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2403 Khalsa Gate Town of Oakville Transportation Impact and Parking Study

Paradigm Transportation Solutions Limited

2024-09
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Project Summary

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2403 Khalsa Gate
Oakville, ON L6M 4J2

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2403 Khalsa Gate Town of Oakville Transportation Impact and Parking Study



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Executive Summary

Content

The Halton Sikh Cultural Association retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study (TIS) and Parking Study, for the proposed expansion to the existing place of worship (Gurdwara) located at 2403 Khalsa Gate in the Town of Oakville.

This study determines the impacts of the development traffic on the surrounding road network and identifies the recommended improvements, if any, to accommodate the site generated traffic. This study also measures the site's existing parking demand and forecasts its future parking demand.

Subject Site

Existing

Currently a place of worship (Gurdwara) exists on the lands which accommodates 250 persons within the existing 5,605 sq.ft. (521 m²), one-storey building.

The place of worship generally provides casual meeting space from Monday to Wednesday and operates between 4:30 AM and 8:30 PM. Organized programs are provided from Thursday to Sunday between the hours of 8:00 AM and 2:00 PM. Weddings and other important ceremonial events generally occur on Saturdays while the main congregation gathers on Sundays.

Sunday was identified by the client as being generally the largest and most consistent traffic generator for the site.

The site's parking demand was observed to be contained within the two-existing surface parking lots; one-asphalt and one-gravel parking lot. The site's trip generation and parking demands were measured and observed on April 14, 2024. The existing parking supply can vary based on how efficiently drivers are able to park their vehicles in the gravel parking lot area.

Vehicle access is provided by two existing private driveways. Driveway 1 provides access to Khalsa Gate located approximately 65 m south of Pine Glen Road. Driveway 2 provides access to Pine Glen Road and is located approximately 155 m east of Khalsa Gate.



Proposed

An expansion of the existing place of worship is proposed. The proposed building net floor area measures approximately 34,288 sq.ft. (3,185 m²). The expansion is expected to increase the site's capacity to approximately 400 persons.

No changes to the site's existing driveways are proposed.

The development concept includes 256 delineated parking spaces. The Town of Oakville Zoning By-law requires 177 spaces. The site's parking supply is considered over supplied by 79 spaces compared to the Zoning By-law requirements.

The site's bicycle parking supply is identified as 12 short-term spaces which exceeds the Town's Zoning By-Law requirements.

Build-out is expected to occur in one phase by Year 2029.

Conclusion

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Operations:** Critical movements are noted at the following study area intersections:
 - Dundas Street West & Bronte Road
 - Northbound Through: A v/c ratio of 0.90, 56 second delay, LOS F.
 - Pine Glen Road/Highvalley Road & Bronte Road
 - Westbound Left-Turn – The 95th percentile queue is forecast to exceed the current available storage (20 m) by approximately 35 m.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

- ▶ **Vehicle Circulation:** Heavy vehicle and site circulation have been assessed using AutoTURN swept path analysis software. No conflicts with the proposed on-site geometry are noted.
- ▶ **Transportation Demand Management (TDM):** Walking and cycling measures are provided in the proposed site plan.

A bicycle/pedestrian connectivity plan illustrates and identifies all pedestrian linkages through, within, and around the perimeter of the site including connections through parking areas and to local transit amenities.



- ▶ **Site Generated Traffic:** The subject site is forecast to generate approximately 142 new vehicle trips (58 in/84 out) during the Sunday peak hour which is forecast to result in approximately 378 total vehicle trips (154 in/224 out).
- ▶ **Background Traffic Operations:** Critical movements are noted at the following study area intersections:
 - Dundas Street West & Bronte Road
 - Northbound Through: A v/c ratio greater than 1.00, 96 second delay, LOS F.
 - Southbound Through: A v/c ratio of 0.97, 70 second delay, LOS F.
 - Pine Glen Road/Highvalley Road & Bronte Road
 - Westbound Left-Turn – The 95th percentile queue is forecast to exceed the current available storage (20 m) by approximately 45 m.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

- ▶ **Total Traffic Operations:** The intersection capacity deficiencies forecast to occur under the total traffic horizon are noted to occur under either existing conditions or under the forecast background traffic conditions. No new critical movements are forecast to occur with the additional vehicle trips associated with the development's expansion.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

- ▶ **Remedial Measures:** Based on the warrant analysis, traffic control signals are not warranted at the existing unsignalized intersections in the study area. No changes to the existing form of traffic control is recommended.

The warrant analysis indicates that westbound left-turn and southbound left-turn lanes are not warranted at the site driveway intersections with Pine Glen Road and Khalsa Gate.

To help manage increases in the background traffic operations, optimization of signal timings (cycle length and cycle splits) and the implementation of an eastbound left-turn lane at the intersection of Pine Glen Road/Highvalley Road and Bronte Road has been explored to determine if changes to the existing signal timings and geometry can improve future operations.



With signal timing adjustments, all movements within the study area are forecast to operate with acceptable levels of service and within capacity during the Sunday peak hour.

The westbound left-turn 95th percentile queue length at the intersection of Pine Glen Road/Highvalley Road at Bronte Road is forecast to exceed the available storage (20 m) by approximately 19 m. The average queue length is expected to be contained within the existing left-turn lane storage and taper. The movement is considered critical under existing, background and total traffic horizon.

► **Parking:**

The subject site is estimated to have a parking demand of approximately 256 spaces.

The proposed parking supply of 256 spaces is expected to accommodate the site's forecast parking demand.

Recommendations

Based on the findings of this study, it is recommended that:

- The municipal sidewalks be continuous through the site driveway approaches;
- Stop signs (Ra-1) be installed on the site driveway approaches to Khalsa Gate and Pine Glen Road;
- The Town of Oakville should consider providing an additional 20 metres of storage for the westbound left-turn lane at the intersection of Pine Glen Road/Highvalley Road at Bronte Road to accommodate the existing traffic within the study area; and
- The Halton Region continue to monitor and adjust signal timings as required.



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1 Introduction

1.1 Overview

The Halton Sikh Cultural Association retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study (TIS) and Parking Study, for the proposed expansion to the existing place of worship (Gurdwara) located at 2403 Khalsa Gate in the Town of Oakville.

Figure 1.1 illustrates the site location.

The scope of the study includes:

- ▶ An assessment of the current traffic and site conditions within the study area for the Sunday peak hour;
- ▶ Estimates of background traffic growth;
- ▶ Estimates of additional traffic generated by the subject site;
- ▶ Analyses of the impact of the future traffic on the surrounding road network;
- ▶ Recommendations to mitigate the site generated traffic in a satisfactory manner, if required;
- ▶ A Turning Movement Plan (AutoTURN) to illustrate the on-site circulation of heavy vehicles;
- ▶ A Bicycle/Pedestrian Connectivity Plan to illustrate and identify all pedestrian linkages through, within, and around the perimeter of the site including connections made to adjacent sites, through parking areas and to local transit amenities;
- ▶ A transportation demand management plan that includes transit-oriented design;
- ▶ A parking study to determine the sites anticipated parking demand and to determine the mitigation measures required, if any, to accommodate the forecast parking demand.

Appendix A contains the pre-study consultation material and responses from the Region of Halton and Town of Oakville staff. The study generally follows the Halton Region Transportation Impact Study Guidelines¹.

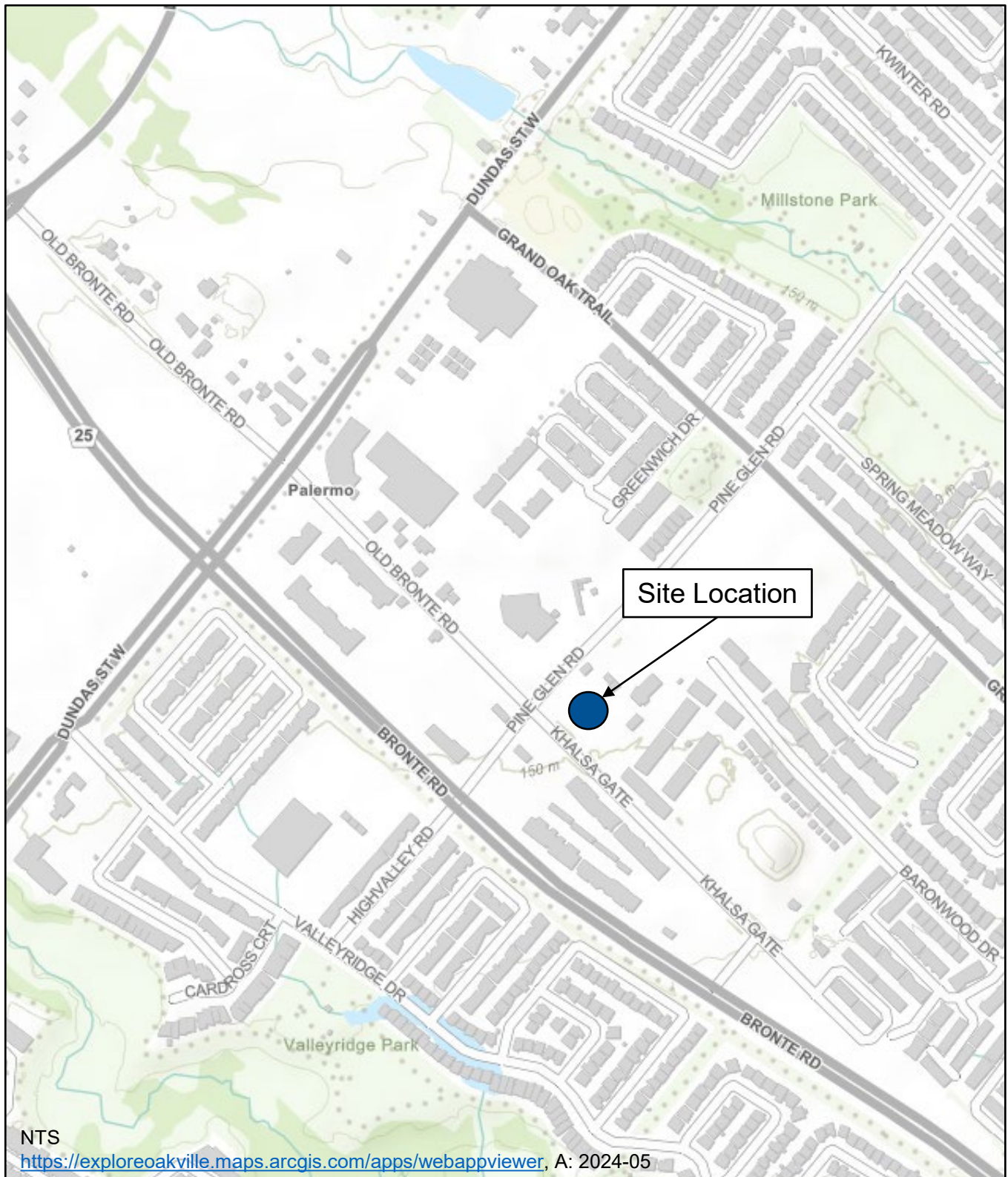
The study area intersections assessed in this study include:

¹ (Halton Region). *Transportation Impact Study Guidelines*. (Halton Region, January 2015).



- ▶ Bronte Road at Dundas Street West (signalized);
- ▶ Bronte Road at Pine Glen Road (signalized);
- ▶ Dundas Street West at Old Bronte Road (unsignalized);
- ▶ Dundas Street West at Grand Oak Trail (signalized);
- ▶ Pine Glen Road at Old Bronte Road/Khalsa Gate (unsignalized);
- ▶ Pine Glen Road at Grand Oak Trail (Unsignalized);
- ▶ The existing site driveway to Khalsa Gate (Driveway 1) (unsignalized); and
- ▶ The existing site driveway to Pine Glen Road (Driveway 2) (unsignalized).





2 Existing Conditions

2.1 Pedestrian Network

Sidewalks are provided along the following roadways:

- ▶ Dundas Street West (East of Bronte Road) – Sidewalks on both sides of the roadway;
- ▶ Dundas Street West (West of Bronte Road) – A multi-use path is provided on the south side of the roadway;
- ▶ Bronte Road (South of Dundas Street West) – Sidewalks on the east side of the roadway and a multi-use path on the west side of the roadway;
- ▶ Pine Glen Road/Highvalley Road – Discontinuous sidewalks on the north side of the roadway and continuous sidewalks on the south side of the roadway;
- ▶ Khalsa Gate – Discontinuous sidewalks are provided on both sides of the roadway;
- ▶ Old Bronte Road – Discontinuous sidewalks are provided on both sides of the roadway; and
- ▶ Grand Oak Trail – Sidewalks are provided on both sides of the roadway.

All study intersections except for the intersection of Pine Glen Road and Old Bronte Road/Khalsa Gate have painted pedestrian crosswalks. Pedestrian signal heads/push buttons are provided at all signalized intersections.

The area is currently developing which includes multiple active construction projects along Old Bronte Road/Khalsa Gate. Sidewalks will likely be provided along both sides of the roadway once construction is complete. Sidewalks are illustrated on the site plan along the site's frontage to both Khalsa Gate and Pine Glen Road.

2.2 Cycling Network

Figure 2.1 illustrates the existing and future cycling infrastructure in near the subject site.

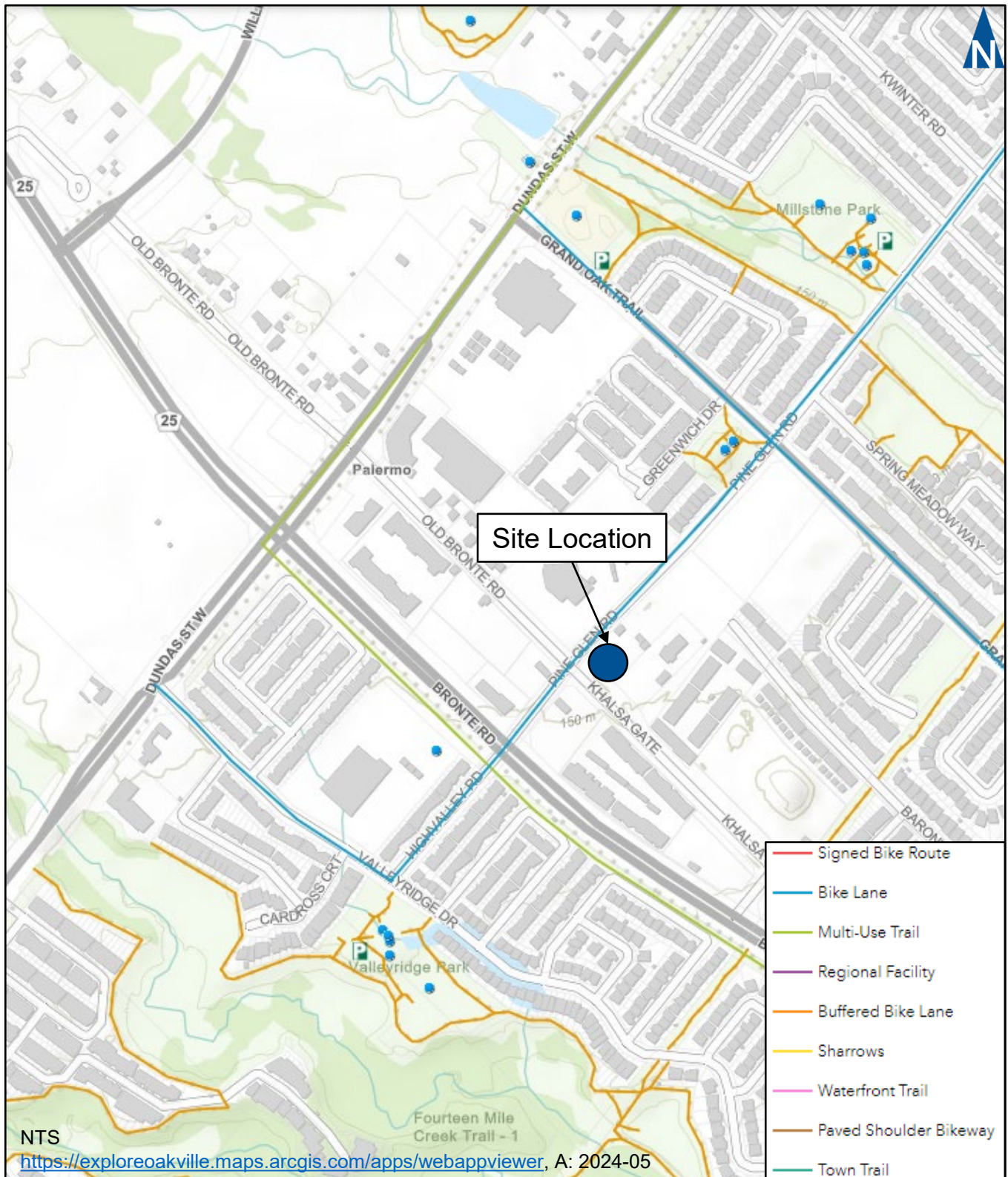
A multi-use path is provided on the west side of Bronte Road and the south side of Dundas Street West. On-street painted cycling lanes are provided in both directions along Grand Oak Trail and Pine Glen Road east of Old Bronte Road/Khalsa Gate. No other cycling facilities are noted within the study area.



The Town of Oakville Active Transportation Master Plan² identifies future on-street bicycle lanes on Pine Glen Road west of Old Bronte Road/Khalsa Gate and on Bronte Road which will provide opportunities for local area residents and visitors to travel by bicycle.

² Town of Oakville Active Transportation Master Plan, Final Report, WSP/GLPi, November 2017





2.3 Transit Network

Oakville Transit provides municipal transit service in the Town of Oakville. There are approximately 12 existing transit stops located within 500 m of the subject site. The nearest transit stops are located on the north and south side of Pine Glen Road directly adjacent to the subject site near the Khalsa Gate intersection.

The eastbound transit stop has a concrete pad while the westbound transit stop provides no amenities. Improvements may be made to the stops as the area builds out.

Route 34 (Pine Glen) and Route 86 (Garth Webb S.S.) service the nearest existing transit stops. Route 34 is rush hour service only and Route 86 is a school special. **Figure 2.2** illustrates the existing Oakville Transit Network.

Figure 2.3 illustrates the existing transit stops within 500 m (about a 5-minute walk) of the subject site.

Route 34 loops around Colonel William Parkway, Pine Glen Road, Proudfoot Trail, and Upper Middle Road West starting and ending at the Bronte GO station located south of the subject site. Service is weekdays from approximately 7:00 AM to 9:00 AM and 4:30 PM to 8:00 PM.

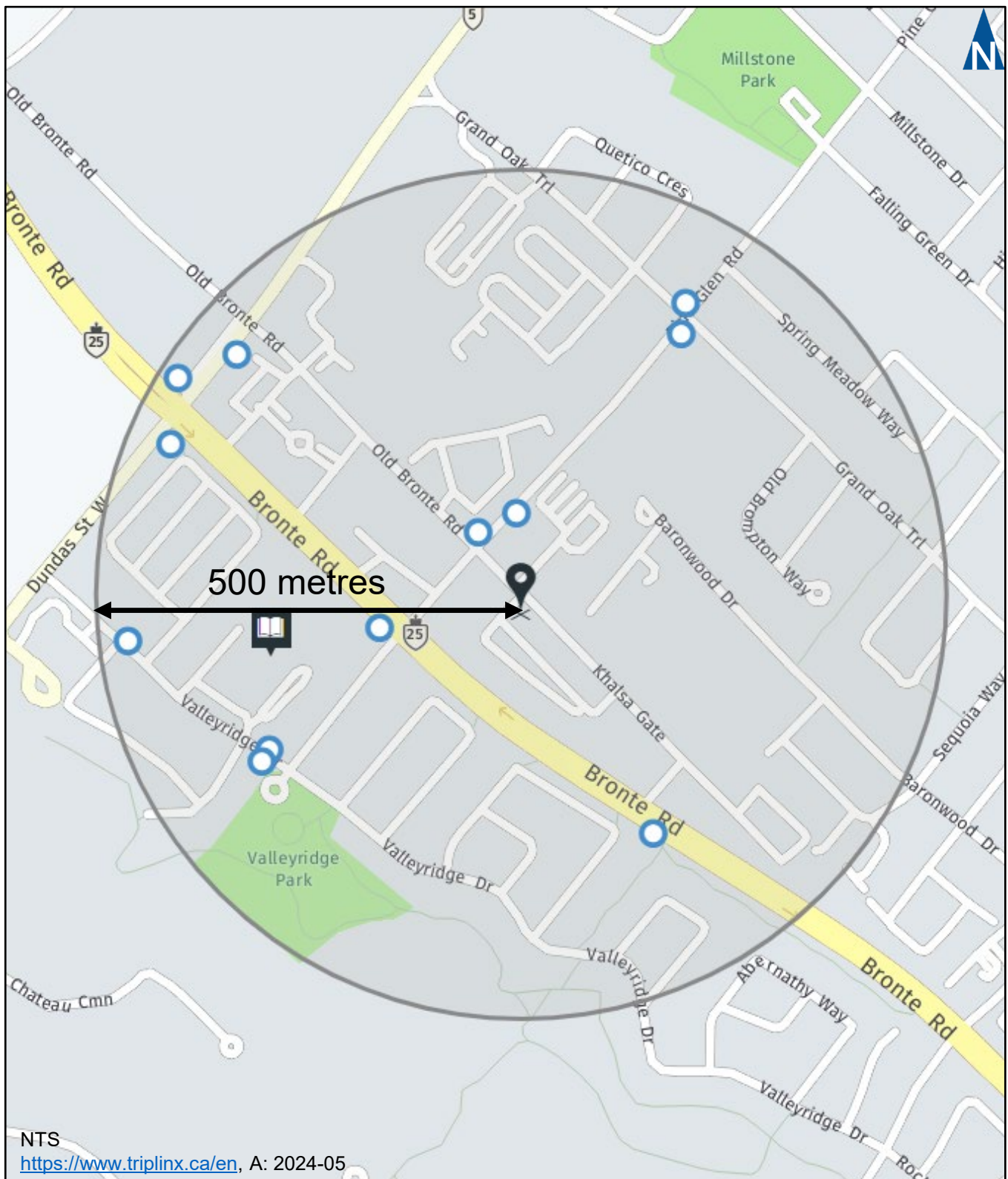
Routes 86, 86A and 86B provides service to and from Garth Webb Secondary School via Colonel William Parkway, Pine Glen Road, Third Line and Proudfoot Trail. Service is provided on school days from 7:50 AM to 8:15 AM and 3:00 PM to 3:30 PM.

Route 34 provides service to and from the Bronte GO station. The Government of Ontario (Metrolinx/GO Transit) provides daily interregional public transport in the form of bus and rail transit to communities across the Greater Golden Horseshoe. Weekday headways for GO transit range from 30-60 minutes.

Oakville Transit provides door-to-door paratransit service called care-A-van for persons with disabilities. Service is provided by low-floor, fully accessible buses.







2.4 Road Network

The roadways near the subject site include:

- ▶ **Dundas Street West** (Regional Road 5), an east-west divided major arterial roadway³ with a six-lane urban cross-section and a posted speed limit of 70 km/h. The intersection with Bronte Road and Grand Oak Trail is signalized. The intersection with Old Bronte Road is stop controlled on the minor approach. On-street parking is not permitted along this roadway in the study area.
- ▶ **Bronte Road** (Regional Road 25), a north-south divided major arterial roadway⁴ with a four-lane urban cross-section and posted speed limit of 60 km/h. The intersections with Dundas Street West and Pine Glen Road/Highvalley Road are signalized. On-street parking is not permitted along this roadway in the study area.
- ▶ **Pine Glen Road/Highvalley Road**, an east-west major collector roadway⁵ with a two-lane urban cross-section and an assumed speed limit of 50 km/h. The intersections with Old Bronte Road/Khalsa Gate and Grand Oak Trail are all-way stop controlled. The Bronte Road intersection is signalized. On-street parking is permitted on the south side of the roadway between Khalsa Gate and Grand Oak Trail.
- ▶ **Old Bronte Road/Khalsa Gate**, a north-south collector roadway⁶ with a two-lane urban cross-section and posted speed limit of 50 km/h. On-street parking is permitted along this roadway in the study area. The intersection with Bronte Road is two-way stop controlled and the intersection with Pine Glen Road is all-way stop controlled.
- ▶ **Grand Oak Trail**, a north-south major collector roadway⁷ with a two-lane urban cross-section and posted speed limit of 50 km/h. On-street parking is permitted along the west side of the roadway south of Quetico Crescent in the study area. The intersections with Dundas Street West is signalized while the intersection with Pine Glen Road is all-way stop controlled.

Figure 2.4 illustrates the existing lane-configuration and traffic control.

³ Town of Oakville, 2015 Road System Report, 2015

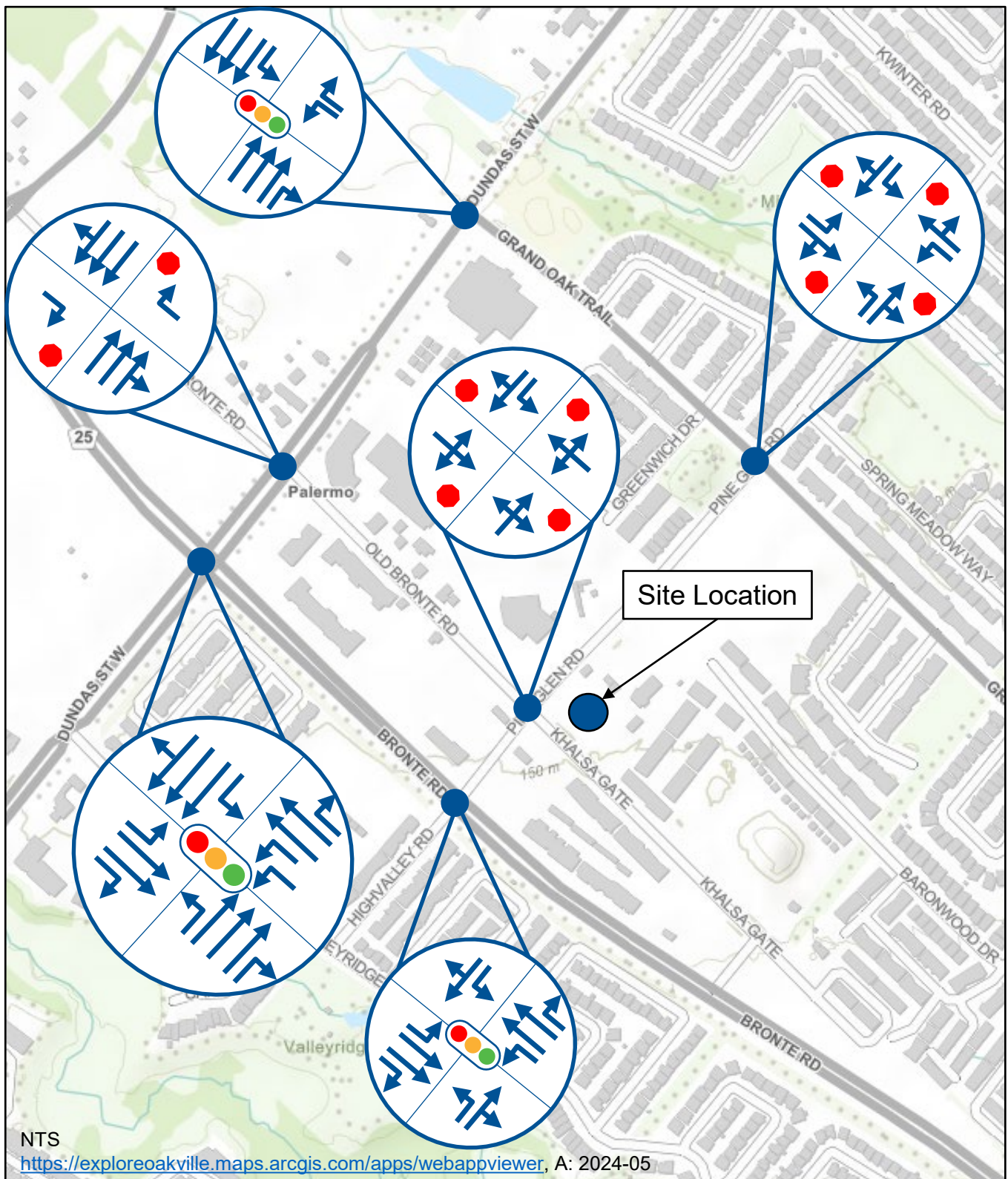
⁴ Town of Oakville, 2015 Road System Report, 2015

⁵ Town of Oakville, 2015 Road System Report, 2015

⁶ Town of Oakville, 2015 Road System Report, 2015

⁷ Town of Oakville, 2015 Road System Report, 2015





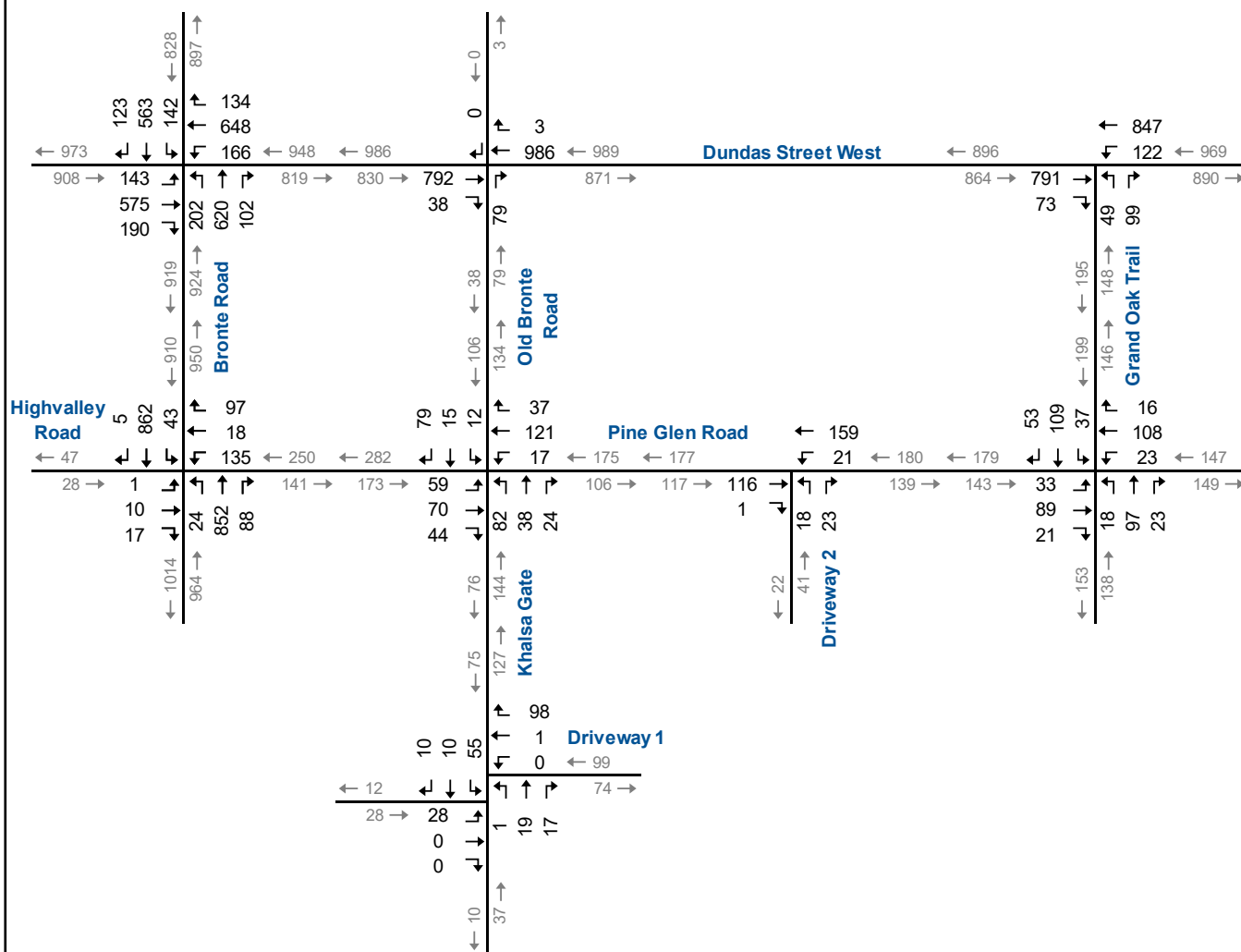
2.5 Existing Traffic Volumes

Turning movement counts were collected at the study area intersections by Paradigm on Sunday April 14th, 2024. 24-hour traffic counts were also collected at the existing site driveways. **Appendix B** contains the existing count data.

Figure 2.5 illustrates the existing Sunday peak hour traffic volumes at the study area intersections. The Sunday peak hour occurred between 12:30 PM to 1:30 PM at both site driveways on Sunday April 14th, 2024.

The subject site is currently generating approximately 236 total Sunday peak hour trips with a directional distribution of approximately 41% inbound.





NTS



Existing Sunday Peak Hour Traffic

2403 Khalsa Gate
240110

Figure 2.5

2.6 Existing Operations

Intersection level of service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to make a movement, compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flows. The highest possible rating is LOS A, under which the average total delay is equal or less than 10 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections (50 seconds at unsignalized), the movement is considered to have a LOS F and remedial measures are usually implemented if they are feasible.

The operations of the study area intersections were evaluated Synchro 11 and HCM 2000 procedures. The intersection analysis considered the following measures of performance:

- ▶ The LOS for each turning movement. LOS is based on the average control delay per vehicle;
- ▶ The volume to capacity ratio for each intersection; and
- ▶ 95th percentile queue length (m) (Synchro 11).

Under the Region's TIS Guidelines, the following criteria indicate critical movements and signify that mitigation measures may need to be considered:

- ▶ At signalized intersections,
 - Overall intersection operations, through movements, or shared through/turning movements increased to 0.85 v/c or above.
 - Volume to capacity ratios for exclusive right-turn/left-turn movements increased to 0.95 v/c or above; or
 - Queues for an individual movement are projected to exceed turning lane storage.
- ▶ At unsignalized intersections,
 - LOS, based on average delay per vehicle, on individual movements exceeds LOS D or
 - Queues for an individual movement are projected to exceed turning lane storage.



Table 2.2 summarizes the existing operational conditions, and the following critical movements are noted:

- ▶ Dundas Street West & Bronte Road
 - Northbound Through: A v/c ratio of 0.90, 56 second delay, LOS F.
- ▶ Pine Glen Road/Highvalley Road & Bronte Road
 - Westbound Left-Turn: The 95th percentile queue is forecast to exceed the current available storage (20 m) by approximately 35 m.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

Appendix C contains the detailed Synchro reports.



TABLE 2.1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
Sunday Peak Hour	Dundas Street West & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	C 16 0.42 26 90 64	C 20 0.27 41 13 67	C 19 0.13 13 80 67	C 19	C 16 0.40 30 115 85	C 21 0.36 53 115 85	>	C 20	D 30 0.44 25 100 75	F 56 0.90 108 12 45 33	E 35 0.07 12 45 33	E 48	E 36 0.64 175 136	E 50 0.83 90 17 33	E 36 0.09 17 50 33	E 45	D 33 0.56
	Dundas Street West & Old Bronte Road	TWSC	LOS Delay V/C 95th	< 0.20 0	A 0	>	A 0	< 0.25 0	A 0	>	A 0	< 9 2	A 9	>	A 9	< 0 0	A 0	>	A 0	A 0
	Dundas Street West & Grand Oak Trail	TCS	LOS Delay V/C 95th Storage Avail.	A 9 0.29 33 -	A 8 0.05 6 70 64	A 9	A 4 0.26 10 75 65	A 4 0.25 23 -	>	A 4	D 33 0.32 26 -	>	D 33						A 8 0.30	
	Pine Glen Road/Highvalley Road & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	E 39 0.01 2 20 18	E 40 0.05 10 -	>	E 40	F 54 0.70 53 20 -33	E 41 0.15 20 -	>	E 48	A 6 0.06 4 85 81	A 10 0.40 74 45 35	A 7 0.07 10 25	A 9	A 5 0.11 6 54	A 9 0.40 76 -	A 6 0.00 0 25	A 9	B 14 0.44
	Pine Glen Road & Old Bronte Road/Khalsa Gate	AWSC	LOS Delay V/C	< 9 0.25	A 9	>	A 9	A 8 0.03 0.24	A 9	>	A 9	< 9 0.21	A 9	>	A 9	< 8 0.15	A 8	>	A 8	A 9
	Pine Glen Road & Grand Oak Trail	AWSC	LOS Delay V/C	A 8 0.06	A 9 0.18	>	A 9	A 8 0.04 0.21	A 9	>	A 9	A 8 0.03 0.20	A 9	>	A 9	A 8 0.07 0.26	A 9	>	A 9	A 9
	Khalsa Gate & Driveway 1	TWSC	LOS Delay V/C 95th	< 11 0.05 1	B 11	>	B 11	< 9 0.10 3	A 9	>	A 9	< 0 0.00 0	A 0	>	A 0	< 6 0.04 1	A 6	>	A 6	A 7
	Pine Glen Road & Driveway 2	TWSC	LOS Delay V/C 95th	A 0 0.07 0	A 0	>	A 0	< 1 0.02 0	A 1	>	A 1	A 10 0.06 2	>	A 0	>					A 2

MOE - Measure of Effectiveness

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

LOS - Level of Service

V/C - Volume to Capacity Ratio

95th - 95th Percentile Queue Length

Ex. - Existing Storage (m)

Avail. - Available Storage (m)

> - Shared Right-Turn Lane

< - Shared Left-Turn Lane



3 Development Concept

3.1 Site Description

Existing

Currently a place of worship (Gurdwara) exists on the lands which accommodates 250 persons within the existing 5,605 sq.ft. (521 m²), one-storey building.

The place of worship generally provides casual meeting space from Monday to Wednesday and operates between 4:30 AM and 8:30 PM. Organized programs are provided from Thursday to Sunday between the hours of 8:00 AM and 2:00 PM. Weddings and other important ceremonial events generally occur on Saturdays while the main congregation gathers on Sundays.

Sunday was identified by the client as being generally the largest and most consistent traffic generator for the site.

The site's parking demand was observed to be contained within the two-existing surface parking lots; one-asphalt and one-gravel parking lot. The site's trip generation and parking demands were measured and observed on April 14, 2024. The existing parking supply can vary based on how efficiently drivers are able to park their vehicles in the gravel parking lot area.

Vehicle access is provided by two existing private driveways. Driveway 1 provides access to Khalsa Gate located approximately 65 m south of Pine Glen Road. Driveway 2 provides access to Pine Glen Road and is located approximately 155 m east of Khalsa Gate.



Proposed

An expansion of the existing place of worship is proposed. The proposed building net floor area measures approximately 34,288 sq.ft. (3,185 m²). The expansion is expected to increase the site's capacity to approximately 400 persons.

No changes to the site's existing driveways are proposed.

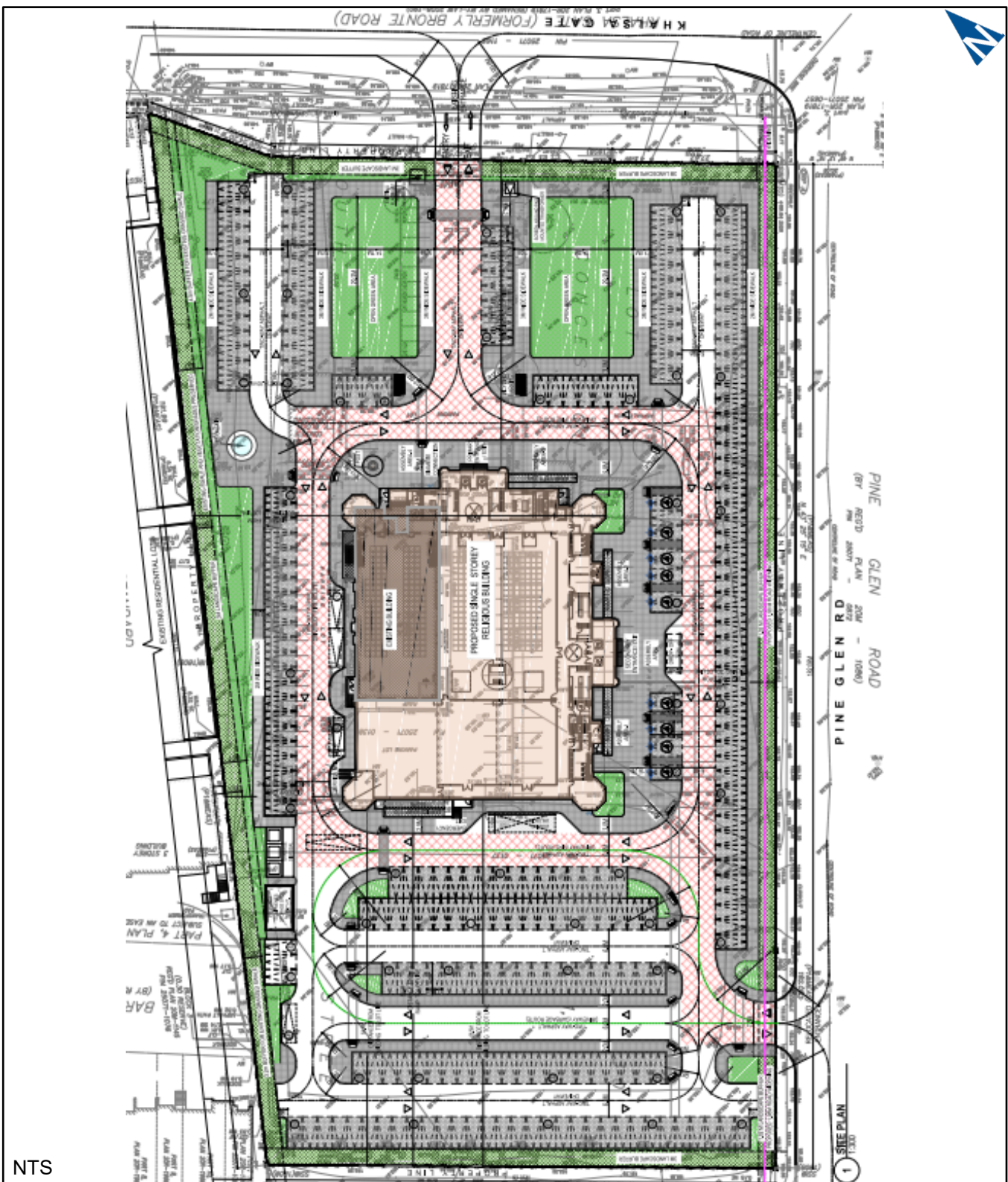
The development concept includes 256 delineated parking spaces. The Town of Oakville Zoning By-law requires 177 spaces. The site's parking supply is considered over supplied by 79 spaces compared to the Zoning By-law requirements.

