendix F

Traffic Signal Warrant Calculations – Future Conditions with Current Intersection Configuration

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2026 Saturday
Municipality: Town of Saugeen Shores

Project number: 250497

Major Street: N Rankin St N Rankin N Rankin St (Hwy 21) North/South?: N
Minor Street: Turner St Turner St Turner St

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
200% Satisfied	No	Case 1: Signal is undoubtedly warranted
100% Satisfied	Yes	Case 2: Signal might be warranted
		Case 3: Signal warrant is unlikely

	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	280	308	86	6	395	54	17	7	10	17	12	280	
PM Peak Hour	280	308	86	6	395	54	17	7	10	17	12	280	
verage Hourly Volum	140	154	43	3	197	27	9	4	5	9	6	140	0

Warrant	AHV
1A - All	736
1B - Minor	172
2A - Major	564
2B - Cross	23

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	736
					% Fulfilled	81.8%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	172
					% Fulfilled	101.0%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	564
					% Fulfilled	62.7%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	23
					% Fulfilled	31.0%

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2026 Friday
Municipality: Town of Saugeen Shores

Project number: 250497

Major Street: N Rankin St N Rankin N Rankin St (Hwy 21)
Minor Street: Turner St Turner St Turner St

North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
200% Satisfied	No	Case 1: Signal is undoubtedly warranted
100% Satisfied	No	Case 2: Signal might be warranted
		Case 3: Signal warrant is unlikely

	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	145	250	31	2	291	16	11	5	5	6	13	237	
PM Peak Hour	328	357	71	1	385	44	21	2	5	5	6	242	
verage Hourly Volum	118	152	26	1	169	15	8	2	3	3	5	120	0

Warrant	AHV
1A - All	620
1B - Minor	140
2A - Major	480
2B - Cross	16

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	620
					% Fulfilled	68.9%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	140
					% Fulfilled	82.1%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	480
					% Fulfilled	53.4%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	16
					% Fulfilled	20.8%

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2031 Saturday
Municipality: Town of Saugeen Shores

Project number: 250497

Major Street: N Rankin St N Rankin N Rankin St (Hwy 21)
Minor Street: Turner St Turner St Turner St

North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
200% Satisfied	No	Case 1: Signal is undoubtedly warranted
100% Satisfied	Yes	Case 2: Signal might be warranted
		Case 3: Signal warrant is unlikely

	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	294	324	90	6	415	56	18	7	11	18	13	294	
PM Peak Hour	294	324	90	6	415	56	18	7	11	18	13	294	
verage Hourly Volum	147	162	45	3	208	28	9	4	5	9	6	147	0

Warrant	AHV
1A - All	773
1B - Minor	180
2A - Major	593
2B - Cross	24

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	773
					% Fulfilled	85.9%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	180
					% Fulfilled	106.2%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	593
					% Fulfilled	65.9%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	24
					% Fulfilled	32.6%

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2031 Friday
Municipality: Town of Saugeen Shores

Project number: 250497

Major Street: N Rankin St N Rankin N Rankin St (Hwy 21)
Minor Street: Turner St Turner St Turner St

North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
200% Satisfied	No	Case 1: Signal is undoubtedly warranted
100% Satisfied	No	Case 2: Signal might be warranted
		Case 3: Signal warrant is unlikely

	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	153	263	33	2	306	17	12	5	5	6	14	249	
PM Peak Hour	345	375	74	1	404	47	22	2	5	5	6	255	
verage Hourly Volum	124	159	27	1	178	16	8	2	3	3	5	126	0

Warrant	AHV
1A - All	652
1B - Minor	147
2A - Major	505
2B - Cross	16

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	652
					% Fulfilled	72.4%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	147
					% Fulfilled	86.5%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	505
					% Fulfilled	56.1%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	16
					% Fulfilled	21.9%

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2036 Saturday
Municipality: Town of Saugeen Shores

Project number: 250497

Major Street: N Rankin St N Rankin N Rankin St (Hwy 21) North/South?: N
Minor Street: Turner St Turner St Turner St

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
200% Satisfied	No	Case 1: Signal is undoubtedly warranted
100% Satisfied	Yes	Case 2: Signal might be warranted
		Case 3: Signal warrant is unlikely

	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	309	340	95	7	436	59	19	8	11	19	13	309	
PM Peak Hour	309	340	95	7	436	59	19	8	11	19	13	309	
verage Hourly Volum	155	170	47	3	218	30	9	4	6	9	7	155	0

Warrant	AHV
1A - All	813
1B - Minor	190
2A - Major	623
2B - Cross	26

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	813
					% Fulfilled	90.3%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	190
					% Fulfilled	111.6%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	623
					% Fulfilled	69.2%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	26
					% Fulfilled	34.2%

Signal Justification Calculation for Forecast Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2036 Friday
Municipality: Town of Saugeen Shores

Project number: 250497

Major Street: N Rankin St N Rankin N Rankin St (Hwy 21)
Minor Street: Turner St Turner St Turner St

North/South?: N

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
200% Satisfied	No	Case 1: Signal is undoubtedly warranted
100% Satisfied	No	Case 2: Signal might be warranted
		Case 3: Signal warrant is unlikely

	Major Street N Rankin St (Hwy 21)						Minor Street Turner St						
	Eastbound			Westbound			Northbound			Southbound			Peds
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Crossing
AM Peak Hour	161	277	35	2	321	18	12	6	6	7	15	262	
PM Peak Hour	363	394	78	1	425	49	23	2	6	6	7	268	
verage Hourly Volum	131	168	28	1	187	17	9	2	3	3	5	132	0

Warrant	AHV
1A - All	685
1B - Minor	155
2A - Major	531
2B - Cross	17

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	685
					% Fulfilled	76.1%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	155
					% Fulfilled	90.9%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	531
					% Fulfilled	59.0%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	17
					% Fulfilled	23.1%

Appendix G

Roundabout Initial Screening Analysis

Project: N Rankin St (Hwy 21) and Turner St
Project #: 250497
Task: Roundabout Screening

Intersection	AM							PM							Saturday						
	Movement	Volume	Approach	E	C	E + C	Result	Movement	Volume	Approach	E	C	E + C	Result	Movement	Volume	Approach	E	C	E + C	Result
	EBL	161	EB	473	24	497	Single-lane entry likely sufficient	EBL	363	EB	835	14	849	Single-lane entry likely sufficient	EBL	309	EB	744	39	783	Single-lane entry likely sufficient
	EBT	277			24			EBT	394			14			EBT	340			39		
	EBR	35			24			EBR	78			14			EBR	95			39		
	WBL	2	WB	341	179	520	Single-lane entry likely sufficient	WBL	1	WB	475	388	863	Single-lane entry likely sufficient	WBL	7	WB	502	336	838	Single-lane entry likely sufficient
	WBT	321			179			WBT	425			388			WBT	436			336		
	WBR	18			179			WBR	49			388			WBR	59			336		
N Rankin St (Hwy 21) and Turner St	NBL	12	NB	24	445	469	Single-lane entry likely sufficient	NBL	23	NB	31	763	794	Single-lane entry likely sufficient	NBL	19	NB	38	668	706	Single-lane entry likely sufficient
	NBT	6			445			NBT	2			763			NBT	8			668		
	NBR	6			445			NBR	6			763			NBR	11			668		
	SBL	7	SB	284	335	619	Single-lane entry likely sufficient	SBL	6	SB	281	449	730	Single-lane entry likely sufficient	SBL	19	SB	341	462	803	Single-lane entry likely sufficient
	SBT	15			335			SBT	7			449			SBT	13			462		
	SBR	262			335			SBR	268			449			SBR	309			462		
	Total	1122	**Total**	1122	-			**Total**	1622	**Total**	1622	-			**Total**	1625	**Total**	1625	-		

Ten-year Horizon (2036)

E - Entry Flow
C - Circulating Flow

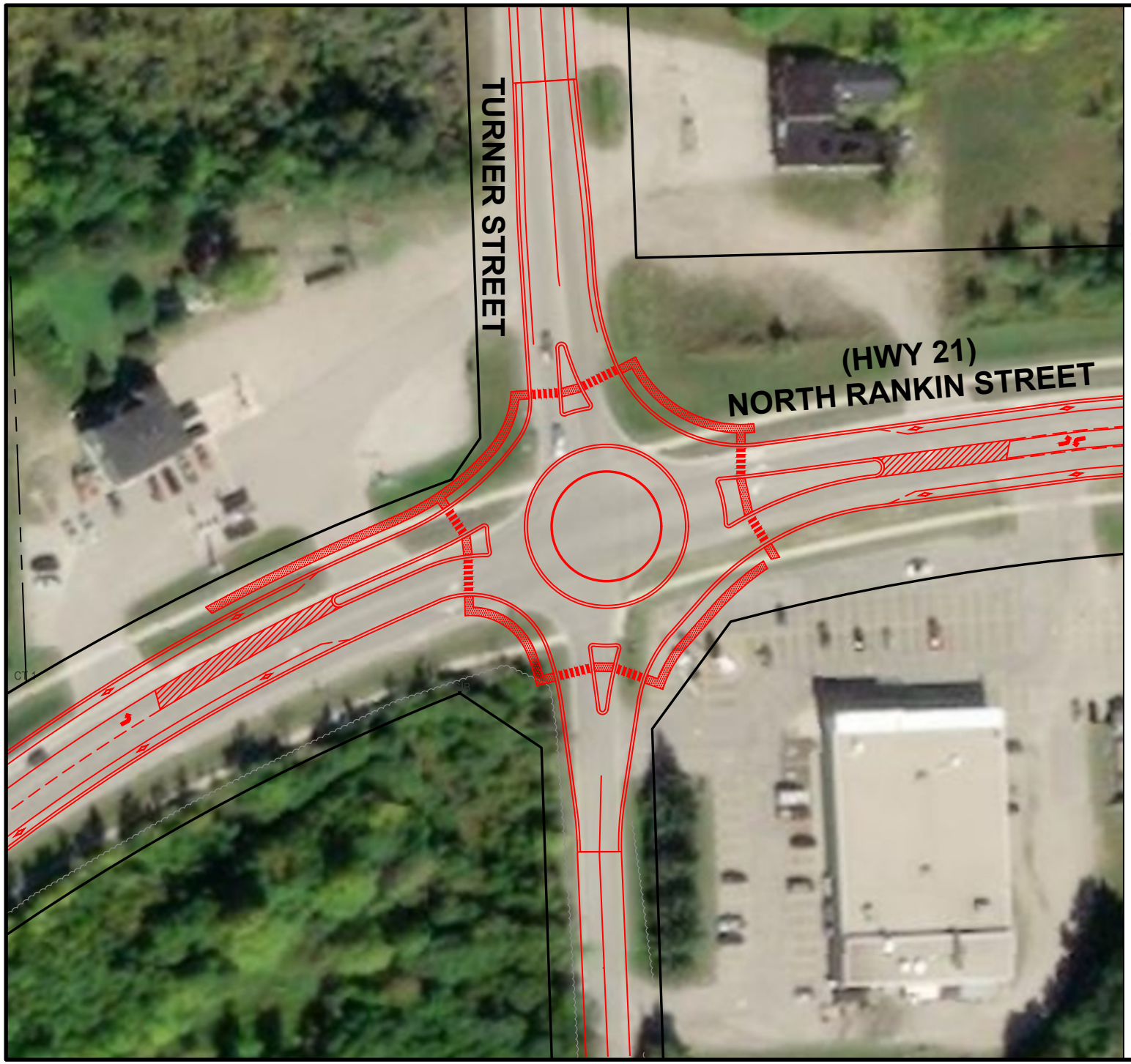
From the MTO Roundabout Feasibility Initial Screening Tool Version 1.0
It identifies the capacity guidelines for multi-lane entries as follows:
Entry flow + circulating flow < 1400 vph, use single lane entry
1400 vph < entry flow + circulating flow < 2200 vph, use two-lane entry
Entry flow + circulating flow > 2200 vph, use three-lane entry

This is generally consistent with NCHRP Report 675 Roundabouts: An Informational Guide, Second Edition

Volume Range (sum of entering and conflicting volumes)	Number of Lanes Required
0 to 1,000 vph	Single-lane entry likely to be sufficient
1,000 to 1,300 vph	Two-lane entry may be needed
1,300 to 1,800 vph	Two-lane entry likely to be sufficient
1,800 vph	More than two entering lanes may be required

Appendix H

Conceptual Drawings of Traffic Control Alternatives



N

TOWN OF SAUGEEN SHORES (SOUTHAMPTON)

SINGLE LANE ROUNDABOUT

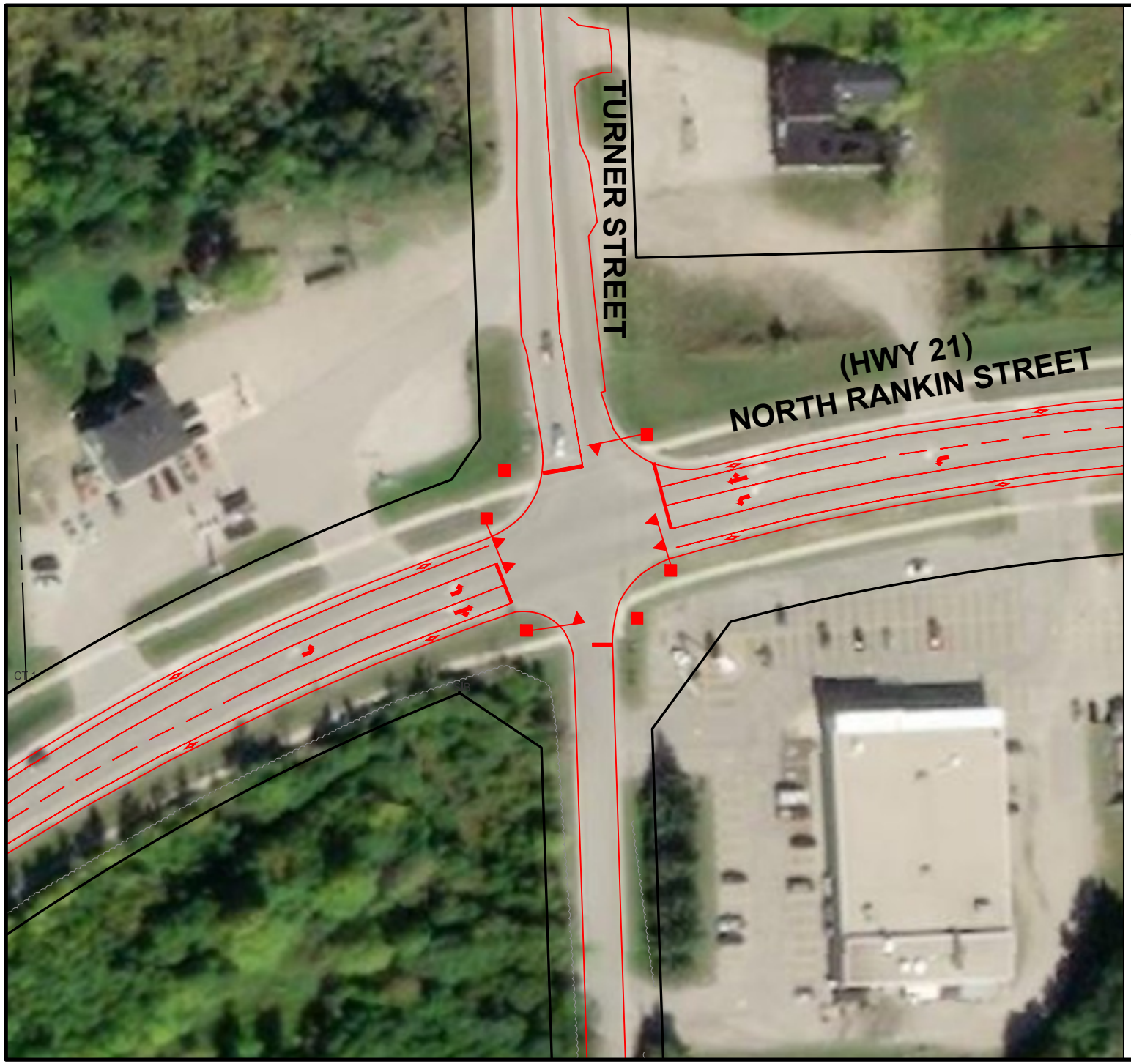
ALTERNATIVE #1

GEI Consultants Canada

GEI CONSULTANTS CANADA LTD.
975 WALLACE AVENUE NORTH
LISTOWEL, ONTARIO N4W 1M6
519.291.9339

2503507
AUGUST 2025

FILE:B:\Working\SAUGEEN SHORES ON, TOWN OF\2503507 Highway 21 At Turner Street (Bruce County Road 13) Intersection Improvements\Work In Progress\Drafting\2503507 - Concept Plans.dwg LAYOUT:CONCEPT 1
LAST SAVED BY:Chrpol4099, 8/28/2025 3:54:52 PM PLOTTED BY:Polhamus, Christopher 8/28/2025 3:55:10 PM