The site's bicycle parking supply is identified as 12 short-term spaces which exceeds the Town's Zoning By-Law requirements.

Build-out is expected to occur in one phase by Year 2029. Municipal sidewalks are noted on the site frontages to Khalsa Gate and Pine Glen Road. It is recommended that the municipal sidewalks should be continuous though the site driveway approaches.

Figure 3.1 illustrates the proposed site concept plan.





3.2 Vehicle Circulation

Heavy vehicle and site circulation have been assessed using AutoTURN swept path analysis software. Three design vehicles were used in the analysis:

- ▶ Pumper Fire Truck (NCHRP Report 659 2010);
- ▶ Transportation Association of Canada (TAC) Heavy Single Unit (HSU); and
- ▶ TAC Medium Signal Unit (MSU).

Appendix D contains the AutoTURN swept path analysis. No conflicts with the proposed on-site geometry are noted.

3.3 Trip Generation Estimate

The turning movement count data collected by Paradigm at the existing site driveways to Pine Glen Road and Khalsa Gate on Sunday April 14th, 2024 was used to establish a trip generation rate for the proposed expansion.

The existing site can accommodate 250 persons. Approximately 236 total trips (0.94 trips/person) were recorded between the two site driveways during the Sunday Peak Hour; these trips include 96 inbound trips and 140 outbound trips.

An overall rate of 0.94 trips per person with directional distribution of 41 percent inbound is calculated. **Table 3.1** summarizes the existing and estimated trip generation for the site following the proposed expansion, which is expected to increase the site's capacity to 400 persons.

The expansion to the subject site is estimated to generate approximately 142 new vehicle trips (58 in/84 out) during the Sunday peak hour which results in a forecast total of 378 total vehicle trips (154 in/224 out) for the subject site.



TABLE 3.1: TRIP GENERATION ESTIMATE

Land Use	Sunday Peak Hour		
	In	Out	Total
Existing Trips (Proxy Data) - 250 Persons	96	140	236
Existing Trips	96	140	236
Expansion Trip Generation - 150 Persons*	58	84	142
New Trips	58	84	142
Total Trips	154	224	378

*0.94 trips per person

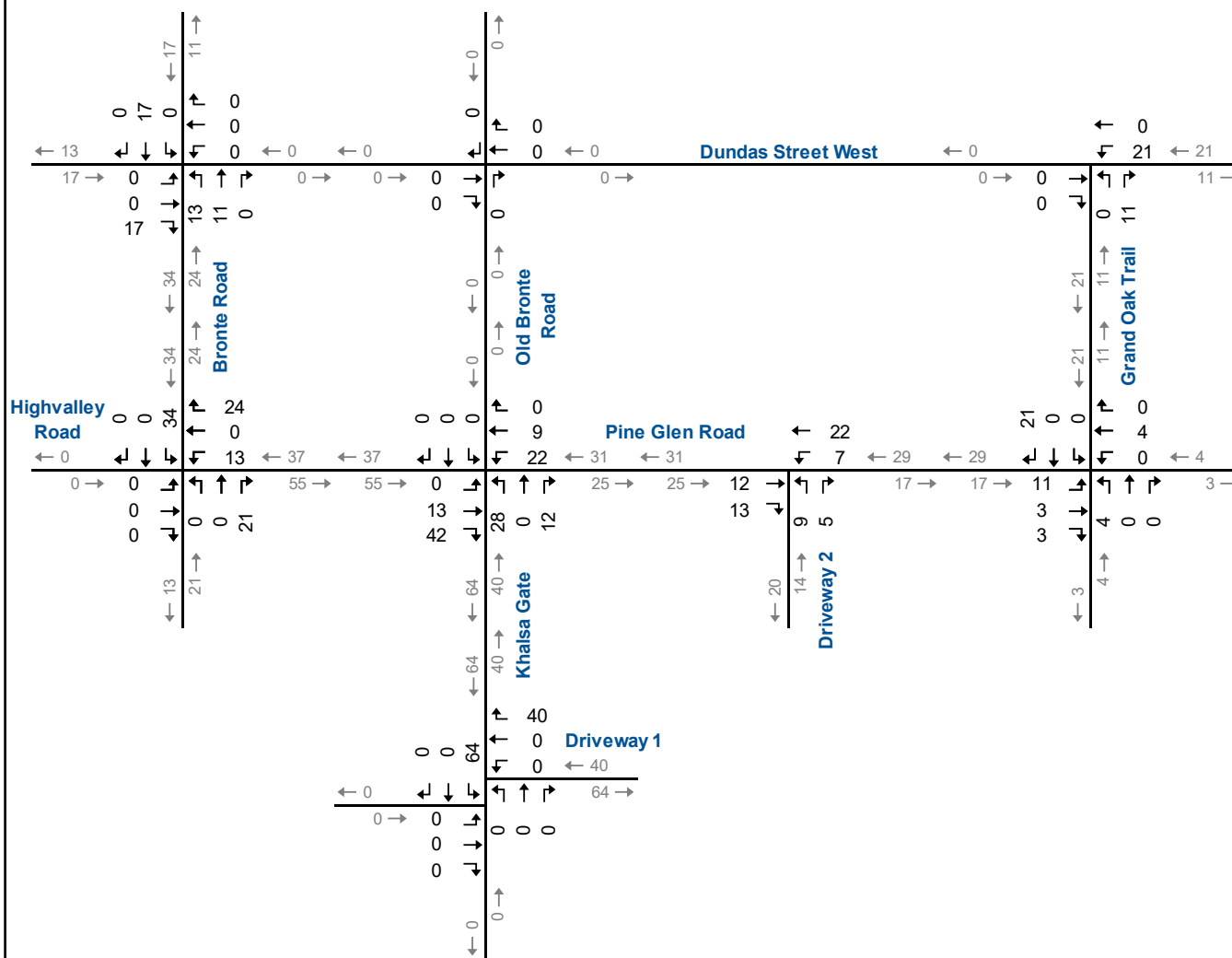
Table 3.2 summarizes the estimated trip distribution.

The new vehicle trips generated by the proposed expansion are expected to have the same general distribution as the existing site under existing conditions. The existing traffic distribution rates were rounded to the nearest 5%. **Figure 3.2** illustrates the site traffic assignment.

TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

Origin/Destination	Sunday Peak Hour	
	In	Out
East via Dundas Street West	25%	20%
West via Dundas Street West	20%	25%
East via Pine Glen Road	5%	5%
North via Bronte Road	20%	20%
South via Bronte Road	25%	25%
South via Grand Oak Trail	5%	5%
Total	100%	100%





NTS

3.4 Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is a wide range of policies, programs, services and products that influence how, why, when and where people travel to make travel behaviours more sustainable⁸.

To help manage the site's travel demands, the site plan should incorporate both short-term and long-term bicycle parking.

The Town of Oakville's zoning by-law requires a bicycle parking supply of the greater of 2 or 1.0 per 500 m² of net floor area. The Zoning By-law states that "in no circumstance shall the number of minimum bicycle parking spaces required on a lot be greater than 30." A minimum of 7 short-term bicycle parking spaces are required, with 12 spaces proposed the site's bicycle parking supply exceeds the Town's Zoning By-Law requirement.

The site's bicycle parking supply appears to be convenient, secure, and readily available. The bicycle parking spaces are also provided close to the buildings entrances and avoid conflicts with pedestrians and vehicles.

A bicycle/pedestrian connectivity plan illustrates and identifies the pedestrian linkages through, within, and around the perimeter of the site including connections through parking areas and to local transit amenities. **Appendix E** contains the bicycle/pedestrian connectivity plan.

Multiple TDM measures aimed at pedestrians are also provided on the proposed site plan, these measures include:

- ▶ A pedestrian realm that connects directly to the municipal sidewalk along Pine Glen Road. Pedestrian connections are also provided to Khalsa Gate in anticipation of municipal sidewalks along Khalsa Gate; and
- ▶ Weather protection at the proposed building entrances.

⁸ Town of Oakville, Transportation Demand Management Plan Oakville Green Life Sciences and Technology District (Oakville, October 2016), Section 1.1



4 Future Traffic Conditions

The assessment of future conditions in this section includes the following components:

- ▶ Future background traffic estimates;
- ▶ Level of service analysis for background traffic (pre-development);
- ▶ Future total traffic estimates; and
- ▶ Level of service analysis for total traffic (post-development).

4.1 Forecast Traffic

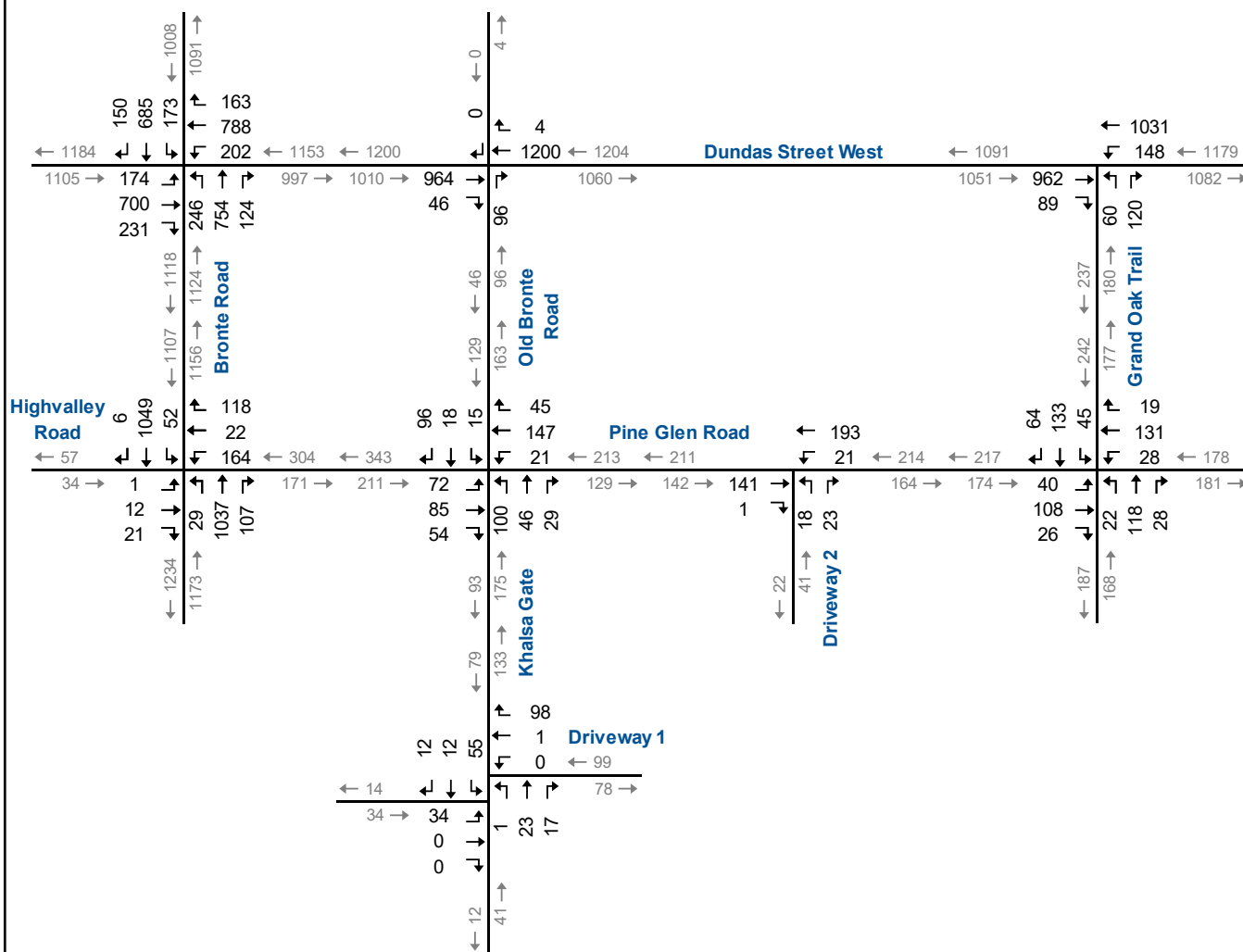
A five-year horizon (Year 2029) following the year of the study (2024) has been assessed. The likely future traffic volumes near the subject site are estimated to consist of:

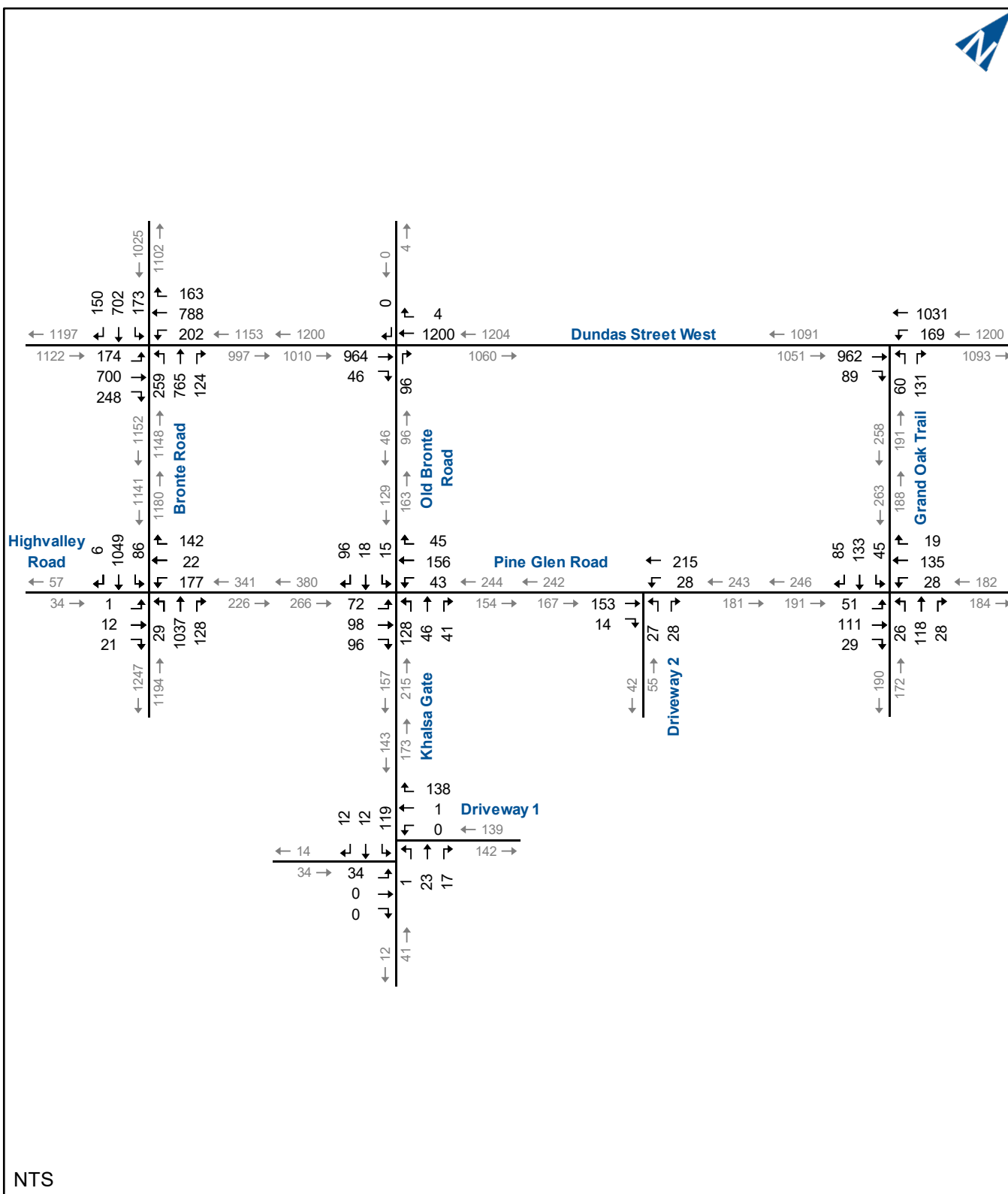
- ▶ Increased non-site traffic (generalized background traffic growth); and
- ▶ Traffic generated by the proposed development.

During pre-study consultations, Town staff requested a background growth rate of 4% per annum to account for the anticipated growth in the study area.

Figure 4.1 illustrates the forecast background Sunday traffic volumes. **Figure 4.2** illustrates the forecast total Sunday traffic volumes.







4.2 Background Traffic Operations

The study area intersection operational analyses for the background traffic forecast followed the same methodology used for existing conditions. Existing traffic signal timings were used. **Table 4.1** summarizes the level of service conditions for the forecast background traffic volumes. The following critical movement is noted:

- ▶ Dundas Street West & Bronte Road
 - Northbound Through: A v/c ratio greater than 1.00, 96 second delay, LOS F.
 - Southbound Through: A v/c ratio of 0.97, 70 second delay, LOS F.
- ▶ Pine Glen Road/Highvalley Road & Bronte Road
 - Westbound Left-Turn: The 95th percentile queue is forecast to exceed the current available storage (20 m) by approximately 45 m.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

Appendix F contains the detailed Synchro reports.



TABLE 4.1: BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
Sunday Peak Hour	Dundas Street West & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	C 20 0.61 31 90 59	C 21 0.33 50 - -	C 20 0.15 14 80 66	C 21	C 18 0.56 36 115 79	C 23 0.45 67 - -	>	C 22	D 32 0.56 30 100 70	F 96 1.07 144 - -	E 36 0.11 18 45 27	F 75	E 44 0.76 53 175 122	F 70 0.97 126 - 25	E 36 0.18 25 50 25	F 61	E 44 0.75
	Dundas Street West & Old Bronte Road	TWSC	LOS Delay V/C 95th	< 0.24 <	A 0 >	>	A 0	< 0.30 <	A 0 >	>	A 0	< 0.10 <	A 9 >	>	A 9	< 0.00 <	A 0 >	>	A 0	A 0
	Dundas Street West & Grand Oak Trail	TCS	LOS Delay V/C 95th Storage Avail.		A 10 0.36 45 - -	A 8 0.06 7 70 63	A 10	A 5 0.38 14 75 61	A 5 0.31 32 - -		A 5	D 34 0.45 34 - -		>	D 34					A 9 0.41
	Pine Glen Road/Highvalley Road & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	E 38 0.01 2 20 18	E 38 0.06 11 - -	>	E 38	F 56 0.75 63 20 -43	E 39 0.17 22 - -	>	E 48	A 7 0.10 6 85 80	B 12 0.50 105 45 31	A 8 0.09 14 45 31	B 11	A 7 0.17 9 60 51	B 11 0.50 108 0 - 25	A 7 0.00 0 25 25	B 11	C 16 0.54
	Pine Glen Road & Old Bronte Road/Khalsa Gate	AWSC	LOS Delay V/C	< 0.32 <	B 11 >	>	B 11	A 8 0.04 0.31 >	A 10 >	>	A 10	< 0.27 <	B 10 >	>	B 10	< 0.19 <	A 9 >	>	A 9	A 10
	Pine Glen Road & Grand Oak Trail	AWSC	LOS Delay V/C	A 9 0.08	A 9 0.23 >	>	A 9	A 9 0.05 0.27 >	A 10 >	>	A 10	A 9 0.04 0.25 >	A 9 >	>	A 9	A 9 0.08 0.33 >	B 10 >	>	A 10	A 10
	Khalsa Gate & Driveway 1	TWSC	LOS Delay V/C 95th	< 0.06 <	B 12 >	>	B 12	< 0.10 <	A 9 >	>	A 9	< 0.00 <	A 0 >	>	A 0	< 0.04 <	A 5 >	>	A 5	A 7
	Pine Glen Road & Driveway 2	TWSC	LOS Delay V/C 95th		A 0 0.09 0	>	A 0	< 0.02 <	A 1 >		A 1	B 10 0.06 2		>	A 0					

MOE - Measure of Effectiveness

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

LOS - Level of Service

V/C - Volume to Capacity Ratio

95th - 95th Percentile Queue Length

Ex. - Existing Storage (m)

Avail. - Available Storage (m)

> - Shared Right-Turn Lane

< - Shared Left-Turn Lane



4.3 Total Traffic Operations

The study area intersection operational analyses for the total traffic forecast followed the same methodology used for background traffic conditions. Existing traffic signal timings were used. **Table 4.2** summarizes the level of service conditions for the forecast total traffic volumes.

The intersection capacity deficiencies forecast to occur under the total traffic horizon are noted to occur under either existing conditions or under the forecast background traffic conditions. No new critical movements are forecast to occur with the additional vehicle trips associated with the development's expansion.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

Appendix G contains the detailed Synchro reports.

The road authorities should continue to monitor and adjust traffic control signal timings to reflect changes in real world traffic volumes.



TABLE 4.2: TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
Sunday Peak Hour	Dundas Street West & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	C 20 0.61 31 90 59	C 21 0.33 50 15 - -	C 20 0.17 15 80 65	C 21	C 18 0.56 36 115 79	C 23 0.45 67 - -	> > > >	C 22	D 33 0.59 32 100 69	F 101 1.08 147 - -	E 36 0.11 18 45 27	F 79	E 44 0.76 53 175 123	F 78 1.00 131 - 25	E 36 0.19 25 50 25	F 66	E 46 0.75
	Dundas Street West & Old Bronte Road	TWSC	LOS Delay V/C 95th	< < <	A 0 0.24 0	> > >	A 0	< < <	A 0 0.30 0	> > >	A 0	< < <	A 9 0.10 3	> > >	A 9	< < <	A 0 0.00 0	> > >	A 0	A 0
	Dundas Street West & Grand Oak Trail	TCS	LOS Delay V/C 95th Storage Avail.		A 10 0.36 45 - -	A 8 0.06 7 63	A 10	A 5 0.43 16 75 59	A 5 0.31 32 - -		A 5	D 33 0.46 35 - -		> > >	D 33					A 9 0.46
	Pine Glen Road/Highvalley Road & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	E 38 0.01 2 20 18	E 39 0.06 11 - -	> > >	E 39	F 58 0.77 68 20 -48	E 40 0.20 25 - -	> > >	E 49	A 8 0.10 6 85 79	B 13 0.51 109 45 29	A 10 0.11 16 45 29	B 13	A 8 0.27 13 60 47	B 12 0.51 112 - 25	A 8 0.00 25 25	B 12	C 17 0.56
	Pine Glen Road & Old Bronte Road/Khalsa Gate	AWSC	LOS Delay V/C	< < <	B 12 0.42	> > >	B 12	A 9 0.08	B 11 0.35	> > >	B 10	< < <	B 12 0.36	> > >	B 12	< < <	A 10 0.20	> > >	A 10	B 11
	Pine Glen Road & Grand Oak Trail	AWSC	LOS Delay V/C	A 9 0.10	A 10 0.25	> > >	A 10	A 9 0.05	B 10 0.28	> > >	A 10	A 9 0.05	A 10 0.26	> > >	A 10	A 9 0.09	B 11 0.37	> > >	B 10	A 10
	Khalsa Gate & Driveway 1	TWSC	LOS Delay V/C 95th	< < <	B 15 0.09 2	> > >	B 15	< < <	A 9 0.15 4	> > >	A 9	< < <	A 0 0.00 0	> > >	A 0	< < <	A 6 0.08 2	> > >	A 6	A 8
	Pine Glen Road & Driveway 2	TWSC	LOS Delay V/C 95th		A 0 0.11 0	> > >	A 0	< < <	A 1 0.02 1		A 1	B 11 0.09 2		> > >	A 0					

MOE - Measure of Effectiveness

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

LOS - Level of Service

V/C - Volume to Capacity Ratio

95th - 95th Percentile Queue Length

Ex. - Existing Storage (m)

Avail. - Available Storage (m)

> - Shared Right-Turn Lane

< - Shared Left-Turn Lane



5 Remedial Measures

5.1 Traffic Control Improvements

The unsignalized intersections in the study area including the site driveways were assessed using the Ontario Traffic Manual (OTM Book 12 – Justification 7) signal warrant procedures for total traffic conditions to determine the need for a traffic control signal.

Appendix H contains the warrant analysis.

Based on the warrant analysis, traffic control signals are not warranted at the existing unsignalized intersections in the study area. No changes to the existing form of traffic control is recommended.

Stop signs (Ra-1) should be installed on the site driveway approaches to Khalsa Gate and Pine Glen Road.

5.2 Auxiliary Turn Lanes

The Ministry of Transportation's (MTO) Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads⁹ provides guidance on the assessment and/or need for auxiliary left-turn lanes. **Appendix I** contains the MTO left-turn lane nomographs for the site driveway intersections with Pine Glen Road and Khalsa Gate.

The warrant analysis indicates that westbound left-turn and southbound left-turn lanes are not warranted at the site driveway intersections with Pine Glen Road and Khalsa Gate. No changes to the existing lane configuration is recommended at the site driveways.

5.3 Signal Timing Improvements

Intersection capacity issues are noted to be occurring under existing conditions at the Dundas Street West at Bronte Road and Pine Glen Road/Highvalley Road at Bronte Road intersections. Increases in both non-site and site related traffic are expected to increase delays and v/c ratios at these intersections.

To help manage increases in traffic, optimization of signal timings (cycle length and cycle splits) and the implementation of an eastbound left-turn lane at the intersection of Pine Glen Road/Highvalley Road and Bronte Road has been explored to determine if changes to the

⁹ MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017 Appendix 9 for Chapter 9 Intersections



existing signal timings can improve future operations. No changes to the existing lane configurations are assumed.

Table 4.3 summarizes the total traffic level of service conditions with optimized signal timings in place. **Appendix J** contains the detailed Synchro reports.

With signal timing adjustments, all movements within the study area are forecast to operate with acceptable levels of service and within capacity during the Sunday peak hour. The westbound left-turn 95th percentile queue length at the intersection of Pine Glen Road/Highvalley Road at Bronte Road is forecast to exceed the available storage (20 m) by approximately 19 m. The average queue length is expected to be contained within the existing left-turn lane storage and taper. The movement is considered critical under existing, background and total traffic horizon.

The Town of Oakville should consider providing an additional 20 metres of storage for the westbound left-turn lane at the intersection of Pine Glen Road/Highvalley Road at Bronte Road to accommodate the existing traffic within the study area. The additional storage may impact the existing on-street parking along the south side of Highvalley Road.

Halton Region should monitor and adjust the signal timings at the Dundas Street West at Bronte Road and Pine Glen Road/Highvalley Road at Bronte Road intersections to reflect real-world changes in traffic volumes.



TABLE 4.3: TOTAL TRAFFIC OPERATIONS – REMEDIAL MEASURES

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
Sunday Peak Hour	Dundas Street West & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	D 28 0.69 48 90 42	D 26 0.38 62 - 59	C 24 0.18 21 80 59	D 25	C 24 0.63 48 115 67	D 28 0.51 85 - -	> > > >	D 27	D 27 0.56 28 100 72	E 43 0.81 112 - 27	D 30 0.12 18 45 27	E 38	E 47 0.81 51 175 124	E 42 0.78 103 - 30	D 31 0.14 20 50 30	E 41	D 33 0.74
	Dundas Street West & Old Bronte Road	TWSC	LOS Delay V/C 95th	< < < <	A 0 0.24 0	> > > >	A 0	< < < <	A 0 0.30 0	> > > >	A 0	< < < <	A 9 9 0.10 3	> > > >	A 9	< < < <	A 0 0.00 0	> > > >	A 0	A 0
	Dundas Street West & Grand Oak Trail	TCS	LOS Delay V/C 95th Storage Avail.		B 11 0.37 49 - -	A 9 0.06 7 70 63	B 10	A 5 0.42 16 75 59	A 5 0.31 32 - -		A 5	D 33 0.46 35 - -		> > > >	D 33					A 9 0.44
	Pine Glen Road/Highvalley Road & Bronte Road	TCS	LOS Delay V/C 95th Storage Avail.	D 33 0.01 2 20 19	D 34 0.17 10 - -	> > > >	D 34	D 25 0.55 39 20 -19	C 22 0.16 17 - -	> > > >	C 23	B 11 0.14 5 85 80	C 19 0.70 95 - 35	B 12 0.09 10 45 35	C 18	B 10 0.36 11 60 49	C 16 0.66 97 - 25	A 10 0.00 0 25 25	C 16	C 18 0.67
	Pine Glen Road & Old Bronte Road/Khalsa Gate	AWSC	LOS Delay V/C	< < <	B 12 0.42	> > >	B 12	A 9 0.08	B 11 0.35	> > >	B 10	< < <	B 12 0.36	> > >	B 12	< < <	A 10 0.20	> > >	A 10	B 11
	Pine Glen Road & Grand Oak Trail	AWSC	LOS Delay V/C	A 9 0.10	A 10 0.25	> > >	A 10	A 9 0.05	B 10 0.28	> > >	A 10	A 9 0.05	A 10 0.26	> > >	A 10	A 9 0.09	B 11 0.37	> > >	B 10	A 10
	Khalsa Gate & Driveway 1	TWSC	LOS Delay V/C 95th	< < < <	B 15 0.09 2	> > > >	B 15	< < < <	A 9 0.15 4	> > > >	A 9	< < < <	A 0 0.00 0	> > > >	A 0	< < < <	A 6 0.08 2	> > > >	A 6	A 8
	Pine Glen Road & Driveway 2	TWSC	LOS Delay V/C 95th		A 0 0.11 0	> > >	A 0	< < <	A 1 0.02 1		A 1	B 11 0.09 2		> > >	A 0					A 2

MOE - Measure of Effectiveness

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

LOS - Level of Service

V/C - Volume to Capacity Ratio

95th - 95th Percentile Queue Length

Ex. - Existing Storage (m)

Avail. - Available Storage (m)

> - Shared Right-Turn Lane

< - Shared Left-Turn Lane



6 Parking

6.1 Parking Supply

The site's parking is currently contained within the two-existing surface parking lots; one-asphalt and one-gravel parking lot. The existing parking supply can vary based on how efficiently drivers are able to park their vehicles in the gravel parking lot area.

After the expansion, a parking supply of 256 delineated at-grade spaces (0.64 spaces per person), including eight barrier free spaces is proposed within a single at-grade asphalt parking lot.

6.2 Zoning By-Law Requirements

The Town of Oakville zoning by-law¹⁰ requires 1 space per 5 persons plus 1 space per 22 m² of additional accessory assembly area.

A total of 1047 m² of assembly area is proposed with the proposed expansion. Approximately 2139 m² of additional accessory assembly area is provided.

The Zoning By-law parking requirement for the subject site is 177 spaces. With 256 spaces provided, the site's parking supply is considered oversupplied by 79 spaces.

Parking	Spaces
Zoning By-Law Requirement	177 spaces
Proposed Supply	256 spaces
Surplus	+ 79 spaces

6.3 Existing Parking Demand

Paradigm collected parking data from 10:00 AM to 3:00 PM at the subject site on Sunday April 14, 2024. The existing place of worship currently facilitates a maximum of 250 persons. **Appendix K** contains the proxy site parking survey data.

A maximum parking demand of 159 vehicles was observed which results in a calculated parking demand rate of 0.64 parking spaces per person.

¹⁰ Town of Oakville. *Zoning By-law 2014-014*. (Oakville. April 2023).



The site's expansion is proposed to accommodate 400 persons which results in an anticipated parking demand of 256 parking spaces. With 256 spaces proposed, the site's parking supply is forecast to meet demand.

6.4 Summary

The subject site is estimated to have a parking demand of approximately 256 spaces.

The proposed parking supply of 256 spaces is expected to accommodate the site's forecast parking demand.



7 Conclusions and Recommendations

7.1 Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Operations:** Critical movements are noted at the following study area intersections:
 - Dundas Street West & Bronte Road
 - Northbound Through: A v/c ratio of 0.90, 56 second delay, LOS F.
 - Pine Glen Road/Highvalley Road & Bronte Road
 - Westbound Left-Turn – The 95th percentile queue is forecast to exceed the current available storage (20 m) by approximately 35 m.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

- ▶ **Site Description:** An expansion of the existing place of worship (Gurdwara) is proposed. The proposed expansion measures approximately 34,288 sq.ft. (3,185 m²). The expansion is expected to increase the site's worship service capacity to approximately 400 persons.

No changes to the site's existing driveways are proposed.

The development concept includes 256 delineated parking spaces. The Town of Oakville Zoning By-law requires 177 spaces. The site's parking supply is considered over supplied by 79 spaces compared to the Zoning By-law requirements.

The site's bicycle parking supply is identified as 12 short-term spaces.

Build-out is expected to occur in one phase by Year 2029.

- ▶ **Vehicle Circulation:** Heavy vehicle and site circulation have been assessed using AutoTURN swept path analysis software. No conflicts with the proposed on-site geometry are noted.
- ▶ **Transportation Demand Management (TDM):** Walking and cycling measures are provided in the proposed site plan.

A bicycle/pedestrian connectivity plan illustrates and identifies all pedestrian linkages through, within, and around the perimeter of the site including connections through parking areas and to local transit amenities.



- ▶ **Site Generated Traffic:** The subject site is forecast to generate approximately 142 new vehicle trips (58 in/84 out) during the Sunday peak hour which is forecast to result in approximately 378 total vehicle trips (154 in/224 out).
- ▶ **Background Traffic Operations:** Critical movements are noted at the following study area intersections:
 - Dundas Street West & Bronte Road
 - Northbound Through: A v/c ratio greater than 1.00, 96 second delay, LOS F.
 - Southbound Through: A v/c ratio of 0.97, 70 second delay, LOS F.
 - Pine Glen Road/Highvalley Road & Bronte Road
 - Westbound Left-Turn – The 95th percentile queue is forecast to exceed the current available storage (20 m) by approximately 45 m.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

- ▶ **Total Traffic Operations:** The intersection capacity deficiencies forecast to occur under the total traffic horizon are noted to occur under either existing conditions or under the forecast background traffic conditions. No new critical movements are forecast to occur with the additional vehicle trips associated with the development's expansion.

The site driveways are forecast to operate with delays in the LOS A-B range with a queue of about one vehicle.

- ▶ **Remedial Measures:** Based on the warrant analysis, traffic control signals are not warranted at the existing unsignalized intersections in the study area. No changes to the existing form of traffic control is recommended.

The warrant analysis indicates that westbound left-turn and southbound left-turn lanes are not warranted at the site driveway intersections with Pine Glen Road and Khalsa Gate.

To help manage increases in the background traffic operations, optimization of signal timings (cycle length and cycle splits) and the implementation of an eastbound left-turn lane at the intersection of Pine Glen Road/Highvalley Road and Bronte Road has been explored to determine if changes to the existing signal timings and geometry can improve future operations.



With signal timing adjustments, all movements within the study area are forecast to operate with acceptable levels of service and within capacity during the Sunday peak hour.

The westbound left-turn 95th percentile queue length at the intersection of Pine Glen Road/Highvalley Road at Bronte Road is forecast to exceed the available storage (20 m) by approximately 19 m. The average queue length is expected to be contained within the existing left-turn lane storage and taper. The movement is considered critical under existing, background and total traffic horizon.

► **Parking:**

The subject site is estimated to have a parking demand of approximately 256 spaces.

The proposed parking supply of 256 spaces is expected to accommodate the site's forecast parking demand.

7.2 Recommendations

Based on the findings of this study, it is recommended that:

- The municipal sidewalks be continuous through the site driveway approaches;
- Stop signs (Ra-1) be installed on the site driveway approaches to Khalsa Gate and Pine Glen Road;
- The Town of Oakville should consider providing an additional 20 metres of storage for the westbound left-turn lane at the intersection of Pine Glen Road/Highvalley Road at Bronte Road to accommodate the existing traffic within the study area; and
- The Halton Region continue to monitor and adjust signal timings as required.



Appendix A

Pre-Study Consultation



Creighton Chartier

From: Khan, Ayesha <Ayesha.Khan@halton.ca>
Sent: May 6, 2024 4:08 PM
To: Creighton Chartier
Cc: Scott Catton; Krusto, Matt
Subject: RE: (240110) 2403 Khalsa Gate - TIS & PS - TOR

Hello Creighton,
Thanks for your email.

In consideration of the letter you provided, we feel comfortable withdrawing the requirement for the additional periods. Please proceed with the study with the originally intended peak periods.

Thanks,
Ayesha

From: Creighton Chartier <cchartier@ptsl.com>
Sent: Monday, May 6, 2024 1:24 PM
To: Khan, Ayesha <Ayesha.Khan@halton.ca>
Cc: Scott Catton <scatton@ptsl.com>; Krusto, Matt <Matt.Krusto@halton.ca>
Subject: RE: (240110) 2403 Khalsa Gate - TIS & PS - TOR

CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. If you are unsure or need assistance please contact the IT Service Desk.

Hi Ayesha,

Thank you for the response. We have some concerns in regards to including a maximum of 9 additional peak hours which you described in your response below.

Attached is a letter detailing the typical and special event attendance at the existing place of worship. The client confirms the typical busiest day of worship is Sunday. In addition to the client's input, the Town of Oakville also reviewed the proposed terms of reference and provided no additional comment on the proposed Sunday peak hour (attached).

A summary of the letter is also provided below:

Day of the Week or Special Event	Typical Attendance
Monday to Wednesday	5-15
Thursday to Friday	10-40
Saturday Special Event - Wedding (10 to 15/year)	10-50
Saturday Special Event - Sukhmani Sahib	10-50
Saturday Special event - Akhand Sahib Path Ji	20-100
Sunday	100-150

We believe expanding the study to include a maximum of 9 additional peak hours would also cause significant financial impact on the Gurdwara's congregation.

With this, we believe that the Sunday peak hour (12:00 to 2:00 PM) suggested in the original terms of reference email will capture the typical peak period for the place of worship and we hope you will reconsider the need for the additional peak hours detailed below.

Regards,

Creighton Chartier

Transportation Consultant
(He/Him)



5A-150 Pinebush Road, Cambridge ON, N1R 8J8
p: 416.479.9684 x504
m: 905.242.2420
e: cchartier@ptsl.com
w: www.ptsl.com

Office Hours: 07:30 – 17:30 M-T, closed Fridays

From: Khan, Ayesha <Ayesha.Khan@halton.ca>
Sent: Tuesday, April 9, 2024 12:11 PM
To: Creighton Chartier <cchartier@ptsl.com>
Subject: RE: (240110) 2403 Khalsa Gate - TIS & PS - TOR

Hello Creighton,

Thank you for circulating the Terms of Reference to us. We find it generally satisfactory, and offer the following notes:

Analysis Periods

Aside from the Sunday Mid-Day Peak Hour (between 12-2pm) proposed, please also include the following:

- Friday 12pm to 4pm;
- Weekend Religious Program peak hours (Saturday and Sunday);
- Weekend Special Event peak hours (Saturday and Sunday);
- Daily Prayer peak hours (weekday 3pm to 6pm);
- Educational peak hours (weekday and weekend);
- Roadway p.m. peak hour

Traffic Data:

Any Regional information (traffic counts, signal timing) if needed, can be obtained from Halton through a request to our Road Operations staff at trafficdatarequests@halton.ca

Background Developments:

Town staff will provide/approve all background developments to consider as part of the study.

Other General study comments include:

The TIS report will include:

- Site Plan and Map,
- Size & Number of Development Phases,
- Existing Conditions (Study Area Intersections, Road Network, Pedestrian Routes, Cycling Routes, Transit Services),
- Existing Traffic Conditions (Site Operating Characteristics, Data Collection/Traffic Counts, Analysis Periods (5 years Ahead),
- Future Background Conditions (Horizon Years, Horizon Year Volumes)
- Background Traffic Demand (with TMC's < 2 years old),
- Background Traffic Demand Forecast (with acceptable growth rates)
- Site Generated Traffic (Transit Modal Split, Trip Generation/Distribution/Assignment)
- Future Total Traffic Demand,
- Capacity Analysis (by Intersection, with LOS, Avg. Delay, V/C ratios),
- Traffic Impacts (Tables – Total Traffic with/without Mitigation)
- Access Considerations – Existing, Proposed, Geometrics (turn lanes, sight lines),
- Recommendations - Identify required/recommended road improvements either as a result of the development impacts, or general non-development improvements.
- TDM recommendations (Transit, Pedestrian & Cycling Facilities Analysis)
- Conclusions
- Appendices with Terms of Reference correspondence from all agencies.

Please let me know if you require any further clarifications.

Thanks,
Ayesha

Ayesha Khan

Project Manager I – Transportation Development Review

Development Services

Public Works

Halton Region

905-825-6000, ext. | 1-866-442-5866



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From: Krusto, Matt <Matt.Krusto@halton.ca>

Sent: Wednesday, April 3, 2024 11:13 AM

To: Khan, Ayesha <Ayesha.Khan@halton.ca>

Subject: FW: (240110) 2403 Khalsa Gate - TIS & PS - TOR

Hi Ayesha,

This is for you.

My only comment as this isn't a new site but expansion, my previous comments on analysis periods on some other similar sites included:

Analysis Periods:

- Friday 12pm to 4pm;
- Weekend Religious Program peak hours (Saturday and Sunday);
- Weekend Special Event peak hours (Saturday and Sunday);
- Daily Prayer peak hours (weekday 3pm to 6pm);
- Educational peak hours (weekday and weekend);
- Roadway p.m. peak hour

They only state below:

Analysis Periods:

- Sunday Mid-Day Peak Hour
 - Site operators have confirmed that the largest attendance occurs on Sunday's between 12:00 PM and 2:00 PM.

Something to consider.

Matt

Matt Krusto

Supervisor, Transportation Development Review

Development Services

Public Works

Halton Region

905-825-6000, ext. 7225 | 1-866-442-5866



From: Creighton Chartier <cchartier@ptsl.com>

Sent: Wednesday, April 3, 2024 10:47 AM

To: Syed Rizvi <syed.rizvi@oakville.ca>; Krusto, Matt <Matt.Krusto@halton.ca>

Subject: (240110) 2403 Khalsa Gate - TIS & PS - TOR

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Hello All,

Paradigm has been retained to prepare a Transportation Impact Study and Parking Study for the proposed development of 2403 Khalsa Gate in the Town of Oakville. The conceptual site plan is attached. The property owner is proposing to expand the existing place of worship (Gurdwara) to measure approximately 21,000 square feet.

Vehicle access is proposed by the existing private driveway to Khalsa Gate and the existing private driveway to Pine Glen Road. A total parking supply of 228 spaces is proposed. The build-out date is not yet known.

Proposed Terms of Reference

Study Guidelines:

- Generally, follow the Halton Region Transportation Impact Study Guidelines (2015)

Study Area Intersections:

- Pine Glen Road at Bronte Road (signalized);
- Pine Glen Road at Khalsa Gate/Old Bronte Road (unsignalized);
- Pine Glen Road at Grand Oak Trail (unsignalized);
- Dundas Street at Bronte Road (signalized);
- Dundas Street at Old Bronte Road (unsignalized);
- Dundas Street at Grand Oak Trail (signalized);
- Khalsa Gate at existing site driveway (unsignalized); and
- Pine Glen Road at existing site driveway (unsignalized).

Analysis Periods:

- Sunday Mid-Day Peak Hour
 - Site operators have confirmed that the largest attendance occurs on Sunday's between 12:00 PM and 2:00 PM.

Existing Data:

- Collect new TMC data for the above noted intersections.
- Measure site existing trip generation.
- Measure site's existing parking generation

Horizon Year:

- Existing Conditions; and
- Five-years from the date the study.

Analysis:

- Synchro 11 with HCM 2000 analysis.

Site Circulation:

- AutoTURN Analysis for the following design vehicles:
 - TAC MSU
 - Garbage Collection
 - Fire Truck

Traffic Forecast:

- Background traffic annual growth rate of 2% per annum.
- Other approved developments to include in background. **Please identify**

Trip Generation:

- Based on the existing site's traffic generation
- No modal split reductions.

Trip Distribution:

- Existing Traffic Patterns

Future Road Improvements:

- None, unless identified

Remedial Measure:

- OTM Traffic Control signal warrants
- Left-Turn lane warrants

Bicycle/Pedestrian Connectivity Plan:

- Illustrate and identify all pedestrian linkages through, within, and around the perimeter of the site including connections made to adjacent sites, through parking areas and to local transit amenities.

Parking Study:

- Estimate the parking demand generated by the proposed development using the site's existing parking demand to establish the number of on-site parking spaces that should be provided, recognizing site constraints and local conditions.

Report:

- Report documenting the study methodologies, findings and conclusions.

Regards,

Creighton Chartier

Transportation Consultant
(He/Him)



5A-150 Pinebush Road, Cambridge ON, N1R 8J8
p: 416.479.9684 x504
m: 905.242.2420
e: cchartier@ptsl.com
w: www.ptsl.com

Office Hours: 07:30 – 17:30 M-T, closed Fridays

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Creighton Chartier

From: Syed Rizvi <syed.rizvi@oakville.ca>
Sent: April 4, 2024 4:34 PM
To: Creighton Chartier
Subject: RE: (240110) 2403 Khalsa Gate - TIS & PS - TOR

Hi Creighton,

There is one minor comment on the proposed TOR's i.e., offered in red below please.

Please feel free to contact for any questions.

Thanks,
Sted

Syed Rizvi, M.Sc., P. Eng
Transportation Engineer
Transportation and Engineering
Town of Oakville | 905-845-6601, ext. 3981 | www.oakville.ca

Vision: A vibrant and livable community for all

Please consider the environment before printing this email.
<http://www.oakville.ca/privacy.html>

From: Creighton Chartier <cchartier@ptsl.com>
Sent: Wednesday, April 3, 2024 10:47 AM
To: Syed Rizvi <syed.rizvi@oakville.ca>; Krusto, Matt <Matt.Krusto@halton.ca>
Subject: (240110) 2403 Khalsa Gate - TIS & PS - TOR

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 - Garbage Collection
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Regards,

Creighton Chartier

Transportation Consultant
(He/Him)



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Appendix B

Traffic Data





Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@pts1.com

Count Name: Dundas Street & Old Bronte Road
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Dundas Street Eastbound						Dundas Street Westbound						Old Bronte Road Northbound						Old Bronte Road 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	
11:00 AM	0	128	12	0	0	140	0	129	1	0	0	130	0	0	11	0	1	11	0	0	2	0	0	2	283
11:15 AM	0	159	6	0	0	165	0	158	0	0	0	158	0	0	11	0	0	11	0	0	0	0	0	0	334
11:30 AM	0	162	11	0	0	173	0	143	1	0	0	144	0	0	10	0	2	10	0	0	2	0	1	2	329
11:45 AM	0	185	17	0	0	202	0	204	0	0	0	204	0	0	12	0	2	12	0	0	1	0	0	1	419
Hourly Total	0	634	46	0	0	680	0	634	2	0	0	636	0	0	44	0	5	44	0	0	5	0	1	5	1365
12:00 PM	0	204	12	0	0	216	0	179	1	0	0	180	0	0	12	0	0	12	0	0	1	0	0	1	409
12:15 PM	0	161	10	0	0	171	0	181	0	0	0	181	0	0	29	0	0	29	0	0	1	0	0	1	382
12:30 PM	0	196	10	0	0	206	0	190	1	0	0	191	0	0	32	0	0	32	0	0	1	0	0	1	430
12:45 PM	0	201	12	0	0	213	0	192	1	0	0	193	0	0	26	0	1	26	0	0	0	0	1	0	432
Hourly Total	0	762	44	0	0	806	0	742	3	0	0	745	0	0	99	0	1	99	0	0	3	0	1	3	1653
1:00 PM	0	222	11	0	0	233	0	192	0	0	0	192	0	0	21	0	5	21	0	0	0	0	0	0	446
1:15 PM	0	202	12	0	0	214	0	186	1	0	0	187	0	0	18	0	7	18	0	0	0	0	0	0	419
1:30 PM	0	198	17	0	0	215	0	226	0	0	0	226	0	0	14	0	2	14	0	0	0	0	0	0	455
1:45 PM	0	220	13	0	0	233	0	217	0	0	0	217	0	0	10	0	4	10	0	0	0	0	2	0	460
Hourly Total	0	842	53	0	0	895	0	821	1	0	0	822	0	0	63	0	18	63	0	0	0	0	2	0	1780
2:00 PM	0	207	9	0	0	216	0	243	1	0	0	244	0	0	13	0	4	13	0	0	0	0	1	0	473
2:15 PM	0	187	10	0	0	197	0	246	0	0	0	246	0	0	13	0	0	13	0	0	0	0	2	0	456
2:30 PM	0	198	9	0	0	207	0	234	1	0	0	235	0	0	24	0	4	24	0	0	0	0	0	0	466
2:45 PM	0	200	10	0	0	210	0	263	1	0	0	264	0	0	29	0	7	29	0	0	0	0	0	0	503
Hourly Total	0	792	38	0	0	830	0	986	3	0	0	989	0	0	79	0	15	79	0	0	0	0	3	0	1898
Grand Total	0	3030	181	0	0	3211	0	3183	9	0	0	3192	0	0	285	0	39	285	0	0	8	0	7	8	6696
Approach %	0.0	94.4	5.6	0.0	-	-	0.0	99.7	0.3	0.0	-	-	0.0	0.0	100.0	0.0	-	-	0.0	0.0	100.0	0.0	-	-	-
Total %	0.0	45.3	2.7	0.0	-	48.0	0.0	47.5	0.1	0.0	-	47.7	0.0	0.0	4.3	0.0	-	4.3	0.0	0.0	0.1	0.0	-	0.1	-
Motorcycles	0	13	4	0	-	17	0	19	0	0	-	19	0	0	0	0	-	0	0	0	0	0	-	0	36
% Motorcycles	-	0.4	2.2	-	-	0.5	-	0.6	0.0	-	-	0.6	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	0.5
Cars & Light Goods	0	2988	177	0	-	3165	0	3132	8	0	-	3140	0	0	283	0	-	283	0	0	7	0	-	7	6595
% Cars & Light Goods	-	98.6	97.8	-	-	98.6	-	98.4	88.9	-	-	98.4	-	-	99.3	-	-	99.3	-	-	87.5	-	-	87.5	98.5
Buses	0	7	0	0	-	7	0	9	0	0	-	9	0	0	0	0	-	0	0	0	0	0	-	0	16
% Buses	-	0.2	0.0	-	-	0.2	-	0.3	0.0	-	-	0.3	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	0.2
Single-Unit Trucks	0	15	0	0	-	15	0	15	0	0	-	15	0	0	2	0	-	2	0	0	1	0	-	1	33
% Single-Unit Trucks	-	0.5	0.0	-	-	0.5	-	0.5	0.0	-	-	0.5	-	-	0.7	-	-	0.7	-	-	12.5	-	-	12.5	0.5
Articulated Trucks	0	6	0	0	-	6	0	8	0	0	-	8	0	0	0	0	-	0	0	0	0	0	-	0	14
% Articulated Trucks	-	0.2	0.0	-	-	0.2	-	0.3	0.0	-	-	0.3	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	0.2

Bicycles on Road	0	1	0	0	-	1	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	-	0	2
% Bicycles on Road	-	0.0	0.0	-	-	0.0	-	0.0	11.1	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	17	-	-	-	-	-	2	-	-	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43.6	-	-	-	-	-	28.6	-	-	
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	22	-	-	-	-	-	5	-	-	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56.4	-	-	-	-	-	71.4	-	-	

Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Dundas Street & Old Bronte Road
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Turning Movement Peak Hour Data (2:00 PM)

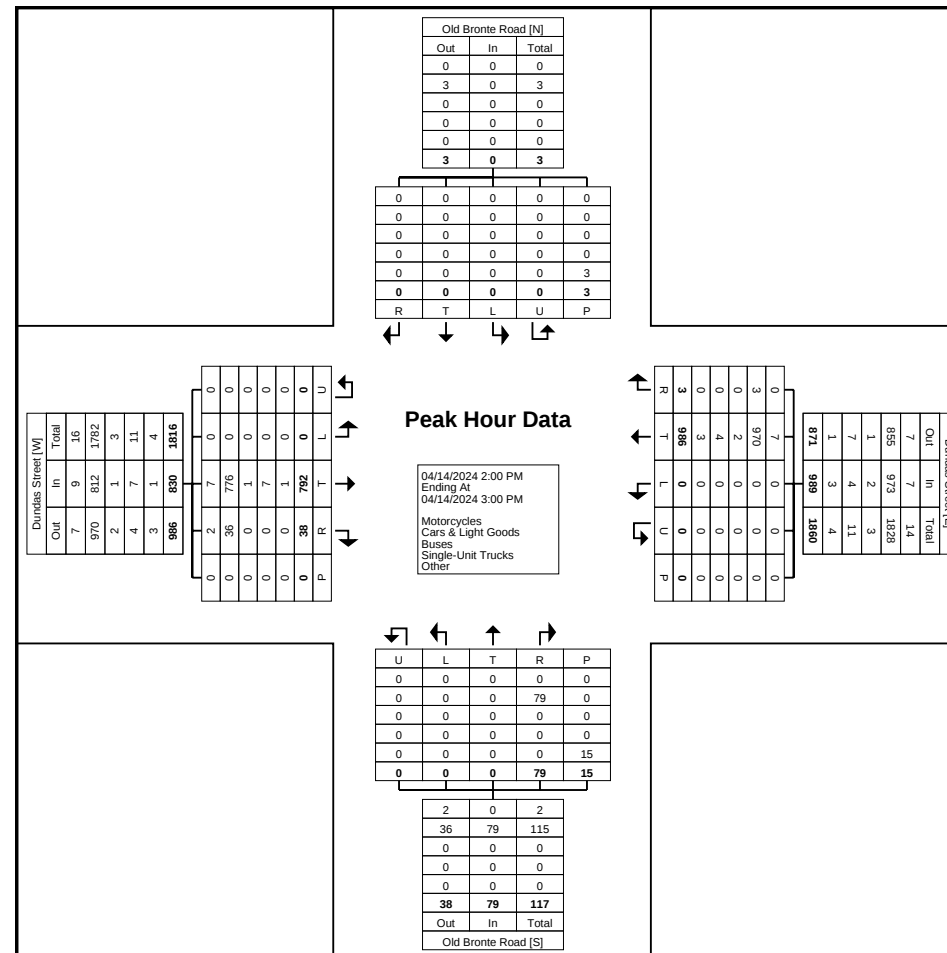
Start Time	Dundas Street Eastbound						Dundas Street Westbound						Old Bronte Road Northbound						Old Bronte Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
2:00 PM	0	207	9	0	0	216	0	243	1	0	0	244	0	0	13	0	4	13	0	0	0	0	1	0	473
2:15 PM	0	187	10	0	0	197	0	246	0	0	0	246	0	0	13	0	0	13	0	0	0	0	2	0	456
2:30 PM	0	198	9	0	0	207	0	234	1	0	0	235	0	0	24	0	4	24	0	0	0	0	0	0	466
2:45 PM	0	200	10	0	0	210	0	263	1	0	0	264	0	0	29	0	7	29	0	0	0	0	0	0	503
Total	0	792	38	0	0	830	0	986	3	0	0	989	0	0	79	0	15	79	0	0	0	0	3	0	1898
Approach %	0.0	95.4	4.6	0.0	-	-	0.0	99.7	0.3	0.0	-	-	0.0	0.0	100.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	-
Total %	0.0	41.7	2.0	0.0	-	43.7	0.0	51.9	0.2	0.0	-	52.1	0.0	0.0	4.2	0.0	-	4.2	0.0	0.0	0.0	0.0	-	0.0	-
PHF	0.000	0.957	0.950	0.000	-	0.961	0.000	0.937	0.750	0.000	-	0.937	0.000	0.000	0.681	0.000	-	0.681	0.000	0.000	0.000	0.000	-	0.000	0.943
Motorcycles	0	7	2	0	-	9	0	7	0	0	-	7	0	0	0	0	-	0	0	0	0	0	-	0	16
% Motorcycles	-	0.9	5.3	-	-	1.1	-	0.7	0.0	-	-	0.7	-	-	0.0	-	-	0.0	-	-	-	-	-	-	0.8
Cars & Light Goods	0	776	36	0	-	812	0	970	3	0	-	973	0	0	79	0	-	79	0	0	0	0	-	0	1864
% Cars & Light Goods	-	98.0	94.7	-	-	97.8	-	98.4	100.0	-	-	98.4	-	-	100.0	-	-	100.0	-	-	-	-	-	-	98.2
Buses	0	1	0	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	3
% Buses	-	0.1	0.0	-	-	0.1	-	0.2	0.0	-	-	0.2	-	-	0.0	-	-	0.0	-	-	-	-	-	-	0.2
Single-Unit Trucks	0	7	0	0	-	7	0	4	0	0	-	4	0	0	0	0	-	0	0	0	0	0	-	0	11
% Single-Unit Trucks	-	0.9	0.0	-	-	0.8	-	0.4	0.0	-	-	0.4	-	-	0.0	-	-	0.0	-	-	-	-	-	-	0.6
Articulated Trucks	0	1	0	0	-	1	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	4
% Articulated Trucks	-	0.1	0.0	-	-	0.1	-	0.3	0.0	-	-	0.3	-	-	0.0	-	-	0.0	-	-	-	-	-	-	0.2
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	-	0.0	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	-	-	-	-	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	6	-	-	-	-	2	-	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.0	-	-	-	-	66.7	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	9	-	-	-	-	1	-	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60.0	-	-	-	-	33.3	-	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Dundas Street & Old Bronte Road
Site Code: 240110
Start Date: 04/14/2024
Page No: 5



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 cdowness@pts1.com

Count Name: Khalsa Gate Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Driveway Eastbound						Khalsa Gate Site Driveway Westbound						Khalsa Gate Northbound						Khalsa Gate 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	
11:00 AM	2	0	0	0	1	2	0	0	6	0	0	6	1	4	5	0	1	10	20	1	1	0	0	22	40
11:15 AM	1	0	1	0	0	2	0	0	8	0	0	8	1	1	7	0	1	9	16	0	1	0	0	17	36
11:30 AM	4	0	0	0	0	4	0	0	4	0	0	4	0	2	5	0	2	7	15	1	1	0	0	17	32
11:45 AM	7	0	0	0	0	7	0	0	16	0	0	16	1	6	4	1	1	12	18	2	1	1	0	22	57
Hourly Total	14	0	1	0	1	15	0	0	34	0	0	34	3	13	21	1	5	38	69	4	4	1	0	78	165
12:00 PM	4	0	1	0	1	5	0	0	11	0	0	11	0	5	8	0	0	13	11	2	0	0	0	13	42
12:15 PM	7	0	0	0	2	7	0	0	16	0	3	16	1	4	8	0	0	13	16	1	4	0	0	21	57
12:30 PM	7	0	0	0	1	7	0	0	27	0	4	27	0	5	4	0	0	9	21	1	1	0	1	23	66
12:45 PM	5	0	0	0	0	5	0	0	28	0	4	28	1	4	6	0	1	11	11	4	3	0	2	18	62
Hourly Total	23	0	1	0	4	24	0	0	82	0	11	82	2	18	26	0	1	46	59	8	8	0	3	75	227
1:00 PM	4	0	0	0	0	4	0	0	18	0	4	18	0	5	3	0	2	8	13	4	4	0	0	21	51
1:15 PM	12	0	0	0	5	12	0	1	25	0	1	26	0	5	4	0	0	9	10	1	2	1	0	14	61
1:30 PM	0	0	0	0	0	0	1	0	26	0	4	27	0	6	3	0	1	9	8	5	2	0	0	15	51
1:45 PM	10	0	0	0	2	10	0	0	30	0	4	30	0	7	7	0	0	14	9	4	5	0	0	18	72
Hourly Total	26	0	0	0	7	26	1	1	99	0	13	101	0	23	17	0	3	40	40	14	13	1	0	68	235
2:00 PM	2	0	0	0	1	2	0	0	12	0	2	12	0	6	3	0	1	9	7	5	2	2	0	16	39
2:15 PM	7	0	0	0	2	7	0	0	18	0	6	18	0	8	2	0	1	10	7	3	4	0	0	14	49
2:30 PM	4	0	0	0	0	4	0	0	11	0	1	11	0	2	1	0	0	3	7	2	4	0	0	13	31
2:45 PM	3	1	1	0	1	5	0	0	11	0	5	11	0	2	1	0	6	3	0	2	2	0	0	4	23
Hourly Total	16	1	1	0	4	18	0	0	52	0	14	52	0	18	7	0	8	25	21	12	12	2	0	47	142
Grand Total	79	1	3	0	16	83	1	1	267	0	38	269	5	72	71	1	17	149	189	38	37	4	3	268	769
Approach %	95.2	1.2	3.6	0.0	-	-	0.4	0.4	99.3	0.0	-	-	3.4	48.3	47.7	0.7	-	-	70.5	14.2	13.8	1.5	-	-	-
Total %	10.3	0.1	0.4	0.0	-	10.8	0.1	0.1	34.7	0.0	-	35.0	0.7	9.4	9.2	0.1	-	19.4	24.6	4.9	4.8	0.5	-	34.9	-
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	1	0	0	-	1	2
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.4	0.0	0.0	-	0.7	0.0	2.6	0.0	0.0	-	0.4	0.3
Cars & Light Goods	77	1	2	0	-	80	1	1	265	0	-	267	5	70	71	1	-	147	189	36	34	4	-	263	757
% Cars & Light Goods	97.5	100.0	66.7	-	-	96.4	100.0	100.0	99.3	-	-	99.3	100.0	97.2	100.0	100.0	-	98.7	100.0	94.7	91.9	100.0	-	98.1	98.4
Buses	0	0	0	0	-	0	0	0	2	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.7	-	-	0.7	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.3
Single-Unit Trucks	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	2
% Single-Unit Trucks	0.0	0.0	33.3	-	-	1.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	2.7	0.0	-	0.4	0.3
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	-	0.0	0.0

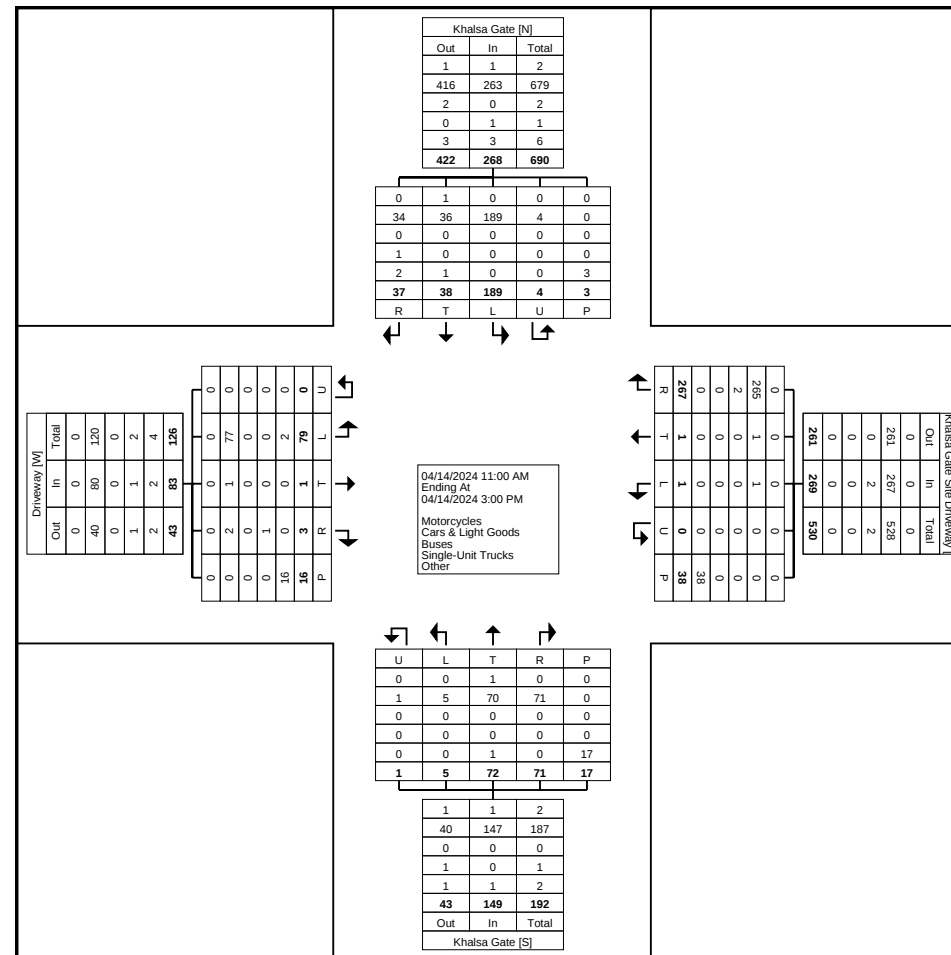
Bicycles on Road	2	0	0	0	-	2	0	0	0	0	-	0	0	1	0	0	-	1	0	1	2	0	-	3	6
% Bicycles on Road	2.5	0.0	0.0	-	-	2.4	0.0	0.0	0.0	-	-	0.0	0.0	1.4	0.0	0.0	-	0.7	0.0	2.6	5.4	0.0	-	1.1	0.8
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	2.6	-	-	-	-	-	5.9	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	16	-	-	-	-	-	37	-	-	-	-	-	16	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	97.4	-	-	-	-	-	94.1	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@pts1.com

Count Name: Khalsa Gate Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@pts1.com

Count Name: Khalsa Gate Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Turning Movement Peak Hour Data (12:30 PM)

Start Time	Driveway Eastbound						Khalsa Gate Site Driveway Westbound						Khalsa Gate Northbound						Khalsa Gate 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	
12:30 PM	7	0	0	0	1	7	0	0	27	0	4	27	0	5	4	0	0	9	21	1	1	0	1	23	66
12:45 PM	5	0	0	0	0	5	0	0	28	0	4	28	1	4	6	0	1	11	11	4	3	0	2	18	62
1:00 PM	4	0	0	0	0	4	0	0	18	0	4	18	0	5	3	0	2	8	13	4	4	0	0	21	51
1:15 PM	12	0	0	0	5	12	0	1	25	0	1	26	0	5	4	0	0	9	10	1	2	1	0	14	61
Total	28	0	0	0	6	28	0	1	98	0	13	99	1	19	17	0	3	37	55	10	10	1	3	76	240
Approach %	100.0	0.0	0.0	0.0	-	-	0.0	1.0	99.0	0.0	-	-	2.7	51.4	45.9	0.0	-	-	72.4	13.2	13.2	1.3	-	-	-
Total %	11.7	0.0	0.0	0.0	-	11.7	0.0	0.4	40.8	0.0	-	41.3	0.4	7.9	7.1	0.0	-	15.4	22.9	4.2	4.2	0.4	-	31.7	-
PHF	0.583	0.000	0.000	0.000	-	0.583	0.000	0.250	0.875	0.000	-	0.884	0.250	0.950	0.708	0.000	-	0.841	0.655	0.625	0.625	0.250	-	0.826	0.909
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	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
Cars & Light Goods	28	0	0	0	-	28	0	1	98	0	-	99	1	19	17	0	-	37	55	10	10	1	-	76	240
% Cars & Light Goods	100.0	-	-	-	-	100.0	-	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	100.0	-	100.0	100.0
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
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Single-Unit 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
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
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	-	-	-	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 Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	6	-	-	-	-	-	13	-	-	-	-	-	3	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Turning Movement Peak Hour Data Plot (12:30 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Khalsa Gate Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Direction (Westbound)

Start Time	Motorcycles	Cars & Light Goods	Buses	Single-Unit Trucks	Articulated Trucks	Bicycles on Road	Total
04/14/2024 12:00 AM	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0	0
5:30 AM	0	0	0	0	0	0	0
5:45 AM	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0
6:30 AM	0	1	0	0	0	0	1
6:45 AM	0	1	0	0	0	0	1
7:00 AM	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0
7:45 AM	0	2	0	0	0	0	2
8:00 AM	0	0	0	0	0	0	0
8:15 AM	0	2	0	0	0	0	2
8:30 AM	0	2	0	0	0	0	2
8:45 AM	0	2	0	0	0	0	2
9:00 AM	0	3	0	0	0	0	3
9:15 AM	0	5	0	0	0	0	5
9:30 AM	0	1	0	0	0	0	1

	0	9	0	0	0	0	9
9:45 AM	0	8	0	0	0	0	8
10:00 AM	0	4	0	0	0	0	4
10:15 AM	0	7	0	0	0	0	7
10:30 AM	0	3	0	0	0	0	3
10:45 AM	0	4	2	0	0	0	6
11:00 AM	0	8	0	0	0	0	8
11:15 AM	0	4	0	0	0	0	4
11:30 AM	0	16	0	0	0	0	16
11:45 AM	0	11	0	0	0	0	11
12:00 PM	0	16	0	0	0	0	16
12:15 PM	0	28	0	0	0	0	28
12:30 PM	0	30	0	0	0	0	30
12:45 PM	0	17	0	0	0	0	17
1:00 PM	0	24	0	0	0	0	24
1:15 PM	0	28	0	0	0	0	28
1:30 PM	0	31	0	0	0	0	31
1:45 PM	0	17	0	0	0	0	17
2:00 PM	0	19	0	0	0	0	19
2:15 PM	0	11	0	0	0	0	11
2:30 PM	0	11	0	0	0	0	11
2:45 PM	0	16	0	0	0	0	16
3:00 PM	0	9	1	0	0	0	10
3:15 PM	0	4	0	0	0	0	4
3:30 PM	0	9	0	0	0	0	9
3:45 PM	0	14	0	0	0	0	14
4:00 PM	0	6	0	0	0	0	6
4:15 PM	0	7	0	0	0	0	7
4:30 PM	0	5	0	0	0	0	5
4:45 PM	0	13	0	0	0	0	13
5:00 PM	0	6	0	0	0	0	6
5:15 PM	0	8	0	0	0	0	8
5:30 PM	0	6	0	0	0	0	6
5:45 PM	0	5	0	0	0	0	5
6:00 PM	0	7	0	0	0	0	7
6:15 PM	0	9	0	0	0	0	9
6:30 PM	0	5	0	0	0	0	5
6:45 PM	0	10	0	0	0	0	10
7:00 PM	0	1	0	0	0	0	1
7:15 PM	0	13	0	0	0	0	13
7:30 PM	0	11	0	0	0	0	11
7:45 PM	0	12	0	0	0	0	12
8:00 PM	0	9	0	0	0	0	9
8:15 PM	0	6	0	0	0	0	6
8:30 PM	0	1	0	0	0	0	1
8:45 PM	0	0	0	0	0	0	0
9:00 PM	0	1	0	0	0	0	1
9:15 PM	0	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0

10:45 PM	0	0	0	0	0	0	0
11:00 PM	0	2	0	0	0	0	2
11:15 PM	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0
Total	0	520	3	0	0	0	523
Total %	0.0	99.4	0.6	0.0	0.0	0.0	100.0
AM Times	12:00 AM	11:00 AM	10:15 AM	12:00 AM	12:00 AM	12:00 AM	11:00 AM
AM Peaks	0	32	2	0	0	0	34
PM Times	12:00 PM	12:15 PM	2:30 PM	12:00 PM	12:00 PM	5:00 PM	12:15 PM
PM Peaks	0	91	1	0	0	0	91



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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519-896-3163 cbowness@pts1.com

Count Name: Khalsa Gate Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Direction (Eastbound)

Start Time	Motorcycles	Cars & Light Goods	Buses	Single-Unit Trucks	Articulated Trucks	Bicycles on Road	Total
04/14/2024 12:00 AM	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0	0
5:30 AM	0	0	0	0	0	0	0
5:45 AM	0	1	0	0	0	0	1
6:00 AM	0	1	0	0	0	0	1
6:15 AM	0	2	0	0	0	0	2
6:30 AM	0	1	0	0	0	0	1
6:45 AM	0	2	0	0	0	0	2
7:00 AM	0	0	0	0	0	0	0
7:15 AM	0	1	0	0	0	0	1
7:30 AM	0	1	0	0	0	0	1
7:45 AM	0	3	0	0	0	0	3
8:00 AM	0	2	0	0	0	0	2
8:15 AM	0	2	0	0	0	0	2
8:30 AM	0	1	0	0	0	0	1
8:45 AM	0	3	0	0	0	0	3
9:00 AM	0	3	0	0	0	0	3
9:15 AM	0	3	0	0	0	0	3
9:30 AM	0	5	0	0	0	0	5

9:45 AM
10:00 AM
10:15 AM
10:30 AM
10:45 AM
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11:15 AM
11:30 AM
11:45 AM
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9:45 PM
10:00 PM
10:15 PM
10:30 PM

0	11	0	0	0	0	11
0	20	0	0	0	0	20
0	17	0	0	0	0	17
0	12	0	0	0	0	12
0	24	2	0	0	0	26
0	25	0	0	0	0	25
0	23	0	0	0	0	23
0	20	0	0	0	0	20
0	22	0	0	0	0	22
0	19	0	0	0	0	19
0	23	0	0	0	0	23
0	23	0	0	0	0	23
0	16	0	0	0	0	16
0	16	0	0	0	0	16
0	15	0	0	0	0	15
0	11	0	0	0	0	11
0	16	0	0	0	0	16
0	10	0	0	0	0	10
0	8	0	0	0	0	8
0	8	0	0	0	0	8
0	3	0	0	0	0	3
0	3	0	0	0	0	3
0	4	1	0	0	0	5
0	8	0	0	0	0	8
0	8	0	0	0	0	8
0	7	0	0	0	0	7
0	8	0	0	0	0	8
0	7	0	0	0	0	7
0	7	0	0	0	0	7
0	6	0	0	0	0	6
0	6	0	0	0	0	6
0	5	0	0	0	1	6
0	11	0	0	0	1	12
0	7	0	0	0	0	7
0	3	0	0	0	0	3
0	8	0	0	0	0	8
0	11	0	0	0	0	11
0	5	0	0	0	0	5
0	10	0	0	0	0	10
0	10	0	0	0	0	10
0	4	0	0	0	0	4
0	7	0	0	0	0	7
0	2	0	0	0	0	2
0	4	0	0	0	0	4
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	1	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	0	0
0	0	0	0	0	0	0

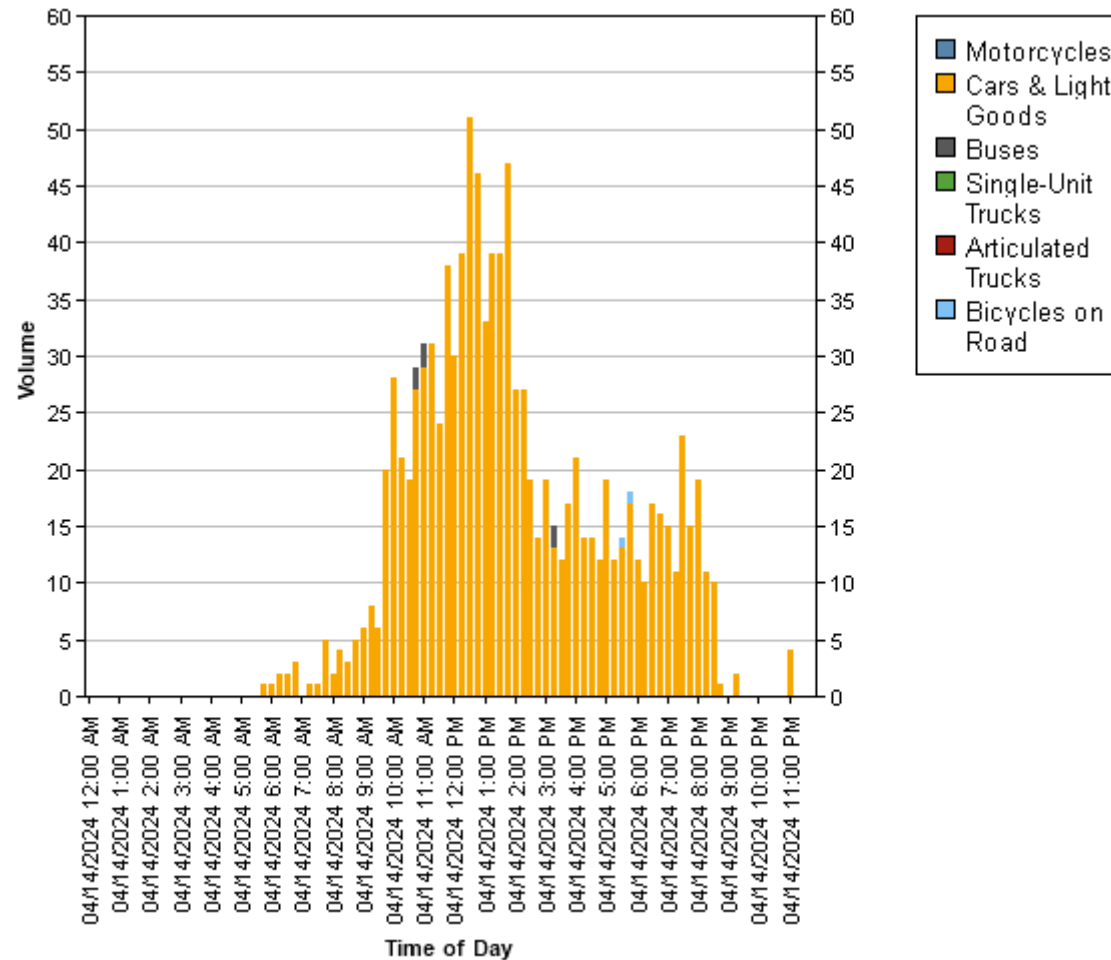
10:45 PM	0	0	0	0	0	0	0
11:00 PM	0	2	0	0	0	0	2
11:15 PM	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0
Total	0	527	3	0	0	2	532
Total %	0.0	99.1	0.6	0.0	0.0	0.4	100.0
AM Times	12:00 AM	11:00 AM	10:15 AM	12:00 AM	12:00 AM	12:00 AM	11:00 AM
AM Peaks	0	90	2	0	0	0	90
PM Times	12:00 PM	12:15 PM	2:30 PM	12:00 PM	12:00 PM	5:00 PM	12:15 PM
PM Peaks	0	78	1	0	0	2	78



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@pts1.com

Count Name: Khalsa Gate Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 7





Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cdowness@pts1.com

Count Name: Pine Glen Road & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Pine Glen Road Eastbound						Pine Glen Road Westbound						Grand Oak Trail Northbound						Grand Oak Trail 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	
11:00 AM	4	8	3	0	0	15	8	20	2	0	0	30	5	20	1	0	2	26	5	17	15	0	4	37	108
11:15 AM	4	13	3	0	2	20	1	28	1	0	0	30	7	18	4	0	5	29	8	30	13	0	1	51	130
11:30 AM	6	13	3	0	2	22	5	28	3	0	1	36	3	26	7	0	2	36	5	13	13	0	1	31	125
11:45 AM	4	23	1	0	3	28	6	33	4	0	5	43	2	18	7	0	6	27	5	26	11	0	3	42	140
Hourly Total	18	57	10	0	7	85	20	109	10	0	6	139	17	82	19	0	15	118	23	86	52	0	9	161	503
12:00 PM	1	13	3	0	0	17	12	27	5	0	1	44	4	25	5	0	0	34	6	20	12	0	4	38	133
12:15 PM	4	23	6	0	1	33	5	24	4	0	1	33	4	21	3	0	3	28	11	16	5	0	8	32	126
12:30 PM	11	26	8	1	2	46	5	31	4	0	9	40	6	28	5	0	0	39	9	25	10	0	8	44	169
12:45 PM	6	17	4	0	0	27	4	26	2	0	7	32	7	23	5	0	0	35	8	26	17	0	0	51	145
Hourly Total	22	79	21	1	3	123	26	108	15	0	18	149	21	97	18	0	3	136	34	87	44	0	20	165	573
1:00 PM	8	20	3	0	2	31	10	26	2	0	3	38	1	24	5	0	0	30	10	37	16	0	3	63	162
1:15 PM	8	26	6	0	2	40	4	25	8	0	6	37	4	22	8	0	7	34	10	21	10	0	4	41	152
1:30 PM	4	25	2	0	1	31	9	27	7	0	4	43	2	20	11	0	3	33	11	21	11	0	2	43	150
1:45 PM	9	17	2	0	0	28	3	35	7	0	2	45	2	21	6	0	5	29	5	25	15	0	2	45	147
Hourly Total	29	88	13	0	5	130	26	113	24	0	15	163	9	87	30	0	15	126	36	104	52	0	11	192	611
2:00 PM	6	23	3	0	5	32	5	22	4	0	6	31	1	28	7	0	1	36	12	23	7	0	3	42	141
2:15 PM	5	20	4	0	4	29	5	22	7	0	2	34	0	21	8	0	4	29	8	26	8	0	0	42	134
2:30 PM	1	19	2	0	5	22	6	15	4	0	2	25	1	29	3	0	3	33	19	25	6	0	6	50	130
2:45 PM	2	19	2	0	6	23	4	28	6	0	3	38	2	25	8	0	3	35	8	23	17	0	3	48	144
Hourly Total	14	81	11	0	20	106	20	87	21	0	13	128	4	103	26	0	11	133	47	97	38	0	12	182	549
Grand Total	83	305	55	1	35	444	92	417	70	0	52	579	51	369	93	0	44	513	140	374	186	0	52	700	2236
Approach %	18.7	68.7	12.4	0.2	-	-	15.9	72.0	12.1	0.0	-	-	9.9	71.9	18.1	0.0	-	-	20.0	53.4	26.6	0.0	-	-	-
Total %	3.7	13.6	2.5	0.0	-	19.9	4.1	18.6	3.1	0.0	-	25.9	2.3	16.5	4.2	0.0	-	22.9	6.3	16.7	8.3	0.0	-	31.3	-
Motorcycles	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	1	0	0	-	1	4
% Motorcycles	0.0	0.0	0.0	0.0	-	0.0	0.0	0.7	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.1	0.2
Cars & Light Goods	83	299	55	1	-	438	91	405	69	0	-	565	51	364	91	0	-	506	138	369	183	0	-	690	2199
% Cars & Light Goods	100.0	98.0	100.0	100.0	-	98.6	98.9	97.1	98.6	-	-	97.6	100.0	98.6	97.8	-	-	98.6	98.6	98.7	98.4	-	-	98.6	98.3
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Buses	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	1	0	0	-	1	0	1	0	0	-	1	0	1	0	0	-	1	2	2	2	0	-	6	9
% Single-Unit Trucks	0.0	0.3	0.0	0.0	-	0.2	0.0	0.2	0.0	-	-	0.2	0.0	0.3	0.0	-	-	0.2	1.4	0.5	1.1	-	-	0.9	0.4
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0