N

TOWN OF SAUGEEN SHORES (SOUTHAMPTON)

TRAFFIC SIGNALS

ALTERNATIVE #2

GEI Consultants Canada

GEI CONSULTANTS CANADA LTD.
975 WALLACE AVENUE NORTH
LISTOWEL, ONTARIO N4W 1M6
519.291.9339

2503507
AUGUST 2025

FILE:B:\Working\SAUGEEN SHORES ON, TOWN OF\2503507 Highway 21 At Turner Street (Bruce County Road 13) Intersection Improvements\Work In Progress\Drafting\2503507 - Concept Plans.dwg LAYOUT:CONCEPT 2
LAST SAVED BY:Chrpol4099, 8/28/2025 3:54:52 PM PLOTTED BY:Polhamus, Christopher 8/28/2025 3:55:13 PM

Appendix I

ARCADY Reports – Future Conditions with Single-Lane Roundabout (Alternative 1)

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 4:43:39 PM

Summary of intersection performance

	AM						
	Queue (PCE)	**95% Queue (PCE)**	**Delay (s)**	**V/C Ratio**	**LOS**	**Intersection Delay (s)**	**Intersection LOS**
	A1 - Opening Year (2026)						
Leg North	0.30	~1	4.08	0.23	A	4.10	A
Leg West	0.52	1.04	4.19	0.33	A		
Leg South	0.02	~1	3.30	0.02	A		
Leg East	0.36	~1	4.04	0.26	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM " model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 4:43:38 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Opening Year (2026), AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Opening Year (2026), AM	Opening Year (2026)	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				4.10	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	
South	3.50	4.50	30.00	20.00	40.00	25.00	

East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	256.00	100.000
West	PHF	✓	426.00	100.000
South	PHF	✓	21.00	100.000
East	PHF	✓	309.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	256.00	0.95	SecondQuarter
West	426.00	0.95	SecondQuarter
South	21.00	0.95	SecondQuarter
East	309.00	0.95	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	237.000	13.000	6.000
	West	145.000	0.000	31.000	250.000
	South	5.000	11.000	0.000	5.000
	East	16.000	291.000	2.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.00	0.93	0.05	0.02
	West	0.34	0.00	0.07	0.59
	South	0.24	0.52	0.00	0.24

	East	0.05	0.94	0.01	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.020	1.080	1.000
	West	1.060	1.000	1.000	1.040
	South	1.000	1.000	1.000	1.000
	East	1.000	1.050	1.500	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	2.0	8.0	0.0
	West	6.0	0.0	0.0	4.0
	South	0.0	0.0	0.0	0.0
	East	0.0	5.0	50.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.23	4.08	0.30	~1	A	256.00	256.00	16.90	3.96	0.28	16.90	3.96
West	0.33	4.19	0.52	1.04	A	426.00	426.00	28.89	4.07	0.48	28.89	4.07
South	0.02	3.30	0.02	~1	A	21.00	21.00	1.14	3.25	0.02	1.14	3.25
East	0.26	4.04	0.36	~1	A	309.00	309.00	20.28	3.94	0.34	20.28	3.94

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	247.02	61.75	245.95	159.47	292.08	0.00	1188.40	716.62	0.208	0.00	0.27	3.901	A
West	411.05	102.76	409.23	517.85	20.18	0.00	1345.77	1323.61	0.305	0.00	0.46	4.005	A
South	20.26	5.07	20.19	44.19	385.21	0.00	1134.50	637.42	0.018	0.00	0.02	3.230	A
East	298.16	74.54	296.87	250.73	154.67	0.00	1267.93	815.62	0.235	0.00	0.32	3.885	A

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	269.47	67.37	269.33	174.64	319.83	0.00	1172.34	716.62	0.230	0.27	0.30	4.076	A
West	448.42	112.11	448.17	567.07	22.09	0.00	1344.66	1323.61	0.333	0.46	0.52	4.190	A
South	22.11	5.53	22.10	48.39	421.87	0.00	1113.28	637.42	0.020	0.02	0.02	3.298	A
East	325.26	81.32	325.09	274.58	169.38	0.00	1259.41	815.62	0.258	0.32	0.36	4.043	A

Main results: (08:30-08:45)

Leg	Total Demand	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand	Capacity (PCE/hr)	Saturation Capacity	V/C Ratio	Start Queue	End Queue	Delay (s)	LOS

	(PCE/hr)					(Ped/hr)		(PCE/hr)		(PCE)	(PCE)		
North	260.49	65.12	260.54	168.94	309.39	0.00	1178.38	716.62	0.221	0.30	0.29	4.010	A
West	433.47	108.37	433.55	548.55	21.37	0.00	1345.08	1323.61	0.322	0.52	0.50	4.122	A
South	21.37	5.34	21.37	46.82	408.11	0.00	1121.25	637.42	0.019	0.02	0.02	3.272	A
East	314.42	78.61	314.48	265.63	163.85	0.00	1262.61	815.62	0.249	0.36	0.35	3.984	A

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	247.02	61.75	247.10	160.23	293.43	0.00	1187.62	716.62	0.208	0.29	0.27	3.915	A
West	411.05	102.76	411.20	520.27	20.27	0.00	1345.71	1323.61	0.305	0.50	0.46	4.022	A
South	20.26	5.07	20.27	44.40	387.07	0.00	1133.42	637.42	0.018	0.02	0.02	3.233	A
East	298.16	74.54	298.26	251.93	155.41	0.00	1267.50	815.62	0.235	0.35	0.32	3.899	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.91	0.26	3.901	A	A
West	6.67	0.44	4.005	A	A
South	0.27	0.02	3.230	A	A
East	4.70	0.31	3.885	A	A

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.49	0.30	4.076	A	A
West	7.67	0.51	4.190	A	A
South	0.30	0.02	3.298	A	A
East	5.38	0.36	4.043	A	A

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.41	0.29	4.010	A	A
West	7.55	0.50	4.122	A	A
South	0.29	0.02	3.272	A	A
East	5.29	0.35	3.984	A	A

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.09	0.27	3.915	A	A
West	7.00	0.47	4.022	A	A
South	0.28	0.02	3.233	A	A
East	4.92	0.33	3.899	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.32	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or		N/A	N/A

						very big.			

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.52	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.50	0.00	0.00	0.00	1.04			N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.32	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 5:43:25 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - Opening Year (2026)						
Leg North	0.32	~1	4.40	0.24	A	5.68	A
Leg West	1.40	2.03	6.46	0.58	A		
Leg South	0.03	~1	3.94	0.03	A		
Leg East	0.64	~1	5.15	0.39	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM " model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:43:25 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Opening Year (2026), PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Opening Year (2026), PM	Opening Year (2026)	PM		PHF	16:30	17:30	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				5.68	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	
South	3.50	4.50	30.00	20.00	40.00	25.00	

East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	253.00	100.000
West	PHF	✓	756.00	100.000
South	PHF	✓	28.00	100.000
East	PHF	✓	430.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	253.00	0.96	SecondQuarter
West	756.00	0.96	SecondQuarter
South	28.00	0.96	SecondQuarter
East	430.00	0.96	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	242.000	6.000	5.000
	West	328.000	0.000	71.000	357.000
	South	2.000	21.000	0.000	5.000
	East	44.000	385.000	1.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.00	0.96	0.02	0.02
	West	0.43	0.00	0.09	0.47
	South	0.07	0.75	0.00	0.18

	East	0.10	0.90	0.00	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.040	1.000	1.000
	West	1.020	1.000	1.000	1.010
	South	1.000	1.000	1.000	1.000
	East	1.000	1.000	1.000	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	4.0	0.0	0.0
	West	2.0	0.0	0.0	1.0
	South	0.0	0.0	0.0	0.0
	East	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.24	4.40	0.32	~1	A	253.00	253.00	18.05	4.28	0.30	18.05	4.28
West	0.58	6.46	1.40	2.03	A	756.00	756.00	76.64	6.08	1.28	76.67	6.09
South	0.03	3.94	0.03	~1	A	28.00	28.00	1.80	3.85	0.03	1.80	3.85
East	0.39	5.15	0.64	~1	A	430.00	430.00	35.41	4.94	0.59	35.41	4.94

Main Results for each time segment

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	245.97	61.49	244.82	361.30	393.61	0.00	1129.64	705.74	0.218	0.00	0.29	4.219	A
West	735.00	183.75	730.23	626.82	11.61	0.00	1350.72	1338.73	0.544	0.00	1.19	5.836	A
South	27.22	6.81	27.11	75.35	666.49	0.00	971.71	647.34	0.028	0.00	0.03	3.810	A
East	418.06	104.51	415.82	354.51	339.09	0.00	1161.20	713.54	0.360	0.00	0.56	4.815	A

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	263.54	65.89	263.41	389.20	423.67	0.00	1112.24	705.75	0.237	0.29	0.32	4.403	A
West	787.50	196.88	786.69	674.58	12.49	0.00	1350.21	1338.73	0.583	1.19	1.40	6.464	A
South	29.17	7.29	29.15	81.17	718.01	0.00	941.89	647.34	0.031	0.03	0.03	3.943	A
East	447.92	111.98	447.60	381.90	365.26	0.00	1146.05	713.54	0.391	0.56	0.64	5.152	A

Main results: (17:00-17:15)

Leg	Total Demand	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand	Capacity (PCE/hr)	Saturation Capacity	V/C Ratio	Start Queue	End Queue	Delay (s)	LOS

	(PCE/hr)					(Ped/hr)		(PCE/hr)		(PCE)	(PCE)		
North	256.51	64.13	256.55	379.29	412.73	0.00	1118.57	705.75	0.229	0.32	0.31	4.335	A
West	766.50	191.63	766.70	657.12	12.17	0.00	1350.40	1338.73	0.568	1.40	1.35	6.252	A
South	28.39	7.10	28.39	79.10	699.76	0.00	952.45	647.34	0.030	0.03	0.03	3.895	A
East	435.97	108.99	436.06	372.19	355.96	0.00	1151.43	713.54	0.379	0.64	0.61	5.034	A

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	245.97	61.49	246.05	363.84	395.86	0.00	1128.33	705.74	0.218	0.31	0.29	4.236	A
West	735.00	183.75	735.48	630.24	11.67	0.00	1350.69	1338.73	0.544	1.35	1.23	5.937	A
South	27.22	6.81	27.23	75.88	671.27	0.00	968.94	647.34	0.028	0.03	0.03	3.824	A
East	418.06	104.51	418.24	357.04	341.47	0.00	1159.82	713.54	0.360	0.61	0.57	4.857	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.20	0.28	4.219	A	A
West	17.10	1.14	5.836	A	A
South	0.42	0.03	3.810	A	A
East	8.11	0.54	4.815	A	A

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.75	0.32	4.403	A	A
West	20.42	1.36	6.464	A	A
South	0.47	0.03	3.943	A	A
East	9.38	0.63	5.152	A	A

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.69	0.31	4.335	A	A
West	20.40	1.36	6.252	A	A
South	0.47	0.03	3.895	A	A
East	9.29	0.62	5.034	A	A

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.41	0.29	4.236	A	A
West	18.72	1.25	5.937	A	A
South	0.44	0.03	3.824	A	A
East	8.63	0.58	4.857	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.19	0.00	0.00	1.01	2.03			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.32	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.40	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.64	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.35	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.61	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.23	0.00	0.00	1.01	2.03			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

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Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 5:43:41 PM

Summary of intersection performance

	SAT						
	Queue (PCE)	**95% Queue (PCE)**	**Delay (s)**	**V/C Ratio**	**LOS**	**Intersection Delay (s)**	**Intersection LOS**
	A1 - Opening Year (2026)						
Leg North	0.43	~1	4.70	0.30	A	5.42	A
Leg West	1.18	1.00	5.89	0.54	A		
Leg South	0.04	~1	3.81	0.04	A		
Leg East	0.72	~1	5.34	0.42	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT " model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:43:41 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Opening Year (2026), SAT

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Opening Year (2026), SAT	Opening Year (2026)	SAT		PHF	12:00	13:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				5.42	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	
South	3.50	4.50	30.00	20.00	40.00	25.00	

East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	309.00	100.000
West	PHF	✓	674.00	100.000
South	PHF	✓	34.00	100.000
East	PHF	✓	455.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	309.00	0.93	SecondQuarter
West	674.00	0.93	SecondQuarter
South	34.00	0.93	SecondQuarter
East	455.00	0.93	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	280.000	12.000	17.000
	West	280.000	0.000	86.000	308.000
	South	7.000	17.000	0.000	10.000
	East	54.000	395.000	6.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.00	0.91	0.04	0.06
	West	0.42	0.00	0.13	0.46
	South	0.21	0.50	0.00	0.29

	East	0.12	0.87	0.01	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.000	1.000	1.000
	West	1.010	1.000	1.000	1.000
	South	1.000	1.000	1.000	1.000
	East	1.000	1.010	1.000	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	0.0	0.0	0.0
	West	1.0	0.0	0.0	0.0
	South	0.0	0.0	0.0	0.0
	East	0.0	1.0	0.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.30	4.70	0.43	~1	A	309.00	309.00	22.94	4.45	0.38	22.94	4.45
West	0.54	5.89	1.18	1.00	A	674.00	674.00	61.10	5.44	1.02	61.12	5.44
South	0.04	3.81	0.04	~1	A	34.00	34.00	2.09	3.69	0.03	2.09	3.69
East	0.42	5.34	0.72	~1	A	455.00	455.00	37.83	4.99	0.63	37.83	4.99

Main Results for each time segment

Main results: (12:00-12:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	293.49	73.37	292.10	322.08	394.95	0.00	1128.86	771.27	0.260	0.00	0.35	4.295	A
West	640.18	160.04	636.54	653.97	33.08	0.00	1338.30	1309.69	0.478	0.00	0.91	5.124	A
South	32.29	8.07	32.16	98.23	571.39	0.00	1026.75	671.61	0.031	0.00	0.03	3.619	A
East	432.17	108.04	429.89	316.41	287.14	0.00	1191.26	768.17	0.363	0.00	0.57	4.755	A

Main results: (12:15-12:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	332.26	83.06	331.93	366.15	448.92	0.00	1097.63	771.27	0.303	0.35	0.43	4.699	A
West	724.73	181.18	723.67	743.26	37.60	0.00	1335.69	1309.69	0.543	0.91	1.18	5.895	A
South	36.56	9.14	36.53	111.67	649.60	0.00	981.48	671.61	0.037	0.03	0.04	3.808	A
East	489.25	122.31	488.65	359.71	326.43	0.00	1168.52	768.17	0.419	0.57	0.72	5.336	A

Main results: (12:30-12:45)

Leg	Total Demand	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand	Capacity (PCE/hr)	Saturation Capacity	V/C Ratio	Start Queue	End Queue	Delay (s)	LOS

	(PCE/hr)					(Ped/hr)		(PCE/hr)		(PCE)	(PCE)		
North	316.75	79.19	316.87	349.73	428.67	0.00	1109.35	771.27	0.286	0.43	0.40	4.544	A
West	690.91	172.73	691.26	709.65	35.89	0.00	1336.67	1309.69	0.517	1.18	1.09	5.606	A
South	34.85	8.71	34.86	106.66	620.49	0.00	998.33	671.61	0.035	0.04	0.04	3.735	A
East	466.42	116.60	466.62	343.58	311.78	0.00	1177.00	768.17	0.396	0.72	0.67	5.112	A

Main results: (12:45-13:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	293.49	73.37	293.69	324.19	397.34	0.00	1127.48	771.27	0.260	0.40	0.35	4.320	A
West	640.18	160.04	640.80	657.76	33.27	0.00	1338.19	1309.69	0.478	1.09	0.93	5.187	A
South	32.29	8.07	32.31	98.87	575.20	0.00	1024.54	671.61	0.032	0.04	0.03	3.630	A
East	432.17	108.04	432.52	318.49	289.02	0.00	1190.17	768.17	0.363	0.67	0.58	4.796	A