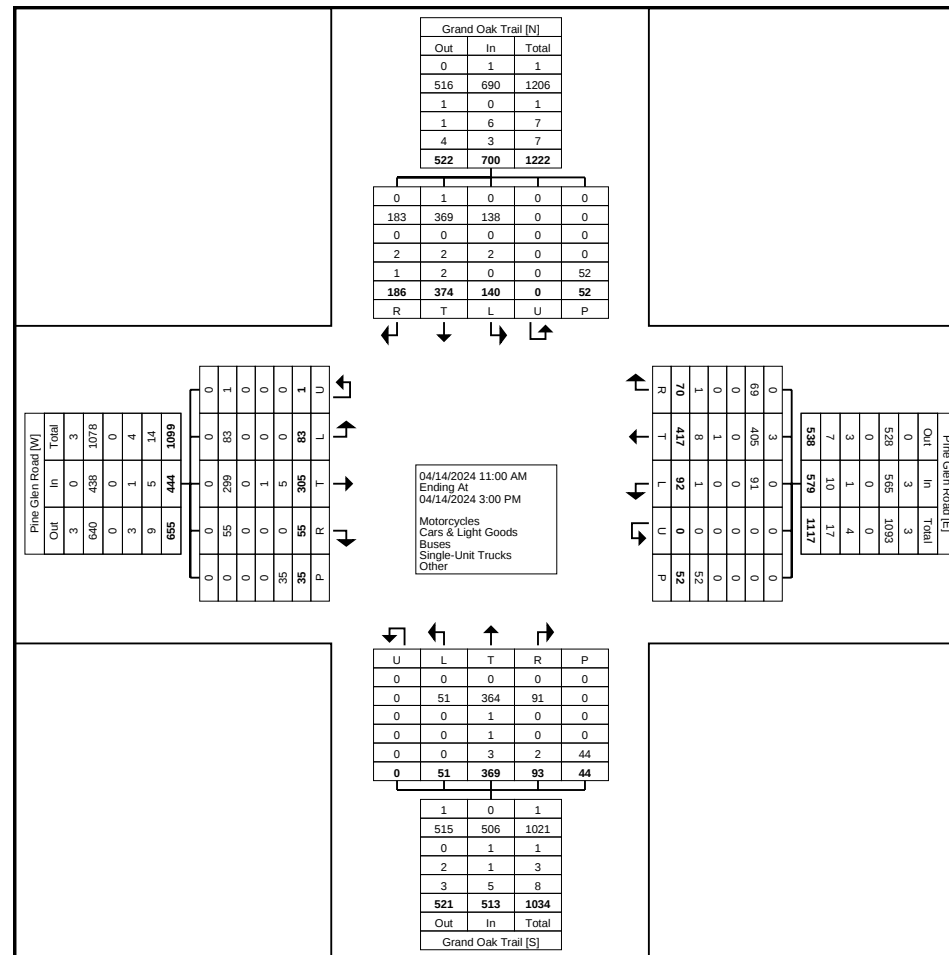
Bicycles on Road	0	5	0	0	-	5	1	7	1	0	-	9	0	3	2	0	-	5	0	2	1	0	-	3	22
% Bicycles on Road	0.0	1.6	0.0	0.0	-	1.1	1.1	1.7	1.4	-	-	1.6	0.0	0.8	2.2	-	-	1.0	0.0	0.5	0.5	-	-	0.4	1.0
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	6	-	-
% Bicycles on Crosswalk	-	-	-	-	11.4	-	-	-	-	-	3.8	-	-	-	-	-	2.3	-	-	-	-	-	11.5	-	-
Pedestrians	-	-	-	-	31	-	-	-	-	-	50	-	-	-	-	-	43	-	-	-	-	-	46	-	-
% Pedestrians	-	-	-	-	88.6	-	-	-	-	-	96.2	-	-	-	-	-	97.7	-	-	-	-	-	88.5	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Pine Glen Road & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 3



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: Pine Glen Road & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Turning Movement Peak Hour Data (12:30 PM)

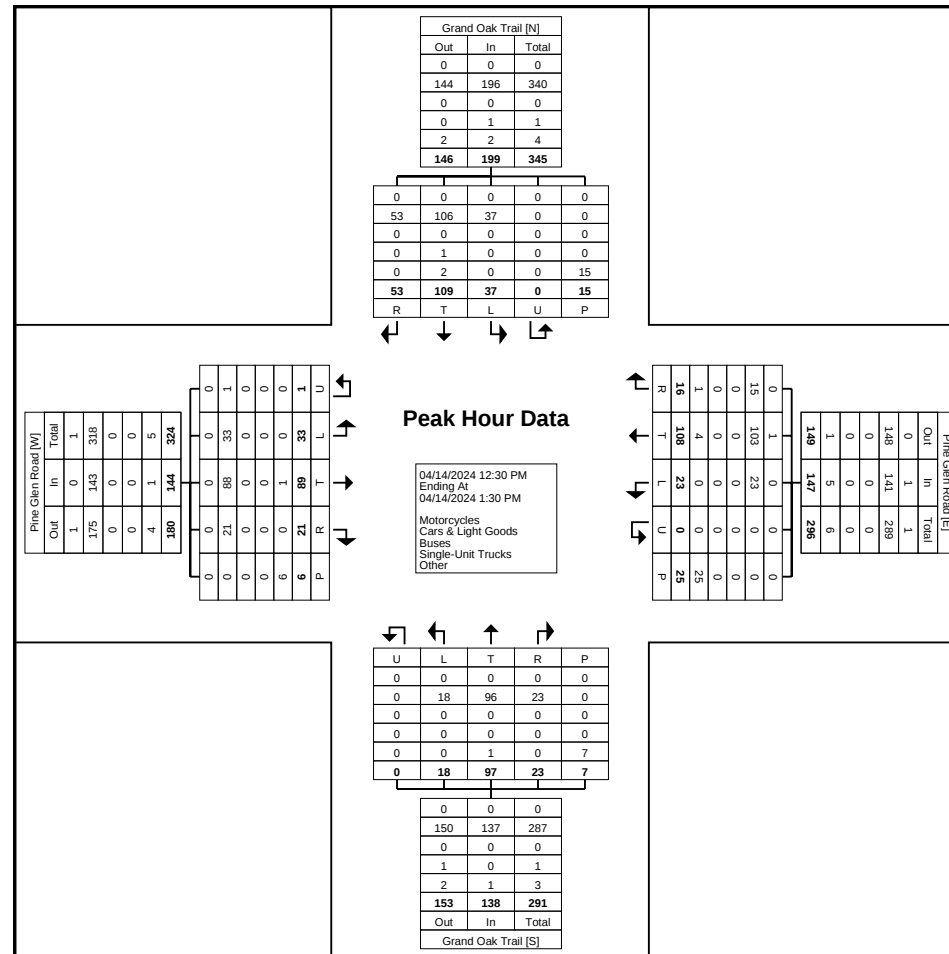
Start Time	Pine Glen Road Eastbound						Pine Glen Road Westbound						Grand Oak Trail Northbound						Grand Oak Trail Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:30 PM	11	26	8	1	2	46	5	31	4	0	9	40	6	28	5	0	0	39	9	25	10	0	8	44	169
12:45 PM	6	17	4	0	0	27	4	26	2	0	7	32	7	23	5	0	0	35	8	26	17	0	0	51	145
1:00 PM	8	20	3	0	2	31	10	26	2	0	3	38	1	24	5	0	0	30	10	37	16	0	3	63	162
1:15 PM	8	26	6	0	2	40	4	25	8	0	6	37	4	22	8	0	7	34	10	21	10	0	4	41	152
Total	33	89	21	1	6	144	23	108	16	0	25	147	18	97	23	0	7	138	37	109	53	0	15	199	628
Approach %	22.9	61.8	14.6	0.7	-	-	15.6	73.5	10.9	0.0	-	-	13.0	70.3	16.7	0.0	-	-	18.6	54.8	26.6	0.0	-	-	-
Total %	5.3	14.2	3.3	0.2	-	22.9	3.7	17.2	2.5	0.0	-	23.4	2.9	15.4	3.7	0.0	-	22.0	5.9	17.4	8.4	0.0	-	31.7	-
PHF	0.750	0.856	0.656	0.250	-	0.783	0.575	0.871	0.500	0.000	-	0.919	0.643	0.866	0.719	0.000	-	0.885	0.925	0.736	0.779	0.000	-	0.790	0.929
Motorcycles	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Motorcycles	0.0	0.0	0.0	0.0	-	0.0	0.0	0.9	0.0	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	33	88	21	1	-	143	23	103	15	0	-	141	18	96	23	0	-	137	37	106	53	0	-	196	617
% Cars & Light Goods	100.0	98.9	100.0	100.0	-	99.3	100.0	95.4	93.8	-	-	95.9	100.0	99.0	100.0	-	-	99.3	100.0	97.2	100.0	-	-	98.5	98.2
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	0.0
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Single-Unit 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	0.9	0.0	-	-	0.5	0.2
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.9	0.0	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Road	0	1	0	0	-	1	0	3	1	0	-	4	0	1	0	0	-	1	0	2	0	0	-	2	8
% Bicycles on Road	0.0	1.1	0.0	0.0	-	0.7	0.0	2.8	6.3	-	-	2.7	0.0	1.0	0.0	-	-	0.7	0.0	1.8	0.0	-	-	1.0	1.3
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	33.3	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	4	-	-	-	-	-	25	-	-	-	-	-	7	-	-	-	-	-	15	-	-
% Pedestrians	-	-	-	-	66.7	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Pine Glen Road & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 5



Turning Movement Peak Hour Data Plot (12:30 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Pine Glen Road & Khalsa Gate
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Pine Glen Road Eastbound						Pine Glen Road Westbound						Khalsa Gate Northbound						Old Bronte Road 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	
11:00 AM	17	12	11	0	0	40	6	20	9	0	0	35	9	4	0	0	4	13	6	4	11	0	0	21	109
11:15 AM	9	11	8	1	0	29	6	30	12	1	2	49	7	0	2	0	3	9	5	3	8	0	2	16	103
11:30 AM	8	11	13	0	1	32	3	28	9	0	2	40	5	1	4	0	1	10	4	1	20	0	2	25	107
11:45 AM	13	13	13	0	0	39	7	28	2	0	1	37	16	5	9	0	5	30	8	2	12	0	2	22	128
Hourly Total	47	47	45	1	1	140	22	106	32	1	5	161	37	10	15	0	13	62	23	10	51	0	6	84	447
12:00 PM	12	11	7	0	1	30	4	28	10	0	1	42	12	2	6	0	4	20	0	3	14	0	1	17	109
12:15 PM	20	21	13	0	4	54	3	17	5	0	1	25	17	4	3	0	0	24	9	3	23	0	1	35	138
12:30 PM	10	20	13	0	2	43	3	26	9	0	4	38	23	8	5	0	1	36	2	4	30	0	5	36	153
12:45 PM	14	7	10	0	1	31	4	34	10	0	0	48	22	9	9	0	0	40	5	4	22	0	0	31	150
Hourly Total	56	59	43	0	8	158	14	105	34	0	6	153	74	23	23	0	5	120	16	14	89	0	7	119	550
1:00 PM	13	21	12	0	2	46	6	32	5	0	0	43	12	12	4	0	0	28	1	2	16	0	0	19	136
1:15 PM	22	22	9	0	4	53	4	29	13	0	1	46	25	9	6	0	1	40	4	5	11	0	1	20	159
1:30 PM	16	20	9	1	5	46	5	29	8	1	5	43	21	5	4	0	2	30	3	0	20	0	1	23	142
1:45 PM	14	11	11	0	2	36	6	37	7	0	3	50	32	6	8	0	0	46	5	0	15	0	1	20	152
Hourly Total	65	74	41	1	13	181	21	127	33	1	9	182	90	32	22	0	3	144	13	7	62	0	3	82	589
2:00 PM	9	23	11	0	3	43	3	23	5	0	1	31	18	4	6	0	1	28	5	0	11	0	1	16	118
2:15 PM	10	19	11	0	1	40	2	26	4	0	4	32	15	7	6	0	1	28	2	0	20	0	0	22	122
2:30 PM	11	15	6	0	2	32	0	18	6	0	1	24	5	2	4	0	4	11	6	1	20	1	0	28	95
2:45 PM	4	8	2	0	1	14	3	34	10	0	4	47	13	1	2	0	3	16	2	1	29	0	1	32	109
Hourly Total	34	65	30	0	7	129	8	101	25	0	10	134	51	14	18	0	9	83	15	2	80	1	2	98	444
Grand Total	202	245	159	2	29	608	65	439	124	2	30	630	252	79	78	0	30	409	67	33	282	1	18	383	2030
Approach %	33.2	40.3	26.2	0.3	-	-	10.3	69.7	19.7	0.3	-	-	61.6	19.3	19.1	0.0	-	-	17.5	8.6	73.6	0.3	-	-	-
Total %	10.0	12.1	7.8	0.1	-	30.0	3.2	21.6	6.1	0.1	-	31.0	12.4	3.9	3.8	0.0	-	20.1	3.3	1.6	13.9	0.0	-	18.9	-
Motorcycles	1	0	0	0	-	1	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	4
% Motorcycles	0.5	0.0	0.0	0.0	-	0.2	0.0	0.7	0.0	0.0	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.2
Cars & Light Goods	201	244	159	2	-	606	64	428	121	2	-	615	250	79	78	0	-	407	67	33	282	1	-	383	2011
% Cars & Light Goods	99.5	99.6	100.0	100.0	-	99.7	98.5	97.5	97.6	100.0	-	97.6	99.2	100.0	100.0	-	-	99.5	100.0	100.0	100.0	100.0	-	100.0	99.1
Buses	0	0	0	0	-	0	0	0	0	0	-	0	2	0	0	0	-	2	0	0	0	0	-	0	2
% Buses	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.8	0.0	0.0	-	-	0.5	0.0	0.0	0.0	0.0	-	0.0	0.1
Single-Unit Trucks	0	0	0	0	-	0	0	3	2	0	-	5	0	0	0	0	-	0	0	0	0	0	-	0	5
% Single-Unit Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.7	1.6	0.0	-	0.8	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.2
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	0.0	-	0.0	0.0

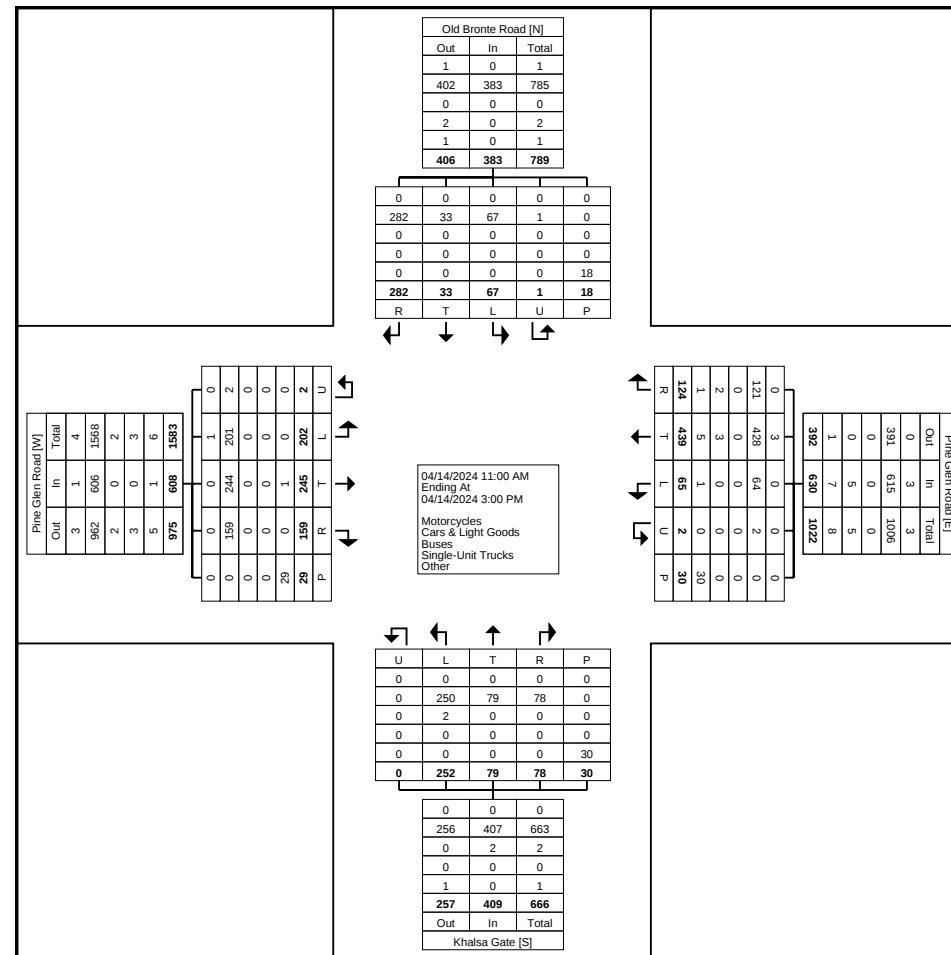
Bicycles on Road	0	1	0	0	-	1	1	5	1	0	-	7	0	0	0	0	-	0	0	0	0	0	-	0	8
% Bicycles on Road	0.0	0.4	0.0	0.0	-	0.2	1.5	1.1	0.8	0.0	-	1.1	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.4
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	13.3	-	-	-	-	-	16.7	-	-
Pedestrians	-	-	-	-	29	-	-	-	-	-	30	-	-	-	-	-	26	-	-	-	-	-	15	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	86.7	-	-	-	-	-	83.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Pine Glen Road & Khalsa Gate
Site Code: 240110
Start Date: 04/14/2024
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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: Pine Glen Road & Khalsa Gate
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Turning Movement Peak Hour Data (12:30 PM)

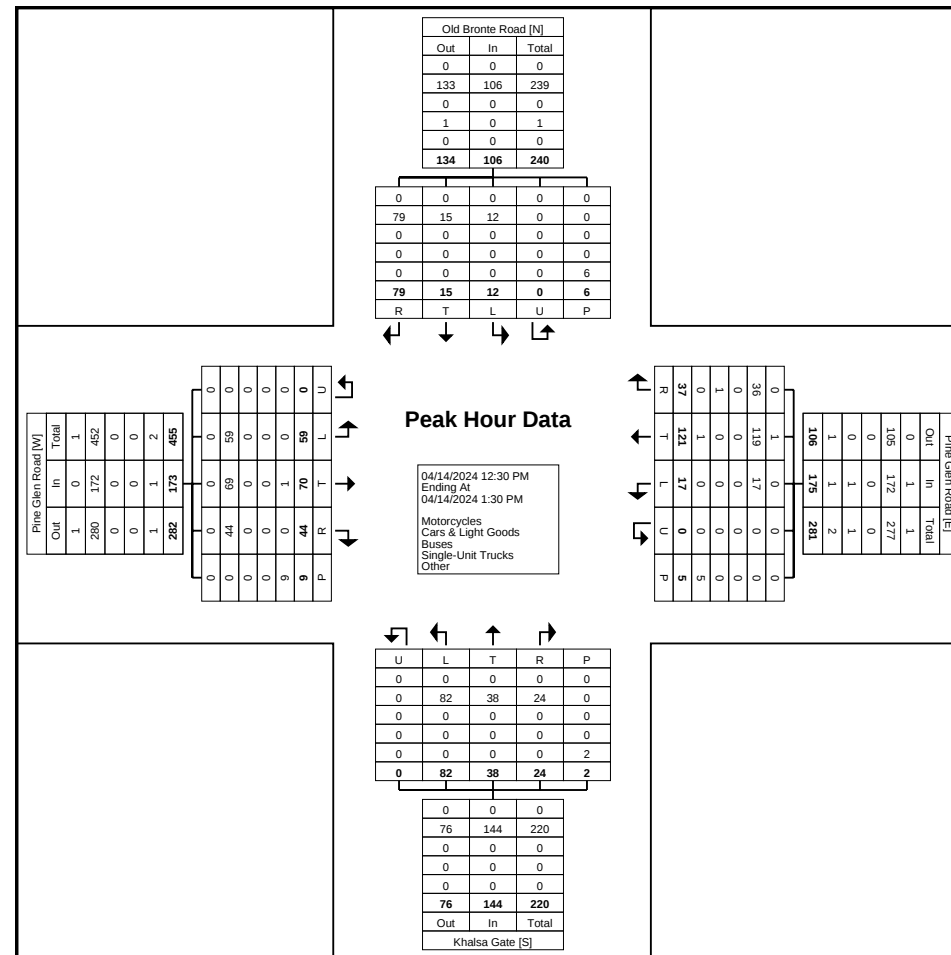
Start Time	Pine Glen Road Eastbound						Pine Glen Road Westbound						Khalsa Gate Northbound						Old Bronte Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:30 PM	10	20	13	0	2	43	3	26	9	0	4	38	23	8	5	0	1	36	2	4	30	0	5	36	153
12:45 PM	14	7	10	0	1	31	4	34	10	0	0	48	22	9	9	0	0	40	5	4	22	0	0	31	150
1:00 PM	13	21	12	0	2	46	6	32	5	0	0	43	12	12	4	0	0	28	1	2	16	0	0	19	136
1:15 PM	22	22	9	0	4	53	4	29	13	0	1	46	25	9	6	0	1	40	4	5	11	0	1	20	159
Total	59	70	44	0	9	173	17	121	37	0	5	175	82	38	24	0	2	144	12	15	79	0	6	106	598
Approach %	34.1	40.5	25.4	0.0	-	-	9.7	69.1	21.1	0.0	-	-	56.9	26.4	16.7	0.0	-	-	11.3	14.2	74.5	0.0	-	-	-
Total %	9.9	11.7	7.4	0.0	-	28.9	2.8	20.2	6.2	0.0	-	29.3	13.7	6.4	4.0	0.0	-	24.1	2.0	2.5	13.2	0.0	-	17.7	-
PHF	0.670	0.795	0.846	0.000	-	0.816	0.708	0.890	0.712	0.000	-	0.911	0.820	0.792	0.667	0.000	-	0.900	0.600	0.750	0.658	0.000	-	0.736	0.940
Motorcycles	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.8	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	59	69	44	0	-	172	17	119	36	0	-	172	82	38	24	0	-	144	12	15	79	0	-	106	594
% Cars & Light Goods	100.0	98.6	100.0	-	-	99.4	100.0	98.3	97.3	-	-	98.3	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	99.3
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	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	2.7	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
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	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	1.4	0.0	-	-	0.6	0.0	0.8	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	33.3	-	-
Pedestrians	-	-	-	-	9	-	-	-	-	-	5	-	-	-	-	-	2	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	66.7	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Pine Glen Road & Khalsa Gate
Site Code: 240110
Start Date: 04/14/2024
Page No: 5



Turning Movement Peak Hour Data Plot (12:30 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Pine Glen Road Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Pine Glen Road Eastbound					Pine Glen Road Westbound					Pine Glen Road Site Driveway Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
11:00 AM	15	0	0	0	15	2	37	0	0	39	0	0	0	3	0	54
11:15 AM	19	0	0	0	19	2	47	0	0	49	0	2	0	4	2	70
11:30 AM	17	1	0	0	18	4	38	0	0	42	2	0	0	1	2	62
11:45 AM	29	0	0	0	29	5	39	0	0	44	0	2	0	7	2	75
Hourly Total	80	1	0	0	81	13	161	0	0	174	2	4	0	15	6	261
12:00 PM	15	1	0	2	16	7	40	0	3	47	1	2	0	2	3	66
12:15 PM	31	2	0	0	33	7	26	0	0	33	1	2	0	8	3	69
12:30 PM	31	0	0	0	31	9	38	0	0	47	1	9	0	3	10	88
12:45 PM	25	1	0	0	26	7	44	0	0	51	3	3	0	4	6	83
Hourly Total	102	4	0	2	106	30	148	0	3	178	6	16	0	17	22	306
1:00 PM	27	0	0	0	27	4	39	0	0	43	6	2	0	5	8	78
1:15 PM	33	0	0	0	33	1	38	0	0	39	8	9	0	11	17	89
1:30 PM	28	0	0	0	28	1	39	0	0	40	1	2	0	6	3	71
1:45 PM	24	0	0	0	24	1	51	0	0	52	2	6	0	10	8	84
Hourly Total	112	0	0	0	112	7	167	0	0	174	17	19	0	32	36	322
2:00 PM	33	1	0	0	34	1	27	0	0	28	1	3	0	5	4	66
2:15 PM	26	1	0	0	27	2	26	0	0	28	1	3	0	5	4	59
2:30 PM	25	0	0	0	25	0	28	0	0	28	0	0	0	8	0	53
2:45 PM	19	0	0	0	19	0	48	0	0	48	0	1	0	8	1	68
Hourly Total	103	2	0	0	105	3	129	0	0	132	2	7	0	26	9	246
Grand Total	397	7	0	2	404	53	605	0	3	658	27	46	0	90	73	1135
Approach %	98.3	1.7	0.0	-	-	8.1	91.9	0.0	-	-	37.0	63.0	0.0	-	-	-
Total %	35.0	0.6	0.0	-	35.6	4.7	53.3	0.0	-	58.0	2.4	4.1	0.0	-	6.4	-
Motorcycles	0	0	0	-	0	0	2	0	-	2	0	0	0	-	0	2
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.3	-	-	0.3	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	391	7	0	-	398	52	588	0	-	640	27	45	0	-	72	1110
% Cars & Light Goods	98.5	100.0	-	-	98.5	98.1	97.2	-	-	97.3	100.0	97.8	-	-	98.6	97.8
Buses	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
Single-Unit Trucks	1	0	0	-	1	0	5	0	-	5	0	0	0	-	0	6
% Single-Unit Trucks	0.3	0.0	-	-	0.2	0.0	0.8	-	-	0.8	0.0	0.0	-	-	0.0	0.5
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	5	0	0	-	5	1	10	0	-	11	0	1	0	-	1	17
% Bicycles on Road	1.3	0.0	-	-	1.2	1.9	1.7	-	-	1.7	0.0	2.2	-	-	1.4	1.5
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	7	-	-

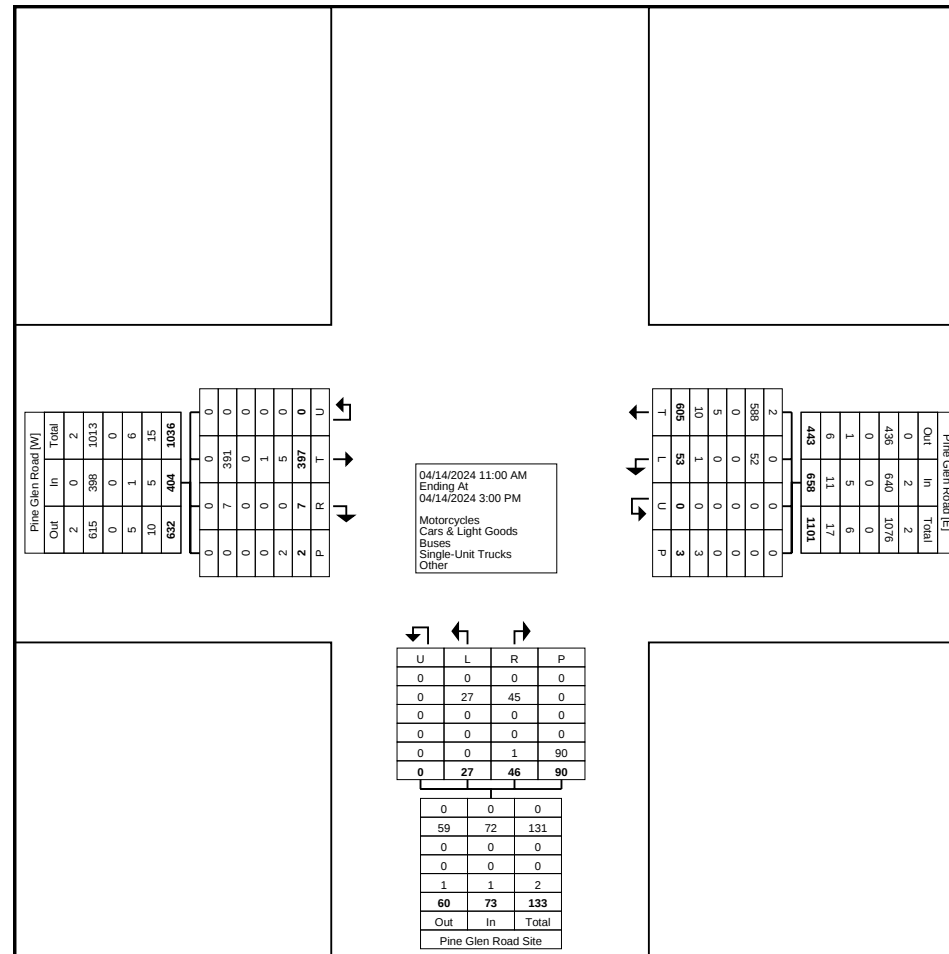
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	7.8	-	-
Pedestrians	-	-	-	2	-	-	-	-	3	-	-	-	-	83	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	92.2	-	-



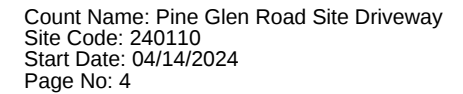
Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Pine Glen Road Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 3



Turning Movement Data Plot



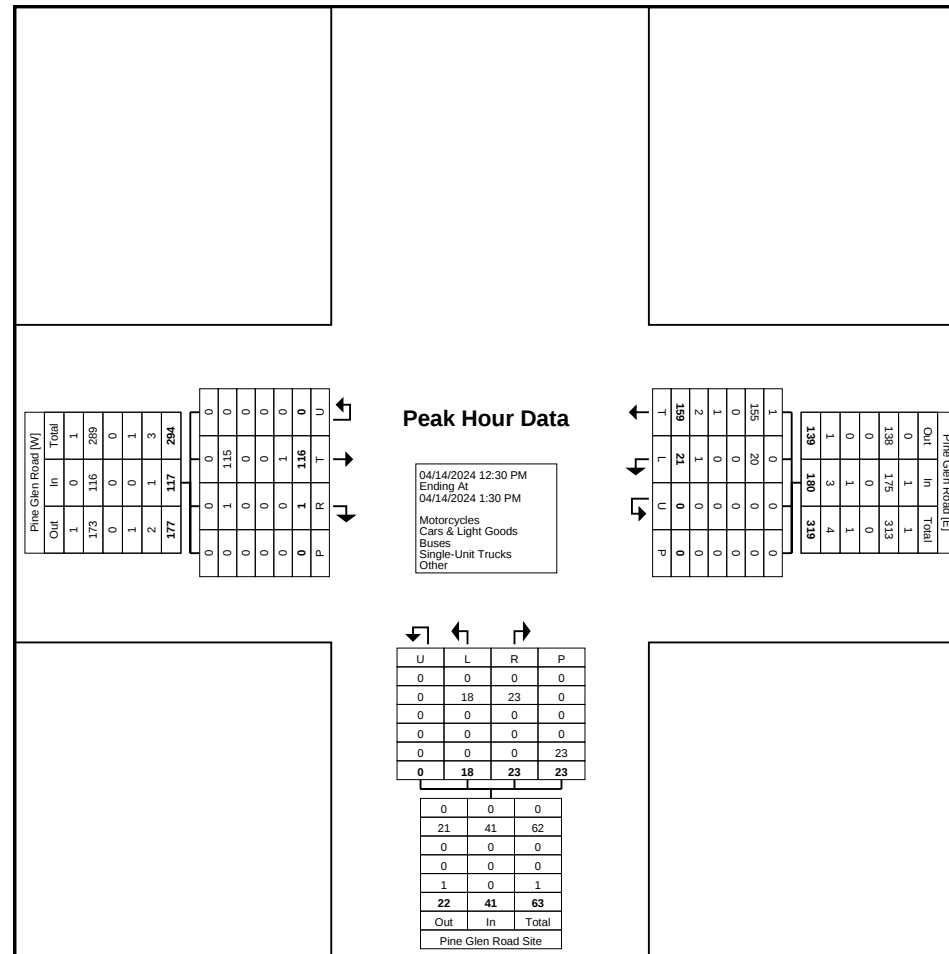
Start Time	Pine Glen Road Eastbound					Pine Glen Road Westbound					Pine Glen Road Site Driveway Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
12:30 PM	31	0	0	0	31	9	38	0	0	47	1	9	0	3	10	88
12:45 PM	25	1	0	0	26	7	44	0	0	51	3	3	0	4	6	83
1:00 PM	27	0	0	0	27	4	39	0	0	43	6	2	0	5	8	78
1:15 PM	33	0	0	0	33	1	38	0	0	39	8	9	0	11	17	89
Total	116	1	0	0	117	21	159	0	0	180	18	23	0	23	41	338
Approach %	99.1	0.9	0.0	-	-	11.7	88.3	0.0	-	-	43.9	56.1	0.0	-	-	-
Total %	34.3	0.3	0.0	-	34.6	6.2	47.0	0.0	-	53.3	5.3	6.8	0.0	-	12.1	-
PHF	0.879	0.250	0.000	-	0.886	0.583	0.903	0.000	-	0.882	0.563	0.639	0.000	-	0.603	0.949
Motorcycles	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.6	-	-	0.6	0.0	0.0	-	-	0.0	0.3
Cars & Light Goods	115	1	0	-	116	20	155	0	-	175	18	23	0	-	41	332
% Cars & Light Goods	99.1	100.0	-	-	99.1	95.2	97.5	-	-	97.2	100.0	100.0	-	-	100.0	98.2
Buses	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
Single-Unit Trucks	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	0.6	-	-	0.6	0.0	0.0	-	-	0.0	0.3
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	1	0	0	-	1	1	2	0	-	3	0	0	0	-	0	4
% Bicycles on Road	0.9	0.0	-	-	0.9	4.8	1.3	-	-	1.7	0.0	0.0	-	-	0.0	1.2
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	8.7	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	21	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	91.3	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Pine Glen Road Site Driveway
Site Code: 240110
Start Date: 04/14/2024
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Turning Movement Peak Hour Data Plot (12:30 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Pine Glen Road Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Direction (Southbound)

Start Time	Motorcycles	Cars & Light Goods	Buses	Single-Unit Trucks	Articulated Trucks	Bicycles on Road	Total
04/14/2024 12:00 AM	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0	0
5:30 AM	0	0	0	0	0	0	0
5:45 AM	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0

	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0
10:15 AM	0	2	0	0	0	0	2
10:30 AM	0	0	0	0	0	0	0
10:45 AM	0	2	0	0	0	0	2
11:00 AM	0	2	0	0	0	0	2
11:15 AM	0	2	0	0	0	0	2
11:30 AM	0	5	0	0	0	0	5
11:45 AM	0	5	0	0	0	0	5
12:00 PM	0	8	0	0	0	0	8
12:15 PM	0	8	0	0	0	0	8
12:30 PM	0	9	0	0	0	0	9
12:45 PM	0	7	0	0	0	1	8
1:00 PM	0	2	0	0	0	0	2
1:15 PM	0	1	0	0	0	0	1
1:30 PM	0	1	0	0	0	0	1
1:45 PM	0	1	0	0	0	0	1
2:00 PM	0	2	0	0	0	0	2
2:15 PM	0	3	0	0	0	0	3
2:30 PM	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0
3:00 PM	0	2	0	0	0	0	2
3:15 PM	0	2	0	0	0	0	2
3:30 PM	0	2	0	0	0	0	2
3:45 PM	0	1	0	0	0	0	1
4:00 PM	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0
7:15 PM	0	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0	0
7:45 PM	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0
8:15 PM	0	0	0	0	0	0	0
8:30 PM	0	0	0	0	0	0	0
8:45 PM	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0

10:45 PM	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0
Total	0	67	0	0	0	1	68
Total %	0.0	98.5	0.0	0.0	0.0	1.5	100.0
AM Times	12:00 AM	11:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	11:00 AM
AM Peaks	0	14	0	0	0	0	14
PM Times	12:00 PM	12:30 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	12:30 PM
PM Peaks	0	19	0	0	0	1	20



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Pine Glen Road Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Direction (Northbound)

Start Time	Motorcycles	Cars & Light Goods	Buses	Single-Unit Trucks	Articulated Trucks	Bicycles on Road	Total
04/14/2024 12:00 AM	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0
1:15 AM	0	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0	0
1:45 AM	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0
2:15 AM	0	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0	0
2:45 AM	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0
3:15 AM	0	0	0	0	0	0	0
3:30 AM	0	0	0	0	0	0	0
3:45 AM	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0
4:15 AM	0	0	0	0	0	0	0
4:30 AM	0	0	0	0	0	0	0
4:45 AM	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0
5:15 AM	0	0	0	0	0	0	0
5:30 AM	0	0	0	0	0	0	0
5:45 AM	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0

	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0
11:15 AM	0	2	0	0	0	0	2
11:30 AM	0	2	0	0	0	0	2
11:45 AM	0	2	0	0	0	0	2
12:00 PM	0	3	0	0	0	0	3
12:15 PM	0	3	0	0	0	0	3
12:30 PM	0	11	0	0	0	0	11
12:45 PM	0	7	0	0	0	0	7
1:00 PM	0	8	0	0	0	0	8
1:15 PM	0	17	0	0	0	0	17
1:30 PM	0	3	0	0	0	0	3
1:45 PM	0	7	0	0	0	0	7
2:00 PM	0	4	0	0	0	0	4
2:15 PM	0	4	0	0	0	0	4
2:30 PM	0	0	0	0	0	0	0
2:45 PM	0	1	0	0	0	0	1
3:00 PM	0	4	0	0	0	0	4
3:15 PM	0	1	0	0	0	0	1
3:30 PM	0	1	0	0	0	0	1
3:45 PM	0	2	0	0	0	0	2
4:00 PM	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0
7:15 PM	0	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0	0
7:45 PM	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0
8:15 PM	0	0	0	0	0	0	0
8:30 PM	0	0	0	0	0	0	0
8:45 PM	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0

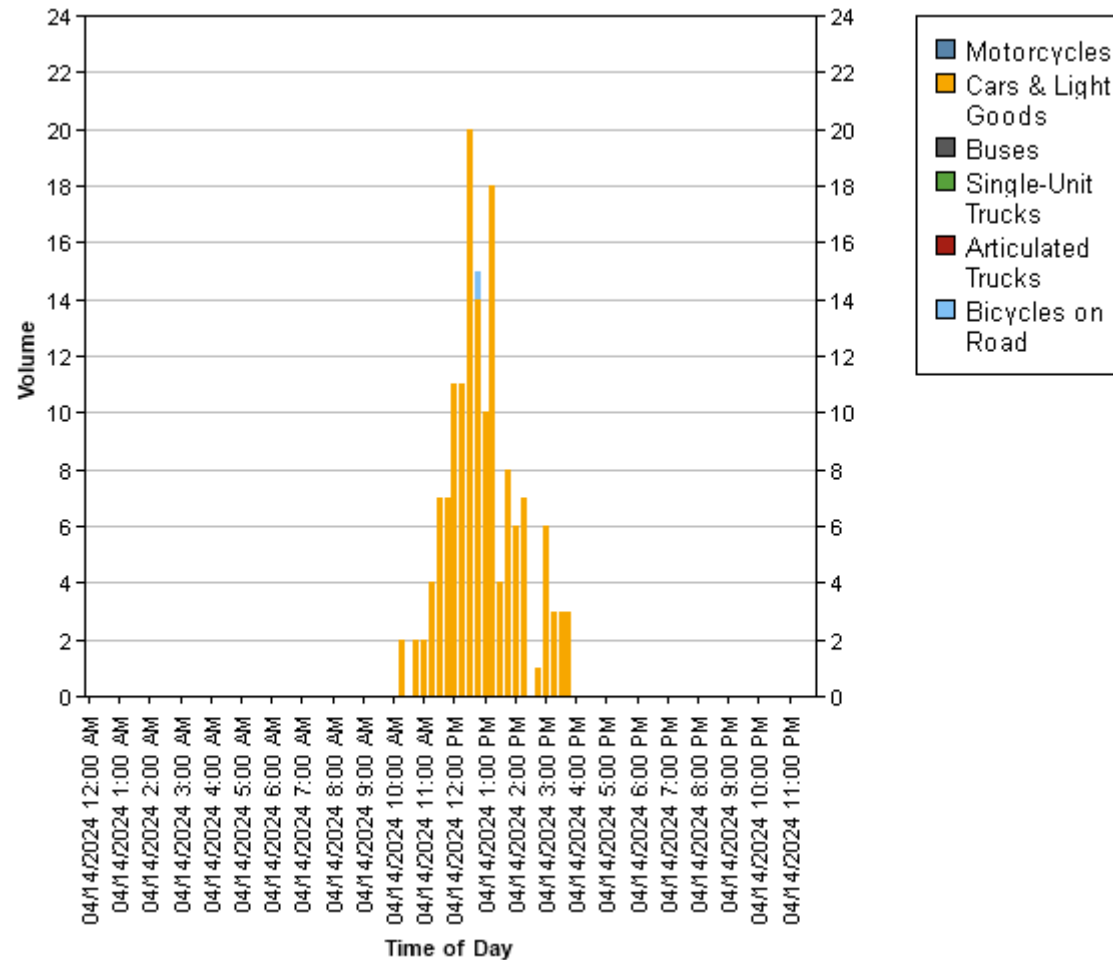
10:45 PM	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0
Total	0	82	0	0	0	0	82
Total %	0.0	100.0	0.0	0.0	0.0	0.0	100.0
AM Times	12:00 AM	11:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	11:00 AM
AM Peaks	0	6	0	0	0	0	6
PM Times	12:00 PM	12:30 PM	12:00 PM	12:00 PM	12:00 PM	12:00 PM	12:30 PM
PM Peaks	0	43	0	0	0	0	43