Queueing Delay Results for each time segment

Queueing Delay results: (12:00-12:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.10	0.34	4.295	A	A
West	13.16	0.88	5.124	A	A
South	0.48	0.03	3.619	A	A
East	8.28	0.55	4.755	A	A

Queueing Delay results: (12:15-12:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.35	0.42	4.699	A	A
West	17.14	1.14	5.895	A	A
South	0.57	0.04	3.808	A	A
East	10.55	0.70	5.336	A	A

Queueing Delay results: (12:30-12:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.10	0.41	4.544	A	A
West	16.55	1.10	5.606	A	A
South	0.55	0.04	3.735	A	A
East	10.15	0.68	5.112	A	A

Queueing Delay results: (12:45-13:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.39	0.36	4.320	A	A
West	14.25	0.95	5.187	A	A
South	0.50	0.03	3.630	A	A
East	8.84	0.59	4.796	A	A

Queue Variation Results for each time segment

Queue Variation results: (12:00-12:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.91	0.00	0.00	1.00	1.00			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:15-12:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.43	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.18	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.72	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:30-12:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.40	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.09	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:45-13:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.93	0.00	0.00	0.00	1.00			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

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Summary of intersection performance

	AM						
	Queue (PCE)	**95% Queue (PCE)**	**Delay (s)**	**V/C Ratio**	**LOS**	**Intersection Delay (s)**	**Intersection LOS**
	A1 - Five-year Horizon (2031)						
Leg North	0.33	~1	4.18	0.24	A	4.21	A
Leg West	0.56	1.04	4.31	0.35	A		
Leg South	0.02	~1	3.34	0.02	A		
Leg East	0.39	~1	4.14	0.27	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM " model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:44:00 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Five-year Horizon (2031), AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Five-year Horizon (2031), AM	Five-year Horizon (2031)	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				4.21	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	

South	3.50	4.50	30.00	20.00	40.00	25.00	
East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	269.00	100.000
West	PHF	✓	449.00	100.000
South	PHF	✓	22.00	100.000
East	PHF	✓	325.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	269.00	0.95	SecondQuarter
West	449.00	0.95	SecondQuarter
South	22.00	0.95	SecondQuarter
East	325.00	0.95	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	249.000	14.000	6.000
	West	153.000	0.000	33.000	263.000
	South	5.000	12.000	0.000	5.000
	East	17.000	306.000	2.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.00	0.93	0.05	0.02
	West	0.34	0.00	0.07	0.59

	South	0.23	0.55	0.00	0.23
	East	0.05	0.94	0.01	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.020	1.080	1.000
	West	1.060	1.000	1.000	1.040
	South	1.000	1.000	1.000	1.000
	East	1.000	1.050	1.500	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	2.0	8.0	0.0
	West	6.0	0.0	0.0	4.0
	South	0.0	0.0	0.0	0.0
	East	0.0	5.0	50.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.24	4.18	0.33	~1	A	269.00	269.00	18.20	4.06	0.30	18.20	4.06
West	0.35	4.31	0.56	1.04	A	449.00	449.00	31.25	4.18	0.52	31.25	4.18
South	0.02	3.34	0.02	~1	A	22.00	22.00	1.21	3.29	0.02	1.21	3.29
East	0.27	4.14	0.39	~1	A	325.00	325.00	21.81	4.03	0.36	21.81	4.03

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	259.56	64.89	258.41	168.10	307.42	0.00	1179.52	711.21	0.220	0.00	0.29	3.991	A
West	433.25	108.31	431.28	544.70	21.13	0.00	1345.21	1323.95	0.322	0.00	0.49	4.103	A
South	21.23	5.31	21.15	47.07	405.34	0.00	1122.85	638.33	0.019	0.00	0.02	3.267	A
East	313.60	78.40	312.22	263.19	163.30	0.00	1262.93	810.86	0.248	0.00	0.34	3.967	A

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	283.16	70.79	283.00	184.10	336.66	0.00	1162.60	711.21	0.244	0.29	0.33	4.185	A
West	472.63	118.16	472.35	596.51	23.14	0.00	1344.05	1323.95	0.352	0.49	0.56	4.309	A
South	23.16	5.79	23.15	51.55	443.95	0.00	1100.51	638.33	0.021	0.02	0.02	3.340	A
East	342.11	85.53	341.92	288.25	178.85	0.00	1253.94	810.86	0.273	0.34	0.39	4.140	A

Main results: (08:30-08:45)

	Total					Pedestrian		Saturation		Start	End		

Leg	Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Demand (Ped/hr)	Capacity (PCE/hr)	Capacity (PCE/hr)	V/C Ratio	Queue (PCE)	Queue (PCE)	Delay (s)	LOS
North	273.72	68.43	273.77	178.10	325.67	0.00	1168.96	711.21	0.234	0.33	0.31	4.111	A
West	456.88	114.22	456.96	577.05	22.39	0.00	1344.49	1323.95	0.340	0.56	0.54	4.233	A
South	22.39	5.60	22.39	49.87	429.48	0.00	1108.88	638.33	0.020	0.02	0.02	3.312	A
East	330.70	82.68	330.76	278.86	173.01	0.00	1257.31	810.86	0.263	0.39	0.38	4.076	A

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	259.56	64.89	259.66	168.92	308.88	0.00	1178.68	711.21	0.220	0.31	0.29	4.007	A
West	433.25	108.31	433.41	547.30	21.24	0.00	1345.15	1323.95	0.322	0.54	0.50	4.122	A
South	21.23	5.31	21.23	47.30	407.35	0.00	1121.69	638.33	0.019	0.02	0.02	3.270	A
East	313.60	78.40	313.71	264.49	164.10	0.00	1262.47	810.86	0.248	0.38	0.35	3.981	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.20	0.28	3.991	A	A
West	7.19	0.48	4.103	A	A
South	0.28	0.02	3.267	A	A
East	5.05	0.34	3.967	A	A

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.84	0.32	4.185	A	A
West	8.31	0.55	4.309	A	A
South	0.32	0.02	3.340	A	A
East	5.79	0.39	4.140	A	A

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.75	0.32	4.111	A	A
West	8.17	0.54	4.233	A	A
South	0.31	0.02	3.312	A	A
East	5.69	0.38	4.076	A	A

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.40	0.29	4.007	A	A
West	7.57	0.50	4.122	A	A
South	0.29	0.02	3.270	A	A
East	5.29	0.35	3.981	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
						Percentiles could not be calculated. This may			

East	0.34	~1	~1	~1	~1	be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.39	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.54	0.00	0.00	0.00	1.04			N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
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Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 5:44:23 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - Five-year Horizon (2031)						
Leg North	0.35	~1	4.54	0.25	A	6.03	A
Leg West	1.57	2.03	6.95	0.61	A		
Leg South	0.03	~1	4.04	0.03	A		
Leg East	0.70	~1	5.41	0.41	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM " model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:44:23 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Five-year Horizon (2031), PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Five-year Horizon (2031), PM	Five-year Horizon (2031)	PM		PHF	16:30	17:30	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				6.03	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	

South	3.50	4.50	30.00	20.00	40.00	25.00	
East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	266.00	100.000
West	PHF	✓	794.00	100.000
South	PHF	✓	29.00	100.000
East	PHF	✓	452.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	266.00	0.96	SecondQuarter
West	794.00	0.96	SecondQuarter
South	29.00	0.96	SecondQuarter
East	452.00	0.96	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	255.000	6.000	5.000
	West	345.000	0.000	74.000	375.000
	South	2.000	22.000	0.000	5.000
	East	47.000	404.000	1.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.00	0.96	0.02	0.02
	West	0.43	0.00	0.09	0.47

	South	0.07	0.76	0.00	0.17
	East	0.10	0.89	0.00	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.040	1.000	1.000
	West	1.020	1.000	1.000	1.010
	South	1.000	1.000	1.000	1.000
	East	1.000	1.000	1.000	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	4.0	0.0	0.0
	West	2.0	0.0	0.0	1.0
	South	0.0	0.0	0.0	0.0
	East	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.25	4.54	0.35	~1	A	266.00	266.00	19.53	4.40	0.33	19.53	4.41
West	0.61	6.95	1.57	2.03	A	794.00	794.00	85.92	6.49	1.43	85.96	6.50
South	0.03	4.04	0.03	~1	A	29.00	29.00	1.91	3.94	0.03	1.91	3.94
East	0.41	5.41	0.70	~1	A	452.00	452.00	38.95	5.17	0.65	38.96	5.17

Main Results for each time segment

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	258.61	64.65	257.37	380.48	412.85	0.00	1118.50	704.90	0.231	0.00	0.31	4.334	A
West	771.94	192.99	766.62	658.61	11.61	0.00	1350.73	1339.66	0.572	0.00	1.33	6.191	A
South	28.19	7.05	28.07	78.22	700.01	0.00	952.31	646.69	0.030	0.00	0.03	3.895	A
East	439.44	109.86	437.00	371.75	356.34	0.00	1151.21	710.80	0.382	0.00	0.61	5.023	A

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	277.08	69.27	276.94	409.96	444.46	0.00	1100.21	704.90	0.252	0.31	0.35	4.540	A
West	827.08	206.77	826.11	708.90	12.49	0.00	1350.21	1339.66	0.613	1.33	1.57	6.945	A
South	30.21	7.55	30.19	84.28	754.32	0.00	920.87	646.69	0.033	0.03	0.03	4.041	A
East	470.83	117.71	470.47	400.58	383.94	0.00	1135.24	710.80	0.415	0.61	0.70	5.413	A

Main results: (17:00-17:15)

	Total					Pedestrian		Saturation		Start	End		

Leg	Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Demand (Ped/hr)	Capacity (PCE/hr)	Capacity (PCE/hr)	V/C Ratio	Queue (PCE)	Queue (PCE)	Delay (s)	LOS
North	269.69	67.42	269.74	399.58	433.02	0.00	1106.83	704.90	0.244	0.35	0.34	4.466	A
West	805.03	201.26	805.26	690.59	12.17	0.00	1350.40	1339.66	0.596	1.57	1.52	6.698	A
South	29.40	7.35	29.41	82.15	735.28	0.00	931.90	646.69	0.032	0.03	0.03	3.990	A
East	458.28	114.57	458.38	390.46	374.23	0.00	1140.86	710.80	0.402	0.70	0.68	5.275	A

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	258.61	64.65	258.70	383.33	415.33	0.00	1117.07	704.90	0.232	0.34	0.31	4.354	A
West	771.94	192.99	772.52	662.36	11.67	0.00	1350.69	1339.66	0.572	1.52	1.37	6.319	A
South	28.19	7.05	28.20	78.81	705.39	0.00	949.19	646.69	0.030	0.03	0.03	3.908	A
East	439.44	109.86	439.66	374.58	359.01	0.00	1149.67	710.80	0.382	0.68	0.62	5.071	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.54	0.30	4.334	A	A
West	19.00	1.27	6.191	A	A
South	0.45	0.03	3.895	A	A
East	8.88	0.59	5.023	A	A

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.14	0.34	4.540	A	A
West	22.95	1.53	6.945	A	A
South	0.50	0.03	4.041	A	A
East	10.34	0.69	5.413	A	A

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.08	0.34	4.466	A	A
West	22.99	1.53	6.698	A	A
South	0.49	0.03	3.990	A	A
East	10.24	0.68	5.275	A	A

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.77	0.32	4.354	A	A
West	20.98	1.40	6.319	A	A
South	0.46	0.03	3.908	A	A
East	9.49	0.63	5.071	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.33	0.00	0.00	2.03	2.03			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.61	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.57	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.52	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.68	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.37	0.00	0.00	2.03	2.03			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
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Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 5:44:58 PM

Summary of intersection performance

	SAT						
	Queue (PCE)	**95% Queue (PCE)**	**Delay (s)**	**V/C Ratio**	**LOS**	**Intersection Delay (s)**	**Intersection LOS**
	A1 - Five-year Horizon (2031)						
Leg North	0.47	1.00	4.89	0.32	A	5.72	A
Leg West	1.31	1.00	6.28	0.57	A		
Leg South	0.04	~1	3.90	0.04	A		
Leg East	0.79	~1	5.61	0.44	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT " model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:44:58 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Five-year Horizon (2031), SAT

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Five-year Horizon (2031), SAT	Five-year Horizon (2031)	SAT		PHF	12:00	13:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				5.72	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only

North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	
South	3.50	4.50	30.00	20.00	40.00	25.00	
East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	325.00	100.000
West	PHF	✓	708.00	100.000
South	PHF	✓	36.00	100.000
East	PHF	✓	477.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	325.00	0.93	SecondQuarter
West	708.00	0.93	SecondQuarter
South	36.00	0.93	SecondQuarter
East	477.00	0.93	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	294.000	13.000	18.000
	West	294.000	0.000	90.000	324.000
	South	7.000	18.000	0.000	11.000
	East	56.000	415.000	6.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To				
		North	**West**	**South**	**East**

From	North	0.00	0.90	0.04	0.06
	West	0.42	0.00	0.13	0.46
	South	0.19	0.50	0.00	0.31
	East	0.12	0.87	0.01	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.000	1.000	1.000
	West	1.010	1.000	1.000	1.000
	South	1.000	1.000	1.000	1.000
	East	1.000	1.010	1.000	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	0.0	0.0	0.0
	West	1.0	0.0	0.0	0.0
	South	0.0	0.0	0.0	0.0
	East	0.0	1.0	0.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.32	4.89	0.47	1.00	A	325.00	325.00	25.00	4.62	0.42	25.01	4.62
West	0.57	6.28	1.31	1.00	A	708.00	708.00	67.79	5.74	1.13	67.81	5.75
South	0.04	3.90	0.04	~1	A	36.00	36.00	2.26	3.77	0.04	2.26	3.77
East	0.44	5.61	0.79	~1	A	477.00	477.00	41.41	5.21	0.69	41.42	5.21

Main Results for each time segment

Main results: (12:00-12:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	308.69	77.17	307.18	337.10	414.71	0.00	1117.43	768.35	0.276	0.00	0.38	4.435	A
West	672.47	168.12	668.46	686.92	34.97	0.00	1337.21	1309.40	0.503	0.00	1.00	5.373	A
South	34.19	8.55	34.05	102.93	600.50	0.00	1009.90	671.32	0.034	0.00	0.03	3.688	A
East	453.06	113.27	450.58	333.32	301.23	0.00	1183.11	772.94	0.383	0.00	0.62	4.940	A

Main results: (12:15-12:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	349.46	87.37	349.09	383.27	471.42	0.00	1084.60	768.35	0.322	0.38	0.47	4.892	A
West	761.29	190.32	760.05	780.78	39.74	0.00	1334.44	1309.40	0.570	1.00	1.31	6.279	A
South	38.71	9.68	38.68	117.02	682.77	0.00	962.29	671.32	0.040	0.03	0.04	3.897	A
East	512.90	128.23	512.22	378.97	342.48	0.00	1159.23	772.94	0.442	0.62	0.79	5.606	A

Main results: (12:30-12:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	333.15	83.29	333.28	366.16	450.23	0.00	1096.87	768.35	0.304	0.47	0.44	4.716	A
West	725.76	181.44	726.18	745.57	37.94	0.00	1335.48	1309.40	0.543	1.31	1.21	5.939	A
South	36.90	9.23	36.91	111.80	652.32	0.00	979.91	671.32	0.038	0.04	0.04	3.819	A
East	488.97	122.24	489.20	362.06	327.18	0.00	1168.09	772.94	0.419	0.79	0.73	5.352	A

Main results: (12:45-13:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	308.69	77.17	308.91	339.44	417.33	0.00	1115.91	768.35	0.277	0.44	0.38	4.461	A
West	672.47	168.12	673.20	691.07	35.17	0.00	1337.09	1309.40	0.503	1.21	1.03	5.453	A
South	34.19	8.55	34.21	103.64	604.74	0.00	1007.45	671.32	0.034	0.04	0.04	3.698	A
East	453.06	113.27	453.47	335.64	303.31	0.00	1181.90	772.94	0.383	0.73	0.63	4.987	A

Queueing Delay Results for each time segment

Queueing Delay results: (12:00-12:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.54	0.37	4.435	A	A
West	14.46	0.96	5.373	A	A
South	0.51	0.03	3.688	A	A
East	9.01	0.60	4.940	A	A

Queueing Delay results: (12:15-12:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.94	0.46	4.892	A	A
West	19.10	1.27	6.279	A	A
South	0.62	0.04	3.897	A	A
East	11.60	0.77	5.606	A	A

Queueing Delay results: (12:30-12:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.66	0.44	4.716	A	A
West	18.46	1.23	5.939	A	A
South	0.59	0.04	3.819	A	A
East	11.15	0.74	5.352	A	A

Queueing Delay results: (12:45-13:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.86	0.39	4.461	A	A
West	15.76	1.05	5.453	A	A
South	0.53	0.04	3.698	A	A
East	9.66	0.64	4.987	A	A

Queue Variation Results for each time segment

Queue Variation results: (12:00-12:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.00	0.00	0.00	1.00	1.00			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
						Percentiles could not be calculated. This may			

East	0.62	~1	~1	~1	~1	be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:15-12:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.31	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.79	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:30-12:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.44	0.00	0.00	0.00	1.00			N/A	N/A
West	1.21	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.73	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:45-13:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.03	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

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Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 5:45:40 PM

Summary of intersection performance

	AM						
	Queue (PCE)	**95% Queue (PCE)**	**Delay (s)**	**V/C Ratio**	**LOS**	**Intersection Delay (s)**	**Intersection LOS**
	A1 - Ten-year Horizon (2036)						
Leg North	0.36	~1	4.31	0.26	A	4.33	A
Leg West	0.61	~1	4.44	0.37	A		
Leg South	0.02	~1	3.39	0.02	A		
Leg East	0.42	~1	4.24	0.29	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM " model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:45:39 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Ten-year Horizon (2036), AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Ten-year Horizon (2036), AM	Ten-year Horizon (2036)	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				4.33	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	

South	3.50	4.50	30.00	20.00	40.00	25.00	
East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	284.00	100.000
West	PHF	✓	473.00	100.000
South	PHF	✓	24.00	100.000
East	PHF	✓	341.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	284.00	0.95	SecondQuarter
West	473.00	0.95	SecondQuarter
South	24.00	0.95	SecondQuarter
East	341.00	0.95	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	262.000	15.000	7.000
	West	161.000	0.000	35.000	277.000
	South	6.000	12.000	0.000	6.000
	East	18.000	321.000	2.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.00	0.92	0.05	0.02
	West	0.34	0.00	0.07	0.59

	South	0.25	0.50	0.00	0.25
	East	0.05	0.94	0.01	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.020	1.080	1.000
	West	1.060	1.000	1.000	1.040
	South	1.000	1.000	1.000	1.000
	East	1.000	1.050	1.500	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	2.0	8.0	0.0
	West	6.0	0.0	0.0	4.0
	South	0.0	0.0	0.0	0.0
	East	0.0	5.0	50.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.26	4.31	0.36	~1	A	284.00	284.00	19.73	4.17	0.33	19.73	4.17
West	0.37	4.44	0.61	~1	A	473.00	473.00	33.86	4.30	0.56	33.87	4.30
South	0.02	3.39	0.02	~1	A	24.00	24.00	1.33	3.34	0.02	1.33	3.34
East	0.29	4.24	0.42	~1	A	341.00	341.00	23.41	4.12	0.39	23.42	4.12

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	274.04	68.51	272.79	177.68	321.80	0.00	1171.20	723.27	0.234	0.00	0.31	4.091	A
West	456.40	114.10	454.27	571.54	23.05	0.00	1344.10	1322.24	0.340	0.00	0.53	4.212	A
South	23.16	5.79	23.07	49.94	427.38	0.00	1110.09	638.50	0.021	0.00	0.02	3.311	A
East	329.04	82.26	327.56	278.52	171.93	0.00	1257.94	819.81	0.262	0.00	0.37	4.052	A

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	298.95	74.74	298.77	194.62	352.43	0.00	1153.47	723.25	0.259	0.31	0.36	4.305	A
West	497.89	124.47	497.58	625.95	25.25	0.00	1342.83	1322.24	0.371	0.53	0.61	4.444	A
South	25.26	6.32	25.25	54.70	468.13	0.00	1086.51	638.50	0.023	0.02	0.02	3.391	A
East	358.95	89.74	358.74	305.07	188.31	0.00	1248.46	819.81	0.288	0.37	0.42	4.243	A

Main results: (08:30-08:45)

	Total					Pedestrian		Saturation		Start	End		

Leg	Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Demand (Ped/hr)	Capacity (PCE/hr)	Capacity (PCE/hr)	V/C Ratio	Queue (PCE)	Queue (PCE)	Delay (s)	LOS
North	288.98	72.25	289.04	188.28	340.94	0.00	1160.12	723.27	0.249	0.36	0.34	4.225	A
West	481.30	120.32	481.39	605.55	24.43	0.00	1343.31	1322.24	0.358	0.61	0.59	4.359	A
South	24.42	6.11	24.42	52.92	452.90	0.00	1095.33	638.50	0.022	0.02	0.02	3.360	A
East	346.98	86.75	347.05	295.15	182.18	0.00	1252.01	819.81	0.277	0.42	0.40	4.173	A

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	274.04	68.51	274.14	178.58	323.36	0.00	1170.29	723.27	0.234	0.34	0.31	4.107	A
West	456.40	114.10	456.59	574.34	23.17	0.00	1344.04	1322.24	0.340	0.59	0.54	4.234	A
South	23.16	5.79	23.16	50.20	429.56	0.00	1108.83	638.50	0.021	0.02	0.02	3.315	A
East	329.04	82.26	329.16	279.94	172.79	0.00	1257.44	819.81	0.262	0.40	0.37	4.068	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.54	0.30	4.091	A	A
West	7.77	0.52	4.212	A	A
South	0.31	0.02	3.311	A	A
East	5.40	0.36	4.052	A	A

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.26	0.35	4.305	A	A
West	9.02	0.60	4.444	A	A
South	0.35	0.02	3.391	A	A
East	6.22	0.41	4.243	A	A

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.16	0.34	4.225	A	A
West	8.87	0.59	4.359	A	A
South	0.35	0.02	3.360	A	A
East	6.11	0.41	4.173	A	A

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.77	0.32	4.107	A	A
West	8.20	0.55	4.234	A	A
South	0.32	0.02	3.315	A	A
East	5.67	0.38	4.068	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
						Percentiles could not be calculated. This may			

East	0.37	~1	~1	~1	~1	be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.61	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.42	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.59	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.40	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.02	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

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Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 5:46:08 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - Ten-year Horizon (2036)						
Leg North	0.38	~1	4.70	0.27	A	6.47	A
Leg West	1.80	3.04	7.57	0.64	A		
Leg South	0.04	~1	4.16	0.04	A		
Leg East	0.78	~1	5.72	0.44	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM " model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT" model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:46:08 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Ten-year Horizon (2036), PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Ten-year Horizon (2036), PM	Ten-year Horizon (2036)	PM		PHF	16:30	17:30	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				6.47	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	

South	3.50	4.50	30.00	20.00	40.00	25.00	
East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	281.00	100.000
West	PHF	✓	835.00	100.000
South	PHF	✓	31.00	100.000
East	PHF	✓	475.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	281.00	0.96	SecondQuarter
West	835.00	0.96	SecondQuarter
South	31.00	0.96	SecondQuarter
East	475.00	0.96	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	268.000	7.000	6.000
	West	363.000	0.000	78.000	394.000
	South	2.000	23.000	0.000	6.000
	East	49.000	425.000	1.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.00	0.95	0.02	0.02
	West	0.43	0.00	0.09	0.47

	South	0.06	0.74	0.00	0.19
	East	0.10	0.89	0.00	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.040	1.000	1.000
	West	1.020	1.000	1.000	1.010
	South	1.000	1.000	1.000	1.000
	East	1.000	1.000	1.000	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	4.0	0.0	0.0
	West	2.0	0.0	0.0	1.0
	South	0.0	0.0	0.0	0.0
	East	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.27	4.70	0.38	~1	A	281.00	281.00	21.32	4.55	0.36	21.32	4.55
West	0.64	7.57	1.80	3.04	A	835.00	835.00	97.67	7.02	1.63	97.72	7.02
South	0.04	4.16	0.04	~1	A	31.00	31.00	2.09	4.05	0.03	2.09	4.05
East	0.44	5.72	0.78	~1	A	475.00	475.00	43.03	5.44	0.72	43.04	5.44

Main Results for each time segment

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	273.19	68.30	271.84	399.60	434.01	0.00	1106.26	706.49	0.247	0.00	0.34	4.471	A
West	811.81	202.95	805.80	692.31	13.54	0.00	1349.61	1337.65	0.602	0.00	1.50	6.639	A
South	30.14	7.53	30.01	83.01	736.33	0.00	931.29	646.85	0.032	0.00	0.03	3.994	A
East	461.81	115.45	459.11	391.83	374.50	0.00	1140.70	718.97	0.405	0.00	0.67	5.265	A

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	292.71	73.18	292.54	430.69	467.32	0.00	1086.98	706.50	0.269	0.34	0.38	4.702	A
West	869.79	217.45	868.60	745.29	14.57	0.00	1349.01	1337.65	0.645	1.50	1.80	7.573	A
South	32.29	8.07	32.28	89.47	793.70	0.00	898.08	646.85	0.036	0.03	0.04	4.157	A
East	494.79	123.70	494.37	422.35	403.63	0.00	1123.84	718.97	0.440	0.67	0.78	5.715	A

Main results: (17:00-17:15)

	Total					Pedestrian		Saturation		Start	End		

Leg	Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Demand (Ped/hr)	Capacity (PCE/hr)	Capacity (PCE/hr)	V/C Ratio	Queue (PCE)	Queue (PCE)	Delay (s)	LOS
North	284.90	71.23	284.95	419.88	455.34	0.00	1093.91	706.50	0.260	0.38	0.37	4.621	A
West	846.60	211.65	846.87	726.10	14.20	0.00	1349.23	1337.65	0.627	1.80	1.73	7.267	A
South	31.43	7.86	31.44	87.22	773.84	0.00	909.58	646.85	0.035	0.04	0.04	4.100	A
East	481.60	120.40	481.71	411.77	393.51	0.00	1129.70	718.97	0.426	0.78	0.75	5.556	A

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	273.19	68.30	273.29	402.84	436.75	0.00	1104.67	706.49	0.247	0.37	0.34	4.495	A
West	811.81	202.95	812.52	696.43	13.62	0.00	1349.56	1337.65	0.602	1.73	1.56	6.805	A
South	30.14	7.53	30.15	83.68	742.45	0.00	927.74	646.85	0.032	0.04	0.03	4.012	A
East	461.81	115.45	462.05	395.06	377.54	0.00	1138.94	718.97	0.405	0.75	0.69	5.320	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.94	0.33	4.471	A	A
West	21.34	1.42	6.639	A	A
South	0.49	0.03	3.994	A	A
East	9.76	0.65	5.265	A	A

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.62	0.37	4.702	A	A
West	26.17	1.74	7.573	A	A
South	0.55	0.04	4.157	A	A
East	11.45	0.76	5.715	A	A

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.56	0.37	4.621	A	A
West	26.30	1.75	7.267	A	A
South	0.54	0.04	4.100	A	A
East	11.35	0.76	5.556	A	A

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.20	0.35	4.495	A	A
West	23.85	1.59	6.805	A	A
South	0.51	0.03	4.012	A	A
East	10.47	0.70	5.320	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.50	0.00	0.00	2.03	3.04			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.80	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.78	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.73	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.75	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.56	0.00	0.00	2.03	3.04			N/A	N/A
South	0.03	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.69	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
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Filename: Turner St & N Rankin St (Hwy 21).arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2025\250497-Arcady
Report generation date: 2025-08-26 5:46:24 PM

Summary of intersection performance

	SAT						
	Queue (PCE)	**95% Queue (PCE)**	**Delay (s)**	**V/C Ratio**	**LOS**	**Intersection Delay (s)**	**Intersection LOS**
	A1 - Ten-year Horizon (2036)						
Leg North	0.52	1.00	5.11	0.34	A	6.09	A
Leg West	1.48	2.01	6.74	0.60	A		
Leg South	0.05	~1	3.99	0.04	A		
Leg East	0.88	~1	5.95	0.47	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Opening Year (2026), AM" model duration: 8:00 AM - 9:00 AM
"D2 - Opening Year (2026), PM" model duration: 4:30 PM - 5:30 PM
"D3 - Opening Year (2026), SAT" model duration: 12:00 PM - 1:00 PM
"D4 - Five-year Horizon (2031), AM" model duration: 8:00 AM - 9:00 AM
"D5 - Five-year Horizon (2031), PM" model duration: 4:30 PM - 5:30 PM
"D6 - Five-year Horizon (2031), SAT" model duration: 12:00 PM - 1:00 PM
"D7 - Ten-year Horizon (2036), AM" model duration: 8:00 AM - 9:00 AM
"D8 - Ten-year Horizon (2036), PM" model duration: 4:30 PM - 5:30 PM
"D9 - Ten-year Horizon (2036), SAT " model duration: 12:00 PM - 1:00 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:46:23 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2025-08-26
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Ten-year Horizon (2036), SAT

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Ten-year Horizon (2036), SAT	Ten-year Horizon (2036)	SAT		PHF	12:00	13:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	North,West,South,East				6.09	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Turner St	
West	West	N Rankin St (Hwy 21)	
South	South	Turner St	
East	East	N Rankin St (Hwy 21)	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
South	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only

North	3.50	4.50	30.00	20.00	40.00	25.00	
West	3.50	4.50	30.00	20.00	40.00	25.00	
South	3.50	4.50	30.00	20.00	40.00	25.00	
East	3.50	4.50	30.00	20.00	40.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.579	1357.445
West		(calculated)	(calculated)	0.579	1357.445
South		(calculated)	(calculated)	0.579	1357.445
East		(calculated)	(calculated)	0.579	1357.445

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	PHF	✓	341.00	100.000
West	PHF	✓	744.00	100.000
South	PHF	✓	38.00	100.000
East	PHF	✓	502.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
North	341.00	0.93	SecondQuarter
West	744.00	0.93	SecondQuarter
South	38.00	0.93	SecondQuarter
East	502.00	0.93	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	**West**	**South**	**East**
From	**North**	0.000	309.000	13.000	19.000
	West	309.000	0.000	95.000	340.000
	South	8.000	19.000	0.000	11.000
	East	59.000	436.000	7.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To				
		North	**West**	**South**	**East**

From	North	0.00	0.91	0.04	0.06
	West	0.42	0.00	0.13	0.46
	South	0.21	0.50	0.00	0.29
	East	0.12	0.87	0.01	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.000	1.000	1.000
	West	1.010	1.000	1.000	1.000
	South	1.000	1.000	1.000	1.000
	East	1.000	1.010	1.000	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	0.0	0.0	0.0
	West	1.0	0.0	0.0	0.0
	South	0.0	0.0	0.0	0.0
	East	0.0	1.0	0.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.34	5.11	0.52	1.00	A	341.00	341.00	27.26	4.80	0.45	27.27	4.80
West	0.60	6.74	1.48	2.01	A	744.00	744.00	75.74	6.11	1.26	75.77	6.11
South	0.04	3.99	0.05	~1	A	38.00	38.00	2.44	3.85	0.04	2.44	3.85
East	0.47	5.95	0.88	~1	A	502.00	502.00	45.89	5.48	0.76	45.90	5.49

Main Results for each time segment

Main results: (12:00-12:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	323.89	80.97	322.24	354.93	436.33	0.00	1104.91	771.60	0.293	0.00	0.41	4.590	A
West	706.67	176.67	702.22	721.72	36.85	0.00	1336.12	1309.35	0.529	0.00	1.11	5.663	A
South	36.09	9.02	35.94	108.56	630.51	0.00	992.53	671.53	0.036	0.00	0.04	3.762	A
East	476.81	119.20	474.08	349.27	317.19	0.00	1173.87	766.57	0.406	0.00	0.68	5.170	A

Main results: (12:15-12:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	366.67	91.67	366.25	403.59	496.05	0.00	1070.35	771.61	0.343	0.41	0.52	5.109	A
West	800.00	200.00	798.53	820.41	41.88	0.00	1333.20	1309.35	0.600	1.11	1.48	6.741	A
South	40.86	10.22	40.83	123.44	716.97	0.00	942.49	671.53	0.043	0.04	0.05	3.992	A
East	539.78	134.95	538.98	397.14	360.66	0.00	1148.71	766.57	0.470	0.68	0.88	5.948	A