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Pine Glen Road Site Driveway
Site Code: 240110
Start Date: 04/14/2024
Page No: 7





Date: 03-Jun-24

Intersection: Dundas & Grand Oak Trail

8 Phase Basic Timing Sheet

	1	2	3	4	5	6	7	8	2 Ped	4 Ped	6 Ped	8 Ped
Phases in use	X	X				X		X	X		X	X
Direction	WBL	EB				WB		NB				
Min Green	7	20				20		10				
Veh Ext.	3.0							3.0				
Yellow	3	4.2				4.2		3.3				
Red	1	1.9				1.9		3				
Walk		7				7		7				
Don't Walk		21				21		32				
Max 1												
Max 2												
Max 3												
Veh Recall												
Ped Recall												

Notes:

Check Sync Reference Point

Pattern 1SSMTWTF Time:6:00-15:00 Cycle Length:140 Offset (%):32%					Pattern 2SSMTWTF Time:09:00-15:00 Cycle Length:110 Offset (%):1%				
Direction Phase % 9 WBL 1 58 EB 2 58 3 0 4 0									
Direction Phase % 0 WB 5 67 NB 6 67 7 0 8 34									
Pattern 3SSMTWTF Time:15:00-21:00 Cycle Length:140 Offset (%):44%					Pattern 4 Time:18:00 Cycle Length:110 Offset (%):1%				
Direction Phase % 9 WBL 1 58 EB 2 58 3 0 4 0									
Direction Phase % 0 WB 5 67 NB 6 67 7 0 8 34									
Pattern 5SSMTWTF Time:21:00-06:00 Cycle Length:Local Offset (%):					Pattern 6 Time: Cycle Length: Offset (%):				
Direction Phase % 1 2 3 4									
Direction Phase % 5 6 7 8									
Direction Phase % 1 2 3 4									
Direction Phase % 5 6 7 8									



Date:

Intersection:

4 Phase Basic Timing Sheet						
	1	2	3	4	2 Ped	4 Ped
Phases in use						
Direction						
Min Green						
Veh Ext.						
Yellow						
Red						
Walk						
Don't Walk						
Max 1						
Max 2						
Max 3						
Veh Recall						
Ped Recall						
Notes:						

Pattern 1 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3 4	Pattern 2 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3
Pattern 3 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3 4	Pattern 4 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3
Pattern 5 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3 4	Pattern 6 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3

4

4

4



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Dundas Street & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Dundas Street Eastbound					Dundas Street Westbound					Grand Oak Trail Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
11:00 AM	122	13	1	0	136	23	120	0	0	143	5	26	0	4	31	310
11:15 AM	154	10	2	0	166	35	142	2	1	179	6	13	0	2	19	364
11:30 AM	166	11	1	0	178	22	129	0	0	151	10	21	0	2	31	360
11:45 AM	179	12	0	0	191	24	184	0	0	208	8	21	0	2	29	428
Hourly Total	621	46	4	0	671	104	575	2	1	681	29	81	0	10	110	1462
12:00 PM	205	9	0	1	214	28	169	3	0	200	9	21	0	1	30	444
12:15 PM	182	14	1	0	197	15	158	1	0	174	14	22	0	1	36	407
12:30 PM	182	13	1	4	196	23	176	2	1	201	8	38	0	5	46	443
12:45 PM	230	16	0	0	246	35	198	0	0	233	6	27	0	3	33	512
Hourly Total	799	52	2	5	853	101	701	6	1	808	37	108	0	10	145	1806
1:00 PM	210	15	3	0	228	36	179	1	0	216	3	26	0	4	29	473
1:15 PM	218	18	4	0	240	26	170	2	1	198	9	31	0	7	40	478
1:30 PM	193	18	1	1	212	23	216	0	0	239	11	19	0	7	30	481
1:45 PM	210	16	0	0	226	25	219	2	1	246	9	20	0	2	29	501
Hourly Total	831	67	8	1	906	110	784	5	2	899	32	96	0	20	128	1933
2:00 PM	198	21	2	0	221	30	202	0	1	232	14	31	0	4	45	498
2:15 PM	179	16	0	0	195	26	216	0	0	242	12	22	0	6	34	471
2:30 PM	210	20	1	0	231	32	187	2	1	221	15	16	1	5	32	484
2:45 PM	204	16	1	0	221	34	242	1	1	277	8	30	0	5	38	536
Hourly Total	791	73	4	0	868	122	847	3	3	972	49	99	1	20	149	1989
Grand Total	3042	238	18	6	3298	437	2907	16	7	3360	147	384	1	60	532	7190
Approach %	92.2	7.2	0.5	-	-	13.0	86.5	0.5	-	-	27.6	72.2	0.2	-	-	-
Total %	42.3	3.3	0.3	-	45.9	6.1	40.4	0.2	-	46.7	2.0	5.3	0.0	-	7.4	-
Motorcycles	10	1	0	-	11	0	11	0	-	11	1	1	0	-	2	24
% Motorcycles	0.3	0.4	0.0	-	0.3	0.0	0.4	0.0	-	0.3	0.7	0.3	0.0	-	0.4	0.3
Cars & Light Goods	3000	235	18	-	3253	433	2864	16	-	3313	145	381	1	-	527	7093
% Cars & Light Goods	98.6	98.7	100.0	-	98.6	99.1	98.5	100.0	-	98.6	98.6	99.2	100.0	-	99.1	98.7
Buses	12	0	0	-	12	1	9	0	-	10	0	1	0	-	1	23
% Buses	0.4	0.0	0.0	-	0.4	0.2	0.3	0.0	-	0.3	0.0	0.3	0.0	-	0.2	0.3
Single-Unit Trucks	13	2	0	-	15	3	12	0	-	15	1	1	0	-	2	32
% Single-Unit Trucks	0.4	0.8	0.0	-	0.5	0.7	0.4	0.0	-	0.4	0.7	0.3	0.0	-	0.4	0.4
Articulated Trucks	7	0	0	-	7	0	10	0	-	10	0	0	0	-	0	17
% Articulated Trucks	0.2	0.0	0.0	-	0.2	0.0	0.3	0.0	-	0.3	0.0	0.0	0.0	-	0.0	0.2
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Bicycles on Road	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 Crosswalk	-	-	-	2	-	-	-	-	2	-	-	-	-	20	-	-

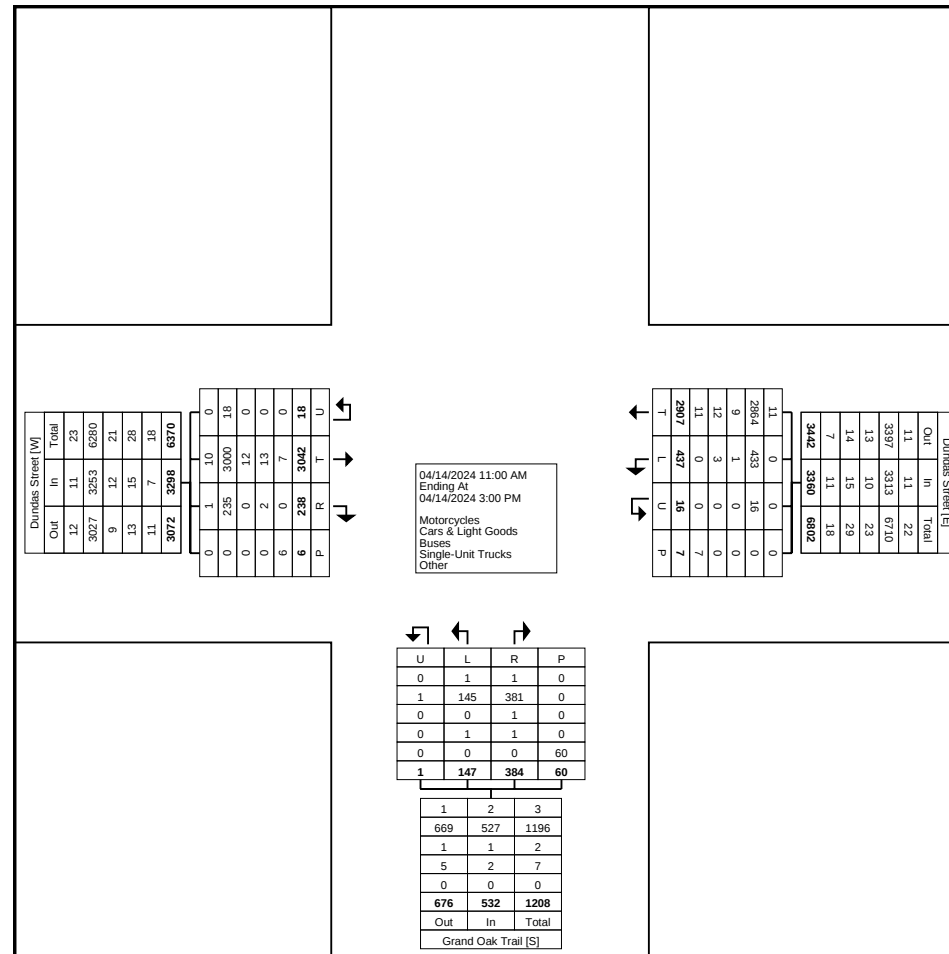
% Bicycles on Crosswalk	-	-	-	33.3	-	-	-	-	28.6	-	-	-	-	33.3	-	-
Pedestrians	-	-	-	4	-	-	-	-	5	-	-	-	-	40	-	-
% Pedestrians	-	-	-	66.7	-	-	-	-	71.4	-	-	-	-	66.7	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Dundas Street & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Dundas Street & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Turning Movement Peak Hour Data (2:00 PM)

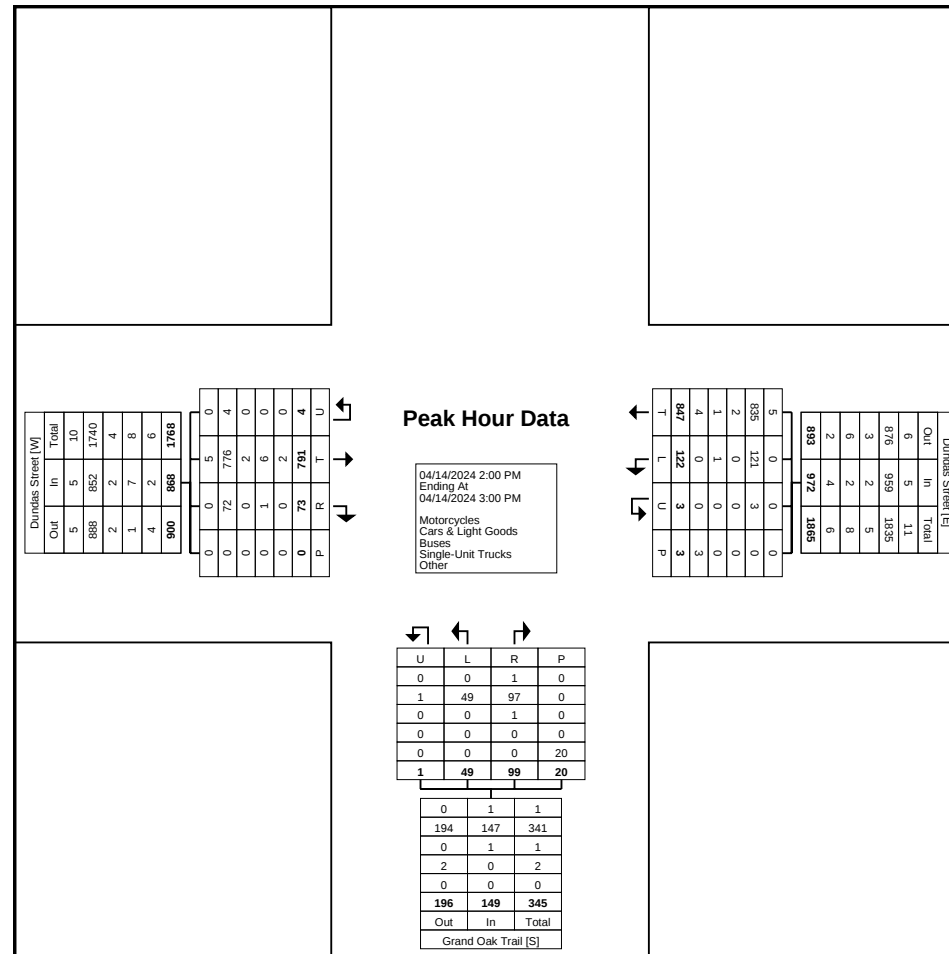
Start Time	Dundas Street Eastbound					Dundas Street Westbound					Grand Oak Trail Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
2:00 PM	198	21	2	0	221	30	202	0	1	232	14	31	0	4	45	498
2:15 PM	179	16	0	0	195	26	216	0	0	242	12	22	0	6	34	471
2:30 PM	210	20	1	0	231	32	187	2	1	221	15	16	1	5	32	484
2:45 PM	204	16	1	0	221	34	242	1	1	277	8	30	0	5	38	536
Total	791	73	4	0	868	122	847	3	3	972	49	99	1	20	149	1989
Approach %	91.1	8.4	0.5	-	-	12.6	87.1	0.3	-	-	32.9	66.4	0.7	-	-	-
Total %	39.8	3.7	0.2	-	43.6	6.1	42.6	0.2	-	48.9	2.5	5.0	0.1	-	7.5	-
PHF	0.942	0.869	0.500	-	0.939	0.897	0.875	0.375	-	0.877	0.817	0.798	0.250	-	0.828	0.928
Motorcycles	5	0	0	-	5	0	5	0	-	5	0	1	0	-	1	11
% Motorcycles	0.6	0.0	0.0	-	0.6	0.0	0.6	0.0	-	0.5	0.0	1.0	0.0	-	0.7	0.6
Cars & Light Goods	776	72	4	-	852	121	835	3	-	959	49	97	1	-	147	1958
% Cars & Light Goods	98.1	98.6	100.0	-	98.2	99.2	98.6	100.0	-	98.7	100.0	98.0	100.0	-	98.7	98.4
Buses	2	0	0	-	2	0	2	0	-	2	0	1	0	-	1	5
% Buses	0.3	0.0	0.0	-	0.2	0.0	0.2	0.0	-	0.2	0.0	1.0	0.0	-	0.7	0.3
Single-Unit Trucks	6	1	0	-	7	1	1	0	-	2	0	0	0	-	0	9
% Single-Unit Trucks	0.8	1.4	0.0	-	0.8	0.8	0.1	0.0	-	0.2	0.0	0.0	0.0	-	0.0	0.5
Articulated Trucks	2	0	0	-	2	0	3	0	-	3	0	0	0	-	0	5
% Articulated Trucks	0.3	0.0	0.0	-	0.2	0.0	0.4	0.0	-	0.3	0.0	0.0	0.0	-	0.0	0.3
Bicycles on Road	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.1	0.0	-	0.1	0.0	0.0	0.0	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	11	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	0.0	-	-	-	-	55.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	3	-	-	-	-	9	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	45.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Dundas Street & Grand Oak Trail
Site Code: 240110
Start Date: 04/14/2024
Page No: 5



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

Pattern 1

Time: 6:00
 Cycle Length: 140
 Offset (%): 75%

Direction	NBL	SB	EBL	WB
Phase	1	2	3	4
%	9	52	0	39
Direction	SBL	NB	WBL	EB
Phase	5	6	7	8
%	9	52	0	39

Pattern 2

Time: 10:00
 Cycle Length: 120
 Offset (%): 60%

Direction	NBL	SB	EBL	WB
Phase	1	2	3	4
%	11	54	0	35
Direction	SBL	NB	WBL	EB
Phase	5	6	7	8
%	9	56	0	35

Pattern 3

Time: 15:00
 Cycle Length: 140
 Offset (%): 93%

Direction	NBL	SB	EBL	WB
Phase	1	2	3	4
%	11	52	0	37
Direction	SBL	NB	WBL	EB
Phase	5	6	7	8
%	11	52	0	37

Pattern 4

Time: 19:00
 Cycle Length: 100
 Offset (%): 68%

Direction	NBL	SB	EBL	WB
Phase	1	2	3	4
%	0	55	0	45
Direction	SBL	NB	WBL	EB
Phase	5	6	7	8
%	0	55	0	45

Pattern 5

Time: 22:00
 Cycle Length: Local
 Offset (%):

Direction	SBL	NB	0	EB
Phase	1	2	3	4
%				
Direction	NBL	SB	0	WB
Phase	5	6	7	8
%				

Pattern 6

Time:
 Cycle Length:
 Offset (%):

Direction	SBL	NB	0	EB
Phase	1	2	3	4
%				
Direction	NBL	SB	0	WB
Phase	5	6	7	8
%				



Date:

Intersection:

4 Phase Basic Timing Sheet						
	1	2	3	4	2 Ped	4 Ped
Phases in use						
Direction						
Min Green						
Veh Ext.						
Yellow						
Red						
Walk						
Don't Walk						
Max 1						
Max 2						
Max 3						
Veh Recall						
Ped Recall						
Notes:						

Pattern 1 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3 4	Pattern 2 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3
Pattern 3 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3 4	Pattern 4 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3
Pattern 5 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3 4	Pattern 6 Time: Cycle Length: Offset (%): Direction Phase % 1 2 3

4

4

4



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

Count Name: Pine Glen Road & Bronte Road
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Higvalley Road Eastbound						Pine Glen Road Westbound						Bronte Road Northbound						Bronte Road 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	
11:00 AM	0	3	7	0	1	10	27	3	10	0	1	40	3	116	21	1	3	141	16	138	1	1	0	156	347
11:15 AM	0	2	4	0	2	6	23	3	22	0	0	48	5	149	17	1	3	172	13	177	1	0	0	191	417
11:30 AM	0	2	11	0	2	13	28	3	23	0	1	54	7	126	12	0	0	145	15	171	1	0	0	187	399
11:45 AM	0	4	11	0	1	15	24	4	24	0	1	52	10	141	22	2	0	175	18	189	2	1	0	210	452
Hourly Total	0	11	33	0	6	44	102	13	79	0	3	194	25	532	72	4	6	633	62	675	5	2	0	744	1615
12:00 PM	1	3	9	0	2	13	32	7	20	0	0	59	6	162	15	1	3	184	10	196	1	1	1	208	464
12:15 PM	0	3	5	0	0	8	36	2	18	0	3	56	7	191	29	1	0	228	23	215	0	0	1	238	530
12:30 PM	0	1	7	1	0	9	43	5	32	0	0	80	3	174	23	1	2	201	17	199	4	0	3	220	510
12:45 PM	1	2	18	0	1	21	28	3	45	0	2	76	9	182	24	2	1	217	12	213	0	0	3	225	539
Hourly Total	2	9	39	1	3	51	139	17	115	0	5	271	25	709	91	5	6	830	62	823	5	1	8	891	2043
1:00 PM	0	0	5	0	0	5	30	1	30	0	1	61	2	159	27	1	1	189	17	181	3	0	2	201	456
1:15 PM	0	2	7	0	4	9	26	1	38	0	4	65	5	212	33	0	1	250	17	189	1	0	2	207	531
1:30 PM	2	8	13	0	0	23	37	1	29	0	0	67	12	168	24	0	0	204	13	174	4	0	0	191	485
1:45 PM	2	1	9	0	1	12	40	3	37	0	2	80	7	174	20	2	0	203	16	194	5	1	0	216	511
Hourly Total	4	11	34	0	5	49	133	6	134	0	7	273	26	713	104	3	2	846	63	738	13	1	4	815	1983
2:00 PM	1	5	5	0	2	11	30	3	23	0	5	56	4	235	31	0	0	270	11	173	2	0	1	186	523
2:15 PM	0	5	3	0	1	8	36	4	27	0	0	67	5	215	23	0	1	243	14	220	0	0	2	234	552
2:30 PM	0	0	2	0	3	2	33	2	20	0	0	55	7	206	24	0	6	237	10	190	3	0	0	203	497
2:45 PM	0	0	7	0	1	7	36	9	27	1	0	73	8	196	10	0	1	214	8	279	0	0	1	287	581
Hourly Total	1	10	17	0	7	28	135	18	97	1	5	251	24	852	88	0	8	964	43	862	5	0	4	910	2153
Grand Total	7	41	123	1	21	172	509	54	425	1	20	989	100	2806	355	12	22	3273	230	3098	28	4	16	3360	7794
Approach %	4.1	23.8	71.5	0.6	-	-	51.5	5.5	43.0	0.1	-	-	3.1	85.7	10.8	0.4	-	-	6.8	92.2	0.8	0.1	-	-	-
Total %	0.1	0.5	1.6	0.0	-	2.2	6.5	0.7	5.5	0.0	-	12.7	1.3	36.0	4.6	0.2	-	42.0	3.0	39.7	0.4	0.1	-	43.1	-
Motorcycles	0	0	0	0	-	0	0	1	2	0	-	3	0	20	1	0	-	21	1	9	0	0	-	10	34
% Motorcycles	0.0	0.0	0.0	0.0	-	0.0	0.0	1.9	0.5	0.0	-	0.3	0.0	0.7	0.3	0.0	-	0.6	0.4	0.3	0.0	0.0	-	0.3	0.4
Cars & Light Goods	7	41	122	1	-	171	506	49	419	1	-	975	99	2735	350	12	-	3196	228	2986	27	4	-	3245	7587
% Cars & Light Goods	100.0	100.0	99.2	100.0	-	99.4	99.4	90.7	98.6	100.0	-	98.6	99.0	97.5	98.6	100.0	-	97.6	99.1	96.4	96.4	100.0	-	96.6	97.3
Buses	0	0	0	0	-	0	2	0	1	0	-	3	0	3	0	0	-	3	0	9	0	0	-	9	15
% Buses	0.0	0.0	0.0	0.0	-	0.0	0.4	0.0	0.2	0.0	-	0.3	0.0	0.1	0.0	0.0	-	0.1	0.0	0.3	0.0	0.0	-	0.3	0.2
Single-Unit Trucks	0	0	1	0	-	1	1	0	3	0	-	4	1	30	2	0	-	33	1	28	0	0	-	29	67
% Single-Unit Trucks	0.0	0.0	0.8	0.0	-	0.6	0.2	0.0	0.7	0.0	-	0.4	1.0	1.1	0.6	0.0	-	1.0	0.4	0.9	0.0	0.0	-	0.9	0.9
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	16	0	0	-	16	0	66	0	0	-	66	82
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.6	0.0	0.0	-	0.5	0.0	2.1	0.0	0.0	-	2.0	1.1

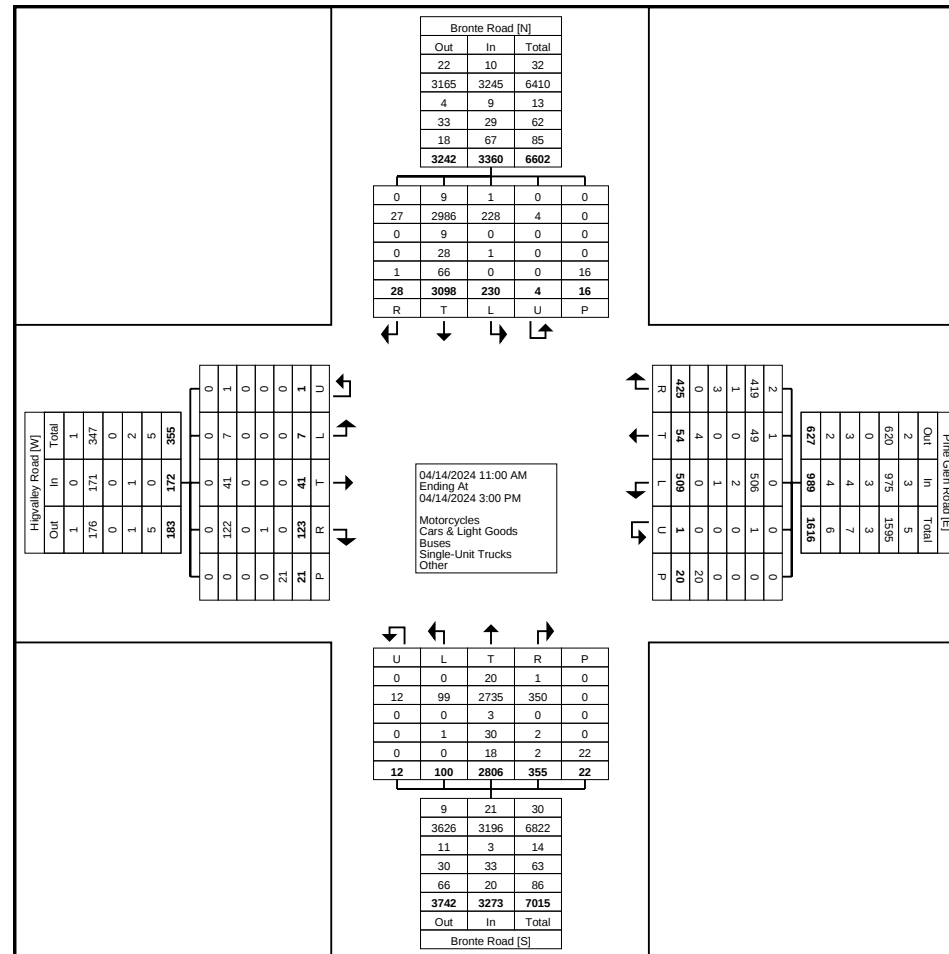
Bicycles on Road	0	0	0	0	-	0	0	4	0	0	-	4	0	2	2	0	-	4	0	0	1	0	-	1	9
% Bicycles on Road	0.0	0.0	0.0	0.0	-	0.0	0.0	7.4	0.0	0.0	-	0.4	0.0	0.1	0.6	0.0	-	0.1	0.0	0.0	3.6	0.0	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	6	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	-	28.6	-	-	-	-	-	0.0	-	-	-	-	-	4.5	-	-	-	-	-	25.0	-	-
Pedestrians	-	-	-	-	15	-	-	-	-	-	20	-	-	-	-	-	21	-	-	-	-	-	12	-	-
% Pedestrians	-	-	-	-	71.4	-	-	-	-	-	100.0	-	-	-	-	-	95.5	-	-	-	-	-	75.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Pine Glen Road & Bronte Road
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Start Date: 04/14/2024
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Turning Movement Data Plot



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Pine Glen Road & Bronte Road
Site Code: 240110
Start Date: 04/14/2024
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Turning Movement Peak Hour Data (2:00 PM)

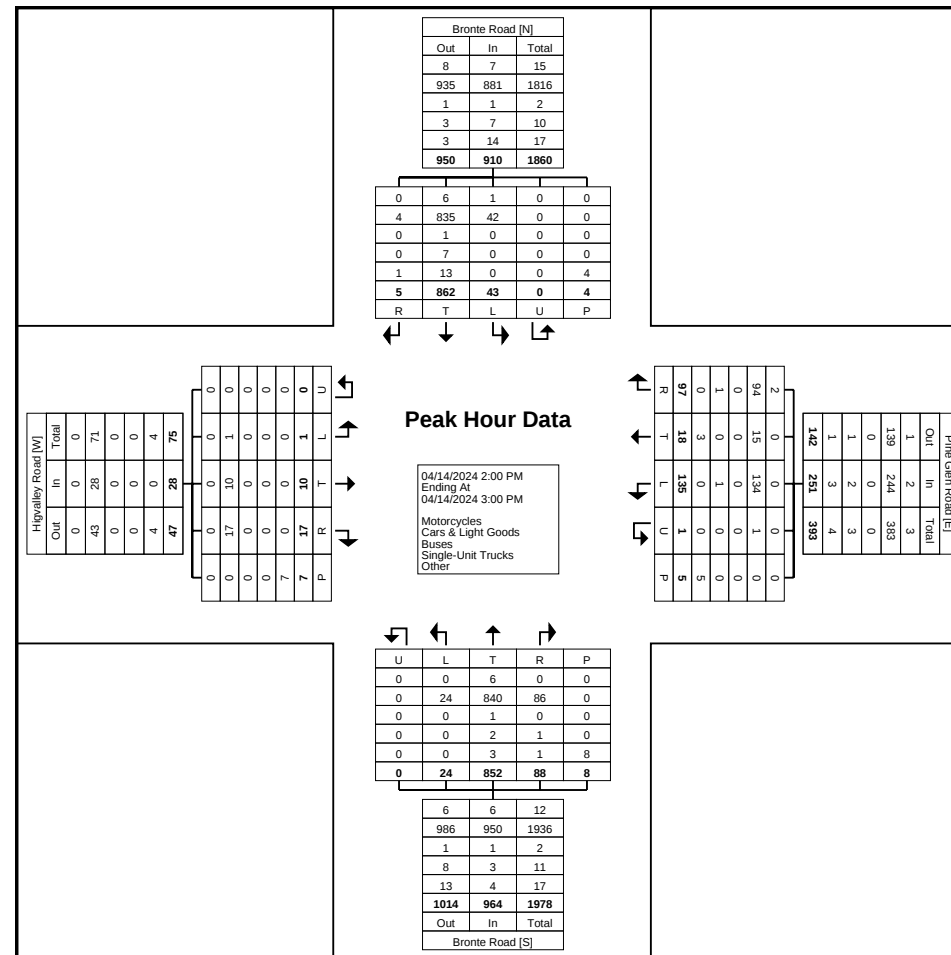
Start Time	Higvalley Road Eastbound						Pine Glen Road Westbound						Bronte Road Northbound						Bronte Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
2:00 PM	1	5	5	0	2	11	30	3	23	0	5	56	4	235	31	0	0	270	11	173	2	0	1	186	523
2:15 PM	0	5	3	0	1	8	36	4	27	0	0	67	5	215	23	0	1	243	14	220	0	0	2	234	552
2:30 PM	0	0	2	0	3	2	33	2	20	0	0	55	7	206	24	0	6	237	10	190	3	0	0	203	497
2:45 PM	0	0	7	0	1	7	36	9	27	1	0	73	8	196	10	0	1	214	8	279	0	0	1	287	581
Total	1	10	17	0	7	28	135	18	97	1	5	251	24	852	88	0	8	964	43	862	5	0	4	910	2153
Approach %	3.6	35.7	60.7	0.0	-	-	53.8	7.2	38.6	0.4	-	-	2.5	88.4	9.1	0.0	-	-	4.7	94.7	0.5	0.0	-	-	-
Total %	0.0	0.5	0.8	0.0	-	1.3	6.3	0.8	4.5	0.0	-	11.7	1.1	39.6	4.1	0.0	-	44.8	2.0	40.0	0.2	0.0	-	42.3	-
PHF	0.250	0.500	0.607	0.000	-	0.636	0.938	0.500	0.898	0.250	-	0.860	0.750	0.906	0.710	0.000	-	0.893	0.768	0.772	0.417	0.000	-	0.793	0.926
Motorcycles	0	0	0	0	-	0	0	0	2	0	-	2	0	6	0	0	-	6	1	6	0	0	-	7	15
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	2.1	0.0	-	0.8	0.0	0.7	0.0	-	-	0.6	2.3	0.7	0.0	-	-	0.8	0.7
Cars & Light Goods	1	10	17	0	-	28	134	15	94	1	-	244	24	840	86	0	-	950	42	835	4	0	-	881	2103
% Cars & Light Goods	100.0	100.0	100.0	-	-	100.0	99.3	83.3	96.9	100.0	-	97.2	100.0	98.6	97.7	-	-	98.5	97.7	96.9	80.0	-	-	96.8	97.7
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	1	0	0	-	1	2
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.1	0.0	-	-	0.1	0.0	0.1	0.0	-	-	0.1	0.1
Single-Unit Trucks	0	0	0	0	-	0	1	0	1	0	-	2	0	2	1	0	-	3	0	7	0	0	-	7	12
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.7	0.0	1.0	0.0	-	0.8	0.0	0.2	1.1	-	-	0.3	0.0	0.8	0.0	-	-	0.8	0.6
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	3	0	0	-	3	0	13	0	0	-	13	16
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.4	0.0	-	-	0.3	0.0	1.5	0.0	-	-	1.4	0.7
Bicycles on Road	0	0	0	0	-	0	0	3	0	0	-	3	0	0	1	0	-	1	0	0	1	0	-	1	5
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	16.7	0.0	0.0	-	1.2	0.0	0.0	1.1	-	-	0.1	0.0	0.0	20.0	-	-	0.1	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	7	-	-	-	-	-	5	-	-	-	-	-	8	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Pine Glen Road & Bronte Road
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Start Date: 04/14/2024
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Turning Movement Peak Hour Data Plot (2:00 PM)



Date: 17-May-2023

Intersection: Bronte Rd (Regional Rd 25) @ Dundas St (Regional Rd 5)

8 Phase Basic Timing Sheet

	1	2	3	4	5	6	7	8	2 Ped	4 Ped	6 Ped	8 Ped
Phases in use	X	X	X	X	X	X	X	X	X	x	x	x
Direction	WBLT	EBT	NBLT	SBT	EBLT	WBT	SBLT	NBLT				
Min Green	7	20	10	10	7	20	7	10				
Veh Ext.	3.0	6.0	3.0	5.0	3.0	6.0	3.0	5.0				
Yellow	3	4	3	4	3	4	3	4				
Red	1,0	3	1	3	1	3	1	3				
Walk		7		7		7		7				
Don't Walk		35		37		35		37				
Max 1	11	55	15	30	11	45	15	30				
Max 2												
Max 3												
Veh Recall		x				x						
Ped Recall												

Notes: Sync Reference 3:15



Pattern 1 Time: 6:00 Cycle Length: 140 Offset (%): 35%					Pattern 2 Time: 9:00 Cycle Length: 140 Offset (%): 0%				
Direction	WBLT	EBT	NBLT	SBT	Direction	WBLT	EBT	NBLT	SBT
Phase	1	2	3	4	Phase	1	2	3	4
%	11	37	15	37	%	11	37	15	37
Direction	EBLT	WBT	SBLT	NBLT	Direction	EBLT	WBT	SBLT	NBLT
Phase	5	6	7	8	Phase	5	6	7	8
%	11	37	15	37	%	11	37	15	37
Pattern 3 Time: 15:15 Cycle Length: 140 Offset (%): 55%					Pattern 4 Time: 18:00 Cycle Length: 140 Offset (%): 0%				
Direction	WBLT	EBT	NBLT	SBT	Direction	WBLT	EBT	NBLT	SBT
Phase	1	2	3	4	Phase	1	2	3	4
%	12	35	23	30	%	11	37	15	37
Direction	EBLT	WBT	SBLT	NBLT	Direction	EBLT	WBT	SBLT	NBLT
Phase	5	6	7	8	Phase	5	6	7	8
%	12	35	12	41	%	11	37	15	37
Pattern 5 Time: 21:00 Cycle Length: Free Offset (%):					Pattern 6 Time: Cycle Length: Offset (%):				
Direction	WBLT	EBT	NBLT	SBT	Direction				
Phase	1	2	3	4	Phase	1	2	3	4
%					%				
Direction	EBLT	WBT	SBLT	NBLT	Direction				
Phase	5	6	7	8	Phase	5	6	7	8
%					%				



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Count Name: Dundas Street & Bronte Road
Site Code: 240110
Start Date: 04/14/2024
Page No: 1

Turning Movement Data

Start Time	Dundas Street Eastbound						Dundas Street Westbound						Bronte Road Northbound						Bronte Road 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	
11:00 AM	23	101	32	0	0	156	27	86	22	0	1	135	36	82	15	0	0	133	23	136	23	0	0	182	606
11:15 AM	19	133	34	0	0	186	23	101	33	2	0	159	40	99	10	0	0	149	22	112	32	0	0	166	660
11:30 AM	27	118	53	0	0	198	22	84	29	2	1	137	50	93	25	0	0	168	29	122	21	0	1	172	675
11:45 AM	26	164	39	0	0	229	28	152	29	1	2	210	44	95	19	0	0	158	27	152	33	0	2	212	809
Hourly Total	95	516	158	0	0	769	100	423	113	5	4	641	170	369	69	0	0	608	101	522	109	0	3	732	2750
12:00 PM	28	143	48	0	0	219	23	129	20	1	2	173	46	104	25	1	0	176	36	138	24	0	0	198	766
12:15 PM	34	114	43	0	0	191	32	119	23	5	2	179	40	146	16	0	0	202	35	165	35	0	0	235	807
12:30 PM	32	131	48	0	0	211	33	139	26	1	5	199	53	122	28	0	1	203	31	134	27	0	0	192	805
12:45 PM	35	150	49	0	2	234	22	125	30	2	0	179	62	150	17	0	0	229	30	161	38	0	2	229	871
Hourly Total	129	538	188	0	2	855	110	512	99	9	9	730	201	522	86	1	1	810	132	598	124	0	2	854	3249
1:00 PM	46	178	43	0	0	267	31	136	20	0	0	187	48	120	28	0	0	196	34	122	19	1	0	176	826
1:15 PM	29	150	40	0	0	219	29	112	38	3	1	182	59	161	31	0	0	251	34	149	42	0	1	225	877
1:30 PM	36	167	41	0	0	244	37	165	24	4	0	230	46	118	15	0	0	179	44	113	42	0	0	199	852
1:45 PM	28	167	52	0	0	247	30	149	31	3	2	213	61	126	30	0	0	217	35	129	20	0	0	184	861
Hourly Total	139	662	176	0	0	977	127	562	113	10	3	812	214	525	104	0	0	843	147	513	123	1	1	784	3416
2:00 PM	32	133	49	0	1	214	33	128	42	3	5	206	54	169	36	0	2	259	39	111	28	0	0	178	857
2:15 PM	33	140	51	0	1	224	43	190	29	0	0	262	54	157	20	0	0	231	36	140	32	0	1	208	925
2:30 PM	34	139	38	0	0	211	36	144	24	0	0	204	58	165	25	0	2	248	39	156	29	1	0	225	888
2:45 PM	44	163	52	0	0	259	54	186	39	0	0	279	36	129	21	1	3	187	28	156	34	0	0	218	943
Hourly Total	143	575	190	0	2	908	166	648	134	3	5	951	202	620	102	1	7	925	142	563	123	1	1	829	3613
Grand Total	506	2291	712	0	4	3509	503	2145	459	27	21	3134	787	2036	361	2	8	3186	522	2196	479	2	7	3199	13028
Approach %	14.4	65.3	20.3	0.0	-	-	16.0	68.4	14.6	0.9	-	-	24.7	63.9	11.3	0.1	-	-	16.3	68.6	15.0	0.1	-	-	-
Total %	3.9	17.6	5.5	0.0	-	26.9	3.9	16.5	3.5	0.2	-	24.1	6.0	15.6	2.8	0.0	-	24.5	4.0	16.9	3.7	0.0	-	24.6	-
Motorcycles	4	8	3	0	-	15	0	16	2	0	-	18	8	12	2	0	-	22	4	7	0	0	-	11	66
% Motorcycles	0.8	0.3	0.4	-	-	0.4	0.0	0.7	0.4	0.0	-	0.6	1.0	0.6	0.6	0.0	-	0.7	0.8	0.3	0.0	0.0	-	0.3	0.5
Cars & Light Goods	501	2262	705	0	-	3468	491	2110	455	27	-	3083	775	1979	353	2	-	3109	515	2102	473	2	-	3092	12752
% Cars & Light Goods	99.0	98.7	99.0	-	-	98.8	97.6	98.4	99.1	100.0	-	98.4	98.5	97.2	97.8	100.0	-	97.6	98.7	95.7	98.7	100.0	-	96.7	97.9
Buses	0	8	4	0	-	12	0	9	0	0	-	9	2	1	0	0	-	3	0	2	0	0	-	2	26
% Buses	0.0	0.3	0.6	-	-	0.3	0.0	0.4	0.0	0.0	-	0.3	0.3	0.0	0.0	0.0	-	0.1	0.0	0.1	0.0	0.0	-	0.1	0.2
Single-Unit Trucks	1	9	0	0	-	10	4	9	2	0	-	15	2	29	3	0	-	34	3	29	4	0	-	36	95
% Single-Unit Trucks	0.2	0.4	0.0	-	-	0.3	0.8	0.4	0.4	0.0	-	0.5	0.3	1.4	0.8	0.0	-	1.1	0.6	1.3	0.8	0.0	-	1.1	0.7
Articulated Trucks	0	4	0	0	-	4	8	1	0	0	-	9	0	13	3	0	-	16	0	56	0	0	-	56	85
% Articulated Trucks	0.0	0.2	0.0	-	-	0.1	1.6	0.0	0.0	0.0	-	0.3	0.0	0.6	0.8	0.0	-	0.5	0.0	2.6	0.0	0.0	-	1.8	0.7

Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	0	0	2	0	-	2	4
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.1	0.0	0.0	-	0.1	0.0	0.0	0.4	0.0	-	0.1	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-	-	6	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	-	-	75.0	-	-	-	-	-	42.9	-	-
Pedestrians	-	-	-	-	4	-	-	-	-	21	-	-	-	-	-	-	2	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	25.0	-	-	-	-	-	57.1	-	-

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: Dundas Street & Bronte Road
Site Code: 240110
Start Date: 04/14/2024
Page No: 4

Turning Movement Peak Hour Data (2:00 PM)

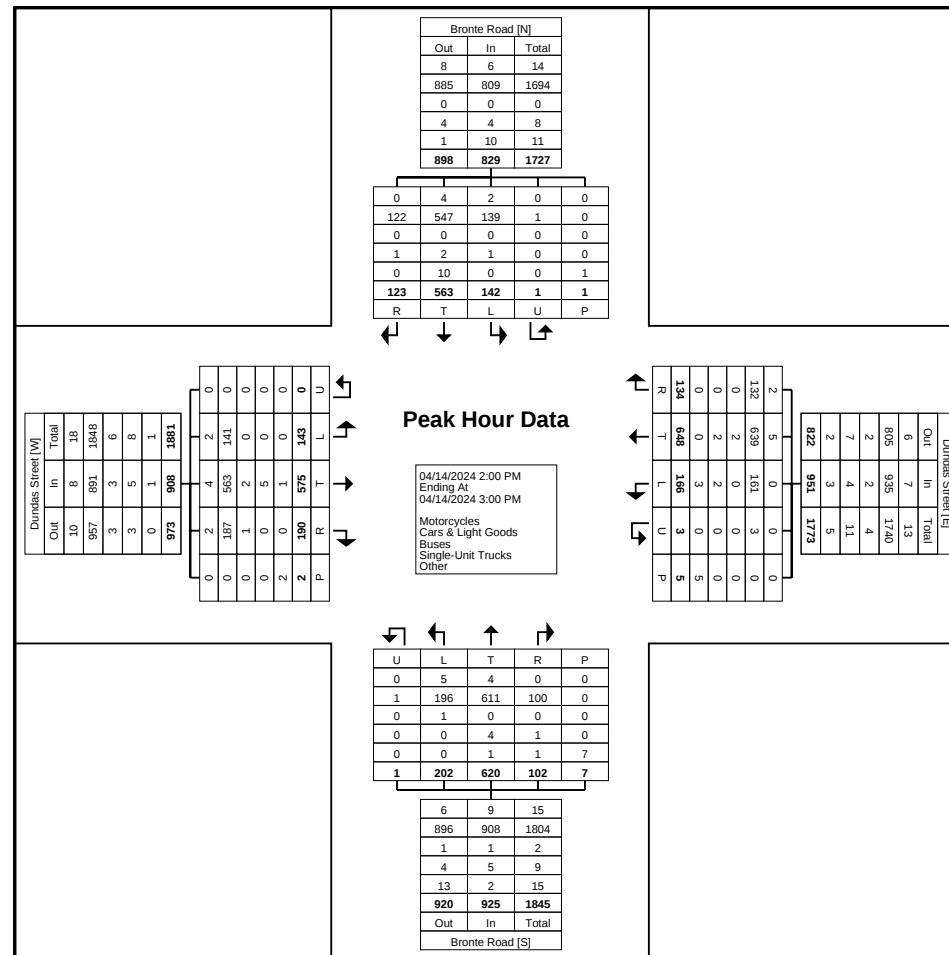
Start Time	Dundas Street Eastbound						Dundas Street Westbound						Bronte Road Northbound						Bronte Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
2:00 PM	32	133	49	0	1	214	33	128	42	3	5	206	54	169	36	0	2	259	39	111	28	0	0	178	857
2:15 PM	33	140	51	0	1	224	43	190	29	0	0	262	54	157	20	0	0	231	36	140	32	0	1	208	925
2:30 PM	34	139	38	0	0	211	36	144	24	0	0	204	58	165	25	0	2	248	39	156	29	1	0	225	888
2:45 PM	44	163	52	0	0	259	54	186	39	0	0	279	36	129	21	1	3	187	28	156	34	0	0	218	943
Total	143	575	190	0	2	908	166	648	134	3	5	951	202	620	102	1	7	925	142	563	123	1	1	829	3613
Approach %	15.7	63.3	20.9	0.0	-	-	17.5	68.1	14.1	0.3	-	-	21.8	67.0	11.0	0.1	-	-	17.1	67.9	14.8	0.1	-	-	-
Total %	4.0	15.9	5.3	0.0	-	25.1	4.6	17.9	3.7	0.1	-	26.3	5.6	17.2	2.8	0.0	-	25.6	3.9	15.6	3.4	0.0	-	22.9	-
PHF	0.813	0.882	0.913	0.000	-	0.876	0.769	0.853	0.798	0.250	-	0.852	0.871	0.917	0.708	0.250	-	0.893	0.910	0.902	0.904	0.250	-	0.921	0.958
Motorcycles	2	4	2	0	-	8	0	5	2	0	-	7	5	4	0	0	-	9	2	4	0	0	-	6	30
% Motorcycles	1.4	0.7	1.1	-	-	0.9	0.0	0.8	1.5	0.0	-	0.7	2.5	0.6	0.0	0.0	-	1.0	1.4	0.7	0.0	0.0	-	0.7	0.8
Cars & Light Goods	141	563	187	0	-	891	161	639	132	3	-	935	196	611	100	1	-	908	139	547	122	1	-	809	3543
% Cars & Light Goods	98.6	97.9	98.4	-	-	98.1	97.0	98.6	98.5	100.0	-	98.3	97.0	98.5	98.0	100.0	-	98.2	97.9	97.2	99.2	100.0	-	97.6	98.1
Buses	0	2	1	0	-	3	0	2	0	0	-	2	1	0	0	0	-	1	0	0	0	0	-	0	6
% Buses	0.0	0.3	0.5	-	-	0.3	0.0	0.3	0.0	0.0	-	0.2	0.5	0.0	0.0	0.0	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.2
Single-Unit Trucks	0	5	0	0	-	5	2	2	0	0	-	4	0	4	1	0	-	5	1	2	1	0	-	4	18
% Single-Unit Trucks	0.0	0.9	0.0	-	-	0.6	1.2	0.3	0.0	0.0	-	0.4	0.0	0.6	1.0	0.0	-	0.5	0.7	0.4	0.8	0.0	-	0.5	0.5
Articulated Trucks	0	1	0	0	-	1	3	0	0	0	-	3	0	1	1	0	-	2	0	10	0	0	-	10	16
% Articulated Trucks	0.0	0.2	0.0	-	-	0.1	1.8	0.0	0.0	0.0	-	0.3	0.0	0.2	1.0	0.0	-	0.2	0.0	1.8	0.0	0.0	-	1.2	0.4
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	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	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	6	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	85.7	-	-	-	-	-	100.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	14.3	-	-	-	-	-	0.0	-	-



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Count Name: Dundas Street & Bronte Road
Site Code: 240110
Start Date: 04/14/2024
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Appendix C

Existing Traffic Operations



Timings (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West
Sunday Peak Hour - Existing Traffic

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰↰	↰↰	↰	↰	↰↰	↰
Traffic Volume (vph)	143	575	190	166	648	202	620	102	142	563	123
Future Volume (vph)	143	575	190	166	648	202	620	102	142	563	123
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8		7	4	
Permitted Phases	2		2	6		8		8	4		4
Detector Phase	5	2	2	1	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	10.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	11.0	49.0	49.0	11.0	49.0	14.0	51.0	51.0	11.0	51.0	51.0
Total Split (s)	11.0	55.0	55.0	11.0	55.0	15.0	30.0	30.0	15.0	30.0	30.0
Total Split (%)	9.9%	49.5%	49.5%	9.9%	49.5%	13.5%	27.0%	27.0%	13.5%	27.0%	27.0%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	58.0	48.0	48.0	58.0	48.0	35.7	22.3	22.3	35.3	22.1	22.1
Actuated g/C Ratio	0.53	0.44	0.44	0.53	0.44	0.33	0.20	0.20	0.32	0.20	0.20
v/c Ratio	0.40	0.27	0.25	0.38	0.37	0.42	0.90	0.26	0.61	0.83	0.31
Control Delay	15.1	20.2	3.5	14.7	20.0	26.6	59.1	7.1	35.8	53.1	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	20.2	3.5	14.7	20.0	26.6	59.1	7.1	35.8	53.1	9.5
LOS	B	C	A	B	C	C	E	A	D	D	A
Approach Delay	15.9			19.1			46.3			43.6	
Approach LOS	B			B			D			D	

Intersection Summary

Cycle Length: 111

Actuated Cycle Length: 109.6

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 30.9

Intersection LOS: C

Intersection Capacity Utilization 90.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 101: Bronte Road & Dundas Street West

↰ Ø1	↰ Ø2	↰ Ø3	↰ Ø4
11 s	55 s	15 s	30 s
↰ Ø5	↰ Ø6	↰ Ø7	↰ Ø8
11 s	55 s	15 s	30 s

Queues (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West
Sunday Peak Hour - Existing Traffic

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	149	599	198	173	815	210	646	106	148	586	128
v/c Ratio	0.40	0.27	0.25	0.38	0.37	0.42	0.90	0.26	0.61	0.83	0.31
Control Delay	15.1	20.2	3.5	14.7	20.0	26.6	59.1	7.1	35.8	53.1	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	20.2	3.5	14.7	20.0	26.6	59.1	7.1	35.8	53.1	9.5
Queue Length 50th (m)	15.5	31.5	0.0	18.4	42.1	16.4	75.8	0.0	23.0	66.7	0.9
Queue Length 95th (m)	26.2	40.5	13.4	30.0	52.9	25.1	#107.5	12.2	38.7	#89.6	17.0
Internal Link Dist (m)	136.8			113.9			358.1			212.2	
Turn Bay Length (m)	90.0		80.0		115.0		100.0		45.0		50.0
Base Capacity (vph)	373	2228	796	456	2216	517	743	420	255	743	431
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.27	0.25	0.38	0.37	0.41	0.87	0.25	0.58	0.79	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 101: Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰
Traffic Volume (vph)	143	575	190	166	648	134	202	620	102	142	563	123
Future Volume (vph)	143	575	190	166	648	134	202	620	102	142	563	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	5085	1563	1752	4995		3399	3539	1559	1769	3505	1577
Flt Permitted	0.30	1.00	1.00	0.40	1.00		0.21	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	557	5085	1563	740	4995		763	3539	1559	337	3505	1577
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)	149	599	198	173	675	140	210	646	106	148	586	128
RTOR Reduction (vph)	0	0	111	0	28	0	0	0	84	0	0	98
Lane Group Flow (vph)	149	599	87	173	787	0	210	646	22	148	586	30
Confl. Peds. (#/hr)			1	1			2		5	5		2
Heavy Vehicles (%)	1%	2%	2%	3%	1%	2%	3%	2%	2%	2%	3%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	55.0	48.0	48.0	55.0	48.0		32.7	22.3	22.3	32.3	22.1	22.1
Effective Green, g (s)	55.0	48.0	48.0	55.0	48.0		32.7	22.3	22.3	32.3	22.1	22.1
Actuated g/C Ratio	0.50	0.44	0.44	0.50	0.44		0.30	0.20	0.20	0.29	0.20	0.20
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	358	2229	685	436	2189		478	720	317	232	707	318
v/s Ratio Prot	c0.03	0.12		0.03	0.16		0.04	c0.18		c0.06	0.17	
v/s Ratio Perm	c0.18		0.06	0.17			0.09		0.01	0.13		0.02
v/c Ratio	0.42	0.27	0.13	0.40	0.36		0.44	0.90	0.07	0.64	0.83	0.09
Uniform Delay, d1	15.0	19.6	18.3	15.1	20.5		29.4	42.5	35.2	30.7	41.9	35.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.3	0.4	0.6	0.5		0.6	13.8	0.1	5.7	8.0	0.1
Delay (s)	15.7	19.9	18.7	15.7	21.0		30.0	56.3	35.3	36.3	49.8	35.7
Level of Service	B	B	B	B	C		C	E	D	D	D	D
Approach Delay (s)		19.0			20.0			48.3			45.4	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		32.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.56										
Actuated Cycle Length (s)		109.5			Sum of lost time (s)			22.0				
Intersection Capacity Utilization		90.5%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 102: Old Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↰↰			↰↰↰				↰			↰
Traffic Volume (veh/h)	0	792	38	0	986	3	0	0	79	0	0	0
Future Volume (Veh/h)	0	792	38	0	986	3	0	0	79	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	843	40	0	1049	3	0	0	84	0	0	0
Pedestrians									9			1
Lane Width (m)									3.6			3.6
Walking Speed (m/s)									1.2			1.2
Percent Blockage									1			0
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		138			344							
pX, platoon unblocked	0.99			0.93			0.94	0.94	0.93	0.94	0.94	0.99
vC, conflicting volume	1053			892			1222	1925	310	1416	1944	352
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1011			626			915	1666	1	1123	1685	301
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	100			100			100	100	92	100	100	100
cM capacity (veh/h)	685			892			213	91	1007	139	88	686
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	337	337	209	420	420	213	84	0				
Volume Left	0	0	0	0	0	0	0	0				
Volume Right	0	0	40	0	0	3	84	0				
cSH	1700	1700	1700	1700	1700	1700	1007	1700				
Volume to Capacity	0.20	0.20	0.12	0.25	0.25	0.13	0.08	0.00				
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0				
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0				
Lane LOS							A	A				
Approach Delay (s)	0.0			0.0			8.9	0.0				
Approach LOS							A	A				
Intersection Summary												
Average Delay		0.4										
Intersection Capacity Utilization		27.7%					ICU Level of Service		A			
Analysis Period (min)		15										

Timings
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↘	↑↑↑	↖
Traffic Volume (vph)	791	73	122	847	49
Future Volume (vph)	791	73	122	847	49
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	8
Permitted Phases		2	6		
Detector Phase	2	2	1	6	8
Switch Phase					
Minimum Initial (s)	20.0	20.0	7.0	20.0	10.0
Minimum Split (s)	34.1	34.1	11.5	34.1	45.3
Total Split (s)	52.0	52.0	11.5	63.5	47.0
Total Split (%)	47.1%	47.1%	10.4%	57.5%	42.5%
Yellow Time (s)	4.2	4.2	3.0	4.2	3.3
All-Red Time (s)	1.9	1.9	1.0	1.9	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	4.0	6.1	6.3
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	Max	Max	None	Max	None
Act Effct Green (s)	46.8	46.8	60.1	58.0	10.6
Actuated g/C Ratio	0.58	0.58	0.74	0.72	0.13
v/c Ratio	0.29	0.08	0.26	0.25	0.52
Control Delay	9.2	2.4	4.3	4.3	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	2.4	4.3	4.3	19.7
LOS	A	A	A	A	B
Approach Delay	8.6			4.3	19.7
Approach LOS	A			A	B

Intersection Summary

Cycle Length: 110.5

Actuated Cycle Length: 81

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 7.3

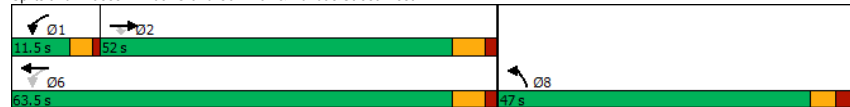
Intersection LOS: A

Intersection Capacity Utilization 55.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 103: Grand Oak Trail & Dundas Street West



Queues
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	851	78	131	911	159
v/c Ratio	0.29	0.08	0.26	0.25	0.52
Control Delay	9.2	2.4	4.3	4.3	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	2.4	4.3	4.3	19.7
Queue Length 50th (m)	22.8	0.0	4.5	14.7	8.2
Queue Length 95th (m)	33.3	5.7	10.2	22.5	25.9
Internal Link Dist (m)	320.5			123.6	401.0
Turn Bay Length (m)		70.0	75.0		
Base Capacity (vph)	2935	921	515	3676	887
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.29	0.08	0.25	0.25	0.18

Intersection Summary

HCM Signalized Intersection Capacity Analysis
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑	↓	↑↑↑	↓	↑
Traffic Volume (vph)	791	73	122	847	49	99
Future Volume (vph)	791	73	122	847	49	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	4.0	6.1	6.3	
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	
Frpb, ped/bikes	1.00	0.97	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	1.00	1.00	0.95	1.00	0.98	
Satd. Flow (prot)	5085	1547	1786	5136	1663	
Flt Permitted	1.00	1.00	0.29	1.00	0.98	
Satd. Flow (perm)	5085	1547	542	5136	1663	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	851	78	131	911	53	106
RTOR Reduction (vph)	0	33	0	0	90	0
Lane Group Flow (vph)	851	45	131	911	69	0
Confl. Peds. (#/hr)		9	9			3
Heavy Vehicles (%)	2%	1%	1%	1%	0%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	46.8	46.8	58.0	58.0	10.6	
Effective Green, g (s)	46.8	46.8	58.0	58.0	10.6	
Actuated g/C Ratio	0.58	0.58	0.72	0.72	0.13	
Clearance Time (s)	6.1	6.1	4.0	6.1	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2938	893	498	3677	217	
v/s Ratio Prot	c0.17		0.02	c0.18	c0.04	
v/s Ratio Perm		0.03	0.16			
v/c Ratio	0.29	0.05	0.26	0.25	0.32	
Uniform Delay, d1	8.7	7.4	3.7	4.0	31.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.3	0.2	0.9	
Delay (s)	8.9	7.5	4.0	4.1	32.8	
Level of Service	A	A	A	A	C	
Approach Delay (s)	8.8			4.1	32.8	
Approach LOS	A			A	C	

Intersection Summary

HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings
104: Bronte Road & Highvalley Road/Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↓	↓	↓	↓	↓	↑↑	↑	↓	↑↑	↓
Traffic Volume (vph)	1	10	135	18	24	852	88	43	862	5
Future Volume (vph)	1	10	135	18	24	852	88	43	862	5
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	38.5	38.5	38.5	38.5	11.0	33.1	33.1	11.0	33.1	33.1
Total Split (s)	55.0	55.0	55.0	55.0	12.0	74.0	74.0	11.0	73.0	73.0
Total Split (%)	39.3%	39.3%	39.3%	39.3%	8.6%	52.9%	52.9%	7.9%	52.1%	52.1%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.7	3.7	3.0	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	1.0	2.4	2.4	1.0	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	4.0	6.1	6.1	4.0	6.1	6.1
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
Act Effect Green (s)	16.5	16.5	16.5	16.5	77.2	69.6	69.6	78.0	71.9	71.9
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.72	0.65	0.65	0.73	0.67	0.67
v/c Ratio	0.01	0.11	0.69	0.38	0.06	0.40	0.09	0.10	0.40	0.01
Control Delay	37.0	22.4	60.1	14.2	4.7	10.7	4.0	4.9	10.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.0	22.4	60.1	14.2	4.7	10.7	4.0	4.9	10.0	0.0
LOS	D	C	E	B	A	B	A	A	A	A
Approach Delay		22.9		39.0		9.9			9.7	
Approach LOS		C		D		A			A	

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 107.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 13.3
Intersection Capacity Utilization 59.2%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service B

Splits and Phases: 104: Bronte Road & Highvalley Road/Pine Glen Road



Queues (240110) 2403 Khalsa Gate
104: Bronte Road & Highvalley Road/Pine Glen Road
Sunday Peak Hour - Existing Traffic

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1	29	145	123	26	916	95	46	927	5
v/c Ratio	0.01	0.11	0.69	0.38	0.06	0.40	0.09	0.10	0.40	0.01
Control Delay	37.0	22.4	60.1	14.2	4.7	10.7	4.0	4.9	10.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.0	22.4	60.1	14.2	4.7	10.7	4.0	4.9	10.0	0.0
Queue Length 50th (m)	0.2	2.1	30.8	3.7	1.2	49.2	2.3	2.2	50.3	0.0
Queue Length 95th (m)	1.7	10.4	52.5	20.1	4.3	74.3	10.0	6.4	76.0	0.0
Internal Link Dist (m)		86.0		103.5		93.5			358.1	
Turn Bay Length (m)	20.0		20.0		85.0		45.0	60.0		25.0
Base Capacity (vph)	570	779	622	761	480	2317	1016	449	2345	886
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.04	0.23	0.16	0.05	0.40	0.09	0.10	0.40	0.01
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (240110) 2403 Khalsa Gate
104: Bronte Road & Highvalley Road/Pine Glen Road
Sunday Peak Hour - Existing Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	1	10	17	135	18	97	24	852	88	43	862	5
Future Volume (vph)	1	10	17	135	18	97	24	852	88	43	862	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1799	1702		1773	1556		1803	3574	1536	1769	3505	1300
Flt Permitted	0.67	1.00		0.74	1.00		0.28	1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)	1261	1702		1378	1556		532	3574	1536	504	3505	1300
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)	1	11	18	145	19	104	26	916	95	46	927	5
RTOR Reduction (vph)	0	15	0	0	88	0	0	0	23	0	0	2
Lane Group Flow (vph)	1	14	0	145	35	0	26	916	72	46	927	3
Confl. Peds. (#/hr)	4		8	8		4	7		5	5		7
Heavy Vehicles (%)	0%	0%	0%	1%	17%	3%	0%	1%	2%	2%	3%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	16.5	16.5		16.5	16.5		74.6	70.5	70.5	77.4	71.9	71.9
Effective Green, g (s)	16.5	16.5		16.5	16.5		74.6	70.5	70.5	77.4	71.9	71.9
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.68	0.65	0.65	0.71	0.66	0.66
Clearance Time (s)	6.5	6.5		6.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	257		208	235		411	2309	992	421	2309	856
v/s Ratio Prot		0.01			0.02		0.00	0.26		c0.01	c0.26	
v/s Ratio Perm	0.00			c0.11			0.04		0.05	0.07		0.00
v/c Ratio	0.01	0.05		0.70	0.15		0.06	0.40	0.07	0.11	0.40	0.00
Uniform Delay, d1	39.3	39.6		43.9	40.2		5.7	9.2	7.2	5.2	8.6	6.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1		9.7	0.3		0.1	0.5	0.1	0.1	0.5	0.0
Delay (s)	39.3	39.7		53.7	40.5		5.8	9.7	7.3	5.3	9.1	6.4
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		39.7			47.6			9.4			8.9	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		14.0										
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		109.1					Sum of lost time (s)		16.6			
Intersection Capacity Utilization		59.2%					ICU Level of Service		B			
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
105: Khalsa Gate/Old Bronte Road & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	59	70	44	17	121	37	82	38	24	12	15	79
Future Volume (vph)	59	70	44	17	121	37	82	38	24	12	15	79
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	63	74	47	18	129	39	87	40	26	13	16	84
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	184	18	168	153	113							
Volume Left (vph)	63	18	0	87	13							
Volume Right (vph)	47	0	39	26	84							
Hadj (s)	-0.08	0.50	-0.12	0.01	-0.42							
Departure Headway (s)	4.9	5.9	5.2	5.0	4.6							
Degree Utilization, x	0.25	0.03	0.24	0.21	0.15							
Capacity (veh/h)	693	578	649	667	704							
Control Delay (s)	9.4	7.8	8.7	9.3	8.4							
Approach Delay (s)	9.4	8.6		9.3	8.4							
Approach LOS	A	A		A	A							
Intersection Summary												
Delay			9.0									
Level of Service			A									
Intersection Capacity Utilization			44.0%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
106: Grand Oak Trail & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	33	89	21	23	108	16	18	97	23	37	109	53
Future Volume (vph)	33	89	21	23	108	16	18	97	23	37	109	53
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)	35	96	23	25	116	17	19	104	25	40	117	57
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	35	119	25	133	19	129	40	174				
Volume Left (vph)	35	0	25	0	19	0	40	0				
Volume Right (vph)	0	23	0	17	0	25	0	57				
Hadj (s)	0.50	-0.12	0.50	0.00	0.50	-0.12	0.50	-0.20				
Departure Headway (s)	6.1	5.5	6.1	5.6	6.1	5.5	6.0	5.3				
Degree Utilization, x	0.06	0.18	0.04	0.21	0.03	0.20	0.07	0.26				
Capacity (veh/h)	551	616	552	605	560	624	567	645				
Control Delay (s)	8.3	8.5	8.2	8.9	8.1	8.6	8.2	8.9				
Approach Delay (s)	8.5		8.8		8.5		8.8					
Approach LOS	A		A		A		A					
Intersection Summary												
Delay				8.7								
Level of Service				A								
Intersection Capacity Utilization			37.7%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
107: Khalsa Gate & Private Driveway/Driveway 1

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	0	0	0	1	98	1	19	17	55	10	10
Future Volume (Veh/h)	28	0	0	0	1	98	1	19	17	55	10	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	0	0	0	1	107	1	21	18	60	11	11
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	276	178	16	168	174	30	22			39		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276	178	16	168	174	30	22			39		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	100	100	100	90	100			96		
cM capacity (veh/h)	588	688	1063	772	691	1044	1593			1571		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	30	108	40	82								
Volume Left	30	0	1	60								
Volume Right	0	107	18	11								
cSH	588	1040	1593	1571								
Volume to Capacity	0.05	0.10	0.00	0.04								
Queue Length 95th (m)	1.3	2.8	0.0	1.0								
Control Delay (s)	11.4	8.9	0.2	5.5								
Lane LOS	B	A	A	A								
Approach Delay (s)	11.4	8.9	0.2	5.5								
Approach LOS	B	A										
Intersection Summary												
Average Delay		6.8										
Intersection Capacity Utilization		25.7%		ICU Level of Service				A				
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
108: Driveway 2 & Pine Glen Road

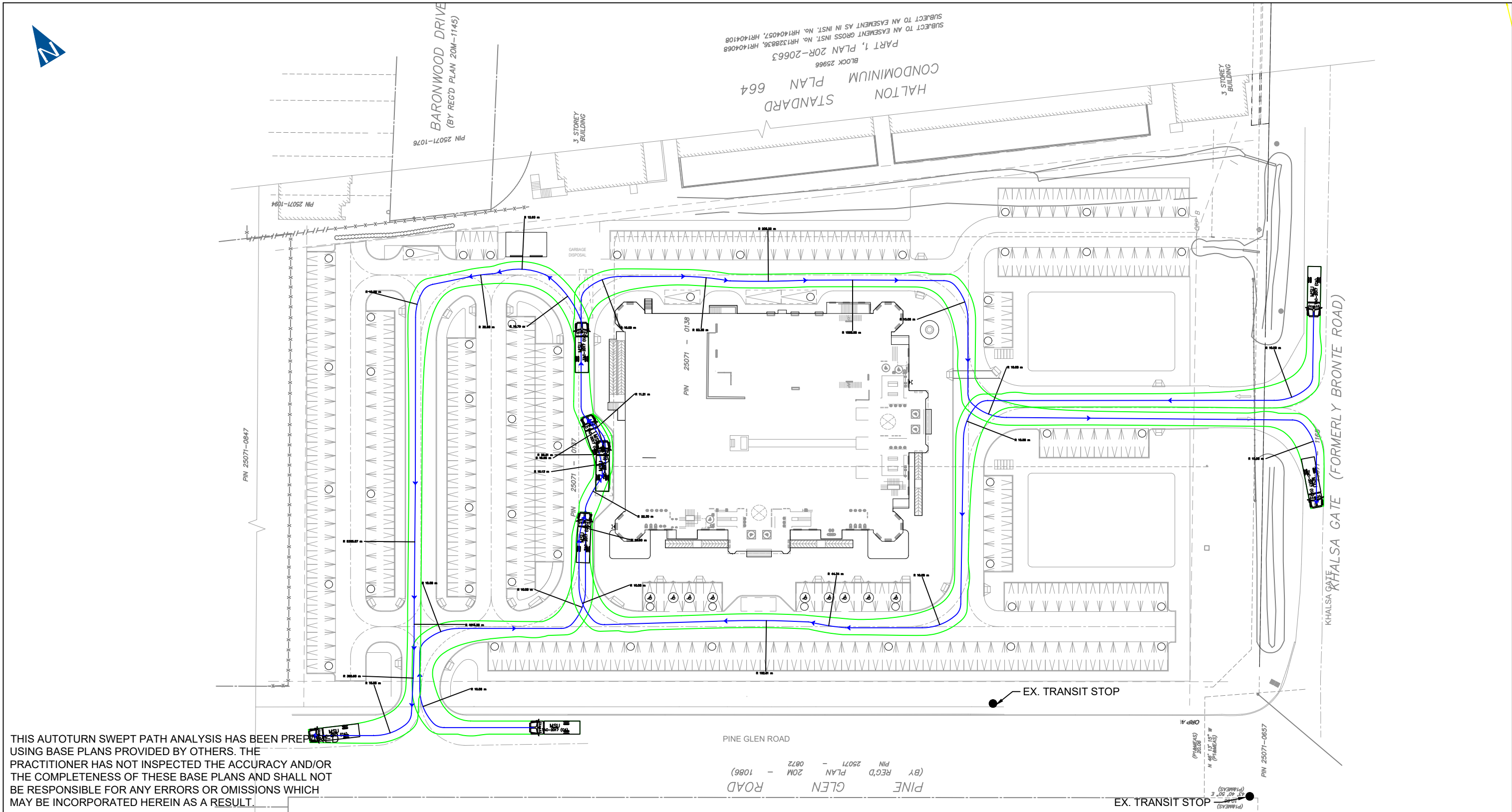
(240110) 2403 Khalsa Gate
Sunday Peak Hour - Existing Traffic

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	116	1	21	159	18	23
Future Volume (Veh/h)	116	1	21	159	18	23
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	126	1	23	173	20	25
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			127		346	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			127		346	126
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	97
cM capacity (veh/h)			1459		641	924
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	127	196	45			
Volume Left	0	23	20			
Volume Right	1	0	25			
cSH	1700	1459	772			
Volume to Capacity	0.07	0.02	0.06			
Queue Length 95th (m)	0.0	0.4	1.5			
Control Delay (s)	0.0	1.0	9.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.0	9.9			
Approach LOS		A				
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			26.2%	ICU Level of Service	A	
Analysis Period (min)			15			

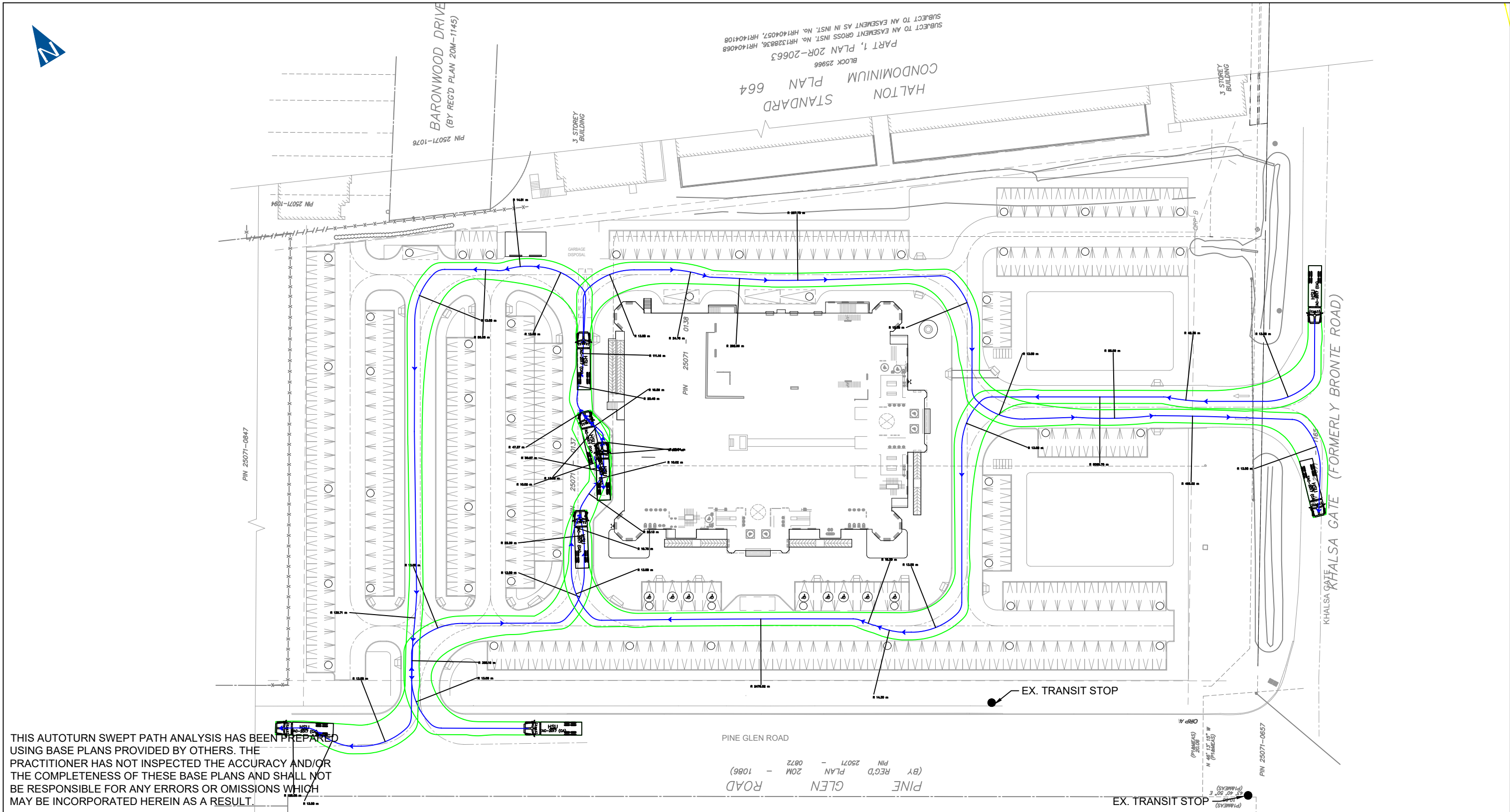
Appendix D

AutoTURN Analysis





				DESIGN VEHICLE: MSU meters Width : 2.60 Track : 2.60 Lock to Lock Time : 6.0 Steering Angle : 40.2	AUTOTURN ASSESSMENT 2403 KHALSA GATE OAKVILLE, ON				
						PROJECT NO.: 240110	DATE: JULY 2024	SCALE: 1:750	DRAWING NO.: 01
						DRAWN: LC	DESIGN: LC	CHECK: SC	
1	2024-07-23	LC	UPDATED SITE PLAN						
NO.	DATE	INITIAL	REVISION DETAIL						



1	2024-07-23	LC	UPDATED SITE PLAN
NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHICLE:

HSU

meters

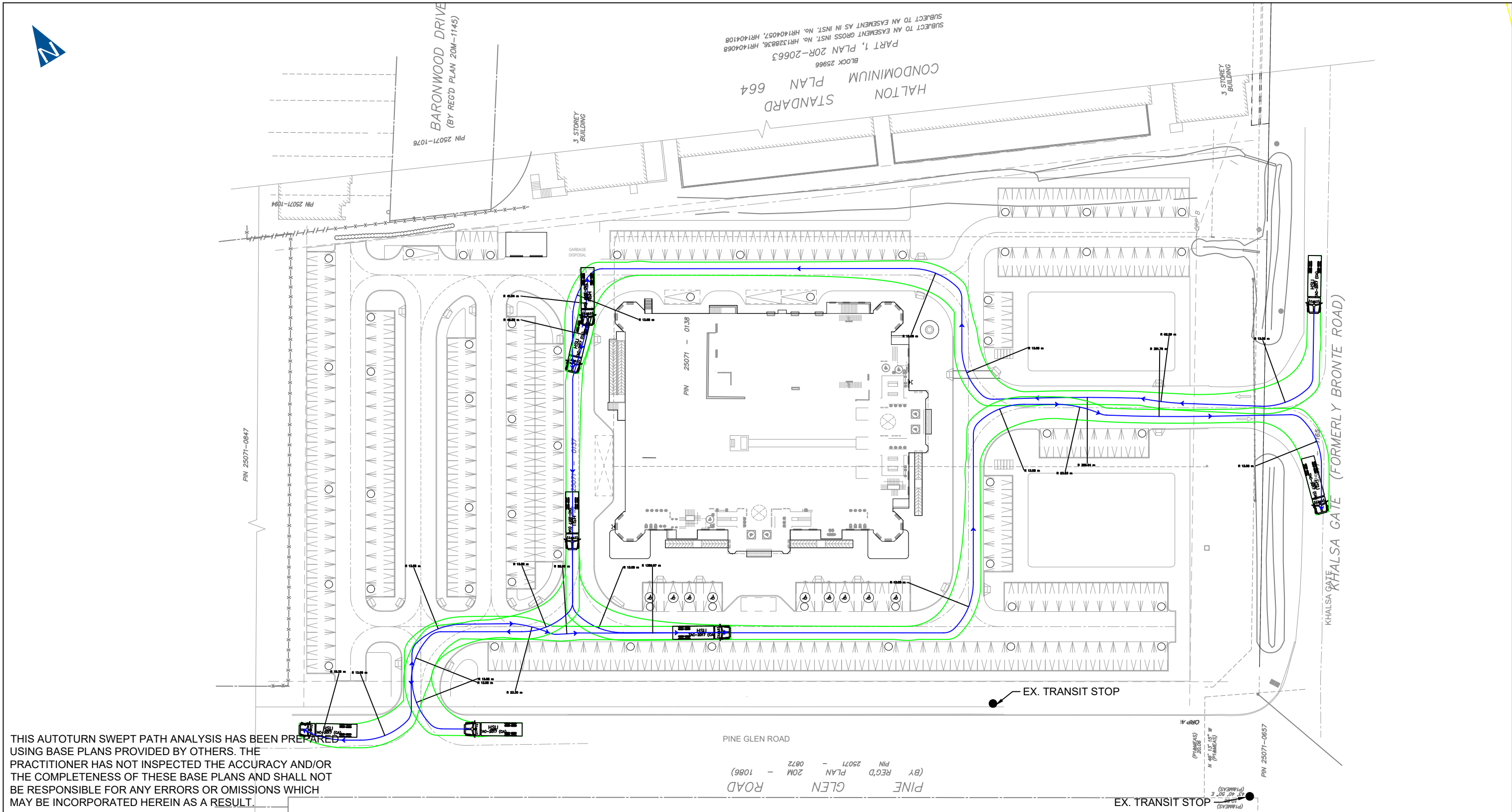
Width : 2.60
Track : 2.60
Lock to Lock Time : 6.0
Steering Angle : 40.0

AUTOTURN ASSESSMENT

2403 KHALSA GATE

OAKVILLE, ON

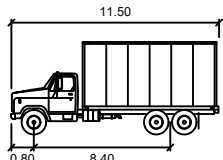
PROJECT NO.: 240110	DATE: JULY 2024	SCALE: 1:750	DRAWING NO.: 02
DRAWN: LC	DESIGN: LC	CHECK: SC	



THIS AUTOTURN SWEEP PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

1	2024-07-23	LC	UPDATED SITE PLAN
NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHICLE:



HSU

meters
Width : 2.60
Track : 2.60
Lock to Lock Time : 6.0
Steering Angle : 40.0

AUTOTURN ASSESSMENT
2403 KHALSA GATE
OAKVILLE, ON



PROJECT NO.: 240110

DATE: JULY 2024

SCALE: 1:750

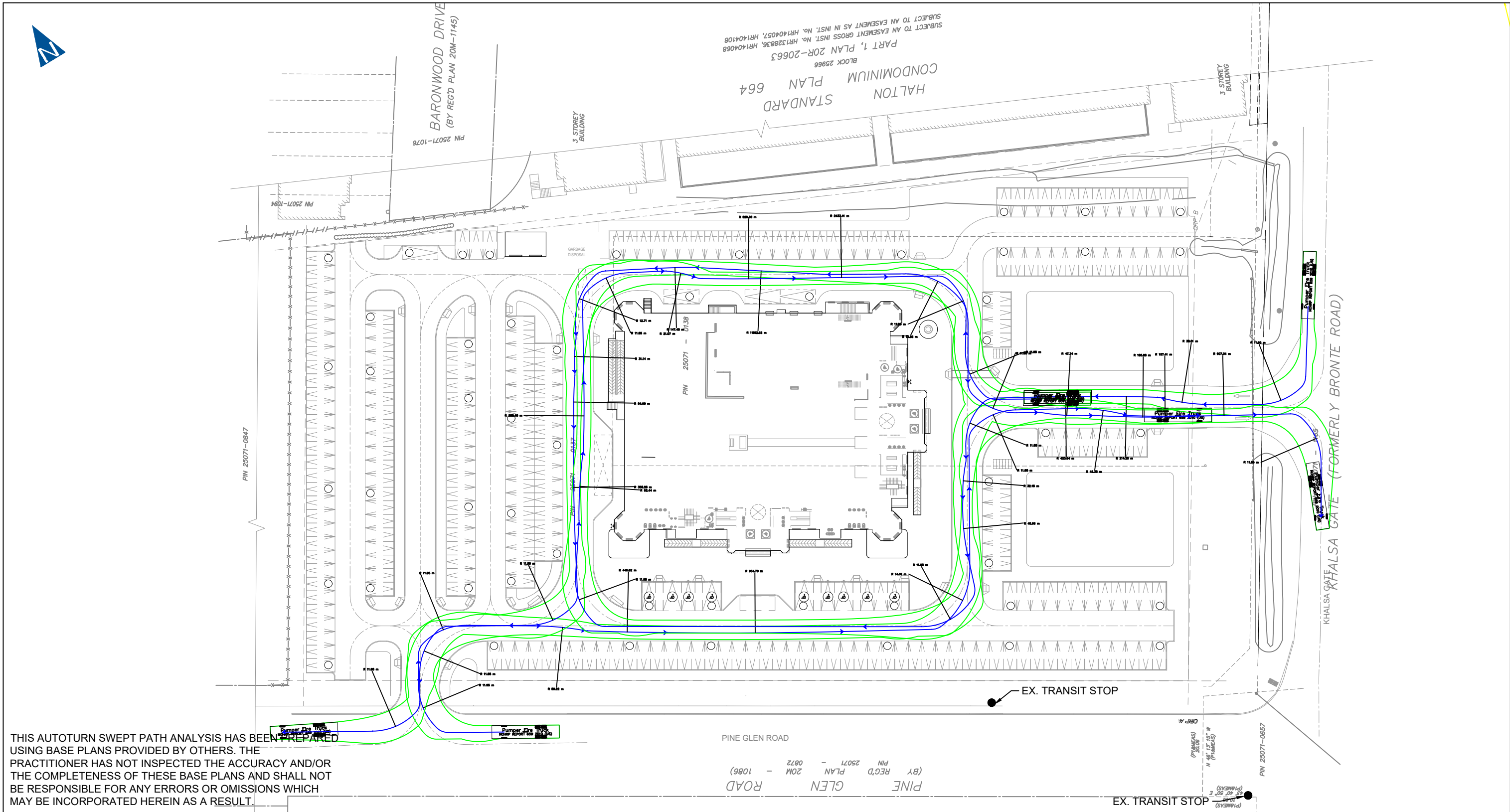
DRAWING NO.:

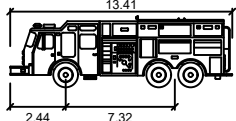
DRAWN: LC

DESIGN: LC

CHECK: SC

03

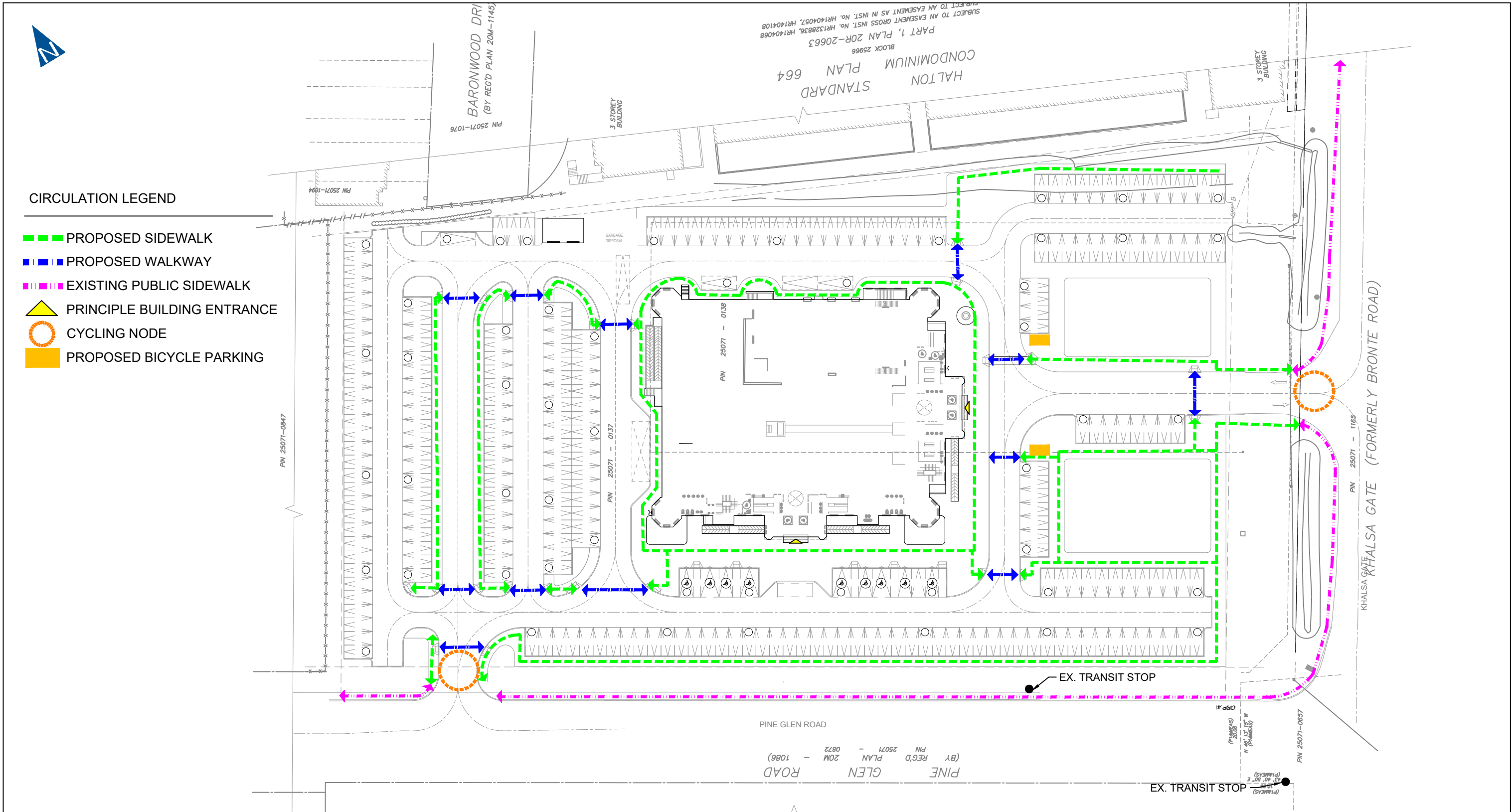


				DESIGN VEHICLE:  Pumper Fire Truck meters : 2.59 : 2.59 : 6.0 : 37.8	AUTOTURN ASSESSMENT 2403 KHALSA GATE OAKVILLE, ON				
1	2024-07-23	LC	UPDATED SITE PLAN			PROJECT NO.: 240110	DATE: JULY 2024	SCALE: 1:750	DRAWING NO.: 04
NO.	DATE	INITIAL	REVISION DETAIL			DRAWN: LC	DESIGN: LC	CHECK: SC	

Appendix E

Bicycle and Pedestrian Connectivity Plan





1	2024-07-23	LC	UPDATED SITE PLAN
NO.	DATE	INITIAL	REVISION DETAIL



PROJECT NO.: 240110	DATE: JULY 2024	SCALE: 1:750	DRAWING NO.: 001
DRAWN: LC	DESIGN: LC	CHECK: SC	

Appendix F

Background Traffic Operations



Timings (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West Sunday Peak Hour - Background Traffic

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩	↩↩	↩↩	↩	↩	↩↩	↩
Traffic Volume (vph)	174	700	231	202	788	246	754	124	173	685	150
Future Volume (vph)	174	700	231	202	788	246	754	124	173	685	150
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8		7	4	
Permitted Phases	2		2	6		8		8	4		4
Detector Phase	5	2	2	1	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	10.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	11.0	49.0	49.0	11.0	49.0	14.0	51.0	51.0	11.0	51.0	51.0
Total Split (s)	11.0	55.0	55.0	11.0	55.0	15.0	30.0	30.0	15.0	30.0	30.0
Total Split (%)	9.9%	49.5%	49.5%	9.9%	49.5%	13.5%	27.0%	27.0%	13.5%	27.0%	27.0%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None
Act Effect Green (s)	58.0	48.0	48.0	58.0	48.0	36.7	23.1	23.1	36.9	23.2	23.2
Actuated g/C Ratio	0.52	0.43	0.43	0.52	0.43	0.33	0.21	0.21	0.33	0.21	0.21
v/c Ratio	0.59	0.33	0.30	0.53	0.45	0.54	1.06	0.31	0.73	0.97	0.37
Control Delay	21.0	21.3	3.5	18.6	21.7	28.7	93.5	10.5	43.9	71.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	21.3	3.5	18.6	21.7	28.7	93.5	10.5	43.9	71.5	13.3
LOS	C	C	A	B	C	C	F	B	D	E	B
Approach Delay	17.5			21.2			58.1				
Approach LOS	B			C			E				

Intersection Summary

Cycle Length: 111

Actuated Cycle Length: 110.8

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 41.3

Intersection LOS: D

Intersection Capacity Utilization 97.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 101: Bronte Road & Dundas Street West

↩ Ø1	↩ Ø2	↩ Ø3	↩ Ø4
11 s	55 s	15 s	30 s
↩ Ø5	↩ Ø6	↩ Ø7	↩ Ø8
11 s	55 s	15 s	30 s

Queues (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West Sunday Peak Hour - Background Traffic

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	181	729	241	210	991	256	785	129	180	714	156
v/c Ratio	0.59	0.33	0.30	0.53	0.45	0.54	1.06	0.31	0.73	0.97	0.37
Control Delay	21.0	21.3	3.5	18.6	21.7	28.7	93.5	10.5	43.9	71.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	21.3	3.5	18.6	21.7	28.7	93.5	10.5	43.9	71.5	13.3
Queue Length 50th (m)	19.3	39.4	0.0	22.8	54.1	20.2	~104.7	2.0	28.5	86.0	6.1
Queue Length 95th (m)	31.2	49.6	14.4	36.1	66.5	30.0	#144.0	18.2	#52.7	#126.4	24.6
Internal Link Dist (m)	136.8			113.9			358.1			212.2	
Turn Bay Length (m)	90.0		80.0	115.0		100.0		45.0	175.0		50.0
Base Capacity (vph)	308	2202	813	393	2191	483	739	418	251	733	427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.33	0.30	0.53	0.45	0.53	1.06	0.31	0.72	0.97	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
101: Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰
Traffic Volume (vph)	174	700	231	202	788	163	246	754	124	173	685	150
Future Volume (vph)	174	700	231	202	788	163	246	754	124	173	685	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	5085	1563	1752	4995		3400	3539	1558	1769	3505	1577
Flt Permitted	0.23	1.00	1.00	0.33	1.00		0.17	1.00	0.17	1.00	1.00	1.00
Satd. Flow (perm)	425	5085	1563	615	4995		620	3539	1558	321	3505	1577
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)	181	729	241	210	821	170	256	785	129	180	714	156
RTOR Reduction (vph)	0	0	137	0	28	0	0	0	93	0	0	97
Lane Group Flow (vph)	181	729	104	210	963	0	256	785	36	180	714	59
Confl. Peds. (#/hr)			1	1			2		5	5		2
Heavy Vehicles (%)	1%	2%	2%	3%	1%	2%	3%	2%	2%	2%	3%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	55.0	48.0	48.0	55.0	48.0		33.7	23.1	23.1	33.9	23.2	23.2
Effective Green, g (s)	55.0	48.0	48.0	55.0	48.0		33.7	23.1	23.1	33.9	23.2	23.2
Actuated g/C Ratio	0.50	0.43	0.43	0.50	0.43		0.30	0.21	0.21	0.31	0.21	0.21
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	297	2202	677	377	2163		454	737	324	238	733	330
v/s Ratio Prot	c0.04	0.14		0.04	0.19		0.05	c0.22		c0.07	0.20	
v/s Ratio Perm	c0.26		0.07	0.24			0.12		0.02	0.16		0.04
v/c Ratio	0.61	0.33	0.15	0.56	0.45		0.56	1.07	0.11	0.76	0.97	0.18
Uniform Delay, d1	16.2	20.8	19.1	16.3	22.0		30.3	43.8	35.5	31.5	43.5	36.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.4	0.5	1.8	0.7		1.6	51.9	0.2	12.8	26.7	0.3
Delay (s)	19.7	21.2	19.6	18.1	22.7		31.9	95.7	35.7	44.4	70.2	36.2
Level of Service	B	C	B	B	C		C	F	D	D	E	D
Approach Delay (s)		20.6			21.9			75.1			60.7	
Approach LOS		C			C			E			E	
Intersection Summary												
HCM 2000 Control Delay		44.1			HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio		0.75										
Actuated Cycle Length (s)		110.8			Sum of lost time (s)			22.0				
Intersection Capacity Utilization		97.4%			ICU Level of Service			F				
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
102: Old Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↰↰			↰↰↰				↰			↰
Traffic Volume (veh/h)	0	964	46	0	1200	4	0	0	96	0	0	0
Future Volume (Veh/h)	0	964	46	0	1200	4	0	0	96	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	1026	49	0	1277	4	0	0	102	0	0	0
Pedestrians									9			1
Lane Width (m)									3.6			3.6
Walking Speed (m/s)									1.2			1.2
Percent Blockage									1			0
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		138			344							
pX, platoon unblocked	0.95			0.91			0.93	0.93	0.91	0.93	0.93	0.95
vC, conflicting volume	1282			1084			1485	2342	376	1724	2364	429
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1125			748			934	1851	0	1190	1875	230
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	100			100			100	100	90	100	100	100
cM capacity (veh/h)	599			786			206	69	986	121	67	736
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	410	410	254	511	511	259	102	0				
Volume Left	0	0	0	0	0	0	0	0				
Volume Right	0	0	49	0	0	4	102	0				
cSH	1700	1700	1700	1700	1700	1700	986	1700				
Volume to Capacity	0.24	0.24	0.15	0.30	0.30	0.15	0.10	0.00				
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0				
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0				
Lane LOS							A	A				
Approach Delay (s)	0.0			0.0			9.1	0.0				
Approach LOS							A	A				
Intersection Summary												
Average Delay		0.4										
Intersection Capacity Utilization		32.3%					ICU Level of Service		A			
Analysis Period (min)		15										

Timings
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↘	↑↑↑	↖
Traffic Volume (vph)	962	89	148	1031	60
Future Volume (vph)	962	89	148	1031	60
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	8
Permitted Phases		2	6		
Detector Phase	2	2	1	6	8
Switch Phase					
Minimum Initial (s)	20.0	20.0	7.0	20.0	10.0
Minimum Split (s)	34.1	34.1	11.5	34.1	45.3
Total Split (s)	52.0	52.0	11.5	63.5	47.0
Total Split (%)	47.1%	47.1%	10.4%	57.5%	42.5%
Yellow Time (s)	4.2	4.2	3.0	4.2	3.3
All-Red Time (s)	1.9	1.9	1.0	1.9	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	4.0	6.1	6.3
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	Max	Max	None	Max	None
Act Effct Green (s)	46.2	46.2	59.6	57.5	11.5
Actuated g/C Ratio	0.57	0.57	0.73	0.71	0.14
v/c Ratio	0.36	0.11	0.37	0.31	0.60
Control Delay	10.3	2.5	6.0	4.9	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	2.5	6.0	4.9	24.4
LOS	B	A	A	A	C
Approach Delay	9.6			5.1	24.4
Approach LOS	A			A	C

Intersection Summary

Cycle Length: 110.5

Actuated Cycle Length: 81.4

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 8.5

Intersection LOS: A

Intersection Capacity Utilization 58.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 103: Grand Oak Trail & Dundas Street West



Queues
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1034	96	159	1109	194
v/c Ratio	0.36	0.11	0.37	0.31	0.60
Control Delay	10.3	2.5	6.0	4.9	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	2.5	6.0	4.9	24.4
Queue Length 50th (m)	29.4	0.0	5.5	18.9	13.8
Queue Length 95th (m)	44.8	6.7	13.9	31.9	34.4
Internal Link Dist (m)	320.5			123.6	401.0
Turn Bay Length (m)		70.0	75.0		
Base Capacity (vph)	2884	914	436	3625	883
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.36	0.11	0.36	0.31	0.22

Intersection Summary

HCM Signalized Intersection Capacity Analysis
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑	↓	↑↑↑	↓	↑
Traffic Volume (vph)	962	89	148	1031	60	120
Future Volume (vph)	962	89	148	1031	60	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	4.0	6.1	6.3	
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	
Frpb, ped/bikes	1.00	0.97	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	1.00	1.00	0.95	1.00	0.98	
Satd. Flow (prot)	5085	1547	1786	5136	1663	
Flt Permitted	1.00	1.00	0.23	1.00	0.98	
Satd. Flow (perm)	5085	1547	426	5136	1663	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1034	96	159	1109	65	129
RTOR Reduction (vph)	0	42	0	0	88	0
Lane Group Flow (vph)	1034	54	159	1109	106	0
Confl. Peds. (#/hr)		9	9			3
Heavy Vehicles (%)	2%	1%	1%	1%	0%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	46.2	46.2	57.5	57.5	11.5	
Effective Green, g (s)	46.2	46.2	57.5	57.5	11.5	
Actuated g/C Ratio	0.57	0.57	0.71	0.71	0.14	
Clearance Time (s)	6.1	6.1	4.0	6.1	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2886	878	422	3628	234	
v/s Ratio Prot	0.20		c0.03	0.22	c0.06	
v/s Ratio Perm		0.04	c0.23			
v/c Ratio	0.36	0.06	0.38	0.31	0.45	
Uniform Delay, d1	9.6	7.9	4.3	4.5	32.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1	0.6	0.2	1.4	
Delay (s)	9.9	8.0	4.9	4.7	33.5	
Level of Service	A	A	A	A	C	
Approach Delay (s)	9.7			4.7	33.5	
Approach LOS	A			A	C	

Intersection Summary

HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	16.4
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings
104: Bronte Road & Highvalley Road/Pine Glen Road

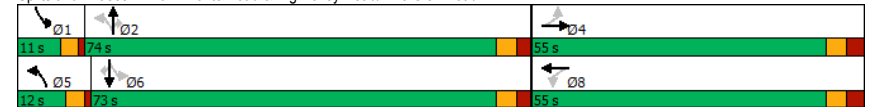
(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↓	↓	↓	↓	↓	↑↑	↑	↓	↑↑	↓
Traffic Volume (vph)	1	12	164	22	29	1037	107	52	1049	6
Future Volume (vph)	1	12	164	22	29	1037	107	52	1049	6
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	38.5	38.5	38.5	38.5	11.0	33.1	33.1	11.0	33.1	33.1
Total Split (s)	55.0	55.0	55.0	55.0	12.0	74.0	74.0	11.0	73.0	73.0
Total Split (%)	39.3%	39.3%	39.3%	39.3%	8.6%	52.9%	52.9%	7.9%	52.1%	52.1%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.7	3.7	3.0	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	1.0	2.4	2.4	1.0	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	4.0	6.1	6.1	4.0	6.1	6.1
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
Act Effect Green (s)	19.1	19.1	19.1	19.1	76.2	68.7	68.7	77.0	70.9	70.9
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.70	0.63	0.63	0.71	0.65	0.65
v/c Ratio	0.01	0.11	0.73	0.40	0.08	0.50	0.12	0.16	0.49	0.01
Control Delay	36.0	20.4	61.1	13.2	5.8	13.1	5.4	6.3	12.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	20.4	61.1	13.2	5.8	13.1	5.4	6.3	12.4	0.0
LOS	D	C	E	B	A	B	A	A	B	A
Approach Delay		20.8		39.0		12.2			12.1	
Approach LOS		C		D		B			B	

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 109
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 15.4
Intersection Capacity Utilization 65.8%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

Splits and Phases: 104: Bronte Road & Highvalley Road/Pine Glen Road



Queues
104: Bronte Road & Highvalley Road/Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1	36	176	151	31	1115	115	56	1128	6
v/c Ratio	0.01	0.11	0.73	0.40	0.08	0.50	0.12	0.16	0.49	0.01
Control Delay	36.0	20.4	61.1	13.2	5.8	13.1	5.4	6.3	12.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	20.4	61.1	13.2	5.8	13.1	5.4	6.3	12.4	0.0
Queue Length 50th (m)	0.2	2.5	38.4	4.6	1.7	69.9	4.3	3.1	71.8	0.0
Queue Length 95th (m)	1.7	11.4	62.8	22.4	5.5	105.0	13.9	8.6	108.1	0.0
Internal Link Dist (m)		86.0		103.5		93.5			358.1	
Turn Bay Length (m)	20.0		20.0		85.0		45.0	60.0		25.0
Base Capacity (vph)	505	771	612	766	384	2251	989	354	2279	862
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.05	0.29	0.20	0.08	0.50	0.12	0.16	0.49	0.01
Intersection Summary										

HCM Signalized Intersection Capacity Analysis
104: Bronte Road & Highvalley Road/Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	1	12	21	164	22	118	29	1037	107	52	1049	6
Future Volume (vph)	1	12	21	164	22	118	29	1037	107	52	1049	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1799	1696		1773	1557		1804	3574	1536	1769	3505	1300
Flt Permitted	0.60	1.00		0.73	1.00		0.21	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1129	1696		1369	1557		396	3574	1536	374	3505	1300
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)	1	13	23	176	24	127	31	1115	115	56	1128	6
RTOR Reduction (vph)	0	19	0	0	105	0	0	0	24	0	0	2
Lane Group Flow (vph)	1	17	0	176	46	0	31	1115	91	56	1128	4
Confl. Peds. (#/hr)	4		8	8		4	7		5	5		7
Heavy Vehicles (%)	0%	0%	0%	1%	17%	3%	0%	1%	2%	2%	3%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	19.1	19.1		19.1	19.1		73.5	69.5	69.5	76.3	70.9	70.9
Effective Green, g (s)	19.1	19.1		19.1	19.1		73.5	69.5	69.5	76.3	70.9	70.9
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.66	0.63	0.63	0.69	0.64	0.64
Clearance Time (s)	6.5	6.5		6.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	292		236	268		314	2245	965	326	2246	833
v/s Ratio Prot		0.01			0.03		0.00	0.31		c0.01	c0.32	
v/s Ratio Perm	0.00			c0.13			0.06		0.06	0.11		0.00
Uniform Delay, d1	37.9	38.2		43.4	39.0		7.0	11.1	8.1	6.7	10.5	7.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1		12.1	0.3		0.1	0.8	0.2	0.3	0.8	0.0
Delay (s)	37.9	38.3		55.5	39.3		7.2	11.9	8.3	6.9	11.3	7.2
Level of Service	D	D		E	D		A	B	A	A	B	A
Approach Delay (s)		38.3			48.0			11.4			11.1	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		15.9								B		
HCM 2000 Volume to Capacity ratio		0.54										
Actuated Cycle Length (s)		110.6						Sum of lost time (s)		16.6		
Intersection Capacity Utilization		65.8%						ICU Level of Service		C		
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
105: Khalsa Gate/Old Bronte Road & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

																			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR							
Lane Configurations																			
Sign Control		Stop			Stop			Stop			Stop								
Traffic Volume (vph)	72	85	54	21	147	45	100	46	29	15	18	96							
Future Volume (vph)	72	85	54	21	147	45	100	46	29	15	18	96							
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94							
Hourly flow rate (vph)	77	90	57	22	156	48	106	49	31	16	19	102							
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1														
Volume Total (vph)	224	22	204	186	137														
Volume Left (vph)	77	22	0	106	16														
Volume Right (vph)	57	0	48	31	102														
Hadj (s)	-0.08	0.50	-0.13	0.01	-0.42														
Departure Headway (s)	5.2	6.2	5.5	5.3	5.0														
Degree Utilization, x	0.32	0.04	0.31	0.27	0.19														
Capacity (veh/h)	651	550	613	614	648														
Control Delay (s)	10.6	8.2	9.8	10.3	9.1														
Approach Delay (s)	10.6	9.7		10.3	9.1														
Approach LOS	B	A		B	A														
Intersection Summary																			
Delay			10.0																
Level of Service			A																
Intersection Capacity Utilization			49.3%	ICU Level of Service		A													
Analysis Period (min)			15																

HCM Unsignalized Intersection Capacity Analysis
106: Grand Oak Trail & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	40	108	26	28	131	19	22	118	28	45	133	64
Future Volume (vph)	40	108	26	28	131	19	22	118	28	45	133	64
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)	43	116	28	30	141	20	24	127	30	48	143	69
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	43	144	30	161	24	157	48	212				
Volume Left (vph)	43	0	30	0	24	0	48	0				
Volume Right (vph)	0	28	0	20	0	30	0	69				
Hadj (s)	0.50	-0.12	0.50	0.00	0.50	-0.12	0.50	-0.19				
Departure Headway (s)	6.5	5.8	6.4	5.9	6.4	5.8	6.3	5.6				
Degree Utilization, x	0.08	0.23	0.05	0.27	0.04	0.25	0.08	0.33				
Capacity (veh/h)	523	580	524	571	532	588	541	612				
Control Delay (s)	8.8	9.4	8.6	9.9	8.5	9.5	8.7	10.1				
Approach Delay (s)	9.3		9.7		9.4		9.9					
Approach LOS	A		A		A		A					
Intersection Summary												
Delay			9.6									
Level of Service			A									
Intersection Capacity Utilization			41.6%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
107: Khalsa Gate & Private Driveway/Driveway 1

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	0	0	0	1	98	1	23	17	55	12	12
Future Volume (Veh/h)	34	0	0	0	1	98	1	23	17	55	12	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	0	0	0	1	107	1	25	18	60	13	13
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	283	184	20	176	182	34	26			43		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	283	184	20	176	182	34	26			43		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	100	100	100	90	100			96		
cM capacity (veh/h)	582	682	1058	764	684	1039	1588			1566		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	37	108	44	86								
Volume Left	37	0	1	60								
Volume Right	0	107	18	13								
cSH	582	1034	1588	1566								
Volume to Capacity	0.06	0.10	0.00	0.04								
Queue Length 95th (m)	1.6	2.8	0.0	1.0								
Control Delay (s)	11.6	8.9	0.2	5.2								
Lane LOS	B	A	A	A								
Approach Delay (s)	11.6	8.9	0.2	5.2								
Approach LOS	B	A										
Intersection Summary												
Average Delay	6.7											
Intersection Capacity Utilization	26.3%			ICU Level of Service					A			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
108: Driveway 2 & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Background Traffic

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	141	1	21	193	18	23
Future Volume (Veh/h)	141	1	21	193	18	23
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	153	1	23	210	20	25
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			154		410	154
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			154		410	154
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	97
cM capacity (veh/h)			1426		589	892
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	154	233	45			
Volume Left	0	23	20			
Volume Right	1	0	25			
cSH	1700	1426	726			
Volume to Capacity	0.09	0.02	0.06			
Queue Length 95th (m)	0.0	0.4	1.6			
Control Delay (s)	0.0	0.9	10.3			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.9	10.3			
Approach LOS		B				
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			32.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Appendix G

Total Traffic Operations



Timings (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West Sunday Peak Hour - Total Traffic

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰↰	↰↰	↰	↰	↰↰	↰
Traffic Volume (vph)	174	700	248	202	788	259	765	124	173	702	150
Future Volume (vph)	174	700	248	202	788	259	765	124	173	702	150
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8		7	4	
Permitted Phases	2		2	6		8		8	4		4
Detector Phase	5	2	2	1	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	10.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	11.0	49.0	49.0	11.0	49.0	14.0	51.0	51.0	11.0	51.0	51.0
Total Split (s)	11.0	55.0	55.0	11.0	55.0	15.0	30.0	30.0	15.0	30.0	30.0
Total Split (%)	9.9%	49.5%	49.5%	9.9%	49.5%	13.5%	27.0%	27.0%	13.5%	27.0%	27.0%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	58.0	48.0	48.0	58.0	48.0	36.8	23.1	23.1	36.8	23.1	23.1
Actuated g/C Ratio	0.52	0.43	0.43	0.52	0.43	0.33	0.21	0.21	0.33	0.21	0.21
v/c Ratio	0.59	0.33	0.31	0.53	0.45	0.57	1.08	0.31	0.73	1.00	0.37
Control Delay	21.0	21.3	3.5	18.6	21.7	29.3	98.5	10.5	43.9	77.5	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	21.3	3.5	18.6	21.7	29.3	98.5	10.5	43.9	77.5	13.8
LOS	C	C	A	B	C	C	F	B	D	E	B
Approach Delay	17.3			21.2			73.4			62.5	
Approach LOS	B			C			E			E	

Intersection Summary

Cycle Length: 111

Actuated Cycle Length: 110.8

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 43.2

Intersection LOS: D

Intersection Capacity Utilization 97.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 101: Bronte Road & Dundas Street West

↰ Ø1	↰ Ø2	↰ Ø3	↰ Ø4
11 s	55 s	15 s	30 s
↰ Ø5	↰ Ø6	↰ Ø7	↰ Ø8
11 s	55 s	15 s	30 s

Queues (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West Sunday Peak Hour - Total Traffic

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	181	729	258	210	991	270	797	129	180	731	156
v/c Ratio	0.59	0.33	0.31	0.53	0.45	0.57	1.08	0.31	0.73	1.00	0.37
Control Delay	21.0	21.3	3.5	18.6	21.7	29.3	98.5	10.5	43.9	77.5	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	21.3	3.5	18.6	21.7	29.3	98.5	10.5	43.9	77.5	13.8
Queue Length 50th (m)	19.3	39.4	0.0	22.8	54.1	21.4	~107.7	2.0	28.5	~89.3	6.7
Queue Length 95th (m)	31.2	49.6	14.8	36.1	66.5	31.5	#147.3	18.2	#52.5	#130.9	25.3
Internal Link Dist (m)	136.8			113.9			358.1			212.2	
Turn Bay Length (m)	90.0		80.0	115.0		100.0		45.0	175.0		50.0
Base Capacity (vph)	308	2202	823	393	2191	483	739	418	251	732	424
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.33	0.31	0.53	0.45	0.56	1.08	0.31	0.72	1.00	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 101: Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰
Traffic Volume (vph)	174	700	248	202	788	163	259	765	124	173	702	150
Future Volume (vph)	174	700	248	202	788	163	259	765	124	173	702	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	5085	1563	1752	4995		3400	3539	1558	1769	3505	1577
Flt Permitted	0.23	1.00	1.00	0.33	1.00		0.17	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	425	5085	1563	615	4995		620	3539	1558	323	3505	1577
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)	181	729	258	210	821	170	270	797	129	180	731	156
RTOR Reduction (vph)	0	0	146	0	28	0	0	0	93	0	0	95
Lane Group Flow (vph)	181	729	112	210	963	0	270	797	36	180	731	61
Confl. Peds. (#/hr)			1	1			2		5	5		2
Heavy Vehicles (%)	1%	2%	2%	3%	1%	2%	3%	2%	2%	2%	3%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	55.0	48.0	48.0	55.0	48.0		33.8	23.1	23.1	33.8	23.1	23.1
Effective Green, g (s)	55.0	48.0	48.0	55.0	48.0		33.8	23.1	23.1	33.8	23.1	23.1
Actuated g/C Ratio	0.50	0.43	0.43	0.50	0.43		0.31	0.21	0.21	0.31	0.21	0.21
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	297	2202	677	377	2163		457	737	324	238	730	328
v/s Ratio Prot	c0.04	0.14		0.04	0.19		0.06	c0.23		c0.07	0.21	
v/s Ratio Perm	c0.26		0.07	0.24			0.12		0.02	0.16		0.04
v/c Ratio	0.61	0.33	0.17	0.56	0.45		0.59	1.08	0.11	0.76	1.00	0.19
Uniform Delay, d1	16.2	20.8	19.2	16.3	22.0		30.5	43.8	35.5	31.6	43.8	36.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.4	0.5	1.8	0.7		2.0	57.4	0.2	12.8	33.6	0.3
Delay (s)	19.7	21.2	19.7	18.1	22.7		32.6	101.2	35.7	44.4	77.5	36.4
Level of Service	B	C	B	B	C		C	F	D	D	E	D
Approach Delay (s)		20.6			21.9			78.6			65.9	
Approach LOS		C			C			E			E	
Intersection Summary												
HCM 2000 Control Delay		46.4			HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio		0.75										
Actuated Cycle Length (s)		110.8			Sum of lost time (s)			22.0				
Intersection Capacity Utilization		97.6%			ICU Level of Service			F				
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 102: Old Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↰↰			↰↰↰				↰			↰
Traffic Volume (veh/h)	0	964	46	0	1200	4	0	0	96	0	0	0
Future Volume (Veh/h)	0	964	46	0	1200	4	0	0	96	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	1026	49	0	1277	4	0	0	102	0	0	0
Pedestrians									9			1
Lane Width (m)									3.6			3.6
Walking Speed (m/s)									1.2			1.2
Percent Blockage									1			0
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		138			344							
pX, platoon unblocked	0.95			0.91			0.93	0.93	0.91	0.93	0.93	0.95
vC, conflicting volume	1282			1084			1485	2342	376	1724	2364	429
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1121			748			929	1846	0	1185	1870	225
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	100			100			100	100	90	100	100	100
cM capacity (veh/h)	600			786			208	70	986	122	68	740
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	410	410	254	511	511	259	102	0				
Volume Left	0	0	0	0	0	0	0	0				
Volume Right	0	0	49	0	0	4	102	0				
cSH	1700	1700	1700	1700	1700	1700	986	1700				
Volume to Capacity	0.24	0.24	0.15	0.30	0.30	0.15	0.10	0.00				
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0				
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0				
Lane LOS							A	A				
Approach Delay (s)	0.0			0.0			9.1	0.0				
Approach LOS							A	A				
Intersection Summary												
Average Delay		0.4										
Intersection Capacity Utilization		32.3%					ICU Level of Service		A			
Analysis Period (min)		15										

Timings
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

	→	↖	↗	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↖	↑↑↑	↖
Traffic Volume (vph)	962	89	169	1031	60
Future Volume (vph)	962	89	169	1031	60
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	8
Permitted Phases		2	6		
Detector Phase	2	2	1	6	8
Switch Phase					
Minimum Initial (s)	20.0	20.0	7.0	20.0	10.0
Minimum Split (s)	34.1	34.1	11.5	34.1	45.3
Total Split (s)	52.0	52.0	11.5	63.5	47.0
Total Split (%)	47.1%	47.1%	10.4%	57.5%	42.5%
Yellow Time (s)	4.2	4.2	3.0	4.2	3.3
All-Red Time (s)	1.9	1.9	1.0	1.9	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	4.0	6.1	6.3
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	Max	Max	None	Max	None
Act Effct Green (s)	46.1	46.1	59.5	57.4	11.7
Actuated g/C Ratio	0.57	0.57	0.73	0.70	0.14
v/c Ratio	0.36	0.11	0.42	0.31	0.62
Control Delay	10.4	2.5	6.7	5.0	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	2.5	6.7	5.0	24.1
LOS	B	A	A	A	C
Approach Delay	9.7			5.2	24.1
Approach LOS	A			A	C

Intersection Summary

Cycle Length: 110.5

Actuated Cycle Length: 81.5

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 8.6

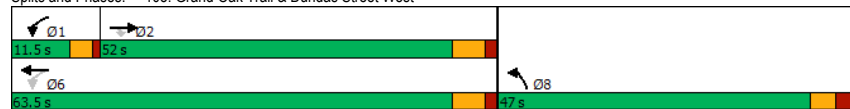
Intersection LOS: A

Intersection Capacity Utilization 60.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 103: Grand Oak Trail & Dundas Street West



Queues
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

	→	↖	↗	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1034	96	182	1109	206
v/c Ratio	0.36	0.11	0.42	0.31	0.62
Control Delay	10.4	2.5	6.7	5.0	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	2.5	6.7	5.0	24.1
Queue Length 50th (m)	29.5	0.0	6.5	19.0	14.2
Queue Length 95th (m)	45.3	6.7	15.9	32.4	35.4
Internal Link Dist (m)	320.5			123.6	401.0
Turn Bay Length (m)		70.0	75.0		
Base Capacity (vph)	2874	911	435	3618	884
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.36	0.11	0.42	0.31	0.23

Intersection Summary

HCM Signalized Intersection Capacity Analysis
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑	↓	↑↑↑	↓	↑
Traffic Volume (vph)	962	89	169	1031	60	131
Future Volume (vph)	962	89	169	1031	60	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	4.0	6.1	6.3	
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	
Frpb, ped/bikes	1.00	0.97	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	1.00	1.00	0.95	1.00	0.98	
Satd. Flow (prot)	5085	1547	1786	5136	1659	
Flt Permitted	1.00	1.00	0.23	1.00	0.98	
Satd. Flow (perm)	5085	1547	425	5136	1659	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1034	96	182	1109	65	141
RTOR Reduction (vph)	0	42	0	0	96	0
Lane Group Flow (vph)	1034	54	182	1109	110	0
Confl. Peds. (#/hr)		9	9			3
Heavy Vehicles (%)	2%	1%	1%	1%	0%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	46.1	46.1	57.4	57.4	11.7	
Effective Green, g (s)	46.1	46.1	57.4	57.4	11.7	
Actuated g/C Ratio	0.57	0.57	0.70	0.70	0.14	
Clearance Time (s)	6.1	6.1	4.0	6.1	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2876	875	421	3617	238	
v/s Ratio Prot	0.20		c0.04	0.22	c0.07	
v/s Ratio Perm		0.04	c0.27			
v/c Ratio	0.36	0.06	0.43	0.31	0.46	
Uniform Delay, d1	9.7	8.0	4.5	4.5	32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1	0.7	0.2	1.4	
Delay (s)	10.0	8.1	5.2	4.8	33.4	
Level of Service	B	A	A	A	C	
Approach Delay (s)	9.8			4.8	33.4	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	81.5	Sum of lost time (s)	16.4
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

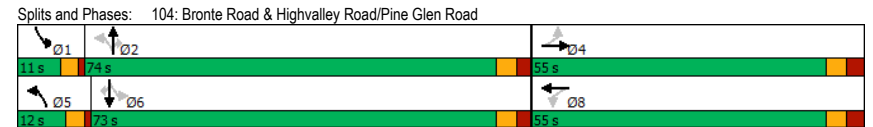
c Critical Lane Group

Timings
104: Bronte Road & Highvalley Road/Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↓	↓	↓	↓	↓	↑↑	↑	↓	↑↑	↓
Traffic Volume (vph)	1	12	177	22	29	1037	128	86	1049	6
Future Volume (vph)	1	12	177	22	29	1037	128	86	1049	6
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	38.5	38.5	38.5	38.5	11.0	33.1	33.1	11.0	33.1	33.1
Total Split (s)	55.0	55.0	55.0	55.0	12.0	74.0	74.0	11.0	73.0	73.0
Total Split (%)	39.3%	39.3%	39.3%	39.3%	8.6%	52.9%	52.9%	7.9%	52.1%	52.1%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.7	3.7	3.0	3.7	3.7
All-Red Time (s)	3.2	3.2	3.2	3.2	1.0	2.4	2.4	1.0	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	4.0	6.1	6.1	4.0	6.1	6.1
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
Act Effect Green (s)	20.7	20.7	20.7	20.7	77.2	68.1	68.1	78.9	72.7	72.7
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.69	0.61	0.61	0.70	0.65	0.65
v/c Ratio	0.01	0.11	0.76	0.44	0.09	0.52	0.14	0.27	0.50	0.01
Control Delay	35.0	20.0	62.4	13.0	6.2	14.5	5.5	7.7	13.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	20.0	62.4	13.0	6.2	14.5	5.5	7.7	13.0	0.0
LOS	C	B	E	B	A	B	A	A	B	A
Approach Delay		20.4		38.6		13.4			12.6	
Approach LOS		C		D		B			B	

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 112.4	
Natural Cycle: 85	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 66.4%	ICU Level of Service C
Analysis Period (min) 15	



Queues (240110) 2403 Khalsa Gate
104: Bronte Road & Highvalley Road/Pine Glen Road
Sunday Peak Hour - Total Traffic

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1	36	190	177	31	1115	138	92	1128	6
v/c Ratio	0.01	0.11	0.76	0.44	0.09	0.52	0.14	0.27	0.50	0.01
Control Delay	35.0	20.0	62.4	13.0	6.2	14.5	5.5	7.7	13.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	20.0	62.4	13.0	6.2	14.5	5.5	7.7	13.0	0.0
Queue Length 50th (m)	0.2	2.5	41.9	5.8	1.8	72.4	5.3	5.4	74.3	0.0
Queue Length 95th (m)	1.7	11.4	67.8	24.9	5.8	109.3	16.3	13.4	112.4	0.0
Internal Link Dist (m)		86.0		103.5		93.5			358.1	
Turn Bay Length (m)	20.0		20.0		85.0		45.0	60.0		25.0
Base Capacity (vph)	434	745	591	754	379	2163	958	338	2266	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.05	0.32	0.23	0.08	0.52	0.14	0.27	0.50	0.01
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (240110) 2403 Khalsa Gate
104: Bronte Road & Highvalley Road/Pine Glen Road
Sunday Peak Hour - Total Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	1	12	21	177	22	142	29	1037	128	86	1049	6
Future Volume (vph)	1	12	21	177	22	142	29	1037	128	86	1049	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1799	1696		1773	1554		1804	3574	1535	1769	3505	1299
Flt Permitted	0.53	1.00		0.73	1.00		0.21	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1005	1696		1369	1554		401	3574	1535	357	3505	1299
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)	1	13	23	190	24	153	31	1115	138	92	1128	6
RTOR Reduction (vph)	0	19	0	0	120	0	0	0	30	0	0	2
Lane Group Flow (vph)	1	17	0	190	57	0	31	1115	108	92	1128	4
Confl. Peds. (#/hr)	4		8	8		4	7		5	5		7
Heavy Vehicles (%)	0%	0%	0%	1%	17%	3%	0%	1%	2%	2%	3%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	20.7	20.7		20.7	20.7		73.9	69.8	69.8	79.7	72.7	72.7
Effective Green, g (s)	20.7	20.7		20.7	20.7		73.9	69.8	69.8	79.7	72.7	72.7
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.65	0.61	0.61	0.70	0.64	0.64
Clearance Time (s)	6.5	6.5		6.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	182	307		248	281		310	2186	939	335	2233	827
v/s Ratio Prot	0.01			0.04			0.00	0.31		c0.02	c0.32	
v/s Ratio Perm	0.00			c0.14			0.06		0.07	0.17		0.00
v/c Ratio	0.01	0.06		0.77	0.20		0.10	0.51	0.11	0.27	0.51	0.00
Uniform Delay, d1	38.3	38.6		44.4	39.7		7.8	12.5	9.2	7.3	11.1	7.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1		13.2	0.4		0.1	0.9	0.2	0.4	0.8	0.0
Delay (s)	38.3	38.7		57.6	40.0		8.0	13.4	9.5	7.7	11.9	7.5
Level of Service	D	D		E	D		A	B	A	A	B	A
Approach Delay (s)		38.7			49.1			12.8			11.6	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		17.2							B			
HCM 2000 Volume to Capacity ratio		0.56										
Actuated Cycle Length (s)		114.1						Sum of lost time (s)	16.6			
Intersection Capacity Utilization		66.4%						ICU Level of Service	C			
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
105: Khalsa Gate/Old Bronte Road & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