Main results: (12:30-12:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	349.56	87.39	349.70	385.67	473.84	0.00	1083.21	771.60	0.323	0.52	0.48	4.910	A
West	762.67	190.67	763.15	783.55	40.00	0.00	1334.30	1309.35	0.572	1.48	1.36	6.335	A
South	38.95	9.74	38.96	117.96	685.19	0.00	960.88	671.53	0.041	0.05	0.04	3.904	A
East	514.59	128.65	514.87	379.52	344.64	0.00	1157.98	766.57	0.444	0.88	0.81	5.648	A

Main results: (12:45-13:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	323.89	80.97	324.13	357.55	439.24	0.00	1103.23	771.60	0.294	0.48	0.42	4.621	A
West	706.67	176.67	707.53	726.30	37.07	0.00	1335.99	1309.35	0.529	1.36	1.14	5.759	A
South	36.09	9.02	36.11	109.36	635.25	0.00	989.79	671.53	0.036	0.04	0.04	3.773	A
East	476.81	119.20	477.28	351.85	319.51	0.00	1172.52	766.57	0.407	0.81	0.70	5.226	A

Queueing Delay Results for each time segment

Queueing Delay results: (12:00-12:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.00	0.40	4.590	A	A
West	15.98	1.07	5.663	A	A
South	0.55	0.04	3.762	A	A
East	9.90	0.66	5.170	A	A

Queueing Delay results: (12:15-12:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.60	0.51	5.109	A	A
West	21.46	1.43	6.741	A	A
South	0.67	0.04	3.992	A	A
East	12.91	0.86	5.948	A	A

Queueing Delay results: (12:30-12:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.29	0.49	4.910	A	A
West	20.75	1.38	6.335	A	A
South	0.64	0.04	3.904	A	A
East	12.41	0.83	5.648	A	A

Queueing Delay results: (12:45-13:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.37	0.42	4.621	A	A
West	17.55	1.17	5.759	A	A
South	0.58	0.04	3.773	A	A
East	10.67	0.71	5.226	A	A

Queue Variation Results for each time segment

Queue Variation results: (12:00-12:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.11	0.00	0.00	1.00	2.01			N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
						Percentiles could not be calculated. This may			

East	0.68	~1	~1	~1	~1	be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:15-12:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.52	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.48	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.05	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.88	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:30-12:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.48	0.00	0.00	0.00	1.00			N/A	N/A
West	1.36	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.81	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (12:45-13:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.42	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.14	0.00	0.00	1.00	2.01			N/A	N/A
South	0.04	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Appendix J

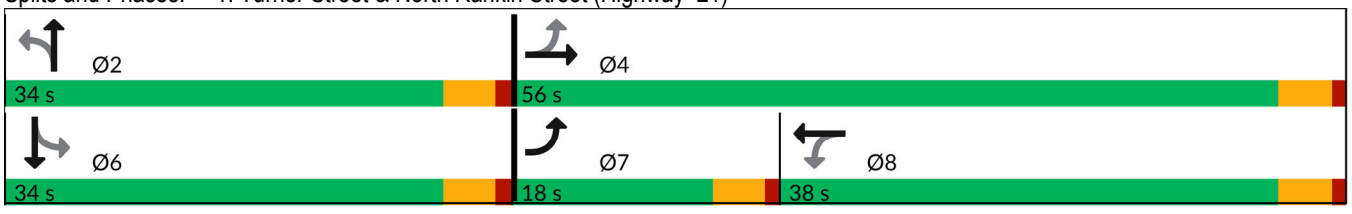
Synchro Reports – Future Conditions with Traffic Signal Control (Alternative 2)

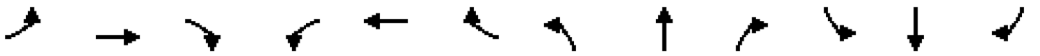
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	250	31	2	291	16	11	5	5	6	13	237
Future Volume (vph)	145	250	31	2	291	16	11	5	5	6	13	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt		0.983			0.992			0.969			0.875	
Flt Protected	0.950			0.950				0.973			0.999	
Satd. Flow (prot)	1722	1824	0	1217	1817	0	0	1811	0	0	1642	0
Flt Permitted	0.262			0.579				0.862			0.997	
Satd. Flow (perm)	474	1824	0	742	1817	0	0	1605	0	0	1639	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			4			5			249	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Adj. Flow (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	296	0	2	323	0	0	22	0	0	269	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	18.0	56.0		38.0	38.0		34.0	34.0		34.0	34.0	
Total Split (%)	20.0%	62.2%		42.2%	42.2%		37.8%	37.8%		37.8%	37.8%	
Maximum Green (s)	13.5	51.5		33.5	33.5		29.5	29.5		29.5	29.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	32.7	32.7		17.5	17.5			29.8			29.8	
Actuated g/C Ratio	0.46	0.46		0.24	0.24			0.42			0.42	
v/c Ratio	0.38	0.35		0.01	0.72			0.03			0.32	
Control Delay (s/veh)	13.8	12.8		20.0	34.6			13.6			4.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	13.8	12.8		20.0	34.6			13.6			4.5	
LOS	B	B		B	C			B			A	
Approach Delay (s/veh)		13.2			34.6			13.6			4.5	
Approach LOS		B			C			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 71.6			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay (s/veh): 17.5		Intersection LOS: B	
Intersection Capacity Utilization 51.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	250	31	2	291	16	11	5	5	6	13	237
Future Volume (vph)	145	250	31	2	291	16	11	5	5	6	13	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.97			0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.97			1.00	
Satd. Flow (prot)	1721	1824		1217	1818			1813			1642	
Flt Permitted	0.26	1.00		0.58	1.00			0.86			1.00	
Satd. Flow (perm)	474	1824		742	1818			1605			1639	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	153	263	33	2	306	17	12	5	5	6	14	249
RTOR Reduction (vph)	0	7	0	0	3	0	0	3	0	0	145	0
Lane Group Flow (vph)	153	289	0	2	320	0	0	19	0	0	124	0
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	32.7	32.7		17.5	17.5			29.8			29.8	
Effective Green, g (s)	32.7	32.7		17.5	17.5			29.8			29.8	
Actuated g/C Ratio	0.46	0.46		0.24	0.24			0.42			0.42	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	403	834		181	444			668			683	
v/s Ratio Prot	0.06	c0.16			c0.18							
v/s Ratio Perm	0.12			0.00				0.01			c0.08	
v/c Ratio	0.38	0.35		0.01	0.72			0.03			0.18	
Uniform Delay, d1	12.7	12.5		20.4	24.8			12.3			13.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.6	0.3		0.0	5.7			0.1			0.6	
Delay (s)	13.3	12.8		20.5	30.4			12.4			13.7	
Level of Service	B	B		C	C			B			B	
Approach Delay (s/veh)		12.9			30.4			12.4			13.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	71.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

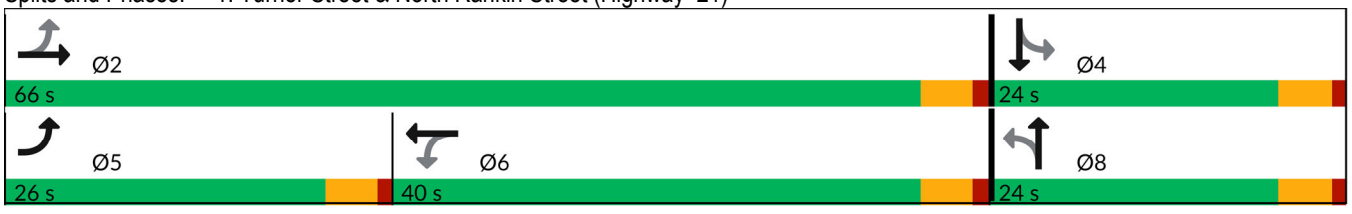
c Critical Lane Group

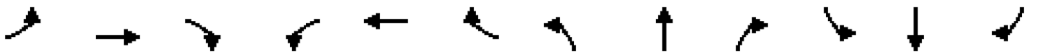
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	328	357	71	1	385	44	21	2	5	5	6	242
Future Volume (vph)	328	357	71	1	385	44	21	2	5	5	6	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00							
Frt		0.975			0.985			0.977			0.871	
Flt Protected	0.950			0.950				0.963			0.999	
Satd. Flow (prot)	1789	1849	0	1825	1887	0	0	1807	0	0	1610	0
Flt Permitted	0.172			0.505				0.797			0.997	
Satd. Flow (perm)	324	1849	0	966	1887	0	0	1496	0	0	1607	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			8			5			252	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	2		3	3		2						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Adj. Flow (vph)	342	372	74	1	401	46	22	2	5	5	6	252
Shared Lane Traffic (%)												
Lane Group Flow (vph)	342	446	0	1	447	0	0	29	0	0	263	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	26.0	66.0		40.0	40.0		24.0	24.0		24.0	24.0	
Total Split (%)	28.9%	73.3%		44.4%	44.4%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	21.5	61.5		35.5	35.5		19.5	19.5		19.5	19.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	42.4	42.4		20.6	20.6			19.9			19.9	
Actuated g/C Ratio	0.59	0.59		0.29	0.29			0.28			0.28	
v/c Ratio	0.63	0.40		0.00	0.81			0.07			0.42	
Control Delay (s/veh)	16.1	8.0		18.0	36.0			21.4			6.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	16.1	8.0		18.0	36.0			21.4			6.7	
LOS	B	A		B	D			C			A	
Approach Delay (s/veh)		11.5			35.9			21.4			6.7	
Approach LOS		B			D			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 71.5			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay (s/veh): 18.0		Intersection LOS: B	
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)

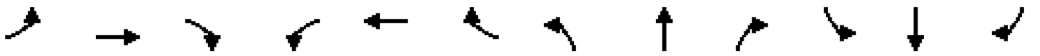




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	328	357	71	1	385	44	21	2	5	5	6	242
Future Volume (vph)	328	357	71	1	385	44	21	2	5	5	6	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.98			0.98			0.87	
Flt Protected	0.95	1.00		0.95	1.00			0.96			1.00	
Satd. Flow (prot)	1789	1850		1819	1887			1808			1609	
Flt Permitted	0.17	1.00		0.50	1.00			0.80			1.00	
Satd. Flow (perm)	323	1850		966	1887			1495			1606	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	342	372	74	1	401	46	22	2	5	5	6	252
RTOR Reduction (vph)	0	10	0	0	6	0	0	4	0	0	182	0
Lane Group Flow (vph)	342	436	0	1	441	0	0	25	0	0	81	0
Confl. Peds. (#/hr)	2		3	3		2						
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	42.4	42.4		20.8	20.8			19.9			19.9	
Effective Green, g (s)	42.4	42.4		20.8	20.8			19.9			19.9	
Actuated g/C Ratio	0.59	0.59		0.29	0.29			0.28			0.28	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	543	1100		281	550			417			448	
v/s Ratio Prot	c0.15	0.24			c0.23							
v/s Ratio Perm	0.22			0.00				0.02			c0.05	
v/c Ratio	0.63	0.40		0.00	0.80			0.06			0.18	
Uniform Delay, d1	11.0	7.7		17.9	23.3			18.8			19.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.3	0.2		0.0	8.3			0.3			0.9	
Delay (s)	13.3	7.9		17.9	31.6			19.1			20.4	
Level of Service	B	A		B	C			B			C	
Approach Delay (s/veh)		10.2			31.6			19.1			20.4	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

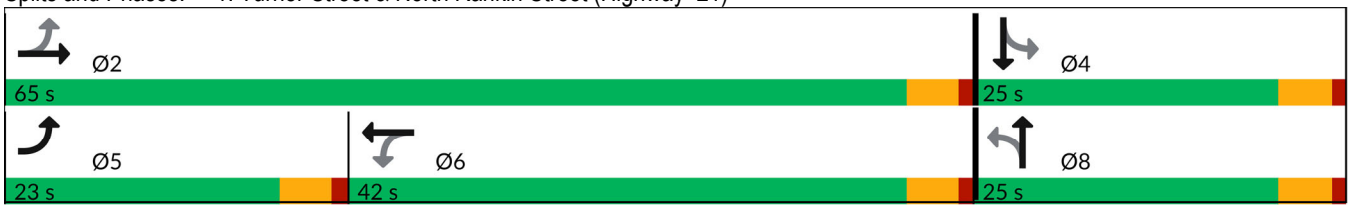


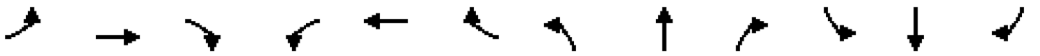
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	308	86	6	395	54	17	7	10	17	12	280
Future Volume (vph)	280	308	86	6	395	54	17	7	10	17	12	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.982			0.960			0.878	
Flt Protected	0.950			0.950				0.976			0.997	
Satd. Flow (prot)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Flt Permitted	0.164			0.515				0.850			0.987	
Satd. Flow (perm)	312	1858	0	989	1870	0	0	1568	0	0	1665	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			9			11			301	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	301	331	92	6	425	58	18	8	11	18	13	301
Shared Lane Traffic (%)												
Lane Group Flow (vph)	301	423	0	6	483	0	0	37	0	0	332	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	23.0	65.0		42.0	42.0		25.0	25.0		25.0	25.0	
Total Split (%)	25.6%	72.2%		46.7%	46.7%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	18.5	60.5		37.5	37.5		20.5	20.5		20.5	20.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	42.8	42.8		22.9	22.9			20.9			20.9	
Actuated g/C Ratio	0.59	0.59		0.31	0.31			0.29			0.29	
v/c Ratio	0.61	0.38		0.02	0.82			0.08			0.48	
Control Delay (s/veh)	15.6	7.9		16.8	34.6			19.1			7.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	15.6	7.9		16.8	34.6			19.1			7.4	
LOS	B	A		B	C			B			A	
Approach Delay (s/veh)		11.1			34.4			19.1			7.4	
Approach LOS		B			C			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 72.9			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay (s/veh): 17.7		Intersection LOS: B	
Intersection Capacity Utilization 69.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	308	86	6	395	54	17	7	10	17	12	280
Future Volume (vph)	280	308	86	6	395	54	17	7	10	17	12	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.98			0.96			0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1807	1858		1825	1870			1800			1681	
Flt Permitted	0.16	1.00		0.52	1.00			0.85			0.99	
Satd. Flow (perm)	313	1858		990	1870			1567			1664	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	301	331	92	6	425	58	18	8	11	18	13	301
RTOR Reduction (vph)	0	14	0	0	6	0	0	8	0	0	214	0
Lane Group Flow (vph)	301	409	0	6	477	0	0	29	0	0	118	0
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	42.8	42.8		23.0	23.0			20.9			20.9	
Effective Green, g (s)	42.8	42.8		23.0	23.0			20.9			20.9	
Actuated g/C Ratio	0.59	0.59		0.32	0.32			0.29			0.29	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	498	1093		313	591			450			478	
v/s Ratio Prot	c0.13	0.22			c0.25							
v/s Ratio Perm	0.23			0.01				0.02			c0.07	
v/c Ratio	0.60	0.37		0.02	0.81			0.06			0.25	
Uniform Delay, d1	10.8	7.9		17.1	22.8			18.8			19.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.1	0.2		0.0	7.9			0.3			1.2	
Delay (s)	12.8	8.1		17.1	30.7			19.1			21.1	
Level of Service	B	A		B	C			B			C	
Approach Delay (s/veh)		10.1			30.6			19.1			21.1	
Approach LOS		B			C			B			C	

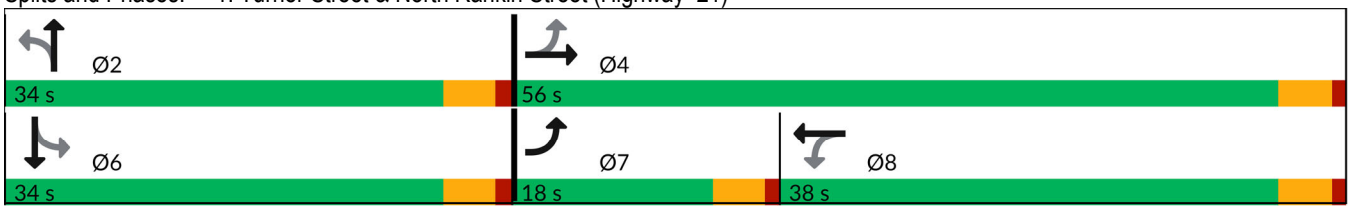
Intersection Summary			
HCM 2000 Control Delay (s/veh)	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	72.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

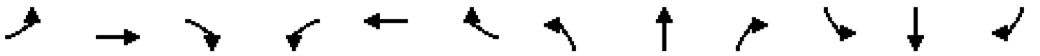
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Future Volume (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt		0.983			0.992			0.971			0.875	
Flt Protected	0.950			0.950				0.973			0.999	
Satd. Flow (prot)	1722	1824	0	1217	1817	0	0	1815	0	0	1642	0
Flt Permitted	0.250			0.571				0.851			0.997	
Satd. Flow (perm)	453	1824	0	731	1817	0	0	1587	0	0	1639	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			4			5			262	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Adj. Flow (vph)	161	277	35	2	322	18	13	5	5	6	15	262
Shared Lane Traffic (%)												
Lane Group Flow (vph)	161	312	0	2	340	0	0	23	0	0	283	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	18.0	56.0		38.0	38.0		34.0	34.0		34.0	34.0	
Total Split (%)	20.0%	62.2%		42.2%	42.2%		37.8%	37.8%		37.8%	37.8%	
Maximum Green (s)	13.5	51.5		33.5	33.5		29.5	29.5		29.5	29.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	33.8	33.8		18.3	18.3			29.8			29.8	
Actuated g/C Ratio	0.46	0.46		0.25	0.25			0.41			0.41	
v/c Ratio	0.40	0.37		0.01	0.74			0.04			0.34	
Control Delay (s/veh)	13.9	12.8		20.0	35.2			14.1			4.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	13.9	12.8		20.0	35.2			14.1			4.6	
LOS	B	B		B	D			B			A	
Approach Delay (s/veh)		13.2			35.1			14.1			4.6	
Approach LOS		B			D			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 72.7			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay (s/veh): 17.7		Intersection LOS: B	
Intersection Capacity Utilization 53.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Future Volume (vph)	153	263	33	2	306	17	12	5	5	6	14	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.97			0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.97			1.00	
Satd. Flow (prot)	1721	1824		1217	1818			1813			1642	
Flt Permitted	0.25	1.00		0.57	1.00			0.85			1.00	
Satd. Flow (perm)	452	1824		731	1818			1586			1639	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	161	277	35	2	322	18	13	5	5	6	15	262
RTOR Reduction (vph)	0	6	0	0	3	0	0	3	0	0	154	0
Lane Group Flow (vph)	161	306	0	2	337	0	0	20	0	0	129	0
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	33.8	33.8		18.4	18.4			29.8			29.8	
Effective Green, g (s)	33.8	33.8		18.4	18.4			29.8			29.8	
Actuated g/C Ratio	0.47	0.47		0.25	0.25			0.41			0.41	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	400	849		185	460			651			672	
v/s Ratio Prot	0.06	c0.17			c0.19							
v/s Ratio Perm	0.13			0.00				0.01			c0.08	
v/c Ratio	0.40	0.36		0.01	0.73			0.03			0.19	
Uniform Delay, d1	12.7	12.5		20.3	24.8			12.8			13.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.7	0.3		0.0	5.9			0.1			0.6	
Delay (s)	13.4	12.7		20.3	30.8			12.9			14.3	
Level of Service	B	B		C	C			B			B	
Approach Delay (s/veh)		13.0			30.7			12.9			14.3	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	72.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

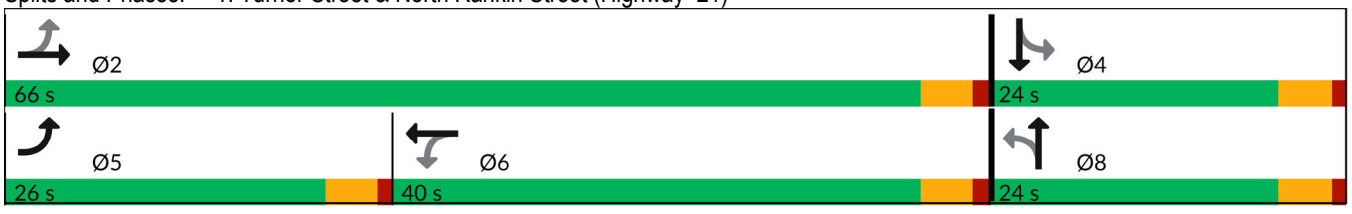
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	375	74	1	404	47	22	2	5	5	6	255
Future Volume (vph)	345	375	74	1	404	47	22	2	5	5	6	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00							
Frt		0.975			0.984			0.977			0.870	
Flt Protected	0.950			0.950				0.963			0.999	
Satd. Flow (prot)	1789	1849	0	1825	1885	0	0	1807	0	0	1608	0
Flt Permitted	0.162			0.495				0.796			0.997	
Satd. Flow (perm)	305	1849	0	947	1885	0	0	1494	0	0	1605	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			8			5			266	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	2		3	3		2						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Adj. Flow (vph)	359	391	77	1	421	49	23	2	5	5	6	266
Shared Lane Traffic (%)												
Lane Group Flow (vph)	359	468	0	1	470	0	0	30	0	0	277	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	26.0	66.0		40.0	40.0		24.0	24.0		24.0	24.0	
Total Split (%)	28.9%	73.3%		44.4%	44.4%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	21.5	61.5		35.5	35.5		19.5	19.5		19.5	19.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	44.6	44.6		22.3	22.3			20.0			20.0	
Actuated g/C Ratio	0.60	0.60		0.30	0.30			0.27			0.27	
v/c Ratio	0.66	0.41		0.00	0.82			0.07			0.44	
Control Delay (s/veh)	18.4	7.9		17.0	35.8			22.7			7.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	18.4	7.9		17.0	35.8			22.7			7.0	
LOS	B	A		B	D			C			A	
Approach Delay (s/veh)		12.5			35.7			22.7			7.0	
Approach LOS		B			D			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 73.8			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay (s/veh): 18.5		Intersection LOS: B	
Intersection Capacity Utilization 70.8%		ICU Level of Service C	
Analysis Period (min) 15			

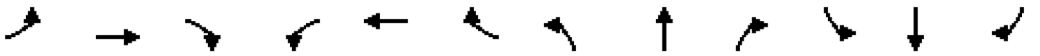
Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	375	74	1	404	47	22	2	5	5	6	255
Future Volume (vph)	345	375	74	1	404	47	22	2	5	5	6	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.98			0.98			0.87	
Flt Protected	0.95	1.00		0.95	1.00			0.96			1.00	
Satd. Flow (prot)	1789	1850		1819	1886			1809			1609	
Flt Permitted	0.16	1.00		0.49	1.00			0.80			1.00	
Satd. Flow (perm)	306	1850		947	1886			1494			1605	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	359	391	77	1	421	49	23	2	5	5	6	266
RTOR Reduction (vph)	0	10	0	0	6	0	0	4	0	0	194	0
Lane Group Flow (vph)	359	458	0	1	464	0	0	26	0	0	83	0
Confl. Peds. (#/hr)	2		3	3		2						
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.6	44.6		22.4	22.4			19.9			19.9	
Effective Green, g (s)	44.6	44.6		22.4	22.4			19.9			19.9	
Actuated g/C Ratio	0.61	0.61		0.30	0.30			0.27			0.27	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	542	1122		288	574			404			434	
v/s Ratio Prot	c0.16	0.25			c0.25							
v/s Ratio Perm	0.24			0.00				0.02			c0.05	
v/c Ratio	0.66	0.41		0.00	0.81			0.07			0.19	
Uniform Delay, d1	12.6	7.6		17.8	23.6			19.9			20.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.0	0.2		0.0	8.2			0.3			1.0	
Delay (s)	15.7	7.8		17.8	31.8			20.2			21.6	
Level of Service	B	A		B	C			C			C	
Approach Delay (s/veh)		11.2			31.8			20.2			21.6	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	73.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

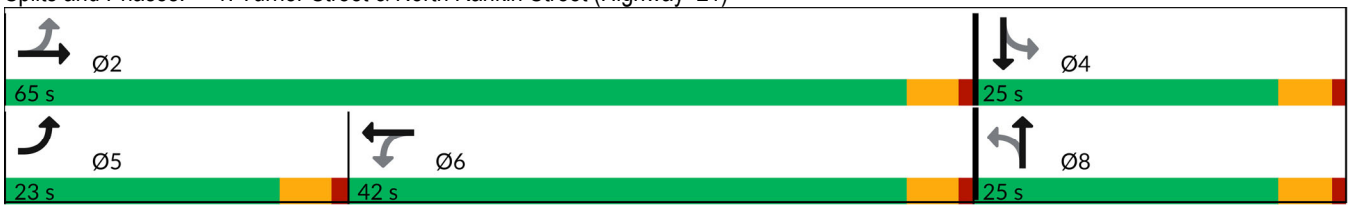


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	294	324	90	6	415	56	18	7	11	18	13	294
Future Volume (vph)	294	324	90	6	415	56	18	7	11	18	13	294
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.982			0.958			0.878	
Flt Protected	0.950			0.950				0.976			0.997	
Satd. Flow (prot)	1807	1858	0	1825	1870	0	0	1796	0	0	1682	0
Flt Permitted	0.151			0.505				0.831			0.986	
Satd. Flow (perm)	287	1858	0	970	1870	0	0	1529	0	0	1663	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			9			12			316	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	316	348	97	6	446	60	19	8	12	19	14	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	316	445	0	6	506	0	0	39	0	0	349	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	23.0	65.0		42.0	42.0		25.0	25.0		25.0	25.0	
Total Split (%)	25.6%	72.2%		46.7%	46.7%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	18.5	60.5		37.5	37.5		20.5	20.5		20.5	20.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	44.5	44.5		24.1	24.1			20.9			20.9	
Actuated g/C Ratio	0.60	0.60		0.32	0.32			0.28			0.28	
v/c Ratio	0.64	0.40		0.02	0.83			0.09			0.50	
Control Delay (s/veh)	18.2	7.9		16.7	35.4			19.6			7.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	18.2	7.9		16.7	35.4			19.6			7.8	
LOS	B	A		B	D			B			A	
Approach Delay (s/veh)		12.2			35.2			19.6			7.8	
Approach LOS		B			D			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 74.6			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay (s/veh): 18.5		Intersection LOS: B	
Intersection Capacity Utilization 72.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	294	324	90	6	415	56	18	7	11	18	13	294
Future Volume (vph)	294	324	90	6	415	56	18	7	11	18	13	294
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.98			0.96			0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1807	1858		1825	1870			1798			1682	
Flt Permitted	0.15	1.00		0.51	1.00			0.83			0.99	
Satd. Flow (perm)	287	1858		970	1870			1530			1663	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	316	348	97	6	446	60	19	8	12	19	14	316
RTOR Reduction (vph)	0	14	0	0	6	0	0	9	0	0	227	0
Lane Group Flow (vph)	316	431	0	6	500	0	0	30	0	0	122	0
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.5	44.5		24.2	24.2			20.9			20.9	
Effective Green, g (s)	44.5	44.5		24.2	24.2			20.9			20.9	
Actuated g/C Ratio	0.60	0.60		0.33	0.33			0.28			0.28	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	494	1111		315	608			429			467	
v/s Ratio Prot	c0.14	0.23			c0.27							
v/s Ratio Perm	0.25			0.01				0.02			c0.07	
v/c Ratio	0.64	0.39		0.02	0.82			0.07			0.26	
Uniform Delay, d1	12.5	7.8		17.0	23.1			19.6			20.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.7	0.2		0.0	8.8			0.3			1.4	
Delay (s)	15.2	8.1		17.1	31.9			19.9			22.1	
Level of Service	B	A		B	C			B			C	
Approach Delay (s/veh)		11.0			31.7			19.9			22.1	
Approach LOS		B			C			B			C	

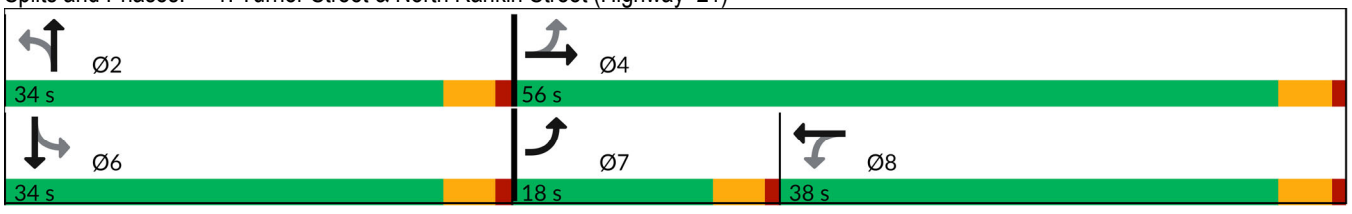
Intersection Summary			
HCM 2000 Control Delay (s/veh)	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	74.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	277	35	2	321	18	12	6	6	7	15	262
Future Volume (vph)	161	277	35	2	321	18	12	6	6	7	15	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt		0.983			0.992			0.968			0.875	
Flt Protected	0.950			0.950				0.975			0.999	
Satd. Flow (prot)	1722	1824	0	1217	1817	0	0	1813	0	0	1642	0
Flt Permitted	0.236			0.562				0.855			0.996	
Satd. Flow (perm)	427	1824	0	720	1817	0	0	1590	0	0	1637	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			4			6			276	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Adj. Flow (vph)	169	292	37	2	338	19	13	6	6	7	16	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	329	0	2	357	0	0	25	0	0	299	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	18.0	56.0		38.0	38.0		34.0	34.0		34.0	34.0	
Total Split (%)	20.0%	62.2%		42.2%	42.2%		37.8%	37.8%		37.8%	37.8%	
Maximum Green (s)	13.5	51.5		33.5	33.5		29.5	29.5		29.5	29.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	34.8	34.8		19.1	19.1			29.9			29.9	
Actuated g/C Ratio	0.47	0.47		0.26	0.26			0.41			0.41	
v/c Ratio	0.43	0.38		0.01	0.75			0.04			0.36	
Control Delay (s/veh)	14.2	12.9		19.5	35.7			14.3			4.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	14.2	12.9		19.5	35.7			14.3			4.8	
LOS	B	B		B	D			B			A	
Approach Delay (s/veh)		13.3			35.6			14.3			4.8	
Approach LOS		B			D			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 73.8			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay (s/veh): 17.9		Intersection LOS: B	
Intersection Capacity Utilization 55.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	277	35	2	321	18	12	6	6	7	15	262
Future Volume (vph)	161	277	35	2	321	18	12	6	6	7	15	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.97			0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.97			1.00	
Satd. Flow (prot)	1721	1824		1217	1818			1812			1642	
Flt Permitted	0.24	1.00		0.56	1.00			0.85			1.00	
Satd. Flow (perm)	428	1824		720	1818			1589			1638	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	169	292	37	2	338	19	13	6	6	7	16	276
RTOR Reduction (vph)	0	6	0	0	3	0	0	4	0	0	164	0
Lane Group Flow (vph)	169	323	0	2	354	0	0	21	0	0	135	0
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	6%	4%	0%	50%	5%	0%	0%	0%	0%	0%	8%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	34.8	34.8		19.2	19.2			29.9			29.9	
Effective Green, g (s)	34.8	34.8		19.2	19.2			29.9			29.9	
Actuated g/C Ratio	0.47	0.47		0.26	0.26			0.41			0.41	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	396	861		187	473			644			664	
v/s Ratio Prot	c0.06	0.18			c0.19							
v/s Ratio Perm	0.14			0.00				0.01			c0.08	
v/c Ratio	0.43	0.37		0.01	0.75			0.03			0.20	
Uniform Delay, d1	12.9	12.5		20.2	25.0			13.2			14.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.7	0.3		0.0	6.4			0.1			0.7	
Delay (s)	13.6	12.7		20.2	31.4			13.3			14.9	
Level of Service	B	B		C	C			B			B	
Approach Delay (s/veh)		13.0			31.4			13.3			14.9	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	73.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