																			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR							
Lane Configurations																			
Sign Control		Stop			Stop			Stop			Stop								
Traffic Volume (vph)	72	98	96	43	156	45	128	46	41	15	18	96							
Future Volume (vph)	72	98	96	43	156	45	128	46	41	15	18	96							
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94							
Hourly flow rate (vph)	77	104	102	46	166	48	136	49	44	16	19	102							
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1														
Volume Total (vph)	283	46	214	229	137														
Volume Left (vph)	77	46	0	136	16														
Volume Right (vph)	102	0	48	44	102														
Hadj (s)	-0.16	0.50	-0.12	0.00	-0.42														
Departure Headway (s)	5.3	6.4	5.8	5.6	5.4														
Degree Utilization, x	0.42	0.08	0.35	0.36	0.20														
Capacity (veh/h)	630	521	579	583	586														
Control Delay (s)	12.1	8.8	10.7	11.7	9.8														
Approach Delay (s)	12.1	10.3		11.7	9.8														
Approach LOS	B	B		B	A														
Intersection Summary																			
Delay	11.1																		
Level of Service	B																		
Intersection Capacity Utilization	55.2%			ICU Level of Service			B												
Analysis Period (min)	15																		

HCM Unsignalized Intersection Capacity Analysis
106: Grand Oak Trail & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

																
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
Lane Configurations																
Sign Control		Stop			Stop			Stop			Stop					
Traffic Volume (vph)	51	111	29	28	135	19	26	118	28	45	133	85				
Future Volume (vph)	51	111	29	28	135	19	26	118	28	45	133	85				
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)	55	119	31	30	145	20	28	127	30	48	143	91				
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2								
Volume Total (vph)	55	150	30	165	28	157	48	234								
Volume Left (vph)	55	0	30	0	28	0	48	0								
Volume Right (vph)	0	31	0	20	0	30	0	91								
Hadj (s)	0.50	-0.13	0.50	0.00	0.50	-0.12	0.50	-0.24								
Departure Headway (s)	6.5	5.9	6.6	6.1	6.5	5.9	6.4	5.6								
Degree Utilization, x	0.10	0.25	0.05	0.28	0.05	0.26	0.09	0.37								
Capacity (veh/h)	514	572	513	559	521	576	533	609								
Control Delay (s)	9.1	9.6	8.7	10.2	8.7	9.7	8.8	10.7								
Approach Delay (s)	9.5		9.9		9.5		10.4									
Approach LOS	A		A		A		B									
Intersection Summary																
Delay	9.9															
Level of Service	A															
Intersection Capacity Utilization	42.8%			ICU Level of Service			A									
Analysis Period (min)	15															

HCM Unsignalized Intersection Capacity Analysis
107: Khalsa Gate & Private Driveway/Driveway 1

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Traffic Volume (veh/h)	34	0	0	0	1	138	1	23	17	119	12	12								
Future Volume (Veh/h)	34	0	0	0	1	138	1	23	17	119	12	12								
Sign Control		Stop			Stop			Free			Free									
Grade		0%			0%			0%			0%									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92								
Hourly flow rate (vph)	37	0	0	0	1	150	1	25	18	129	13	13								
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	464	322	20	314	320	34	26			43										
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	464	322	20	314	320	34	26			43										
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1										
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2										
p0 queue free %	91	100	100	100	100	86	100			92										
cM capacity (veh/h)	407	546	1058	599	547	1039	1588			1566										
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	37	151	44	155																
Volume Left	37	0	1	129																
Volume Right	0	150	18	13																
cSH	407	1033	1588	1566																
Volume to Capacity	0.09	0.15	0.00	0.08																
Queue Length 95th (m)	2.4	4.1	0.0	2.2																
Control Delay (s)	14.7	9.1	0.2	6.4																
Lane LOS	B	A	A	A																
Approach Delay (s)	14.7	9.1	0.2	6.4																
Approach LOS	B	A																		
Intersection Summary																				
Average Delay		7.5																		
Intersection Capacity Utilization		36.5%	ICU Level of Service						A											
Analysis Period (min)		15																		

HCM Unsignalized Intersection Capacity Analysis
108: Driveway 2 & Pine Glen Road

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	153	14	28	215	27	28
Future Volume (Veh/h)	153	14	28	215	27	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	166	15	30	234	29	30
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			181		468	174
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			181		468	174
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	97
cM capacity (veh/h)			1394		542	870
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	181	264	59			
Volume Left	0	30	29			
Volume Right	15	0	30			
cSH	1700	1394	670			
Volume to Capacity	0.11	0.02	0.09			
Queue Length 95th (m)	0.0	0.5	2.3			
Control Delay (s)	0.0	1.0	10.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.0	10.9			
Approach LOS		B				
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			35.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Appendix H

OTM Book 12 – Traffic Signal Justification Warrant



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



Horizon Year: _____ Total Traffic _____
Region/City/Township: Town of Oakville

Major Street: Dundas Street North/South: N
Minor Street: Old Bronte Road

Number of Approach Lanes: 1
Tee Intersection? Y
Flow Conditions: Restricted

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

PM Forecast Only? N

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Dundas Street						Old Bronte Road						
	Eastbound			Westbound			Northbound			Southbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Saturday Peak Hour		964	46		1200	4			96			0	0
Average Hourly Volume	0	482	23	0	600	2	0	0	48	0	0	0	0

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	1155
% Fulfilled						160.4%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	180	255	180	255	48
% Fulfilled						18.8%

Warrant	AHV
1A - All	1155
1B - Minor	48
2A - Major	1107
2B - Cross	0

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	1107
% Fulfilled						153.8%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	0
% Fulfilled						0.0%

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



Horizon Year: _____ Total Traffic _____
Region/City/Township: Town of Oakville

Major Street: Pine Glen Road
Minor Street: Old Bronte Road/Khalsa Gate

North/South: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results

150% Satisfied **No** Justification for new intersections with forecast traffic
120% Satisfied **No** Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Pine Glen Road						Old Bronte Road/Khalsa Gate						
	Eastbound			Westbound			Northbound			Southbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Saturday Peak Hour	72	98	96	43	156	45	128	46	41	15	18	96	14
Average Hourly Volume	36	49	48	22	78	23	64	23	21	8	9	48	7

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	427
					% Fulfilled	59.3%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	120	170	120	170	172
					% Fulfilled	101.2%

Warrant	AHV
1A - All	427
1B - Minor Street	172
2A - Major Street	255
2B - Cross Street	102

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	255
					% Fulfilled	35.4%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	102
					% Fulfilled	135.3%

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



Horizon Year: _____ Total Traffic _____
Region/City/Township: Town of Oakville

Major Street: Pine Glen Road North/South: N
Minor Street: Grand Oak Trail

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

Warrant Results

150% Satisfied **No** Justification for new intersections with forecast traffic
120% Satisfied **No** Justification for existing intersections with forecast traffic

PM Forecast Only? N

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Pine Glen Road						Grand Oak Trail						
	Eastbound			Westbound			Northbound			Southbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Saturday Peak Hour	51	111	29	28	135	19	26	118	28	45	133	85	29
Average Hourly Volume	26	56	15	14	68	10	13	59	14	23	67	43	15

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	404
					% Fulfilled	56.1%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	120	170	120	170	218
					% Fulfilled	127.9%

Warrant	AHV
1A - All	404
1B - Minor	218
2A - Major	187
2B - Cross	117

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	187
					% Fulfilled	25.9%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	117
					% Fulfilled	155.3%

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



Horizon Year: _____ Total Traffic _____
Region/City/Township: Town of Oakville

Major Street: Pine Glen Road North/South: N
Minor Street: Driveway 2

Number of Approach Lanes: 1
Tee Intersection? Y
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results

150% Satisfied **No** Justification for new intersections with forecast traffic
120% Satisfied **No** Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Pine Glen Road						Driveway 2						
	Eastbound			Westbound			Northbound			Southbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Saturday Peak Hour		153	14	28	215		27		28				0
Average Hourly Volume	0	77	7	14	108	0	14	0	14	0	0	0	0

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	All Approaches	480	720	600	900	
					% Fulfilled	32.3%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Minor Street Approaches	180	255	180	255	
					% Fulfilled	10.8%

Warrant	AHV
1A - All	233
1B - Minor	28
2A - Major	205
2B - Cross	14

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Major Street Approaches	480	720	600	900	
					% Fulfilled	28.5%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
			X			
	Traffic Crossing Major Street	50	75	50	75	
					% Fulfilled	18.0%

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



Horizon Year: _____ Total Traffic _____
Region/City/Township: Town of Oakville

Major Street: Khalsa Gate North/South: Y
Minor Street: Driveway 1

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Khalsa Gate						Driveway 1						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Saturday Peak Hour	1	23	17	119	12	12	34	0	0	0	1	138	0
Average Hourly Volume	1	12	9	60	6	6	17	0	0	0	1	69	0

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	
					% Fulfilled	24.8%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	120	170	120	170	
					% Fulfilled	50.9%

Warrant	AHV
1A - All	179
1B - Mino	87
2A - Majo	92
2B - Cros	18

Warrant 2 - Delay To Cross Traffic

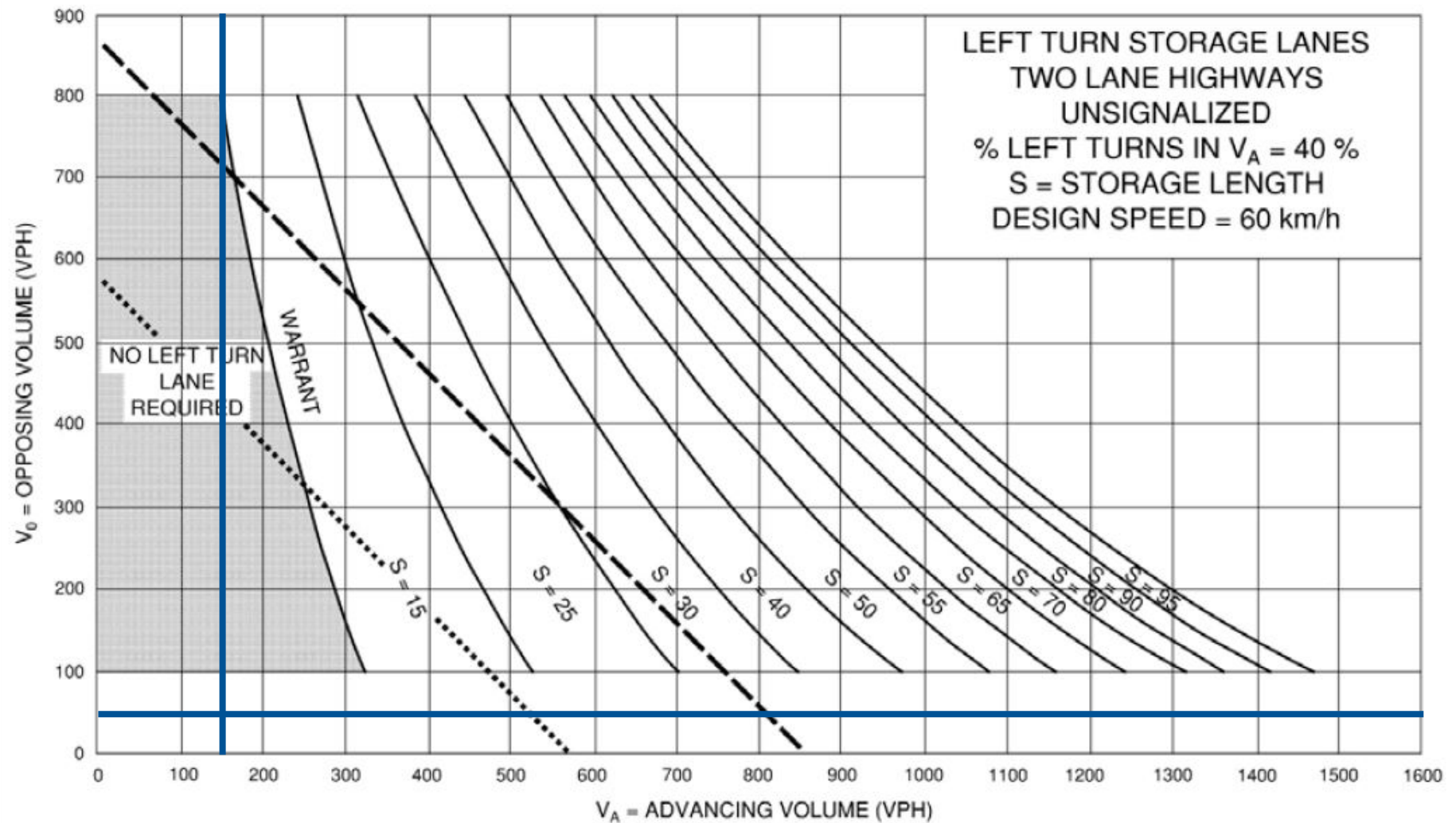
2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	
					% Fulfilled	12.8%

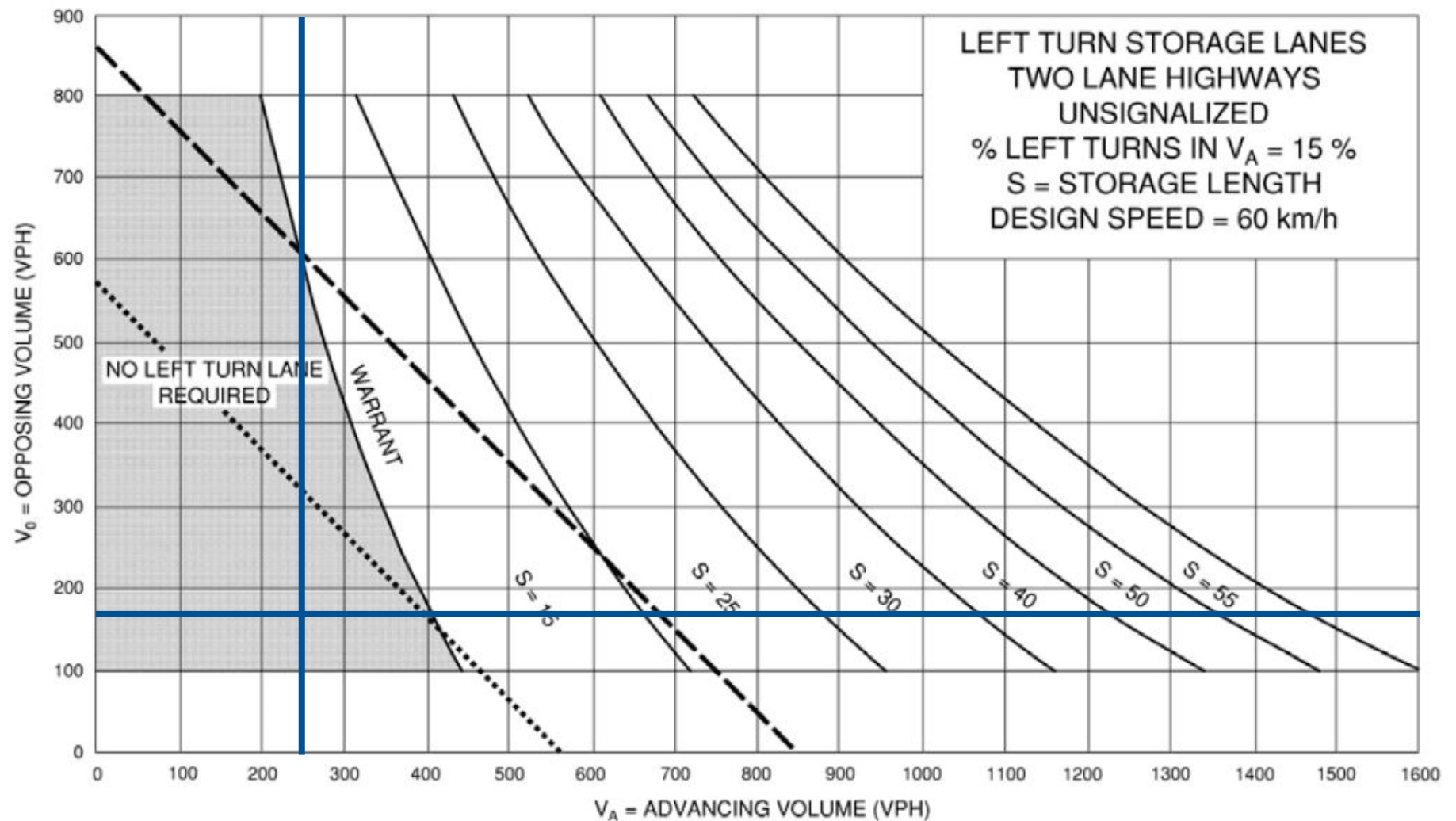
2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	
					% Fulfilled	23.3%

Appendix I

MTO Left-Turn Lane Nomographs







Appendix J

Total Traffic Operations – Remedial



Timings (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West Sunday Peak Hour - Total Traffic - Remedial Measures

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰↰↰	↰	↰	↰↰↰	↰
Traffic Volume (vph)	174	700	248	202	788	259	765	124	173	702	150
Future Volume (vph)	174	700	248	202	788	259	765	124	173	702	150
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8		7	4	
Permitted Phases	2		2	6		8		8	4		4
Detector Phase	5	2	2	1	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	10.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	11.0	49.0	49.0	11.0	49.0	14.0	51.0	51.0	11.0	51.0	51.0
Total Split (s)	11.0	49.0	49.0	11.0	49.0	14.0	52.0	52.0	13.0	51.0	51.0
Total Split (%)	8.8%	39.2%	39.2%	8.8%	39.2%	11.2%	41.6%	41.6%	10.4%	40.8%	40.8%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0	1.0	3.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None
Act Effect Green (s)	52.2	42.1	42.1	52.2	42.1	43.8	30.8	30.8	41.8	29.8	29.8
Actuated g/C Ratio	0.47	0.38	0.38	0.47	0.38	0.39	0.28	0.28	0.38	0.27	0.27
v/c Ratio	0.67	0.38	0.35	0.60	0.52	0.54	0.81	0.25	0.79	0.78	0.30
Control Delay	31.5	26.4	5.7	26.7	27.4	24.1	44.5	9.6	45.9	43.6	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	26.4	5.7	26.7	27.4	24.1	44.5	9.6	45.9	43.6	9.2
LOS	C	C	A	C	C	C	D	A	D	D	A
Approach Delay		22.6			27.3		36.1		39.0		
Approach LOS		C			C		D		D		

Intersection Summary

Cycle Length: 125

Actuated Cycle Length: 111

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 31.1

Intersection LOS: C

Intersection Capacity Utilization 97.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 101: Bronte Road & Dundas Street West

↰	↰	↰	↰
11 s	49 s	14 s	51 s
↰	↰	↰	↰
11 s	49 s	13 s	52 s

Queues (240110) 2403 Khalsa Gate
101: Bronte Road & Dundas Street West Sunday Peak Hour - Total Traffic - Remedial Measures

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	181	729	258	210	991	270	797	129	180	731	156
v/c Ratio	0.67	0.38	0.35	0.60	0.52	0.54	0.81	0.25	0.79	0.78	0.30
Control Delay	31.5	26.4	5.7	26.7	27.4	24.1	44.5	9.6	45.9	43.6	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	26.4	5.7	26.7	27.4	24.1	44.5	9.6	45.9	43.6	9.2
Queue Length 50th (m)	21.7	43.2	2.5	25.7	60.1	19.4	89.0	4.0	25.8	81.0	4.3
Queue Length 95th (m)	#47.9	62.4	21.4	48.3	84.7	28.0	111.6	18.2	#51.3	102.6	19.7
Internal Link Dist (m)		136.8			113.9		358.1			212.2	
Turn Bay Length (m)	90.0		80.0	115.0		100.0		45.0	175.0		50.0
Base Capacity (vph)	272	1929	742	350	1918	502	1438	695	230	1393	706
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.38	0.35	0.60	0.52	0.54	0.55	0.19	0.78	0.52	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 101: Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic - Remedial Measures

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰↰	↰↰	↰	↰↰	↰↰	↰
Traffic Volume (vph)	174	700	248	202	788	163	259	765	124	173	702	150
Future Volume (vph)	174	700	248	202	788	163	259	765	124	173	702	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	5085	1563	1752	4995		3400	3539	1558	1769	3505	1577
Flt Permitted	0.21	1.00	1.00	0.32	1.00		0.18	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	392	5085	1563	590	4995		641	3539	1558	295	3505	1577
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)	181	729	258	210	821	170	270	797	129	180	731	156
RTOR Reduction (vph)	0	0	149	0	24	0	0	0	76	0	0	96
Lane Group Flow (vph)	181	729	109	210	967	0	270	797	53	180	731	60
Confl. Peds. (#/hr)			1	1			2		5	5		2
Heavy Vehicles (%)	1%	2%	2%	3%	1%	2%	3%	2%	2%	2%	3%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	49.1	42.1	42.1	49.1	42.1		40.8	30.8	30.8	38.8	29.8	29.8
Effective Green, g (s)	49.1	42.1	42.1	49.1	42.1		40.8	30.8	30.8	38.8	29.8	29.8
Actuated g/C Ratio	0.44	0.38	0.38	0.44	0.38		0.37	0.28	0.28	0.35	0.27	0.27
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	261	1930	593	334	1896		484	982	432	222	941	423
v/s Ratio Prot	c0.04	0.14		0.04	0.19		0.05	c0.23		c0.07	0.21	
v/s Ratio Perm	c0.26		0.07	0.24			0.15		0.03	0.22		0.04
v/c Ratio	0.69	0.38	0.18	0.63	0.51		0.56	0.81	0.12	0.81	0.78	0.14
Uniform Delay, d1	19.9	24.9	22.9	20.6	26.5		25.5	37.3	30.0	27.8	37.5	30.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	0.6	0.7	3.7	1.0		1.4	5.2	0.1	19.6	4.1	0.2
Delay (s)	27.6	25.5	23.6	24.2	27.5		26.9	42.5	30.1	47.4	41.6	31.0
Level of Service	C	C	C	C	C		C	D	C	D	D	C
Approach Delay (s)		25.4			26.9			37.7			41.0	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		32.5			HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		110.9			Sum of lost time (s)			22.0				
Intersection Capacity Utilization		97.6%			ICU Level of Service			F				
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 102: Old Bronte Road & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic - Remedial Measures

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↰↰			↰↰↰				↰			↰
Traffic Volume (veh/h)	0	964	46	0	1200	4	0	0	96	0	0	0
Future Volume (Veh/h)	0	964	46	0	1200	4	0	0	96	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	1026	49	0	1277	4	0	0	102	0	0	0
Pedestrians									9			1
Lane Width (m)									3.6			3.6
Walking Speed (m/s)									1.2			1.2
Percent Blockage									1			0
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		138			344							
pX, platoon unblocked	0.95			0.90			0.93	0.93	0.90	0.93	0.93	0.95
vC, conflicting volume	1282			1084			1485	2342	376	1724	2364	429
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1122			710			895	1821	0	1153	1845	226
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	100			100			100	100	90	100	100	100
cM capacity (veh/h)	600			804			218	72	976	127	69	739
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	410	410	254	511	511	259	102	0				
Volume Left	0	0	0	0	0	0	0	0				
Volume Right	0	0	49	0	0	4	102	0				
cSH	1700	1700	1700	1700	1700	1700	976	1700				
Volume to Capacity	0.24	0.24	0.15	0.30	0.30	0.15	0.10	0.00				
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0				
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0				
Lane LOS							A	A				
Approach Delay (s)	0.0			0.0			9.1	0.0				
Approach LOS							A	A				
Intersection Summary												
Average Delay		0.4										
Intersection Capacity Utilization		32.3%					ICU Level of Service		A			
Analysis Period (min)		15										

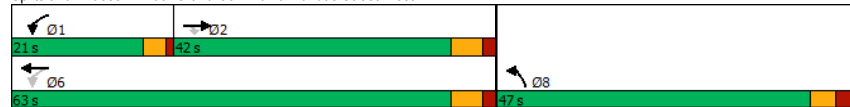
Timings (240110) 2403 Khalsa Gate
103: Grand Oak Trail & Dundas Street West Sunday Peak Hour - Total Traffic - Remedial Measures

	→	↖	↗	←	↘
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↖	↑↑↑	↘
Traffic Volume (vph)	962	89	169	1031	60
Future Volume (vph)	962	89	169	1031	60
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	8
Permitted Phases		2	6		
Detector Phase	2	2	1	6	8
Switch Phase					
Minimum Initial (s)	20.0	20.0	7.0	20.0	10.0
Minimum Split (s)	34.1	34.1	11.5	34.1	45.3
Total Split (s)	42.0	42.0	21.0	63.0	47.0
Total Split (%)	38.2%	38.2%	19.1%	57.3%	42.7%
Yellow Time (s)	4.2	4.2	3.0	4.2	3.3
All-Red Time (s)	1.9	1.9	1.0	1.9	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	4.0	6.1	6.3
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	Max	Max	None	Max	None
Act Effct Green (s)	44.8	44.8	59.1	57.0	11.6
Actuated g/C Ratio	0.55	0.55	0.73	0.70	0.14
v/c Ratio	0.37	0.11	0.41	0.31	0.62
Control Delay	11.1	2.8	6.5	5.0	23.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.1	2.8	6.5	5.0	23.8
LOS	B	A	A	A	C
Approach Delay	10.4			5.2	23.8
Approach LOS	B			A	C

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 81
Natural Cycle: 95
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 8.9
Intersection Capacity Utilization 60.0%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 103: Grand Oak Trail & Dundas Street West



Queues (240110) 2403 Khalsa Gate
103: Grand Oak Trail & Dundas Street West Sunday Peak Hour - Total Traffic - Remedial Measures

	→	↖	↗	←	↘
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1034	96	182	1109	206
v/c Ratio	0.37	0.11	0.41	0.31	0.62
Control Delay	11.1	2.8	6.5	5.0	23.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.1	2.8	6.5	5.0	23.8
Queue Length 50th (m)	29.8	0.0	6.5	18.9	13.9
Queue Length 95th (m)	49.1	7.4	15.9	32.3	34.9
Internal Link Dist (m)	320.5			123.6	401.0
Turn Bay Length (m)		70.0	75.0		
Base Capacity (vph)	2810	893	593	3611	889
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.37	0.11	0.31	0.31	0.23

Intersection Summary

HCM Signalized Intersection Capacity Analysis
103: Grand Oak Trail & Dundas Street West

(240110) 2403 Khalsa Gate
Sunday Peak Hour - Total Traffic - Remedial Measures

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑	↓	↑↑↑	↓	↑
Traffic Volume (vph)	962	89	169	1031	60	131
Future Volume (vph)	962	89	169	1031	60	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	4.0	6.1	6.3	
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	
Flpb, ped/bikes	1.00	0.97	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	1.00	1.00	0.95	1.00	0.98	
Satd. Flow (prot)	5085	1547	1786	5136	1659	
Flt Permitted	1.00	1.00	0.22	1.00	0.98	
Satd. Flow (perm)	5085	1547	421	5136	1659	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1034	96	182	1109	65	141
RTOR Reduction (vph)	0	43	0	0	97	0
Lane Group Flow (vph)	1034	53	182	1109	109	0
Confl. Peds. (#/hr)		9	9			3
Heavy Vehicles (%)	2%	1%	1%	1%	0%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	44.8	44.8	57.0	57.0	11.6	
Effective Green, g (s)	44.8	44.8	57.0	57.0	11.6	
Actuated g/C Ratio	0.55	0.55	0.70	0.70	0.14	
Clearance Time (s)	6.1	6.1	4.0	6.1	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2812	855	434	3614	237	
v/s Ratio Prot	0.20		c0.04	0.22	c0.07	
v/s Ratio Perm		0.03	c0.25			
v/c Ratio	0.37	0.06	0.42	0.31	0.46	
Uniform Delay, d1	10.2	8.4	4.5	4.5	31.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1	0.7	0.2	1.4	
Delay (s)	10.5	8.5	5.2	4.8	33.2	
Level of Service	B	A	A	A	C	
Approach Delay (s)	10.4			4.8	33.2	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

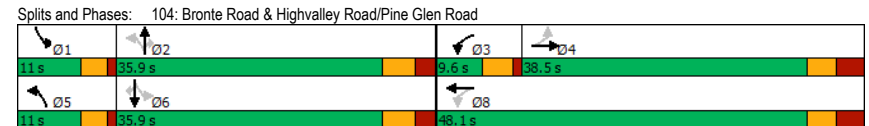
104: Bronte Road & Highvalley Road/Pine Glen Road

(240110) 2403 Khalsa Gate

Sunday Peak Hour - Total Traffic - Remedial Measures

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↓	↓	↓	↓	↓	↑↑	↑	↓	↑↑	↓
Traffic Volume (vph)	1	12	177	22	29	1037	128	86	1049	6
Future Volume (vph)	1	12	177	22	29	1037	128	86	1049	6
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4	3	8	5	2		1	6	
Permitted Phases	4		8		2		2		6	6
Detector Phase	4	4	3	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0	10.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	38.5	38.5	9.5	38.5	11.0	33.1	33.1	11.0	33.1	33.1
Total Split (s)	38.5	38.5	9.6	48.1	11.0	35.9	35.9	11.0	35.9	35.9
Total Split (%)	40.5%	40.5%	10.1%	50.6%	11.6%	37.8%	37.8%	11.6%	37.8%	37.8%
Yellow Time (s)	3.3	3.3	3.5	3.3	3.0	3.7	3.7	3.0	3.7	3.7
All-Red Time (s)	3.2	3.2	1.0	3.2	1.0	2.4	2.4	1.0	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	4.5	6.5	4.0	6.1	6.1	4.0	6.1	6.1
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	10.1	10.1	15.6	13.6	38.2	30.7	30.7	39.9	35.3	35.3
Actuated g/C Ratio	0.15	0.15	0.24	0.21	0.58	0.47	0.47	0.61	0.54	0.54
v/c Ratio	0.00	0.13	0.55	0.40	0.09	0.67	0.17	0.29	0.60	0.01
Control Delay	27.0	17.1	28.6	8.7	6.3	17.5	3.5	8.2	14.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	17.1	28.6	8.7	6.3	17.5	3.5	8.2	14.4	0.0
LOS	C	B	C	A	A	B	A	A	B	A
Approach Delay		17.3		19.0		15.8			13.9	
Approach LOS		B		B		B			B	

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 65.5	
Natural Cycle: 95	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 66.4%	ICU Level of Service C
Analysis Period (min) 15	



Queues (240110) 2403 Khalsa Gate
104: Bronte Road & Highvalley Road/Pine Glen Road Sunday Peak Hour - Total Traffic - Remedial Measures

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1	36	190	177	31	1115	138	92	1128	6
v/c Ratio	0.00	0.13	0.55	0.40	0.09	0.67	0.17	0.29	0.60	0.01
Control Delay	27.0	17.1	28.6	8.7	6.3	17.5	3.5	8.2	14.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	17.1	28.6	8.7	6.3	17.5	3.5	8.2	14.4	0.0
Queue Length 50th (m)	0.1	1.4	21.5	2.6	1.0	52.3	0.0	3.1	32.4	0.0
Queue Length 95th (m)	1.5	9.5	38.5	16.8	4.9	94.5	9.7	10.9	97.2	0.0
Internal Link Dist (m)		86.0		103.5		93.5			358.1	
Turn Bay Length (m)	20.0		20.0		85.0		45.0	60.0		25.0
Base Capacity (vph)	936	849	347	1053	357	1675	794	321	1886	764
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.04	0.55	0.17	0.09	0.67	0.17	0.29	0.60	0.01
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (240110) 2403 Khalsa Gate
104: Bronte Road & Highvalley Road/Pine Glen Road Sunday Peak Hour - Total Traffic - Remedial Measures

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	1	12	21	177	22	142	29	1037	128	86	1049	6
Future Volume (vph)	1	12	21	177	22	142	29	1037	128	86	1049	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		4.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1801	1699		1783	1556		1805	3574	1541	1769	3505	1307
Flt Permitted	1.00	1.00		0.49	1.00		0.18	1.00	1.00	0.14	1.00	1.00
Satd. Flow (perm)	1896	1699		927	1556		344	3574	1541	260	3505	1307
Peak-hour factor, PHF	0.93	0.93		0.93	0.93		0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1	13	23	190	24	153	31	1115	138	92	1128	6
RTOR Reduction (vph)	0	22	0	0	115	0	0	0	76	0	0	3
Lane Group Flow (vph)	1	14	0	190	62	0	31	1115	62	92	1128	3
Confl. Peds. (#/hr)	4		8	8		4	7		5	5		7
Heavy Vehicles (%)	0%	0%	0%	1%	17%	3%	0%	1%	2%	2%	3%	20%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	3.6	3.6		17.8	17.8		34.9	32.4	32.4	40.7	35.3	35.3
Effective Green, g (s)	3.6	3.6		17.8	17.8		34.9	32.4	32.4	40.7	35.3	35.3
Actuated g/C Ratio	0.05	0.05		0.25	0.25		0.48	0.45	0.45	0.56	0.49	0.49
Clearance Time (s)	6.5	6.5		4.5	6.5		4.0	6.1	6.1	4.0	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	94	84		343	383		216	1603	691	259	1713	639
v/s Ratio Prot		0.01		c0.07	0.04		0.00	0.31		c0.03	c0.32	
v/s Ratio Perm	0.00			c0.06			0.06		0.04	0.17		0.00
v/c Ratio	0.01	0.17		0.55	0.16		0.14	0.70	0.09	0.36	0.66	0.00
Uniform Delay, d1	32.6	32.9		23.1	21.3		10.4	15.9	11.4	9.5	13.9	9.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	1.0		1.9	0.2		0.3	2.5	0.3	0.8	2.0	0.0
Delay (s)	32.7	33.8		25.0	21.5		10.7	18.5	11.7	10.3	15.9	9.5
Level of Service	C	C		C	C		B	B	B	B	B	A
Approach Delay (s)		33.8			23.3			17.6			15.5	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		17.6							B			
HCM 2000 Volume to Capacity ratio		0.67										
Actuated Cycle Length (s)		72.2					Sum of lost time (s)		21.1			
Intersection Capacity Utilization		66.4%					ICU Level of Service		C			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis (240110) 2403 Khalsa Gate
105: Khalsa Gate/Old Bronte Road & Pine Glen Road Sunday Peak Hour - Total Traffic - Remedial Measures

																			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR							
Lane Configurations																			
Sign Control		Stop			Stop			Stop			Stop								
Traffic Volume (vph)	72	98	96	43	156	45	128	46	41	15	18	96							
Future Volume (vph)	72	98	96	43	156	45	128	46	41	15	18	96							
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94							
Hourly flow rate (vph)	77	104	102	46	166	48	136	49	44	16	19	102							
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1														
Volume Total (vph)	283	46	214	229	137														
Volume Left (vph)	77	46	0	136	16														
Volume Right (vph)	102	0	48	44	102														
Hadj (s)	-0.16	0.50	-0.12	0.00	-0.42														
Departure Headway (s)	5.3	6.4	5.8	5.6	5.4														
Degree Utilization, x	0.42	0.08	0.35	0.36	0.20														
Capacity (veh/h)	630	521	579	583	586														
Control Delay (s)	12.1	8.8	10.7	11.7	9.8														
Approach Delay (s)	12.1	10.3		11.7	9.8														
Approach LOS	B	B		B	A														
Intersection Summary																			
Delay	11.1																		
Level of Service	B																		
Intersection Capacity Utilization	55.2%			ICU Level of Service			B												
Analysis Period (min)	15																		

HCM Unsignalized Intersection Capacity Analysis (240110) 2403 Khalsa Gate
106: Grand Oak Trail & Pine Glen Road Sunday Peak Hour - Total Traffic - Remedial Measures

																
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
Lane Configurations																
Sign Control		Stop			Stop			Stop			Stop					
Traffic Volume (vph)	51	111	29	28	135	19	26	118	28	45	133	85				
Future Volume (vph)	51	111	29	28	135	19	26	118	28	45	133	85				
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)	55	119	31	30	145	20	28	127	30	48	143	91				
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2								
Volume Total (vph)	55	150	30	165	28	157	48	234								
Volume Left (vph)	55	0	30	0	28	0	48	0								
Volume Right (vph)	0	31	0	20	0	30	0	91								
Hadj (s)	0.50	-0.13	0.50	0.00	0.50	-0.12	0.50	-0.24								
Departure Headway (s)	6.5	5.9	6.6	6.1	6.5	5.9	6.4	5.6								
Degree Utilization, x	0.10	0.25	0.05	0.28	0.05	0.26	0.09	0.37								
Capacity (veh/h)	514	572	513	559	521	576	533	609								
Control Delay (s)	9.1	9.6	8.7	10.2	8.7	9.7	8.8	10.7								
Approach Delay (s)	9.5		9.9		9.5		10.4									
Approach LOS	A		A		A		B									
Intersection Summary																
Delay	9.9															
Level of Service	A															
Intersection Capacity Utilization	42.8%			ICU Level of Service			A									
Analysis Period (min)	15															

HCM Unsignalized Intersection Capacity Analysis (240110) 2403 Khalsa Gate
107: Khalsa Gate & Private Driveway/Driveway 1 Sunday Peak Hour - Total Traffic - Remedial Measures

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Traffic Volume (veh/h)	34	0	0	0	1	138	1	23	17	119	12	12								
Future Volume (Veh/h)	34	0	0	0	1	138	1	23	17	119	12	12								
Sign Control		Stop			Stop			Free			Free									
Grade		0%			0%			0%			0%									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92								
Hourly flow rate (vph)	37	0	0	0	1	150	1	25	18	129	13	13								
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	464	322	20	314	320	34	26			43										
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	464	322	20	314	320	34	26			43										
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1										
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2										
p0 queue free %	91	100	100	100	100	86	100			92										
cM capacity (veh/h)	407	546	1058	599	547	1039	1588			1566										
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	37	151	44	155																
Volume Left	37	0	1	129																
Volume Right	0	150	18	13																
cSH	407	1033	1588	1566																
Volume to Capacity	0.09	0.15	0.00	0.08																
Queue Length 95th (m)	2.4	4.1	0.0	2.2																
Control Delay (s)	14.7	9.1	0.2	6.4																
Lane LOS	B	A	A	A																
Approach Delay (s)	14.7	9.1	0.2	6.4																
Approach LOS	B	A																		
Intersection Summary																				
Average Delay		7.5																		
Intersection Capacity Utilization		36.5%	ICU Level of Service	A																
Analysis Period (min)		15																		

HCM Unsignalized Intersection Capacity Analysis (240110) 2403 Khalsa Gate
108: Driveway 2 & Pine Glen Road Sunday Peak Hour - Total Traffic - Remedial Measures

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	153	14	28	215	27	28
Future Volume (Veh/h)	153	14	28	215	27	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	166	15	30	234	29	30
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			181		468	174
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			181		468	174
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	97
cM capacity (veh/h)			1394		542	870
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	181	264	59			
Volume Left	0	30	29			
Volume Right	15	0	30			
cSH	1700	1394	670			
Volume to Capacity	0.11	0.02	0.09			
Queue Length 95th (m)	0.0	0.5	2.3			
Control Delay (s)	0.0	1.0	10.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.0	10.9			
Approach LOS		B				
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization		35.1%		ICU Level of Service	A	
Analysis Period (min)		15				

Appendix K

Proxy Site Data



Initial Counts				Site Stats	
Location:		2403 Khalsa Gate		Storeys	1
# of Vehicles	Time	Day	DOW	# of Persons	250
9	8:42	April 14, 2024	Sunday		
Count By	SC				

Start Date	April 14, 2024
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DATE 2023-11-21					
Time	OUT	IN	Lot Count	Rate Per 1000 Sq. Ft.	Max Rate
10:00 AM	8	20	25	0.10	0.64
10:15 AM	4	19	40	0.16	Avg Rate
10:30 AM	7	12	45	0.18	0.35
10:45 AM	3	28	70	0.28	85th Rate
11:00 AM	6	27	91	0.36	0.55
11:15 AM	10	25	106	0.42	
11:30 AM	6	25	125	0.50	
11:45 AM	18	27	134	0.54	
12:00 PM	14	27	147	0.59	
12:15 PM	19	31	159	0.64	
12:30 PM	39	32	152	0.61	
12:45 PM	37	23	138	0.55	
1:00 PM	25	18	131	0.52	
1:15 PM	41	16	106	0.42	
1:30 PM	31	12	87	0.35	
1:45 PM	38	17	66	0.26	
2:00 PM	21	12	57	0.23	
2:15 PM	23	11	45	0.18	
2:30 PM	11	8	42	0.17	
2:45 PM	12	3	33	0.13	
3:00 PM	20	5	18	0.07	