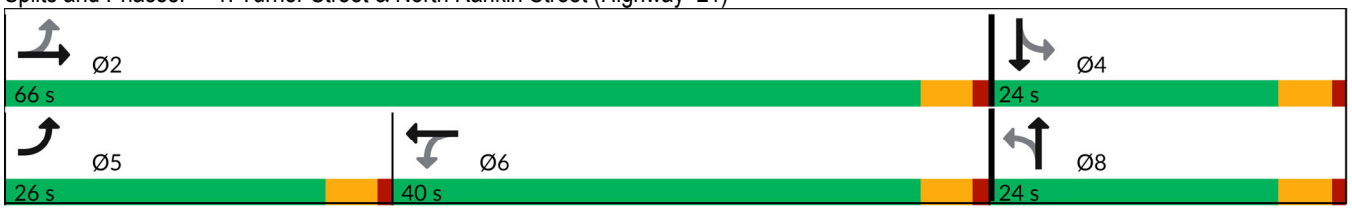
c Critical Lane Group

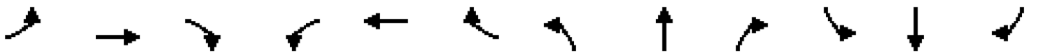
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	363	394	78	1	425	49	23	2	6	6	7	268
Future Volume (vph)	363	394	78	1	425	49	23	2	6	6	7	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00							
Frt		0.975			0.985			0.975			0.871	
Flt Protected	0.950			0.950				0.964			0.999	
Satd. Flow (prot)	1789	1849	0	1825	1887	0	0	1806	0	0	1610	0
Flt Permitted	0.146			0.484				0.768			0.996	
Satd. Flow (perm)	275	1849	0	926	1887	0	0	1439	0	0	1605	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			8			6			279	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Confl. Peds. (#/hr)	2		3	3		2						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Adj. Flow (vph)	378	410	81	1	443	51	24	2	6	6	7	279
Shared Lane Traffic (%)												
Lane Group Flow (vph)	378	491	0	1	494	0	0	32	0	0	292	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	26.0	66.0		40.0	40.0		24.0	24.0		24.0	24.0	
Total Split (%)	28.9%	73.3%		44.4%	44.4%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	21.5	61.5		35.5	35.5		19.5	19.5		19.5	19.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	46.2	46.2		23.3	23.3			19.9			19.9	
Actuated g/C Ratio	0.61	0.61		0.31	0.31			0.26			0.26	
v/c Ratio	0.71	0.43		0.00	0.84			0.08			0.46	
Control Delay (s/veh)	21.8	8.0		17.0	37.3			22.9			7.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	21.8	8.0		17.0	37.3			22.9			7.3	
LOS	C	A		B	D			C			A	
Approach Delay (s/veh)		14.0			37.2			22.9			7.3	
Approach LOS		B			D			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 75.3			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay (s/veh): 19.8		Intersection LOS: B	
Intersection Capacity Utilization 73.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	363	394	78	1	425	49	23	2	6	6	7	268
Future Volume (vph)	363	394	78	1	425	49	23	2	6	6	7	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.98			0.97			0.87	
Flt Protected	0.95	1.00		0.95	1.00			0.96			1.00	
Satd. Flow (prot)	1789	1850		1819	1887			1805			1610	
Flt Permitted	0.15	1.00		0.48	1.00			0.77			1.00	
Satd. Flow (perm)	275	1850		927	1887			1438			1606	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	378	410	81	1	443	51	24	2	6	6	7	279
RTOR Reduction (vph)	0	10	0	0	5	0	0	4	0	0	205	0
Lane Group Flow (vph)	378	481	0	1	489	0	0	28	0	0	87	0
Confl. Peds. (#/hr)	2		3	3		2						
Heavy Vehicles (%)	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.2	46.2		23.5	23.5			19.9			19.9	
Effective Green, g (s)	46.2	46.2		23.5	23.5			19.9			19.9	
Actuated g/C Ratio	0.62	0.62		0.31	0.31			0.26			0.26	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	536	1138		290	590			381			425	
v/s Ratio Prot	c0.17	0.26			c0.26							
v/s Ratio Perm	0.26			0.00				0.02			c0.05	
v/c Ratio	0.71	0.42		0.00	0.83			0.07			0.20	
Uniform Delay, d1	14.9	7.5		17.7	23.9			20.7			21.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.2	0.3		0.0	9.3			0.4			1.1	
Delay (s)	19.1	7.8		17.8	33.3			21.1			22.5	
Level of Service	B	A		B	C			C			C	
Approach Delay (s/veh)		12.7			33.2			21.1			22.5	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

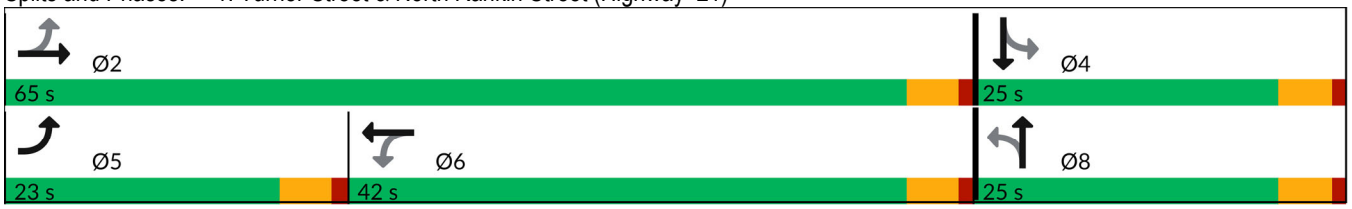
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	340	95	7	436	59	19	8	11	19	13	309
Future Volume (vph)	309	340	95	7	436	59	19	8	11	19	13	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	95.0			85.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.982			0.960			0.878	
Flt Protected	0.950			0.950				0.976			0.997	
Satd. Flow (prot)	1807	1858	0	1825	1870	0	0	1800	0	0	1682	0
Flt Permitted	0.134			0.495				0.802			0.986	
Satd. Flow (perm)	255	1858	0	951	1870	0	0	1479	0	0	1663	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			9			12			332	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		245.8			203.3			189.2			203.0	
Travel Time (s)		18.4			15.2			14.2			15.2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	332	366	102	8	469	63	20	9	12	20	14	332
Shared Lane Traffic (%)												
Lane Group Flow (vph)	332	468	0	8	532	0	0	41	0	0	366	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	23.0	65.0		42.0	42.0		25.0	25.0		25.0	25.0	
Total Split (%)	25.6%	72.2%		46.7%	46.7%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	18.5	60.5		37.5	37.5		20.5	20.5		20.5	20.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	46.0	46.0		25.2	25.2			20.9			20.9	
Actuated g/C Ratio	0.60	0.60		0.33	0.33			0.27			0.27	
v/c Ratio	0.68	0.41		0.03	0.85			0.10			0.53	
Control Delay (s/veh)	21.8	8.0		16.6	37.0			20.3			7.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	21.8	8.0		16.6	37.0			20.3			7.9	
LOS	C	A		B	D			C			A	
Approach Delay (s/veh)		13.7			36.7			20.3			7.9	
Approach LOS		B			D			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 76.1			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay (s/veh): 19.8		Intersection LOS: B	
Intersection Capacity Utilization 75.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Turner Street & North Rankin Street (Highway 21)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	340	95	7	436	59	19	8	11	19	13	309
Future Volume (vph)	309	340	95	7	436	59	19	8	11	19	13	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.98			0.96			0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1807	1858		1825	1870			1801			1681	
Flt Permitted	0.13	1.00		0.49	1.00			0.80			0.99	
Satd. Flow (perm)	255	1858		950	1870			1480			1662	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	332	366	102	8	469	63	20	9	12	20	14	332
RTOR Reduction (vph)	0	13	0	0	6	0	0	9	0	0	241	0
Lane Group Flow (vph)	332	455	0	8	526	0	0	32	0	0	125	0
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.0	46.0		25.3	25.3			20.9			20.9	
Effective Green, g (s)	46.0	46.0		25.3	25.3			20.9			20.9	
Actuated g/C Ratio	0.61	0.61		0.33	0.33			0.28			0.28	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	485	1126		316	623			407			457	
v/s Ratio Prot	c0.15	0.24			c0.28							
v/s Ratio Perm	0.27			0.01				0.02			c0.08	
v/c Ratio	0.68	0.40		0.03	0.84			0.08			0.27	
Uniform Delay, d1	15.2	7.8		17.0	23.5			20.4			21.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.0	0.2		0.0	10.2			0.4			1.5	
Delay (s)	19.1	8.0		17.0	33.7			20.8			23.0	
Level of Service	B	A		B	C			C			C	
Approach Delay (s/veh)		12.6			33.4			20.8			23.0	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix K

Life-Cycle Cost Estimating Sheets

NCHRP Project 03-110: Estimating the Life-Cycle Cost of Intersection Designs

Life-Cycle Cost Estimating Tool

Introduction

The Life-Cycle Cost Estimating Tool (LCCET) was deveoped as part of NCHRP Project 03-110. The objective of this project was to develop a spreadsheet-based tool that can be used to compare the life-cycle costs of alternative designs for new and existing intersections. The tool will be applicable to the following types of intersections: stop-controlled, traffic signal, roundabout, and innovative designs.

Overview of Tool

This spreadsheet tool provides life cycle cost comparisons between different intersection or influence area treatments. The tool incoporates the following costs: safety, vehicular delay, multimodal delay, operations, maintenance, initial capital costs and emissions. Any of these elements can be excluded from the analysis by unselecting them in the "Outputs" worksheet.

Maintenance

Version: LCCET 1.0
Maintained By: TBD
Contact Information: TBD

Tool Guidance

Additional user guidance can be found in Chapter 3 of the NCHRP Project 03-110 Final Report, which is located at the following link: [Website to be determined by NCHRP]

Disclaimers

This is draft material as submitted by the research agency. The opinions and conclusions expressed or implied in the material are those of the research agency. They are not necessarily those of the Transportation Research Board, the National Academies, or the program sponsors. No warranty is made by the developers or their employer as to the accuracy, completeness, or reliability of this software and its associated equations and documentation. No responsibility is assumed by the developers for incorrect results or damages resulting from the use of this software.

Legend

	Required data entry field
	Optional data entry field
	Data entry field not used
[Value]	Automated input
Abc	Comment/Guidance text
Abc	Warning/Error text
	Purple tabs are for reference values only. **Modifying these sheets may cause the LCCET to cease functioning properly.**

How to Use the Life-Cycle Cost Estimating Tool

1. On the **Organization Information** sheet, provide basic project information. This is used for project context and attribution only.
2. The sheet **CostParameters** contains costs that are consistently applied across all project alternatives. The user should review these costs to ensure they are realistic for the location and also select the appropriate input type based on available data or applicable policies.
3. The **GHG.Costs** sheet contains discounted costs for greenhouse gases (GHGs). GHGs are handled separately because the discount rate for GHGs may vary from the discount rate applied to other costs.
4. The **DemandParameters** sheet details the flow profiles applied to all alternatives by mode. The purpose of this sheet is to calibrate peak hour data to annual data so that various inputs are in a consistent format.
5. The sheet **Alternatives_MasterList** is used to manage alternatives. This allows the analyst to add or remove alternatives and sets up the basic sheet titles. It also establishes the base alternative that will be used as a basis for comparison for all alternatives.
6. The sheet **BaseCase** provides cost inputs for the base case analysis. All other alternatives are compared to this alternative.

7. The worksheet **Outputs** is used to compile the summary information within the Net Present Value Table within each alternative. This sheet provides a plot of the results and a comparison.
8. **Purple worksheet tabs** are for calculations and formula references. **These sheets should not be modified without a thorough knowledge of the VBA code used in the LCCET.**

Organization Information

This sheet provides general project information for reference purposes only.

Organization Information	
Agency:	Town of Saugeen Shores
Project Name:	N Rankin St (Hwy 21) and Turner St Intersection Control Study
Project Reference:	250497
Location:	N Rankin St (Hwy 21) and Turner St
City:	Southampton, Saugeen Shores
State:	Ontario
Performing Department or Organization:	Paradigm Transportation Solutions Limited
Date:	2025-08-28
Analyst:	Wenting Li

Cost Parameters

This sheet defines the basic cost parameters used in the benefit-cost analysis. You may either use the default values or override the defaults with your own values. **Note that all costs must be in the same year dollars, preferably in base year dollars.** Consult the Bureau of Labor Statistics web site for latest information on the consumer price index to adjust values to current year: http://www.bls.gov/cpi/

Type	Category group (select)	Category	Unit valuation	Default value	Override value	Use value	Override date	Notes/References
Base year for discounting	N/A	N/A	N/A	N/A	2026	2026		All costs will be discounted to the Base Year for Discounting. *Enter the year in the "Override Value" column.*
Discount rate	N/A	N/A	Percent	0.03		0.03		OMB Circular A-4 recommends using both 3% and 7% real rates.
Value of time	N/A	Person (weekday)	$ per person hour	$ 12.98	$ 22.95	$ 22.95		Override with the values used in the Hwy 21 and McNabb St TCS (2024-02-09), which are from 2015 Revision in 2023 CAD
		Person (weekend)	$ per person hour	$ 12.98	$ 22.95	$ 22.95		
		Trucks	$ per truck hour	$ 25.75	$ 45.56	$ 45.56		Default: USDOT Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis (Revision 2 – corrected) April 2013
Crashes	☐ **KABCO**	K - Fatality crashes	$ per crash	$ 9,200,000				Override with the values used in the Hwy 21 and McNabb St TCS (2024-02-09), which is from MTO Collisions Cost in Engineering Analysis Updated August 2012 - 2011 CAD to 2023 CAD
		A - Severe injury crashes	$ per crash	$ 440,125				
		B - Moderate injury crashes	$ per crash	$ 120,167				
		C - Minor injury crashes	$ per crash	$ 62,114				
		O - No injury crashes	$ per crash	$ 6,734				
	☑ **Fatality, injury, PDO**	Fatality crashes	$ per crash	$ 9,200,000	$ 2,141,500	$ 2,141,500		Default Value:National Highway Traffic Safety Administration, July 2011.
		Injury crashes	$ per crash	$ 167,264	$ 79,900	$ 79,900		
		Property damage only crashes	$ per crash	$ 6,734	$ 10,800	$ 10,800		
	☐ **Total crashes**	Total crashes	$ per crash	N/A				
	☐ **User defined categories**	(Enter user defined categories)	$ per crash	N/A				
Greenhouse gases	☑ **Federal Method (Exec. Order 12866)**	CO2 equivalent	$ per metric ton	Values vary annually, see table in GHG.Costs		See table in GHG.Costs sheet		Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (May 2013; revised November 2013)
	☐ **User defined**	CO2 equivalent	$ per metric ton	N/A		See table in GHG.Costs sheet		
Criteria pollutants	☑ **Criteria pollutants by type**	CO	$ per metric ton	$ 39,600		$ 39,600		Corporate Average Fuel Economy for MY2017- MY2025 Passenger Cars and Light Trucks (August 2012), page 922, Table VIII-16, "Economic Values Used for Benefits Computations (2010 dollars)"
		NOx	$ per metric ton	$ 7,887		$ 7,887		
		HC	$ per metric ton	$ 1,700		$ 1,700		
		PM 2.5	$ per metric ton	$ 306,500		$ 306,500		
	☐ **User defined categories**	(Enter user defined categories)	$ per metric ton	N/A				

Demand Volume Profile

This sheet creates demand profiles for specified years based on the major facility type and total entering AADT. You may either use the default hourly and daily factors or provide your own. These profiles are applied to all alternatives to convert peak hour information to annual delay estimates.

Peak Hours and Facility Profile

Enter peak period begin and end times:

Peak Weekday Time Period	From	To
AM peak	9:00 AM	10:00 AM
PM peak	2:00 PM	3:00 PM
Weekend peak	11:00 AM	12:00 PM

Select Analysis Basis: Specific Day/Month

Weekday Count: July 25, 2025 — Enter dates as "mm/dd/yyyy"

Weekend Count: July 26, 2025 — Enter dates as "mm/dd/yyyy"

Select facility type: Rural Principal Arterial — At intersections of varying facilities select the roadway that will be more representative of the volume, or interpolate between values.

Volume Adjustment Factor:

	Automated Adj. Factor	Override Value	Value Applied	
Weekday Adjustment:	0.765		76.5%	This adjustment factor is used to align the input delay values within the alternatives sheets with the specific volume factor.
Weekend Adjustment:	0.846		84.6%	This adjustment factor is used to align the input delay values within the alternatives sheets with the specific volume factor.

	Base Analysis Volumes	Adjusted Average Annual Volume	Override Value	Year 1 Value Applied
AM peak hour:	1,012	774		774
PM peak hour:	1,467	1,122		1,122
Weekend peak hour:	1,472	1,245		1,245
Specific Weekday Daily Traffic:		17,458		17,458

Volume entries are used to calibrate the volume-delay curve for a given alternative, and AADT values are used to develop demand profiles for each hour of each year. A minimum of one hourly volume must be entered within this table. If data is not available for a time period(s) please leave blank. Offpeak data is only used for calibrating the delay equation, not for AADT estimates.

Adjust hourly volume profile to input peak hour volumes (Yes/No)? Yes

If 'Yes' is selected the default hourly volume profiles will be adjusted to match the input peak hour volumes.
Review plots of demand profiles to the right of Column "R" to assess the appropriateness of the profiles.

Quantity (sum over all cordon approaches)	Units	Year										
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
		2026	2036									
Average annual daily traffic (AADT)	Avg veh/day	17,458	19,324									Demand data must be entered for the opening year and end year for each alternative. Demand data must also be entered for any interim years specified for an alternative.
AM peak hour volume	veh/hr	1,012	1,122									Enter hourly volumes used to carry out travel time/delay calculations for intersection(s)
PM peak hour volume	veh/hr	1,467	1,622									
Weekend peak hour volume:	veh/hr	1,472	1,625									
Average annual auto occupancy	Passengers per vehicle	1.1	1.1									Enter annual averages
Average annual % trucks	Average %	3.0%	3.0%									
Annual transit passengers	Transit passengers per year											Enter annual totals
Annual cyclists	Cyclists per year											
Annual pedestrians	Pedestrians per year											

Click button when years are entered to set up calculations tables:

This button should be pressed any time changes are made to the values above. This button creates a "typical" annual profile in rows 167 and below for various user types.

Alternatives Master List

This sheet is used to manage the alternatives

Add Alternative | Delete Alternative

Alternatives			
Alternative #	**Short Name**	**Description**	**Notes**
Alternative 0	Base Case	Two-Way Stop Control	
Alternative 1	RDBT	Roundabout	
Alternative 2	TCS	Traffic Signal Control	

Alternative 0 - Base Case

Description: **Two-Way Stop Control**

A summary of the net present value for this alternative is shown to the right in Column "J"

Planning & construction period	Begin planning & construction	**2026**	First year of planning & construction
Operating period	Opening year	**2026**	Travel time/delay and demand forecasts for the opening year *must* be provided.
	Interim year 1		Travel time/delay and demand forecasts for up to three years between the opening year and the end year *may* be provided.
	Interim year 2		
	Interim year 3		
	End year	**2036**	Travel time/delay and demand forecasts for the end (horizon) year *must* be provided.
Worksheet setup	**Setup Worksheet**		Once you have entered begin planning & construction, opening, and end years, click this button to set up the worksheet. You may enter other inputs at any time.

Net Present Value Summary	
Planning & Construction Costs	$ -
Operating & Maintenance Costs	$ 152,110
Auto Passenger Time	$ 3,602,573
Auto Passenger Reliability	--
Truck Time	$ 201,081
Truck Reliability	--
Transit Passenger Time	--
Transit Passenger Reliability	--
Bicyclist Time	--
Pedestrian Time	--
Safety	$ 3,590,795
Greenhouse Gases	--
Criteria Pollutants	--
Total Net Present Value	**$ 7,546,559**

Warning: A zero entry for a cost category indicates that the data needed to calculate that cost have either not been entered or have been entered incorrectly. If you believe this is an error please review your entries in this sheet.

Planning & construction costs	**Units**	**Planning & construction year(s)**					**Notes**
		2026	**2027**	**2028**	**2029**	**2030**	
Planning, design	Dollars	$ -					
Survey	Dollars	$ -					
Right of way	Dollars	$ -					
Equipment, signs	Dollars	$ -					
Utilities	Dollars	$ -					
Construction	Dollars	$ -					
Landscaping	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						

Operating & maintenance costs	**Units**	**Begin year**	**Period (years)**	**Cost**	**Notes**
Streetlighting	Dollars	2026	1	$ 600	adoped from the Hwy 21 & McNabb St TCS study
Pavement Markings	Dollars	2026	1	$ 5,500	adoped from the Hwy 21 & McNabb St TCS study, rounded up to the nearest
Repaving	Dollars	2036	10	$ 125,000	adoped from the Hwy 21 & McNabb St TCS study
Signing, striping	Dollars	2031	5	$ 600	adoped from the Hwy 21 & McNabb St TCS study
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				

Calculations can be reviewed within table beginning in cell K133.

Demand & travel time / delay	**Average travel time / delay**		**Opening year**	**Interim year(s)**			**End year**	**Notes**
	Time Period	**Units**	**2026**				**2036**	
Average vehicle travel time or delay	AM peak	seconds/veh	6.0				7.0	from operational results
	PM peak	seconds/veh	11.0				19.0	from operational results
	Weekend peak	seconds/veh	17.0				41.0	from operational results
Standard deviation of vehicle travel time or delay	AM peak	seconds/veh						
	PM peak	seconds/veh						
	Weekend peak	seconds/veh						
Average bicycle travel time or delay	All time periods	seconds/bike						
Average pedestrian travel time or delay	All time periods	seconds/ped						

Safety	**Crash type**	**Units**					
Fatality, injury, PDO	Fatality crashes	crashes/year	0.2			0.2	Referenced Collision Rates from Region of Waterloo, Co
	Injury crashes	crashes/year	0.1			0.1	Referenced Collision Rates from Region of Waterloo, Co
	Property damage only crashes	crashes/year	0.3			0.4	Referenced Collision Rates from Region of Waterloo, Co

Emissions	**Type**	**Units**					
Greenhouse gases -- Federal method (Exec. Order 12866)	CO2 equivalent	metric tons/year					
Criteria pollutants -- by type	CO	metric tons/year					
	NOx	metric tons/year					
	HC	metric tons/year					
	PM 2.5	metric tons/year					

Alternative 1 - RDBT

Description: **Roundabout**

A summary of the net present value for this alternative is shown to the right in Column "J"

Planning & construction period	Begin planning & construction	**2026**	First year of planning & construction
Operating period	Opening year	**2026**	Travel time/delay and demand forecasts for the opening year *must* be provided.
	Interim year 1		Travel time/delay and demand forecasts for up to three years between the opening year and the end year *may* be provided.
	Interim year 2		
	Interim year 3		
	End year	**2036**	Travel time/delay and demand forecasts for the end (horizon) year *must* be provided.
Worksheet setup	**Setup Worksheet**		Once you have entered begin planning & construction, opening, and end years, click this button to set up the worksheet. You may enter other inputs at any time.

Net Present Value Summary	
Planning & Construction Costs	$ 1,513,000
Operating & Maintenance Costs	$ 194,530
Auto Passenger Time	$ 1,674,786
Auto Passenger Reliability	--
Truck Time	$ 93,480
Truck Reliability	--
	--
	--
	--
	--
	$ 892,735
	--
Criteria Pollutants	--
Total Net Present Value	**$ 4,368,530**

Warning: A zero entry for a cost category indicates that the data needed to calculate that cost have either not been entered or have been entered incorrectly. If you believe this is an error please review your entries in this sheet.

Planning & construction costs	**Units**	**Planning & construction year(s)**					**Notes**
		2026	**2027**	**2028**	**2029**	**2030**	
Planning, design (Engineering)	Dollars	$ 137,500					costs provided by GEI
Survey	Dollars						
Right of way	Dollars						
Equipment, signs	Dollars						
Utilities (Storm Sewers)	Dollars	$ 185,500					costs provided by GEI
Construction (removals and road works)	Dollars	$ 1,190,000					costs provided by GEI
Landscaping	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						

Operating & maintenance costs	**Units**	**Begin year**	**Period (years)**	**Cost**	**Notes**
Streetlighting	Dollars	2026	1	$ 2,500	adoped from the Hwy 21 & McNabb St TCS study, rounded up to the nearest
Pavement Markings	Dollars	2026	1	$ 6,000	adoped from the Hwy 21 & McNabb St TCS study, rounded up to the nearest
Repaving	Dollars	2036	10	$ 115,000	adoped from the Hwy 21 & McNabb St TCS study, rounded up to the nearest
Signing, striping	Dollars	2031	5	$ 8,500	adoped from the Hwy 21 & McNabb St TCS study, rounded up to the nearest
Landscaping	Dollars	2026	1	$ 1,500	adoped from the Hwy 21 & McNabb St TCS study, rounded up to the nearest
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				

Calculations can be reviewed within table beginning in cell K133.

Demand & travel time / delay	**Average travel time / delay**		**Opening year**	**Interim year(s)**			**End year**	**Notes**
	Time Period	**Units**	**2026**				**2036**	
Average vehicle travel time or delay	AM peak	seconds/veh	4.0				4.0	from operational results
	PM peak	seconds/veh	6.0				6.0	from operational results
	Weekend peak	seconds/veh	5.0				6.0	from operational results
Standard deviation of vehicle travel time or delay	AM peak	seconds/veh						
	PM peak	seconds/veh						
	Weekend peak	seconds/veh						
Average bicycle travel time or delay	All time periods	seconds/bike						
Average pedestrian travel time or delay	All time periods	seconds/ped						

Safety	**Crash type**	**Units**						
Fatality, injury, PDO	Fatality crashes	crashes/year	0.0				0.0	Referenced Collision Rates from Region of Waterloo, Co
	Injury crashes	crashes/year	0.2				0.2	Referenced Collision Rates from Region of Waterloo, Co
	Property damage only crashes	crashes/year	5.0				5.5	Referenced Collision Rates from Region of Waterloo, Co

Emissions	**Type**	**Units**						
Greenhouse gases -- Federal method (Exec. Order 12866)	CO2 equivalent	metric tons/year						
Criteria pollutants -- by type	CO	metric tons/year						
	NOx	metric tons/year						
	HC	metric tons/year						
	PM 2.5	metric tons/year						

Alternative 2 - TCS

Description: **Traffic Signal Control**

A summary of the net present value for this alternative is shown to the right in Column "J"

Planning & construction period	Begin planning & construction	**2026**	First year of planning & construction
Operating period	Opening year	**2026**	Travel time/delay and demand forecasts for the opening year *must* be provided.
	Interim year 1		Travel time/delay and demand forecasts for up to three years between the opening year and the end year *may* be provided.
	Interim year 2		
	Interim year 3		
	End year	**2036**	Travel time/delay and demand forecasts for the end (horizon) year *must* be provided.
Worksheet setup	Setup Worksheet		Once you have entered begin planning & construction, opening, and end years, click this button to set up the worksheet. You may enter other inputs at any time.

Net Present Value Summary	
Planning & Construction Costs	$ 405,000
Operating & Maintenance Costs	$ 233,343
Auto Passenger Time	$ 7,542,684
Auto Passenger Reliability	--
Truck Time	$ 421,002
Truck Reliability	--
Bicyclist Time	--
Pedestrian Time	--
Safety	$ 1,788,485
Criteria Pollutants	--
Total Net Present Value	**$ 10,390,513**

Warning: A zero entry for a cost category indicates that the data needed to calculate that cost have either not been entered or have been entered incorrectly. If you believe this is an error please review your entries in this sheet.

Planning & construction costs	**Units**	**Planning & construction year(s) 2026**	**2027**	**2028**	**2029**	**2030**	**Notes**
Planning, design	Dollars	$ 50,000					adoped from the Hwy 21 & McNabb St TCS study
Survey	Dollars	$ 5,000					adoped from the Hwy 21 & McNabb St TCS study
Right of way	Dollars						
Equipment, signs	Dollars						
Utilities	Dollars						
Construction	Dollars	$ 350,000					adoped from the Hwy 21 & McNabb St TCS study
Landscaping	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						
(Other planning & construction costs)	Dollars						

Operating & maintenance costs	**Units**	**Begin year**	**Period (years)**	**Cost**	**Notes**
Streetlighting	Dollars	2026	1	$ 1,500	adoped from the Hwy 21 & McNabb St TCS study, rounded up to the nearest
Pavement Markings	Dollars	2026	1	$ 7,000	adoped from the Hwy 21 & McNabb St TCS study
Repaving	Dollars	2036	10	$ 125,000	adoped from the Hwy 21 & McNabb St TCS study
Signing, striping	Dollars	2031	5	$ 600	adoped from the Hwy 21 & McNabb St TCS study
Power fro TCS	Dollars	2026	1	$ 1,500	adoped from the Hwy 21 & McNabb St TCS study
Equipment Inspection and Maintenance	Dollars	2026	1	$ 3,000	adoped from the Hwy 21 & McNabb St TCS study
Retiming and Analysis	Dollars	2031	5	$ 5,000	adoped from the Hwy 21 & McNabb St TCS study
Controller Replacement	Dollars	2036	10	$ 10,000	adoped from the Hwy 21 & McNabb St TCS study
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				
(Other O&M costs)	Dollars				

Calculations can be reviewed within table beginning in cell K133.

Demand & travel time / delay	**Average travel time / delay Time Period**	**Units**	**Opening year 2026**	**Interim year(s)**			**End year 2036**	**Notes**
Average vehicle travel time or delay	AM peak	seconds/veh	18.0				19.0	from operational results
	PM peak	seconds/veh	18.0				21.0	from operational results
	Weekend peak	seconds/veh	19.0				21.0	from operational results
Standard deviation of vehicle travel time or delay	AM peak	seconds/veh						
	PM peak	seconds/veh						
	Weekend peak	seconds/veh						
Average bicycle travel time or delay	All time periods	seconds/bike						
Average pedestrian travel time or delay	All time periods	seconds/ped						

Safety	**Crash type**	**Units**						
Fatality, injury, PDO	Fatality crashes	crashes/year	0.0				0.1	Referenced Collision Rates from Region of Waterloo, Co
	Injury crashes	crashes/year	0.8				0.9	Referenced Collision Rates from Region of Waterloo, Co
	Property damage only crashes	crashes/year	2.5				2.8	Referenced Collision Rates from Region of Waterloo, Co

Emissions	**Type**	**Units**						
Greenhouse gases -- Federal method (Exec. Order 12866)	CO2 equivalent	metric tons/year						
Criteria pollutants -- by type	CO	metric tons/year						
	NOx	metric tons/year						
	HC	metric tons/year						
	PM 2.5	metric tons/year						

Outputs

This sheet compiles the data from summary tables in individual alternatives sheets.

Analysis Summary

Cost Categories	Net Present Value of Costs									
	Alternative 0 - Base Case	Alternative 1 - RDBT	Alternative 2 - TCS							
Planning & Construction Costs	$ -	$ 1,513,000	$ 405,000							
Post-Opening Costs	$ 152,110	$ 194,530	$ 233,343							
Auto Passenger Time	$ 3,602,573	$ 1,674,786	$ 7,542,684							
Auto Passenger Reliability	--	--	--							
Truck Time	$ 201,081	$ 93,480	$ 421,002							
Truck Reliability	--	--	--							
Transit Passenger Time	--	--	--							
Transit Passenger Reliability	--	--	--							
Bicyclist Time	--	--	--							
Pedestrian Time	--	--	--							
Safety	$ 3,590,795	$ 892,735	$ 1,788,485							
Greenhouse Gases	--	--	--							
Criteria Pollutants	--	--	--							
Total cost	**$7,546,559**	**$4,368,530**	**$10,390,513**							

Benefit Categories	Net Present Value of Benefits Relative to Base Case									
		Alternative 1 - RDBT	Alternative 2 - TCS							
Auto Passenger Time		$ 1,927,787	$ (3,940,110)							
Auto Passenger Reliability										
Truck Time		$ 107,601	$ (219,921)							
Truck Reliability										
Transit Passenger Time										
Transit Passenger Reliability										
Bicyclist Time										
Pedestrian Time										
Safety		$ 2,698,060	$ 1,802,310							
Greenhouse Gases										
Criteria Pollutants										
Net Present Value of Benefits		**$ 4,733,448**	**$ (2,357,721)**							
Net Present Value of Costs		**$ 1,555,420**	**$ 486,233**							
Present Value of Net Benefits		**$ 3,178,029**	**$ (2,843,954)**							
Benefit-Cost Ratio		**3.04**	**-4.85**							